WORLD METEOROLOGICAL ORGANIZATION

TECHNICAL DOCUMENT

WMO-TD No. 494

TROPICAL
CYCLONE PROGRAMME

Report No. TCP-30

Regional Association IV (North America, Central America and the Caribbean) Hurricane Operational Plan

2007 Edition

SECRETARIAT OF THE WORLD METEOROLOGICAL ORGANIZATION - GENEVA
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2007 Edition

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I N T R O D U C T I O N

The regional activities under the WMO Tropical Cyclone Programme consist mainly of the programmes pursued by groups of countries acting in concert to improve their warning systems. In Region IV (North America, Central America and the Caribbean) there is a long history of collective action specifically designed to protect people and property from the severe tropical cyclones which are called hurricanes in the Region. A working group, known as the RA IV Hurricane Committee, was established by the seventh session of Regional Association IV (Mexico City, April - May 1977) to promote such activities within the framework of the Tropical Cyclone Programme (Tropical Cyclone Project until Eighth Congress, 1979).

At its first session (San Juan, May 1978), the RA IV Hurricane Committee took a novel approach to its problems by drawing up an RA IV Hurricane Operational Plan with a view to ensuring the most effective co-operation and co-ordination between the countries in preparing and issuing meteorological forecasts and warnings of all tropical cyclones affecting the area. The plan was shortly thereafter adopted by Regional Association IV. It defines the observing, forecasting and warning responsibilities of all cooperating Members and deals with other related items such as terminology and communications. The Committee repeatedly reviews the operational plan and has concluded that it contributes in a very real sense to the improvement of warning systems in the hurricane areas of Region IV. It also serves as a valuable information source for the operational services. Other regional tropical cyclone bodies of the WMO Tropical Cyclone Programme family, the RA I Tropical Cyclone Committee for the South-West Indian Ocean, the WMO/ESCAP Panel on Tropical Cyclones for the Bay of Bengal and the Arabian Sea, the ESCAP/WMO Typhoon Committee and the RA V Tropical Cyclone Committee for the South Pacific and the South-East Indian Ocean have followed this initiative.

As requested by the Hurricane Committee, the RA IV Hurricane Operational Plan has been made available to all concerned through this document. New editions and supplements will be issued from time to time in the years ahead to reflect further development, updating and other changes to the plan.

RESOLUTION 14 (IX-RA IV) - RA IV HURRICANE OPERATIONAL PLAN

REGIONAL ASSOCIATION IV (NORTH AND CENTRAL AMERICA)

NOTING:

(1) Resolution 2914 (XXVI) of the General Assembly of the United Nations - International action for the mitigation of the harmful effects of storms,

(2) Resolution 13 (IX-RA IV) - RA IV Hurricane Committee,

CONSIDERING:

(1) The need to enhance the co-operative efforts of countries within Region IV in carrying out effectively their roles in preparing for and issuing meteorological forecast and warnings of all tropical cyclones affecting the area,

(2) That to achieve this aim it is essential to have an agreed "Hurricane Operational Plan" defining the observing, forecasting and warning responsibilities of all co-operating countries,

DECIDES to adopt the "RA IV Hurricane Operational Plan"*;

AUTHORIZES the president of RA IV to approve on behalf of the Association amendments to this Hurricane Operational Plan, as recommended by the RA IV Hurricane Committee;

REQUESTS the Secretary-General:

(1) To maintain the WMO publication on the RA IV Hurricane Operational Plan in print and to keep it up to date;

(2) To inform all Members concerned of any amendments and updating of the publication.

* Published as WMO/TD-No. 494 Report No. TCP-30

CHAPTER 1

GENERAL

1.1 Introduction

The purpose of this plan is to enhance the co-operative efforts of Members within WMO Region IV in the carrying out of their roles of preparing for and issuing forecasts and warnings of all tropical cyclones affecting the area. Responsibilities of Members are defined. Tropical cyclone releases issued by the Regional/Specialized Meteorological Centre with activity specialization in tropical cyclone analysis, tracking and forecasting, in Miami (RSMC Miami - Hurricane Center) are explained and examples provided. Observational platforms, including land-based radar, satellites and aircraft reconnaissance are discussed. Where differences exist between the USA's National Hurricane Operational Plan (NHOP) and this plan, aircraft radar and upper-air observations made by the US Department of Defense will comply with USA's NHOP. Communication procedures are outlined with special emphasis on headings required to assure proper computer-processing and distribution of messages. The lists of hurricane names for the Caribbean Sea, Gulf of Mexico, the North Atlantic Ocean and the eastern North Pacific are included.

1.2 Terminology used in RA IV

1.2.1 Standard terminology in RA IV

I. Tropical Cyclone A warm-core, non-frontal synoptic-scale cyclone, originating over tropical or subtropical waters, with organized deep convection and closed surface wind circulation about a well defined centre.

A. Hurricane — A warm core tropical cyclone in which maximum average surface wind (one-minute mean) is 118 km/h (74 mph) (64 knots) or greater.

B. Tropical storm — A well organized warm-core tropical cyclone in which the maximum average surface wind (one-minute mean) is in the range 63-117 km/h (39-73 mph) (34-63 knots) inclusive.

C. Tropical depression — A tropical cyclone in which the maximum average surface wind (one minute mean) is 62 km/h (38 mph) (33 knots) or less.

II. Subtropical cyclone A non-frontal low pressure system that has characteristics of both tropical and extratropical cyclones.

- The most common type is an upper-level cold low with circulation extending to the surface layer and maximum sustained winds generally occurring at a radius of about 100 miles or more from the centre. In comparison to tropical cyclones, such systems have a relatively broad zone of maximum winds that is located farther from the centre, and typically have a less symmetric wind field and distribution of convection.

- A second type of subtropical cyclone is a mesoscale low originating in or near a frontolyzing zone of horizontal wind shear, with radius of maximum sustained winds generally less 30 miles. The entire circulation may initially have a diameter of less than 100 miles. These generally short-lived systems may be either cold core or warm core.

A. Subtropical Storm — A subtropical cyclone in which the maximum sustained surface wind is 63 km/h (39 mph) (34 knots) or greater.

B. Subtropical depression — A subtropical cyclone in which the maximum sustained surface wind is less than 63 km/h (39 mph) (34 knots).

III. Tropical wave — A trough or cyclonic curvature maximum in the trade wind easterlies or equatorial westerlies. The wave may reach maximum amplitude in the lower middle troposphere, or may be the reflection of an upper-troposphere cold low or equatorial extension of a mid-latitude trough.

IV. Tropical disturbance — A discrete system of apparently organized convection originating in the tropics or sub-tropics, having a non-frontal migratory character and having maintained its identity for at least 24 hours.

V. Advisory — (English messages) A formal message from a Hurricane Warning Office giving warning information together with details on tropical cyclone location, intensity and movement, and precautions that should be taken. Where possible, the RSMC Miami-Hurricane Center advisory will contain a resumé of all warnings in effect.

A. Hurricane warning — A warning that one or both of the following dangerous effects of a hurricane are expected in a specified area in 24 hours or less: (a) average winds 118 km/h (74 mph) (64 knots) or higher; (b) dangerously high water or a combination of dangerously high water and exceptionally high waves, even though winds expected may be less than hurricane force.

B. Hurricane watch — An announcement for a specific area that a hurricane or an incipient hurricane condition poses a possible threat within 36 hours.

C. Gale and tropical storm — A warning for tropical storm conditions, including warning* possible sustained winds within the range 63-117 km/h (39-73 mph) (34-63 knots) are expected in specified areas within 24 hours or less.

D. Tropical storm watch* — An announcement for a specific area that a tropical storm or an incipient tropical storm condition poses a possible threat within 36 hours.

* The terms "Tropical Storm Warning" and "Tropical Storm Watch" or their equivalent in Spanish are used in coastal or land area warnings by the RSMC Miami-Hurricane Center and an increasing number of Members.

VI. Bulletin (Spanish messages) — A formal message from a Hurricane Warning Office giving warning information, together with details on tropical cyclone location, intensity and movement, and precautions that should be taken.

A. Hurricane Warning — (same as English)

B. Hurricane Watch — (same as English)

C. Gale or Tropical Storm Warning — (same as English)

D. Tropical Storm Watch — (same as English)

E. Advisory — Information on tropical cyclone not requiring watches or warnings at this time.

VII. Bulletin (English) A public release from a weather office issued in the event of the occurrence or forecast occurrence of severe weather, including the developing stage of a tropical cyclone or after formal advisories on a hurricane or tropical cyclone have been discontinued. Bulletins emphasize features which are significant for the safety of the public and summarize all warnings in effect.

1.2.2 Meaning of other terms used

I. Local action statements A public release prepared by a Weather Service Office in or near a threatened area giving specific details for its area of responsibility: (a) weather conditions (b) sections that should be evacuated and (c) other precautions necessary to protect life and property.

II. Hurricane season The portion of the year having a relatively high incidence of hurricanes. In the Atlantic, Caribbean and the Gulf of Mexico, it is the period from 01 June to 30 November, and in the East Pacific, from 15 May to 30 November.

III. Storm surge The difference between the actual water level under influence of a meteorological disturbance (storm tide) and the level which would have been attained in the absence of the meteorological disturbance (i.e. astronomical tide).

IV. Storm tide The actual sea level as influenced by a weather disturbance. The storm tide consists of the normal astronomical tide and the storm surge.

V. "Eye" The relatively clear and calm area inside the circular wall of convective clouds, the geometric centre of which is the centre of the tropical cyclone (hurricane).

VI. Reconnaissance aircraft centre fix of the tropical cyclone, vortex fix The location of the centre of a tropical cyclone obtained by reconnaissance aircraft penetration.

VII. Centre fix of the tropical cyclone The estimated location of the centre of a tropical cyclone.

1.2.3 Equivalent terms

English	French	Spanish
Advisory	Bulletin météorologique	Boletin
Hurricane season	Période des cyclones	Temporada de huracanes
Hurricane warning	Alerte cyclone - Consignes ORSEC N^{o} 2	Alerta de huracan
Hurricane watch	Pre-alerte cyclone - Consignes ORSEC N^{o} 1	Aviso de huracan

1.3 International hurricane scale (IHS)

The scale related to hurricane maximum kinetic energy is as follows:

IHS No.	Corresponding wind speed (V_n)			
n	m s^{-1}	km h^{-1}	knots	m h^{-1}
1.0	33	118	64	74
1.5	40	144	78	90
2.0	46	166	90	103
2.5	52	186	100	116
3.0	57	204	110	127
3.5	61	220	119	137
4.0	65	235	127	146
4.5	69	250	135	155
5.0	73	263	142	164
5.5	77	276	149	172
6.0	80	288	156	179
6.5	83	300	162	186
7.0	87	311	168	194
7.5	90	322	174	200
8.0	92	333	180	207
8.5	95	343	185	213
9.0	98	353	191	219
9.5	101	363	196	225
10.0	103	372	201	231

The wind speed corresponding to IHS numbers greater than 10 may be derived from the following relationships:

m s^{-1}: $V_n = 32.7 \sqrt{n}$ knots: $V_n = 63.563568 \sqrt{n}$

km h^{-1}: $V_n = 117.72 \sqrt{n}$ m.p.h.: $V_n = 73.147938 \sqrt{n}$

where V_n represents a hurricane with n times the kinetic energy per unit mass of the threshold hurricane (V_1).

1.4 The Saffir/Simpson hurricane scale

The Saffir/Simpson Hurricane Scale from one to five based on the hurricane's present intensity, used operationally within RA IV is as follows:

One: Winds 119-153 km h^{-1} (74-95 m.p.h)

Two: Winds 154-177 km h^{-1} (96-110 m.p.h).

Three: Winds 178-209 km h^{-1} (111-130 m.p.h)

Four: Winds 210-250 km h^{-1} (131-155 m.p.h)

Five: Winds greater than 250 km h^{-1} (155 m.p.h)

ATTACHMENT 1 A

RA IV HURRICANE COMMITTEE GLOSSARY OF STORM-RELATED TERMS

(other than those in Chapter 1)

ENGLISH	SPANISH	DESCRIPTION
Analogue method	Método analógico	Forecasting method based on the assumption that a current synoptic situation will develop in the same way as a similar synoptic situation in the past.
Anticyclone	Anticiclón	An area of high pressure, with the highest pressure at the centre. Commonly referred to as "High".
Anticyclogenesis	Anticiclogénesis	Formation of a new anticyclone or intensification of an existing one.
Average one-minute wind speed	Velocidad promedia del viento en un minuto	Determined by averaging observed values from a direct-reading instrument or a recorder over a 1 minute period. The standard height of the wind measuring instrument is 10 meters.
Baroclinic	Baroclínico	An atmospheric state in which the pressure depends upon other variables in addition to density. The isobaric surfaces do not, therefore, coincide with the surfaces of constant specific volume. In a baroclinic atmosphere the variations of the wind with elevation may be quite large.
Barotropic	Barotrópico	A state of the atmosphere in which isobaric surfaces coincide with surfaces of equal density. In a Barotropic atmosphere the variations of the wind elevation is slight.
Blocking	Bloqueo	Interruption of normal eastward motion due to the stagnancy of an anticyclone (or, less frequently, a cyclone) in their paths.
Circulation	Circulación	General or primary patterns of wind-flow in the atmosphere. Cyclonic circulation is considered positive and Anticyclonic circulation negative.
Climatological forecast	Pronóstico Climatológico	Forecast based on the climate of a region rather than upon the dynamic implications of current weather.
Cold low	Baja fría	Depression or low pressure zone which is cold with respect to its surroundings at the same level of the atmosphere.
Convergence	Convergencia	Increase of mass into an atmospheric layer when the winds are so that there is a net horizontal flow toward inside the layer. Is the opposite to "divergence".
Cyclogenesis	Ciclogénesis	The process that creates a new cyclone or intensifies an existing one.
Cyclone	Ciclón	An area of low pressure, with the lowest pressure at the centre. Commonly reffered to as "Low".

ENGLISH	SPANISH	DESCRIPTION
Deepening	Profundización	The process by which the central pressure of a system (i.e. cyclone) decreases with time. Deepening is related to cyclogenesis and results in an increase of the wind speed around a low pressure area.
Divergence	Divergencia	Net outward mass flow into a layer of the atmosphere. Is the opposite to "convergence".
Dropsonde	Dropsonda	A small radio transmitter, that is dropped from an aircraft with a parachute and transmits to the plane data on temperature, pressure and relative humidity.
Extra-Tropical Cyclone	Ciclón extratropical	A cyclone which attributes the majority of its energy from baroclinic processes. An extra-tropical cyclone has significant vertical wind shears, and a distinctive asymmetric temperature and moisture field. It may develop a cold core in its later stages.
Fetch	Fetch	Length of the section over sea water along which wind blows with almost uniform direction and speed. Height of wind waves is function of the fetch.
Filling	Llenado	Process by which the central pressure of cyclones increases. It is the opposite of "deepening".
Flash flood	Crecida repentina	A flood that rises quite rapidly with little or no advance warning; usually as a result of an intense rainfall over a small area, or, possibly a dam failure etc.
Frontogenesis	Frontogénesis	Process of formation or intensification of a front or frontal zone by means of physical (e.g. radiation) or kinematical (e.g. air motion) influences.
Frontolysis	Frontólisis	Process of weakness or dissipation of a front or frontal zone by means of physical (e.g. radiation) or kinematical (e.g. air motion) infuences.
Gale	Viento duro	Sustained winds within the range 63 to 117 km/h (39 to 73 miles per hour) (34 to 63 knots).
Gradient	Gradiente	Change rate of any element value with distance in any given direction.
Gust	Racha	Fluctuation in a short time of wind speed with a variation of 10 knots or more between peaks and lowest speeds.
Hurricane centre or eye	Centro u ojo del huracán	The relatively calm area in the centre of the storm. In this area winds are light and the sky often is only partly covered by clouds.
Hurricane Committee	Comité de Huracanes	Regional Association IV (North and Central America) Working Group established in 1977 to promote collective action specifically designed to minimize loss of life and damage to property from tropical cyclones in the Region.

ENGLISH	SPANISH	DESCRIPTION
Inter-tropical Convergence Zone	Zona de Convergencia Inter-Tropical	Narrow zone where the trade winds of the two hemispheres meet. (It is also known as the Equatorial Convergence Zone).
Inversion	Inversión	Condition of the atmosphere when temperature of an air layer increases with height rather than diminish.
Isobar	Isobara	Line connecting points of equal atmospheric pressure on a given surface.
Isochrone	Isocrona	Line connecting all points where a phenomena occurs at the same time.
Isohyet	Isoyeta	Line connecting points where quantity of precipitation collected during a given period has the same value.
Isotach	Isotaca	Line connecting points of equal wind speed.
Isallobar	Isalobara	Line connecting points with the same barometric change during a given period.
Knot	Nudo	Wind speed unit equal to one nautical mile (6.080 feet) (1.8 km) per hour.
Long wave	Onda Larga	Atmospheric waves with wavelength varying from 50° to 120°.
Meridional flow	Flujo meridional	A predominantly north-south wind circulation.
Modelling	Modelización	Use of a theoretical scheme, usually in a mathematical form, of a system or a complex reality that is developed to facilitate its understanding and the study of its behaviour.
Near gale	Viento fuerte	Wind within the speed range 50 to 62 km/h (32 to 38 miles per hour) (28 to 33 knots) (Number 7 of Beaufort Scale).
Numerical Weather Prediction (NWP)	Predicción Numérica del Tiempo (PNT)	Forecast of a pressure field by means of numerical solution of motion equations in a simplified form, usually with the support of electronic computers.
Persistence forecast	Pronóstico de persistencia	Forecast entirely based on tendency to weather persistence.
Polar trough	Vaguada polar	A low pressure trough embedded in the westerly winds prevailing at medium latitudes. They generally move from west to east accompanied by abundant clouds at all levels. Occasionally a well developed polar trough extends until tropical regions. Western Caribbean hurricanes of June and October are frequently formed on polar trough.
Post Tropical Cyclone	Ciclón Post-Tropical	A cyclone in the subtropics or middle latitudes that is in transition from tropical to extra-tropical. It may be involved with a frontal system, but continues to possess significant tropical characteristics including a warm core.

ENGLISH	SPANISH	DESCRIPTION
Reconnaissance flight	Vuelo de reconocimiento	Flight realized by an aircraft penetrating a tropical storm or hurricane, with the purpose of carrying out observations.
Recurvature	Recurvatura	Change in the track direction of a tropical cyclone from an initial westward movement until its later normal movement poleward and eastward.
Ridge of high pressure	Cuña de alta presión	Elongated area of high pressure displacing between two depressions or troughs.
Spiral band	Banda espiral	A long and narrow spiral band found inserted into wind circulation around a hurricane. Convergence and rainfall reach maximum values into spiral bands.
Squall	Turbonada	Atmospheric phenomenon characterized by a very large variation of wind speed: it begins suddenly, has a duration of the order of minutes, and decreases its speed quickly. It is often accompanied by showers or storms.
Squall line	Línea de turbonada	Fictitious moving line, sometimes of considerable extension, along which squall phenomena occurs. They frequentley precede cold fronts, but occasionally they are present within the external area of the hurricane cloud cover.
Statistical forecast	Pronóstico estadístico	Objective forecast based on a statistical study of the past behaviour of the atmosphere, expressed in the form of regression formulae, probabilities, etc.
Subsidence	Subsidencia	Slow downfall of an air mass over an extended region. It is usually accompanied by horizontal divergence at lower layers.
Swell	Mar de leva	Any water waves system which has not been generated locally.
Thunderstorm	Tormenta	One or more sudden electrical discharges manifested by a luminous flash (lighting) and a sharp or noisy sound (thunder).
Tornado	Tornado	A severe rotating windstorm of small diameter and great destructive power. It is the most violent natural meteorological phenomenon. With certain frequency they can occur within hurricanes circulation. Although tornadoes occur over land areas in many parts of the world associated with several weather situations, they are relatively frequent in the foreward portion of the hurricane periphery.

ENGLISH	SPANISH	DESCRIPTION
Tropical weather outlook	Perspectivas del tiempo en los trópicos	A report containing information on possible evolution of tropical weather prepared by RSMC Miami - Hurricane Center from 1 June through 30 November, and transmitted at 05:30, 11:30 and 17:30 Eastern local time. The outlook discusses which areas are expected to remain stable, which disturbed or suspicious areas are becoming favourable for tropical development during the next day or two.
Trough of low pressure	Vaguada de baja presión	An elongated area of low pressure with U-shaped or V-shaped isobars which concavities are addressed toward low pressure.
Typhoon	Tifón	Name given to "hurricanes" in the China Sea and, more commonly, in the north-west Pacific Ocean.
Vortex	Vórtice	Any rotating wind system.
Vorticity	Vorticidad	Tendency of a fluid to turn or rotate around an arbitrarily oriented axis.
Waterspouts	Tromba marina	Small, revolving storm over oceans or inland waters. They occasionally move towards inland and cause some damage, but winds are less severe than those in tornadoes, which they resemble in appearance.
Wind	Viento	The horizontal movement of the air with respect to earth surface.
Wind shear	Cizalladura del viento	Space variation of wind speed in a given direction (horizontal or vertical).
Wind stress	Fuerza del viento	The drag or tangential force per unit area exerted on the surface of the earth by the adjacent layer of moving air.

ACRONYMS:	SIGLAS:	
GOES	GOES	Geo-stationary Operational Environmental Satellite
HOMS	HOMS	Hydrology Operational Multipurpose System
IOC	COI	Intergovernmental Oceanographic Commission
RSMC	CMRE	Regional Specialized Meteorological Centre
TCP	PCT	Tropical Cyclone Programme
WWW	VMM	World Weather Watch Programme. Consists of the following elements: - GOS (SMO) - Global Observing System; - GTS (SMT) - Global Telecommunication System; - GDPS (SMPD) - Global Data Processing System.

CHAPTER 2

RESPONSIBILITIES OF MEMBERS

2.1 Forecasts and warnings for the general population

The area of responsibility of RSMC Miami for issuing tropical and subtropical cyclone advisories is the North Atlantic Ocean, the Caribbean Sea, Gulf of Mexico, North Pacific Ocean eastward from 140ºW.

2.1.1 In Region IV the responsibility for preparing and issuing warnings is as follows:

Antigua & Barbuda	The islands and coastal waters of Antigua, Anguilla, Barbuda, British Virgin Islands, Montserrat, Nevis and St. Kitts;
Bahamas	The islands and coastal waters of the Bahamas, Turks and Caicos Islands;
Barbados	The islands and coastal waters of Barbados, Dominica, St. Vincent and the Grenadines;
Belize	The islands, coastal waters and inland areas of Belize;
Bermuda	The islands and coastal waters of Bermuda;
Canada	The islands, coastal waters and inland areas of Canada;
Cayman Islands	The islands, and coastal waters of Cayman Islands;
Colombia	The islands, coastal waters and inland areas of Colombia;
Costa Rica	The islands, coastal waters and inland areas of Costa Rica;
Cuba	The islands, coastal waters and inland areas of Cuba;
Dominican Republic	The islands, coastal waters and inland areas of the Dominican Republic;
El Salvador	The islands, coastal waters and inland areas of El Salvador;
France	The coastal waters and islands of Martinique; Guadeloupe (Grande Terre and Basse Terre); Marie-Galante, Desirade and Les Saintes; St Barthelemy; St Martin;
Guatemala	The coastal waters and inland areas of Guatemala;
Honduras	The islands, coastal waters and inland areas of Honduras;
Jamaica	The coastal waters and islands of Jamaica;
Mexico	The islands, coastal waters and inland areas of Mexico;
Netherlands Antilles & Aruba	The islands and coastal waters of Aruba, Bonaire, Curaçao, Saba, St. Eustatius and St Maarten;
Nicaragua	The islands, coastal waters and inland areas of Nicaragua;
Panama	The islands, coastal waters and inland areas of Panama;
St. Lucia	The islands, coastal waters and inland areas of St. Lucia;

Trinidad and Tobago	The islands and coastal waters of Trinidad, Tobago, and Grenada and its dependencies;
United States of America	The islands, coastal waters and inland areas of the United States of America, including Puerto Rico and the US Virgin Islands. In addition, the USA has agreed to issue warnings for Haiti, and its coastal waters. The USA provides Bermuda with information on threatening tropical storms and hurricanes. Forecasts issued by the USA are discussed in Chapter III;
Venezuela	The islands, coastal waters and inland areas of Venezuela.

The dissemination of these warnings within each country or territory is the responsibility of that country or territory.

2.1.2 Some countries have established the following backups for Watches, Warnings and agreed-upon essential products which should include terminal forecasts for main airports. Details of these products will be arranged bilaterally.

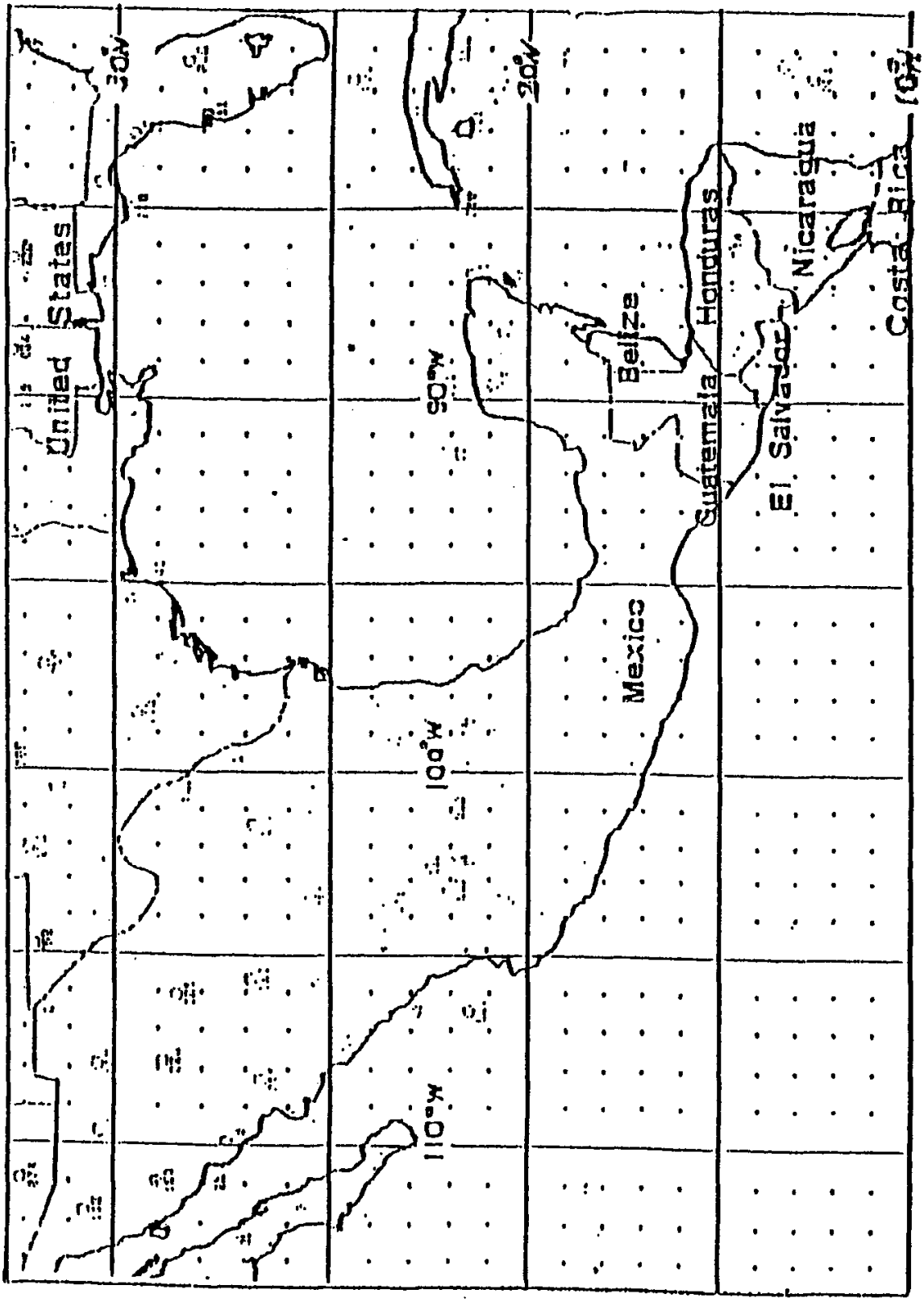

Figure 1-A : Tropical cyclone warning responsibility of RA IV
countries described in paragraph 2.1

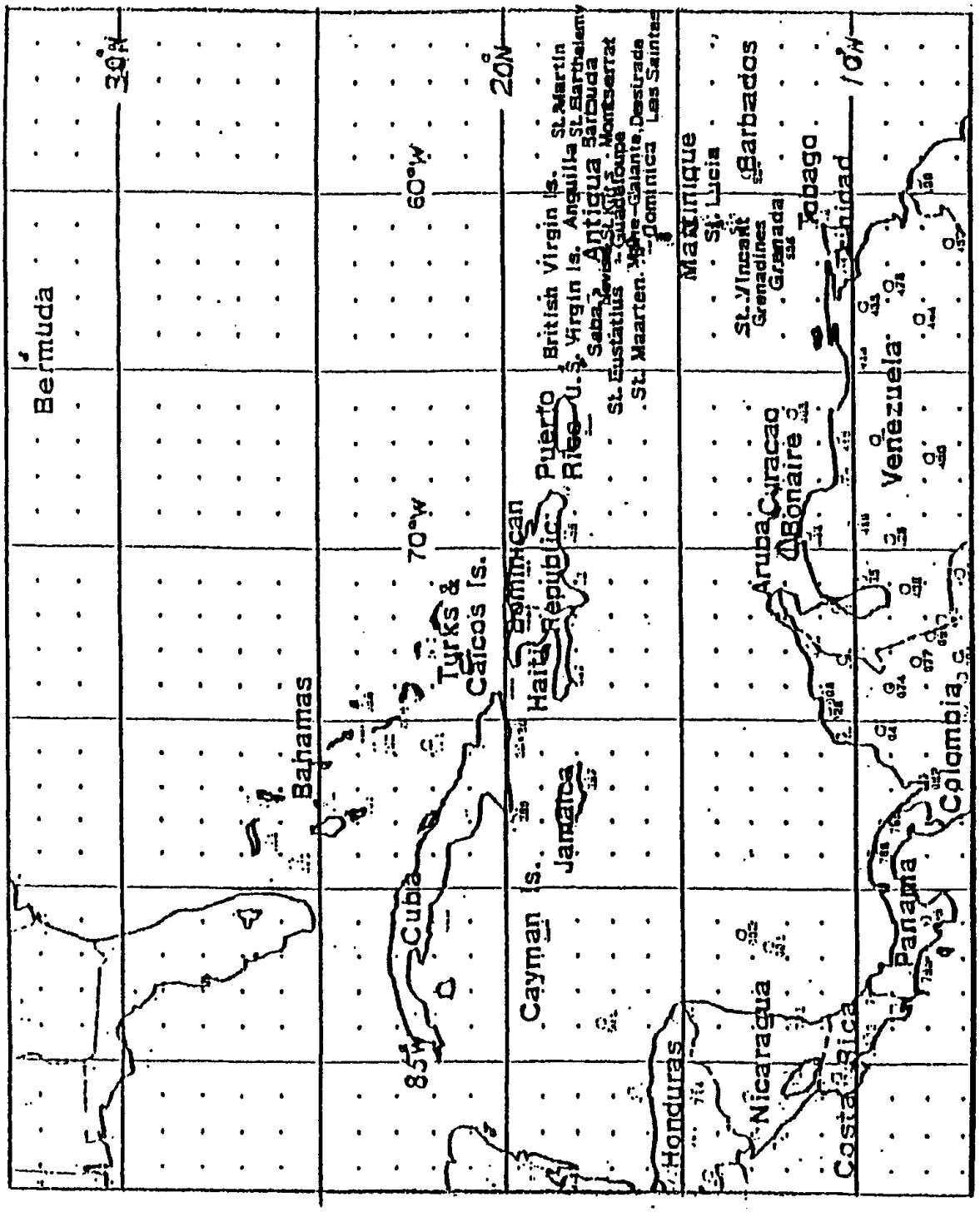

Figure 1-B : Tropical cyclone warning responsibility of
RA IV countries described in paragraph 2.1

(a) Barbados will take over the responsibility of Antigua and/or St. Lucia;

(b) Antigua will take over the responsibility of Barbados with respect to the islands and coastal waters of Dominica.

(c) Trinidad and Tobago will take over the responsibility of Barbados with respect to the islands and coastal waters of Barbados and St. Vincent and the Grenadines;

(d) USA will take over the responsibility of Bahamas and Jamaica;

(e) USA will take over the responsibility of the Netherlands Antilles and Aruba;

(f) Barbados will take over the responsibility of Trinidad and Tobago.

(g) Jamaica will take over the responsibility of the Cayman Islands.

(h) USA, the backup to RSMC Miami is the HPC, Washington

2.2 Forecasts and warnings for the open sea and civil aviation

2.2.1 In accordance with the WMO Manual on Marine Meteorological Services, the USA is responsible for preparing marine tropical cyclone forecasts and warnings for the Caribbean Sea, Gulf of Mexico and the North Atlantic Ocean. These forecasts and warnings are available as part of a tropical cyclone forecast/advisory bulletin (reference chapter 3, section 3.2.4).

2.2.2 In accordance with the International Civil Aviation Organization (ICAO) Air Navigation Plans (ANPs) for the Caribbean (CAR), North Atlantic (NAT) and South American (SAM) Regions, warnings of tropical cyclones for international air navigation are issued as SIGMET messages, including an OUTLOOK, by designated meteorological watch offices (MWOs), each of which provides information for one or more specified flight information regions (FIRs) or upper information regions (UIRs). The boundaries of the FIRs/UIRs are defined in ICAO ANPs for the CAR, NAT and SAM Regions.

2.2.3 SIGMET information is provided in accordance with WMO-No. 49 - Technical Regulations, Volume II (Meteorological Services for International Air Navigation). SIGMETs for tropical cyclones are issued for those tropical cyclones having a 10-minute mean surface wind speed of 63 km/h (34 kt) or more, **except in Regional Association IV where the mean surface wind will be averaged over a one-minute period.** While ICAO wished to standardize the practice of averaging globally, it recognized that the RA IV practice does not constitute a safety problem for aviation; it simply implies that some additional SIGMET messages would be issued for those tropical cyclones in which the ten-minute average would remain below the specified 63 km/h (34 kt) threshold.

2.2.4 The RSMCMiami – Hurricane Center disseminates advisory information on positions of the centre of the tropical cyclones to MWOs as appropriate for use in the preparation of OUTLOOKs appended to SIGMETs for tropical cyclones. To facilitate automated pre-flight planning services, the responsible MWO in RA IV, located in the USA, will issue tropical cyclone advisory messages in accordance with amendment 72 to Annex 3, except that the 18 hour forecast position will not be included at this time.

2.3 Satellite rainfall estimates

The USA will provide satellite rainfall estimates when a tropical system is within 35 hours of making landfall within the region.

2.4 Observations

(a) Radar: Canada, the Caribbean Institute of Meteorology and Hydrology (CIMH), Bahamas, Barbados, Belize, Cuba, Dominican Republic, France (Martinique and Guadeloupe), Jamaica, Mexico, Netherlands Antilles (Curaçao and St. Maarten), Trinidad and Tobago, and the USA will take and distribute radar observations whenever a tropical cyclone is within radar range. Frequency and times of observations will be in accordance with US or

WMO radar reporting procedures;

(b) Reconnaissance: The USA will make available all operational weather reconnaissance observations obtained in connection with tropical disturbances;

(c) Satellite: Near-polar-orbiting and geostationary satellite products will be made available to countries having the necessary receiving equipment (see WMO-No. 411);

(d) Surface: In addition to routine observations, additional observations will be taken by Members when requested by RSMC Miami - Hurricane Center;

(e) Upper-air: Besides routine observations, additional six-hourly rawinsonde observations will be taken by Members when requested by RSMC Miami - Hurricane Center.

2.5 Communications

Members will disseminate forecasts, warnings and observations in accordance with established communications headings presented in the Manual on the Global Telecommunication System (WMO-No. 386).

2.6 Information

RSMC Miami - Hurricane Center will serve as a regional information centre on tropical meteorology including tropical cyclones. This function is performed both during active tropical cyclone periods and as a source of information on past tropical cyclone activity.

CHAPTER 3

TROPICAL CYCLONE PRODUCTS OF THE RSMC MIAMI

NOTE: Refer to Attachment 3A for tropical cyclone product examples.

3.1 Tropical Cyclone Forecast and Advisory Products

3.1.1 Tropical Cyclone Public Advisories (TCP) are the primary tropical cyclone information products issued to the public. The RSMC Miami will issue these products on the criteria set in section 3.1.1.1.

3.1.1.1 Issuance Criteria. In the Atlantic, RSMC Miami will issue TCPs for all tropical cyclones. The initial advisory will be issued when data confirm a tropical cyclone has developed. In the eastern Pacific, RSMC Miami will issue public advisories when watches or warnings are required, or the tropical cyclone is otherwise expected to impact nearby land areas. The title of the advisory will depend upon the intensity of the tropical cyclone as listed below.

a. A tropical depression advisory refers to a tropical cyclone with 1-minute sustained winds up to 62 km/h or 38 mph.

b. A tropical storm advisory will refer to tropical cyclones with 1-minute sustained surface winds 63- 117 km/h or 39 to 73 mph.

c. A hurricane/typhoon advisory will refer to tropical cyclones with winds 118 km/h or 74 mph or greater.

Public advisories will discontinue when either:

a. The tropical cyclone becomes extratropical

b. The tropical cyclone drops below depression stage (dissipates or becomes a remnant low)

c. Moves inland and watches and warnings are no longer required.

3.1.1.2 Issuance Times. RSMC Miami will issue public advisories at 0300, 0900, 1500, and 2100 Universal Time Coordinated (UTC) with valid position times corresponding to the advisory time.

3.1.1.3 Format and Content. Advisories can begin with a lead statement or headline to emphasize significant aspects of the tropical cyclone. Advisories will list watches and warnings for hurricane and tropical storm conditions immediately after the headline. Separate the headline and watch/warning section from the rest of the advisory. Include information in the rest of the advisory in descending order of importance or urgency. At the end of the advisory, repeat the tropical cyclone position, maximum winds, minimum pressure, present movement, and provide forecast movement (if change is indicated). The time and office responsible for the next advisory will provided along with new message headers if the tropical cyclone is passed to another Center. The forecaster's name will be included at the end of the message.

3.1.1.3.1 Units. Times in advisories should be local time of the affected area; however, local time and UTC should be used when noting the storm's location. All advisories will use statute miles and statute miles per hour. Advisories should include the metric units of kilometers and kilometers per hour following the equivalent English units except when the United States is the only country threatened.

3.1.1.3.2 Tropical Storm/Hurricane Watches and Warnings. RSMC Miami will assist in coordination of tropical storm/hurricane watches and warnings if tropical storm/hurricane conditions are possible over land areas.

RSMC Miami will make every effort to list all tropical cyclone watches and warnings in effect. The first advisory in which watches or warnings are mentioned should give the effective time of the watch or warning, except when it is being issued by other countries and the time is not known.

Except for tropical storms and hurricanes forming close to land, it is recommended that a watch should precede a warning. Once a watch is in effect, it should either be replaced by a warning or remain in effect until the threat of the tropical cyclone conditions has passed. A hurricane watch and a tropical storm warning can be in effect for the same section of coast at the same time. It is not advantageous to step down warnings for tropical cyclones. This approach would cause confusion for the media and public, and this is especially true for tropical cyclones whose tracks parallel the coast.

3.1.1.3.3 Location and Movement. All advisories will include the location of the center of the tropical cyclone by its latitude and longitude, and distance and direction from a well known point, preferably downstream from the tropical cyclone. If the forecaster is unsure of the exact location of a depression, the position may be given as within 50, 75, etc., miles/km of a map coordinate. When the center of the tropical cyclone is over land, give its position referencing the state or country in which it is located and in respect to some well known city, if appropriate.

Movement forecasts apply to the tropical cyclone's center. The present movement is given to 16 points of the compass if possible. A 24-hour forecast of movement is included in terms of a continuance or departure from the present movement and speed. This may be reduced to a 12-hour forecast. Uncertainties in either the tropical cyclone's location or movement should be explained in the advisory. An outlook beyond 24 hours (out to 120 hours when appropriate) may be included in the text of the advisory.

Landfall forecasts of the center will be made with caution to avoid giving the public any false sense of security. Other forecast parameters can be used to describe the center's landfall. When a threat to land exists, It is important to stress the tropical cyclone's effects extend well beyond the small area near the tropical cyclone's center.

3.1.1.3.4 Wind and Intensity. Maximum observed 1-minute sustained surface wind speed will be given. During landfall threats, specific gust values and phrases like "briefly higher in squalls" may be used. Also included is the area (or radius) of both tropical and hurricane force winds. When warnings are in effect, the expected times of onset of tropical storm and hurricane force winds along the coast in general terms will be given, such as "this afternoon" or "tonight." Intensity forecasts for 12 hours only will be stated as an "increase," "decrease," or "no change" from the present intensity. The storm may also be compared to some memorable hurricane or referred to by relative intensity. Where appropriate, use the Saffir/Simpson Hurricane Scale (SSHS) in public releases.

3.1.1.3.5 Pressure. Central pressure values in millibars and inches as determined by available data will be provided.

3.1.1.3.6 Storm Surge. Storm surge forecasts should highlight areas along the coast and within bays that are likely to experience dangerous flooding from storm surge. When possible, timing should be estimated or should be referenced to storm position, e.g. "as the hurricane is making landfall", or "as strong winds turn to the southwest". Wave information should be included for the outer coastline when possible. Storm surge heights should be indicated as values above the normal, predicted astronomical tide level. Note should be made of abnormally high or low astronomical tides, and their times of occurrence.

3.1.1.3.7 Inland Impacts. The inland impacts of tropical cyclones in advisories will be highlighted. This includes the threat of strong winds, heavy rainfall, flooding, and tornadoes. The extent and magnitude of inland winds as well as anticipated rainfall amounts and potential for flooding and tornadoes will be included. Tornado and flood watches will be mentioned as appropriate and actual occurrences of tornadoes, floods, and high winds with a note of urgency and supporting warnings and statements from local weather offices

To further publicize local products, when a tropical cyclone threatens a land area, the following statement in the TCP will be included: "For storm information specific to your area...please monitor products issued by your local weather office.

3.1.1.4 Intermediate Public Advisories. These products are issued on a 2- to 3-hourly interval between scheduled advisories (see times of issuance below). 3-hourly intermediate advisories are issued whenever a tropical storm or hurricane watch/warning is in effect. 2-hourly intermediates are issued whenever tropical storm or hurricane warnings are in effect and coastal radars are able to provide RSMC Miami with a reliable hourly center position. For clarity, when issuing intermediate public advisories, a statement at the end of the scheduled public advisory will be included informing customers when an intermediate advisory will be issued, i.e., "AN INTERMEDIATE ADVISORY WILL BE ISSUED BY THE NATIONAL HURRICANE CENTER AT 2 PM EDT FOLLOWED BY THE NEXT COMPLETE ADVISORY ISSUANCE AT 5 PM EDT."

Intermediate advisories can be used to clear all, or parts of, a watch or warning area. Content should be similar to the scheduled advisory.

a. Three hourly issuances...Scheduled advisories at 0300, 0900, 1500, and 2100 UTC. Intermediates at 0000, 0600, 1200, and 1800 UTC.

b. Two hourly issuances...Scheduled advisories at 0300, 0900, 1500, and 2100 UTC. Intermediates at 2300, 0100, 0500, 0700, 1100, 1300, 1700, and 1900 UTC.

3.1.1.5 Special Public Advisories. Special public advisories are unscheduled products issued whenever an unexpected change has occurred requiring a revised forecast or a tropical storm/hurricane watch or warning.

3.1.2 Tropical Cyclone Forecasts/Advisories (TCM). RSMC Miami will prepare these products for all tropical cyclones within their area of responsibility. They will be issued and cease under the criteria given in section 3.1.1.1.

3.1.2.1 Issuance Times. Issue advisories at 0300, 0900, 1500, and 2100 UTC.

3.1.2.2 Format and Content. Tropical cyclone forecasts/advisories will contain appropriate information as shown in Attachment A in a standard consistent format. All forecast advisories will contain 12-, 24-, 36-, 48-, 72-, 96-, and 120-hour forecast positions, and 1-minute surface wind speeds (intensity). The 34- and 50-knot (four-quadrant) wind speed radii will be defined for 12-, 24-, 36-, 48-, and 72-hours. It will also contain forecast 64-knot wind speed radii at 12-, 24-, and 36-hours. No position or wind speed will accompany the forecast of "dissipated." A standard statement indicating the uncertainty associated with the 96- and 120-hour forecast positions will precede those two forecasts.

NOTE: As part of the header, append a code string at the end of the line "NWS TPC/NATIONAL HURRICANE CENTER MIAMI FL."

Format: NWS TPC/NATIONAL HURRICANE CENTER MIAMI FL BSNOYR
where: (BS) is the basin (AL, EP or CP)
where: (NO) is the tropical cyclone number (01, 02, 03,...99)
where: (YR) is the last two digits of the year.

A special tropical cyclone forecast/advisory updates a scheduled advisory if unexpected changes have occurred in a tropical cyclone. Content of the special advisory will reflect significant changes requiring the special advisory to be issued. Issue special tropical cyclone forecast/advisories in conjunction with the issuance of a special public advisory.

3.1.3 Tropical Cyclone Discussion (TCD). RMSC Miami issues this product to explain forecasters' reasoning behind analysis and forecast of the tropical cyclone. They will be issued and cease under the criteria given in section 3.1.1.1.

3.1.3.1 Issuance Times. RSMC Miami will issue tropical cyclone discussions at 0300, 0900, 1500, and 2100 UTC and with all special advisories.

3.1.3.2 Format and Content. Discussions include prognostic reasoning; objective techniques employed; guidance used; coordinated 12-, 24-, 36-, 48-, 72-, 96-, and 120-hour tropical cyclone forecast points; maximum sustained wind speed forecasts for each forecast point; other meteorological

decisions; and plans for watches and warnings. No position or wind speed will accompany the forecast of "dissipated".

3.1.4 Tropical Cyclone Updates (TCU). These products, brief statements issued by RSMC Miami are in lieu of or preceding special advisories, form of unexpected changes in a tropical cyclone or post or cancel watches and warnings.

3.1.5 Tropical Cyclone Position Estimate (TCE). RSMC Miami will issue a position estimate between 2-hourly intermediate public advisories whenever sufficient reliable radar center fix information is available. Position estimates provide location in map coordinates, distance, and direction from a well known point. Position estimates are transmitted near the beginning of the hour.

3.1.6 Tropical Cyclone Surface Wind Speed Probabilities. This product will be issued for all tropical and subtropical cyclones in the Atlantic, East Pacific and Central Pacific basins and will be available no earlier than 15 minutes following the issuance deadlines for routine advisories (03, 09, 15, and 21 UTC) and after special advisories. Probabilities are statistically based on track, intensity, and wind structure uncertainties during recent years in the official tropical cyclone forecasts. They are computed for coastal and inland cities as well as offshore locations (e.g., buoys). The product provides probabilities for sustained wind speeds equal to or exceeding three wind speed thresholds: 34, 50 and 64 knots. Two types of probability values are produced: individual period and cumulative. Individual period probabilities are provided for each of the following time intervals: 0-12 hours, 12-24 hours, 24-36 hours, 36-48 hours, 48-72 hours, 72-96 hours, and 96-120 hours. These individual period probabilities indicate the chance the particular wind speed will start during each interval at each location. Cumulative probabilities are also produced for the following time periods: 0-12 hours, 0-24 hours, 0-36 hours, 0-48 hours, 0-72 hours, 0-96 hours, and 0-120 hours. These cumulative probabilities indicate the overall chance the particular wind speed will occur at each location during the period between hour 0 and the forecast hour. The tropical cyclone wind speed probability text products are found under header FONT1(01-05) for the Atlantic basin and FOPZ1 (01-05) for the eastern North Pacific basin.

3.2 Subtropical Cyclone Forecast and Advisory Products

3.2.1 Subtropical Cyclone Public Advisories (TCP). RSMC Miami will issue subtropical cyclone advisories. However, due to the lack of well-defined criteria for distinguishing subtropical from non-tropical lows, marginally-subtropical systems may be handled as non-tropical gale or storm centers in High Seas forecast products. Format and content of these products are similar to the public tropical cyclone advisory. (See Attachment 3A for an example). The advisories are titled "SUBTROPICAL DEPRESSION ##" and in the message body is referred to as "SUBTROPICAL DEPRESSION ##." If winds reach subtropical storm strength, the storm receives the next available name. The advisories are tittled "SUBTROPICAL STORM (name)" and in the body of the message the storm is referred to as "SUBTROPICAL STORM (name)." Information is listed in order of importance with a lead statement, when appropriate, followed by a summary of all coastal warnings. Latitude and longitude coordinates are used to identify the center of the storm. These advisories are issued at the same scheduled times as public tropical cyclone advisories.

Special Subtropical Public Cyclone Advisories will be issued to (1) update previously scheduled advisories whenever an unexpected significant change has occurred in the cyclone or (2) to issue warnings.

3.2.2 Subtropical Cyclone Forecast/Advisory (TCM). These advisories are issued for all subtropical cyclones within RSMC Miami area of responsibility. The advisory is written in the same format and content as the tropical cyclone forecast/advisories. The advisories are titled "SUBTROPICAL DEPRESSION ##" and in the body of the message the depression is referred to as "SUBTROPICAL DEPRESSION ##." If winds reach subtropical storm strength, the storm receives the next available name. Advisories will be titled "SUBTROPICAL STORM (name)" and refer to in the body of the message as "SUBTROPICAL STORM (name)." These are issued at the same times as scheduled tropical cyclone forecast/advisories.

Special Subtropical Cyclone Forecast/Advisories are issued to update any unexpected change which occurred with the subtropical cyclone. Format remains the same as the scheduled advisory being replaced. These will be issued with every special subtropical cyclone public advisory.

3.3 Numbering and Naming Tropical and Subtropical Cyclones

3.3.1 Numbering and Naming Tropical Cyclones. RSMC Miami will number tropical depressions in their areas of responsibility. Tropical depressions will be numbered consecutively beginning each season with the spelled out number "ONE." In the Pacific, for ease in differentiation, tropical depression numbers, assigned by RSMC Miami or RSMC Honolulu, will include the suffix "E" (for eastern) or "C," (for central) respectively, after the number. In both the Atlantic and Pacific, once the depression reaches tropical storm intensity, it will be given a name and the depression number dropped. The depression number will not be used again until the following year. Tropical cyclones will be given a name in the first advisory after intensifying to 34 knots (63 km/h, 39 mph) or greater.

The following rules apply for tropical cyclones passing from basin to another: the name will be retained if a tropical cyclone passes from one basin into another basin as a tropical cyclone, i.e. advisories are continuous. An unnamed tropical depression will also retain its number (e.g. Tropical Depression Six-E remains Tropical Depression Six-E) if it crosses into another basin.

Within a basin, if the remnant of a tropical cyclone redevelops into a tropical cyclone, it is assigned its original number or name. If the remnants of a former tropical cyclone regenerate in a new basin, the regenerated tropical cyclone will be given a new designation.

3.3.2 Numbering and Naming Subtropical Storms. A single list of numbers and names will be used for all tropical and subtropical cyclones. Therefore, numbering of subtropical depressions will follow the same procedure as tropical depressions. For example, if the first subtropical depression follows the first tropical depression, the subtropical depression will be given the designation SUBTROPICAL DEPRESSION TWO. If a subtropical depression becomes a subtropical storm, it receives the next available name in the tropical cyclone naming sequence.

3.4 Numbering Advisories and Tropical/Subtropical Cyclone Discussions

Number tropical and subtropical cyclone advisories and discussions in the Atlantic and the Pacific similarly. Scheduled and special advisories and TCDs will be numbered consecutively beginning with the number 1 (not spelled out) for each new tropical or subtropical cyclone, and continue through the duration of the cyclone. In situations where only TCMs and TCDs are being written (tropical cyclones in the eastern Pacific not threatening land) and at a later time a public advisory is required, the public advisory number will match the corresponding TCM. In both the Atlantic and the Pacific, intermediate advisories and TCDs will retain the advisory number of the scheduled or special advisory they update and append an alphabetic designator (i.e., "HURRICANE ALLISON INTERMEDIATE ADVISORY NUMBER 20A").

3.5 Other Products

3.5.1 Tropical Weather Discussion (TWD). RSMC Miami will issue these discussions to describe major synoptic weather features and significant areas of disturbed weather in the tropics. One discussion will cover the Gulf of Mexico, the Caribbean, and the Atlantic between the equator and 32° north latitude and be transmitted at 0605, 1205, 1805, 0005 UTC. A second message for the eastern Pacific between the equator and 32° north and east of 140° west will be transmitted at 0405, 1005, 1605, and 2205 UTC.

3.5.2 Tropical Weather Outlook (TWO). RSMC Miami will prepare the TWO during the tropical cyclone seasons. The outlook covers tropical and subtropical waters and discusses areas of disturbed weather and the potential for tropical cyclone development during the next 48 hours. The outlook will mention tropical and subtropical cyclones, including the system's location (in either general terms or map coordinates), status, and change in status. For the first 24 hours of a tropical cyclone, the outlook will include a statement identifying WMO headers for the advisory. In the Atlantic, transmission times

are 0530, 1130, 1730, and 2230 Eastern local time. In the eastern Pacific, transmission times are 0400, 1000, 1600, and 2200 Pacific local time

3.5.3 Tropical Weather Summary (TWS). RSMC Miami will prepare this product each month summarizing the previous month's tropical cyclone activity. The last TWS of the season will summarize November's activity plus the activity for the whole tropical cyclone season. Summaries for each month are due the first day of the next month.

3.5.4 Special Tropical Disturbance Statement (DSA). RSMC Miami may issue these products to furnish information on strong formative, non-depression systems and will focus on major threats of the disturbance, such as the potential for torrential rains on islands or inland areas.

3.5.5 Tropical Cyclone Reports. RSMC Miami will prepare a final track chart and summary of each tropical cyclone occurring in its area of responsibility. Reports will be posted on the Internet at www.nhc.noaa.gov.

3.6 Correction Procedures

If a correction needs to be issued for any tropical cyclone product, the reason for the correction will be indicated immediately after the header of the corrected product.

A T T A C H M E N T 3 A

EXAMPLES OF TROPICAL WEATHER PRODUCTS

Example: Tropical Weather Outlook

ABNT20 KNHC 100855
TWOAT
TROPICAL WEATHER OUTLOOK
NWS TPC/NATIONAL HURRICANE CENTER MIAMI FL
530 AM EDT THU AUG 10 2000

FOR THE NORTH ATLANTIC...CARIBBEAN SEA AND THE GULF OF MEXICO...

THE NATIONAL HURRICANE CENTER IS ISSUING ADVISORIES ON HURRICANE ALBERTO AND ON TROPICAL DEPRESSION FOUR.

CLOUDINESS AND SHOWERS ASSOCIATED WITH A TROPICAL WAVE ABOUT A COUPLE OF HUNDRED MILES SOUTH OF THE CAPE VERDE ISLANDS ARE MOVING WESTWARD. THERE IS SOME POTENTIAL FOR DEVELOPMENT DURING THE NEXT FEW DAYS.

A LARGE AREA OF CLOUDINESS AND THUNDERSTORMS ASSOCIATED WITH A TROPICAL WAVE HAS DEVELOPED OVER THE NORTHWESTERN CARIBBEAN SEA. THIS ACTIVITY IS EXPECTED TO SPREAD WEST-NORTHWESTWARD OVER PORTIONS OF CENTRAL AMERICA AND YUCATAN DURING THE NEXT DAY OR TWO. THERE ARE NO SIGNS OF TROPICAL CYCLONE FORMATION AT THIS TIME.

CLOUDINESS AND THUNDERSTORMS BETWEEN THE BAHAMAS AND BERMUDA ARE DECREASING AT THIS TIME. HOWEVER...SOME REDEVELOPMENT OF THE SHOWER ACTIVITY IS POSSIBLE DURING THE NEXT 24 HOURS.

ELSEWHERE...TROPICAL STORM FORMATION IS NOT EXPECTED THROUGH FRIDAY.

FORECAST/ADVISORIES ON TROPICAL DEPRESSION FOUR ARE ISSUED UNDER AWIPS HEADER TCMAT4 AND WMO HEADER WTNT24 KNHC. PUBLIC ADVISORIES ARE ISSUED UNDER AWIPS HEADER TCPAT4 AND WMO HEADER WTNT34 KNHC.

Examples: Mass News Disseminator Headers

TROPICAL DEPRESSION ONE-E ADVISORY NUMBER 1
TROPICAL STORM ALEX ADVISORY NUMBER 3
HURRICANE ALEX ADVISORY NUMBER 4
SUBTROPICAL STORM THREE ADVISORY NUMBER 1

Example: Tropical Storm Public Advisory

WTNT33 KNHC 081500
TCPAT3
BULLETIN
TROPICAL STORM FLOYD ADVISORY NUMBER 4
NWS TPC/NATIONAL HURRICANE CENTER MIAMI FL
11 AM AST WED SEP 08 1999

...FLOYD MOVING WEST-NORTHWESTWARD IN THE TROPICAL ATLANTIC...

AT 11 AM AST...1500Z...THE CENTER OF TROPICAL STORM FLOYD WAS LOCATED NEAR LATITUDE 15.8 NORTH...LONGITUDE 50.0 WEST OR ABOUT 755 MILES...1210 KM...EAST OF THE LEEWARD ISLANDS.

FLOYD IS MOVING TOWARD THE WEST NORTHWEST NEAR 15 MPH ...24 KM/HR...AND THIS MOTION IS EXPECTED TO CONTINUE THROUGH TONIGHT.

MAXIMUM SUSTAINED WINDS ARE NEAR 45 MPH... 75 KM/HR...WITH HIGHER GUSTS...AND SOME SLOW STRENGTHENING IS EXPECTED DURING THE NEXT 24 HOURS.

TROPICAL STORM FORCE WINDS EXTEND OUTWARD UP TO 85 MILES...140 KM FROM THE CENTER.

ESTIMATED MINIMUM CENTRAL PRESSURE IS 1003 MB...29.62 INCHES.

REPEATING THE 11 AM AST POSITION...15.8 N... 50.0 W. MOVEMENT TOWARD...WEST NORTHWEST NEAR 15 MPH. MAXIMUM SUSTAINED WINDS... 45 MPH. MINIMUM CENTRAL PRESSURE...1003 MB.

THE NEXT ADVISORY WILL BE ISSUED BY THE NATIONAL HURRICANE CENTER AT 5 PM AST.

FORECASTER FRANKLIN

Example: Hurricane Public Advisory

TCPAT3
WTNT33 KNHC 151500
BULLETIN
HURRICANE FLOYD ADVISORY NUMBER 32
NWS TPC/NATIONAL HURRICANE CENTER MIAMI FL
11 AM EDT WED SEP 15 1999

...FRINGES OF HURRICANE CONTINUE TO IMPACT COAST OF NORTH FLORIDA AND GEORGIA...BUT FLOYD IS HEADING FOR THE CAROLINAS...
AT 11 AM EDT...A TROPICAL STORM WATCH IS EXTENDED NORTHWARD AND IS NOW IN EFFECT FROM NORTH OF CHINCOTEAGUE VIRGINIA TO SANDYHOOK NEW JERSEY...INCLUDING DELAWARE BAY.

A HURRICANE WARNING REMAINS IN EFFECT FROM TITUSVILLE FLORIDA TO THE NORTH CAROLINA/VIRGINIA BORDER...INCLUDING PAMLICO AND ALBEMARLE SOUNDS. AT 11 AM EDT...HURRICANE WARNINGS ARE DISCONTINUED SOUTH OF TITUSVILLE.

A HURRICANE WATCH CONTINUES IN EFFECT FROM THE NORTH CAROLINA/VIRGINIA BORDER TO CHINCOTEAGUE VIRGINIA...INCLUDING CHESAPEAKE BAY SOUTH OF SMITH POINT.

INTERESTS ALONG THE FLORIDA EAST COAST SOUTH OF TITUSVILLE SHOULD EXERCISE CAUTION UNTIL WINDS AND SEAS SUBSIDE.

FOR STORM INFORMATION SPECIFIC TO YOUR AREA...PLEASE MONITOR PRODUCTS ISSUED BY YOUR LOCAL WEATHER OFFICE.

AT 11 AM EDT...1500Z...THE CENTER OF HURRICANE FLOYD WAS LOCATED NEAR LATITUDE 29.9 NORTH...LONGITUDE 79.0 WEST OR ABOUT 165 MILES EAST-SOUTHEAST OF JACKSONVILLE FLORIDA. THIS POSITION IS ALSO ABOUT 260 MILES SOUTH OF MYRTLE BEACH SOUTH CAROLINA.

FLOYD IS MOVING TOWARD THE NORTH NORTHWEST NEAR 14 MPH AND A GRADUAL TURN TOWARD THE NORTH IS EXPECTED TODAY.

MAXIMUM SUSTAINED WINDS ARE NEAR 125 MPH...205 KM/HR...WITH HIGHER GUSTS. LITTLE CHANGE IN STRENGTH IS FORECAST BEFORE LANDFALL...WHICH IS EXPECTED TONIGHT NEAR THE BORDER OF SOUTH AND NORTH CAROLINA. ALL PREPARATIONS SHOULD BE RUSHED TO COMPLETION.

HURRICANE FORCE WINDS EXTEND OUTWARD UP TO 140 MILES...220 KM...FROM THE CENTER...AND TROPICAL STORM FORCE WINDS EXTEND OUTWARD UP TO 230 MILES...370 KM.

THE LATEST MINIMUM CENTRAL PRESSURE REPORTED BY U.S. AIR FORCE HURRICANE HUNTER AIRCRAFT IS 943 MB...27.85 INCHES.

STORM SURGE FLOODING OF 10 TO 13 FEET ABOVE NORMAL TIDE LEVELS...ALONG WITH LARGE AND DANGEROUS BATTERING WAVES...ARE EXPECTED NEAR AND TO THE EAST OF WHERE THE CENTER CROSSES THE COAST. HEAVY SURF ADVISORIES ARE IN EFFECT FOR THE U.S. EAST COAST NORTHWARD TO CHATHAM MASSACHUSETTS. REFER TO STATEMENTS ISSUED BY LOCAL NATIONAL WEATHER SERVICE OFFICES FOR ADDITIONAL INFORMATION.

RAINFALL TOTALS OF 5 TO 10 INCHES ARE EXPECTED ALONG THE PATH OF THE HURRICANE.

ISOLATED TORNADOES ARE POSSIBLE OVER THE COASTAL COUNTIES OF SOUTH AND NORTH CAROLINA.

REPEATING THE 11 AM EDT POSITION...29.9 N... 79.0 W. MOVEMENT TOWARD...NORTH NORTHWEST NEAR 14 MPH. MAXIMUM SUSTAINED WINDS...125MPH. MINIMUM CENTRAL PRESSURE... 943 MB.

INTERMEDIATE ADVISORIES WILL BE ISSUED BY THE NATIONAL HURRICANE CENTER AT 1 PM EDT AND 3 PM EDT FOLLOWED BY THE NEXT COMPLETE ADVISORY AT 5 PM EDT.

FORECASTER LAWRENCE

Example: Intermediate Public Advisory

WTNT33 KNHC 151900
TCPAT3
BULLETIN
HURRICANE FLOYD INTERMEDIATE ADVISORY NUMBER 32B
NWS TPC/NATIONAL HURRICANE CENTER MIAMI FL
3 PM EDT WED SEP 15 1999

...FRINGES OF HURRICANE CONTINUE TO IMPACT COAST OF NORTH FLORIDA AND GEORGIA...BUT FLOYD IS HEADING FOR THE CAROLINAS...

A HURRICANE WARNING REMAINS IN EFFECT FROM NORTH OF FERNANDINA BEACH FLORIDA TO THE NORTH CAROLINA/VIRGINIA BORDER...INCLUDING PAMLICO AND ALBEMARLE SOUNDS. AT 3 PM EDT...WARNINGS ARE DISCONTINUED FROM FERNANDINA BEACH SOUTHWARD. WARNINGS WILL LIKELY BE DISCONTINUED FOR PORTIONS OF GEORGIA LATER TODAY.

A HURRICANE WATCH REMAINS IN EFFECT FROM THE NORTH CAROLINA/VIRGINIA BORDER TO CHINCOTEAGUE VIRGINIA...INCLUDING CHESAPEAKE BAY SOUTH OF SMITH POINT.

A TROPICAL STORM WATCH REMAINS IN EFFECT FROM NORTH OF CHINCOTEAGUE VIRGINIA TO MONTAUK POINT LONG ISLAND...INCLUDING DELAWARE BAY AND LONG ISLAND SOUND.

INTERESTS ALONG THE FLORIDA EAST COAST SHOULD EXERCISE CAUTION UNTIL WINDS AND SEAS SUBSIDE.

FOR STORM INFORMATION SPECIFIC TO YOUR AREA...PLEASE MONITOR PRODUCTS ISSUED BY YOUR LOCAL WEATHER OFFICE.

AT 3 PM EDT...1900Z...THE CENTER OF HURRICANE FLOYD WAS LOCATED NEAR LATITUDE 30.8 NORTH...LONGITUDE 79.1 WEST OR ABOUT 200 MILES SOUTH OF MYRTLE BEACH SOUTH CAROLINA.
FLOYD IS MOVING ALMOST DUE NORTHWARD AT 15 MPH AND THIS MOTION IS EXPECTED TO CONTINUE TODAY WITH A GRADUAL TURN TOWARD THE NORTH-NORTHEAST ON THURSDAY.

MAXIMUM SUSTAINED WINDS HAVE DECREASED TO NEAR 120 MPH...WITH HIGHER GUSTS. ALTHOUGH THE HURRICANE HAS BEEN SLOWLY WEAKENING...IT IS OVER THE WARM WATERS OF THE GULF STREAM COULD MAINTAIN ITS PRESENT STRENGTH UNTIL LANDFALL TONIGHT. ALL PREPARATIONS IN THE WARNING AREA SHOULD BE RUSHED TO COMPLETION.

HURRICANE FORCE WINDS EXTEND OUTWARD UP TO 140 MILES...220 KM...FROM THE CENTER...AND TROPICAL STORM FORCE WINDS EXTEND OUTWARD UP TO 230 MILES...370 KM.

THE LATEST MINIMUM CENTRAL PRESSURE REPORTED BY U.S. AIR FORCE HURRICANE HUNTER AIRCRAFT IS 947 MB...27.96 INCHES.

STORM SURGE FLOODING OF 10 TO 13 FEET ABOVE NORMAL TIDE LEVELS...ALONG WITH LARGE AND DANGEROUS BATTERING WAVES...ARE EXPECTED NEAR AND TO THE EAST OF WHERE THE CENTER CROSSES THE COAST.

HEAVY SURF ADVISORIES ARE IN EFFECT FOR THE U.S. EAST COAST NORTHWARD TO CHATHAM MASSACHUSETTS. REFER TO STATEMENTS ISSUED BY LOCAL NATIONAL WEATHER SERVICE OFFICES FOR ADDITIONAL INFORMATION.

RAINFALL TOTALS OF 5 TO 10 INCHES ARE EXPECTED ALONG THE PATH OF THE HURRICANE.

ISOLATED TORNADOES ARE POSSIBLE OVER THE COASTAL COUNTIES OF SOUTH AND NORTH CAROLINA.

REPEATING THE 3 PM EDT POSITION...30.8 N... 79.1 W. MOVEMENT TOWARD...NORTH NEAR 15 MPH. MAXIMUM SUSTAINED WINDS...120 MPH. MINIMUM CENTRAL PRESSURE... 947 MB.

THE NEXT ADVISORY WILL BE ISSUED BY THE NATIONAL HURRICANE CENTER AT 5 PM EDT.

FORECASTER LAWRENCE

Example: Special Public Advisory

WTNT33 KNHC 241309
TCPAT3
BULLETIN
HURRICANE ANDREW SPECIAL ADVISORY NUMBER 25
NWS TPC/NATIONAL HURRICANE CENTER MIAMI FL
900 AM EDT MON AUG 24 1992

...HURRICANE ANDREW MOVING INTO THE GULF OF MEXICO...

HURRICANE WARNINGS REMAIN POSTED FOR THE FLORIDA WEST COAST SOUTH OF VENICE TO FLAMINGO AND FOR LAKE OKEECHOBEE. AT 9 AM EDT A HURRICANE WATCH WILL GO INTO EFFECT FOR THE NORTHERN GULF COAST FROM MOBILE ALABAMA TO SABINE PASS TEXAS. ALL OTHER POSTED WATCHES AND WARNINGS ARE DISCONTINUED.

FOR STORM INFORMATION SPECIFIC TO YOUR AREA...PLEASE MONITOR PRODUCTS ISSUED BY YOUR LOCAL WEATHER OFFICE.

WIND GUSTS TO HURRICANE FORCE CONTINUE TO OCCUR ALONG THE SOUTHEAST FLORIDA COAST BUT WILL GRADUALLY DIMINISH DURING THE DAY. SMALL CRAFT ADVISORIES REMAIN IN EFFECT. RESIDENTS IN THESE AREAS SHOULD MONITOR LOCAL NWS OFFICES FOR THE LATEST FORECASTS AND CONDITIONS IN THEIR AREA.

AT 9 AM EDT THE CENTER OF HURRICANE ANDREW WAS LOCATED NEAR LATITUDE 25.6 NORTH AND LONGITUDE 81.8 WEST OR APPROXIMATELY 45 MILES SOUTH OF NAPLES FLORIDA.

HURRICANE ANDREW IS MOVING TOWARD THE WEST AT 18 MPH. THIS MOTION IS EXPECTED TO CONTINUE THIS MORNING WITH A GRADUAL TURN TO THE WEST NORTHWEST LATER TODAY.

MAXIMUM SUSTAINED WINDS ARE NEAR 140 MPH. LITTLE CHANGE IN STRENGTH IS LIKELY DURING THE NEXT 24 HOURS.

HURRICANE FORCE WINDS EXTEND OUTWARD TO 30 MILES...50 KM FROM THE CENTER WITH TROPICAL STORM FORCE WINDS EXTENDING OUTWARD TO 140 MILES. ESTIMATED MINIMUM CENTRAL PRESSURE IS 945 MB...27.91 INCHES.

STORM SURGES OF 5 TO 8 FEET ARE POSSIBLE ON THE FLORIDA WEST COAST NEAR AND TO THE SOUTH OF THE CENTER FOLLOWING PASSAGE OF THE HURRICANE. ALONG THE SOUTHEAST COAST OF FLORIDA STORM SURGE TIDES ARE DECREASING. PRELIMINARY REPORTS FROM THE SOUTH FLORIDA WATER MANAGEMENT DISTRICT INDICATE A STORM SURGE OF 8 FEET ABOVE NORMAL WAS RECORDED IN BISCAYNE BAY NEAR HOMESTEAD FLORIDA.

RAINFALL AMOUNTS OF 5 TO 8 INCHES AND ISOLATED TORNADOES ARE POSSIBLE ACROSS SOUTHERN AND CENTRAL FLORIDA TODAY.

REPEATING THE 9 AM EDT POSITION...LATITUDE 25.6 NORTH AND LONGITUDE 81.8 WEST AND MOVING TOWARD THE WEST AT 18 MPH. MAXIMUM SUSTAINED WINDS NEAR 140 MPH. MINIMUM CENTRAL PRESSURE OF 945 MB...27.91 INCHES.

THE NEXT SCHEDULED ADVISORY WILL BE ISSUED BY THE NATIONAL HURRICANE CENTER AT 11 AM EDT MON.

Example: Public Advisory Correction

WTNT31 KNHC 240855
TCPAT3

HURRICANE ANDREW ADVISORY NUMBER 25...CORRECTED
NWS TPC/NATIONAL HURRICANE CENTER MIAMI FL
500 AM EDT MON AUG 24 1992

...CORRECTION FOR CENTRAL PRESSURE...

BODY OF TEXT

Example: Hurricane Forecast/Advisory

NOTE: As part of the header, a code string is appended at the end of the line " NWS TPC/NATIONAL HURRICANE CENTER MIAMI FL"

Format: NATIONAL WEATHER SERVICE MIAMI FL BSNOYR
where: (BS) is the basin (AL, EP or CP)
where: (NO) is the tropical cyclone number (01, 02, 03,...99)
where: (YR) is the last two digits of the year.

WTNT23 KNHC 211042
TCMAT2
TROPICAL STORM DEBBY FORECAST/ADVISORY NUMBER 8
NWS TPC/NATIONAL HURRICANE CENTER MIAMI FL AL0700
1500Z MON AUG 21 2000

AT 11 AM AST...1500 UTC...THE GOVERNMENTS OF FRANCE...ANTIGUA...AND THE NETHERLANDS ANTILLES HAVE ISSUED HURRICANE WARNINGS FOR THEIR RESPECTIVE ISLANDS EXTENDING FROM GUADELOUPE NORTH AND NORTHWESTWARD THROUGH THE BRITISH VIRGIN ISLANDS. ALSO AT 11 AM AST...1500 UTC...A HURRICANE WARNING IS IN EFFECT FOR THE U.S. VIRGIN ISLANDS...AND THE GOVERNMENT OF BARBADOS HAS ISSUED A TROPICAL STORM WARNING AND A HURRICANE WATCH FOR DOMINICA. A HURRICANE WATCH REMAINS IN EFFECT FOR PUERTO RICO...AND MAY BE UPGRADED TO A HURRICANE WARNING LATER TODAY.
TROPICAL STORM CENTER LOCATED NEAR 15.7N 57.3W AT 21/1500Z
POSITION ACCURATE WITHIN 45 NM

PRESENT MOVEMENT TOWARD THE WEST OR 275 DEGREES AT 19 KT

ESTIMATED MINIMUM CENTRAL PRESSURE 1008 MB
MAX SUSTAINED WINDS 60 KT WITH GUSTS TO 80 KT.
50 KT..... 50NE 40SE 25SW 50NW.
34 KT.....125NE 75SE 40SW 125NW.
12 FT SEAS..250NE 100SE 75SW 150NW.
WINDS AND SEAS VARY GREATLY IN EACH QUADRANT. RADII IN NAUTICAL MILES ARE THE LARGEST RADII EXPECTED ANYWHERE IN THAT QUADRANT.

REPEAT...CENTER LOCATED NEAR 15.7N 57.3W AT 21/1500Z
AT 21/1200Z CENTER WAS LOCATED NEAR 15.6N 56.4W

FORECAST VALID 22/0000Z 16.2N 60.2W

MAX WIND 65 KT...GUSTS 80 KT.
64 KT... 20NE 10SE 10SW 10NW.

50 KT... 50NE 40SE 25SW 50NW.
34 KT...125NE 75SE 40SW 125NW.

FORECAST VALID 22/1200Z 17.0N 63.8W
MAX WIND 75 KT...GUSTS 90 KT.
64 KT... 20NE 10SE 10SW 20NW.
50 KT... 60NE 50SE 35SW 60NW.
34 KT...125NE 80SE 50SW 125NW.

FORECAST VALID 23/0000Z 18.0N 67.2W
MAX WIND 75 KT...GUSTS 90 KT.
64 KT... 20NE 20SE 10SW 20NW.
50 KT... 50NE 50SE 40SW 60NW.
34 KT...130NE 90SE 60SW 130NW.

FORECAST VALID 23/1200Z 19.0N 70.0W
MAX WIND 70 KT...GUSTS 85 KT.
50 KT... 60NE 45SE 45SW 60NW.
34 KT...100NE 100SE 100SW 100NW.

FORECAST VALID 24/1200Z 21.0N 75.0W
MAX WIND 85 KT...GUSTS 105 KT.
50 KT... 70NE 70SE 50SW 50NW.
34 KT...130NE 130SE 150SW 150NW.

(FORECAST INFORMATION THROUGH 72 H AS IN PREVIOUS YEARS)

EXTENDED OUTLOOK. NOTE...ERRORS FOR TRACK HAVE AVERAGED NEAR 275 NM ON DAY 4 AND 375 NM ON DAY 5...AND FOR INTENSITY NEAR 20 KT EACH DAY.

OUTLOOK VALID 27/0000Z 27.0N 92.5W
MAX WIND 100 KT...GUSTS 120 KT.

OUTLOOK VALID 28/0000Z 29.0N 92.0W
MAX WIND 90 KT...GUSTS 110 KT.

REQUEST FOR 3 HOURLY SHIP REPORTS WITHIN 300 MILES OF 20.8N 89.5W

NEXT ADVISORY AT 23/0900Z

FORECASTER PASCH

Example: Tropical Cyclone Discussion (TCD)

HURRICANE ISIDORE DISCUSSION NUMBER 28
NWS TPC/NATIONAL HURRICANE CENTER MIAMI FL
11 PM EDT SUN SEP 22 2002

SATELLITE IMAGES INDICATE STRENGTHENING…AND THIS IS CORROBORATED BY RECON DATA WHICH SHOW FLIGHT LEVEL WINDS NEAR 100 KT AND FALLING CENTRAL PRESSURE. FURTHER INTENSIFICATION IS LIKELY.

THE 4 AND 5 DAY FORECAST POINTS IMPLY A POTENTIAL THREAT TO EITHER THE NORTHWEST OR NORTHERN GULF OF MEXICO COAST...BUT TRACK ERRORS CAN BE RATHER LARGE AT THESE LONGER RANGES.

FORECASTER PASCH

FORECAST POSITIONS AND MAX WINDS

INITIAL	23/0300Z	20.8N	89.5W	90 KT
12HR VT	23/1200Z	20.7N	90.3W	95 KT
24HR VT	24/0000Z	21.0N	91.0W	100 KT
36HR VT	24/1200Z	21.8N	92.0W	115 KT
48HR VT	25/0000Z	22.8N	92.5W	125 KT
72HR VT	26/0000Z	25.0N	93.0W	125 KT
96HR VT	27/0000Z	27.0N	92.5W	100 KT
120HR VT	28/0000Z	29.0N	92.0W	90 KT

Example: Tropical Cyclone Update from - NHC

WTNT61 KNHC 222000
TCUAT
HURRICANE MICHELLE TROPICAL CYCLONE UPDATE
NWS TPC/NATIONAL HURRICANE CENTER MIAMI FL
100 PM EST THU NOV 1 2001

...RECONNAISSANCE AIRCRAFT INDICATE THAT MICHELLE HAS REACHED HURRICANE STRENGTH...

AN AIR FORCE RESERVE RECONNAISSANCE AIRCRAFT MEASURED HURRICANE FORCE WINDS IN MICHELLE. DETAILS WILL FOLLOW IN A SPECIAL HURRICANE ADVISORY AT 2 PM EST.

AVILA

Example: Tropical Cyclone Position Estimate

WTNT51 KNHC 190755
TCEAT
HURRICANE HUGO...POSITION ESTIMATE
NWS TPC/NATIONAL HURRICANE CENTER MIAMI FL
300 AM AST TUE SEP 19 1989

AT 3 AM AST THE CENTER OF HURRICANE HUGO WAS ESTIMATED NEAR LATITUDE 20.7 NORTH AND LONGITUDE 67.3 WEST. THIS IS APPROXIMATELY 155 MILES NORTH NORTHWEST OF SAN JUAN PUERTO RICO AND 220 MILES EAST SOUTHEAST OF GRAND TURK ISLAND OF THE BAHAMAS.

LAWRENCE

Example: Wind Speed Probabilities

FONT15 KNHC 262100
PWSAT5
TROPICAL STORM ERNESTO WIND SPEED PROBABILITIES NUMBER 9
NWS TPC/NATIONAL HURRICANE CENTER MIAMI FL AL052006
2100 UTC SAT AUG 26 2006

AT 2100Z THE CENTER OF TROPICAL STORM ERNESTO WAS LOCATED NEAR LATITUDE 15.9 NORTH...LONGITUDE 71.6 WEST WITH MAXIMUM SUSTAINED WINDS NEAR 50 KTS...60 MPH...95 KM/HR.

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CHANCES OF SUSTAINED (1-MINUTE AVERAGE) WIND SPEEDS OF AT LEAST
   ...34 KT (39 MPH... 63 KPH)...
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...50 KT (58 MPH... 93 KPH)...
...64 KT (74 MPH...119 KPH)...
FOR LOCATIONS AND TIME PERIODS DURING THE NEXT 5 DAYS

PROBABILITIES FOR LOCATIONS ARE GIVEN AS IP(CP) WHERE
IP IS THE PROBABILITY OF THE EVENT BEGINNING DURING
AN INDIVIDUAL TIME PERIOD (INDIVIDUAL PROBABILITY)
(CP) IS THE PROBABILITY OF THE EVENT OCCURRING BETWEEN
18Z SAT AND THE FORECAST HOUR (CUMULATIVE PROBABILITY)

PROBABILITIES ARE GIVEN IN PERCENT
X INDICATES PROBABILITIES LESS THAN 0.5 PERCENT
LOCATIONS SHOWN WHEN THEIR TOTAL CUMULATED 5-DAY
PROBABILITY IS AT LEAST 2.5 PERCENT

Z INDICATES COORDINATED UNIVERSAL TIME (GREENWICH)
ATLANTIC STANDARD TIME (AST)...SUBTRACT 4 HOURS FROM Z TIME
EASTERN DAYLIGHT TIME (EDT)...SUBTRACT 4 HOURS FROM Z TIME
CENTRAL DAYLIGHT TIME (CDT)...SUBTRACT 5 HOURS FROM Z TIME

- - - - WIND SPEED PROBABILITIES FOR SELECTED LOCATIONS - - - -

TIME PERIODS		FROM 18Z SAT TO 06Z SUN	FROM 06Z SUN TO 18Z SUN	FROM 18Z SUN TO 06Z MON	FROM 06Z MON TO 18Z MON	FROM 18Z MON TO 18Z TUE	FROM 18Z TUE TO 18Z WED	FROM 18Z WED TO 06Z THU
FORECAST HOUR		(12)	(24)	(36)	(48)	(72)	(96)	(120)
LOCATION	KT							
CHARLESTON SC	34	X	X(X)	X(X)	X(X)	X(X)	1(1)	2(3)
ATLANTA GA	34	X	X(X)	X(X)	X(X)	X(X)	1(1)	2(3)
AUGUSTA GA	34	X	X(X)	X(X)	X(X)	X(X)	1(1)	2(3)
SAVANNAH GA	34	X	X(X)	X(X)	X(X)	X(X)	2(2)	2(4)
JACKSONVILLE	34	X	X(X)	X(X)	X(X)	2(2)	4(6)	4(10)
DAYTONA BEACH	34	X	X(X)	X(X)	X(X)	4(4)	5(9)	4(13)
ORLANDO FL	34	X	X(X)	X(X)	X(X)	8(8)	5(13)	4(17)
ORLANDO FL	50	X	X(X)	X(X)	X(X)	1(1)	1(2)	2(4)
COCOA BEACH FL	34	X	X(X)	X(X)	X(X)	7(7)	5(12)	3(15)
COCOA BEACH FL	50	X	X(X)	X(X)	X(X)	1(1)	1(2)	1(3)
FT PIERCE FL	34	X	X(X)	X(X)	1(1)	9(10)	4(14)	3(17)
FT PIERCE FL	50	X	X(X)	X(X)	X(X)	2(2)	1(3)	1(4)
W PALM BEACH	34	X	X(X)	X(X)	2(2)	12(14)	5(19)	3(22)
W PALM BEACH	50	X	X(X)	X(X)	X(X)	3(3)	1(4)	1(5)
MIAMI FL	34	X	X(X)	X(X)	4(4)	19(23)	4(27)	2(29)
MIAMI FL	50	X	X(X)	X(X)	1(1)	5(6)	2(8)	X(8)
MIAMI FL	64	X	X(X)	X(X)	X(X)	2(2)	1(3)	1(4)
MARATHON FL	34	X	X(X)	1(1)	7(8)	30(38)	7(45)	1(46)
MARATHON FL	50	X	X(X)	X(X)	1(1)	11(12)	4(16)	X(16)
MARATHON FL	64	X	X(X)	X(X)	X(X)	5(5)	2(7)	1(8)
KEY WEST FL	34	X	X(X)	1(1)	7(8)	32(40)	8(48)	2(50)
KEY WEST FL	50	X	X(X)	X(X)	1(1)	16(17)	4(21)	1(22)
KEY WEST FL	64	X	X(X)	X(X)	X(X)	7(7)	2(9)	1(10)

MARCO ISLAND	34	X	X(X)	X(X)	3(3)	23(26)	8(34)	2(36)
MARCO ISLAND	50	X	X(X)	X(X)	X(X)	7(7)	3(10)	2(12)
MARCO ISLAND	64	X	X(X)	X(X)	X(X)	3(3)	1(4)	1(5)
FT MYERS FL	34	X	X(X)	X(X)	2(2)	18(20)	8(28)	3(31)
FT MYERS FL	50	X	X(X)	X(X)	X(X)	5(5)	3(8)	2(10)
FT MYERS FL	64	X	X(X)	X(X)	X(X)	2(2)	1(3)	1(4)
VENICE FL	34	X	X(X)	X(X)	1(1)	16(17)	10(27)	4(31)
VENICE FL	50	X	X(X)	X(X)	X(X)	5(5)	4(9)	2(11)
VENICE FL	64	X	X(X)	X(X)	X(X)	2(2)	2(4)	1(5)
TAMPA FL	34	X	X(X)	X(X)	X(X)	11(11)	9(20)	5(25)
TAMPA FL	50	X	X(X)	X(X)	X(X)	3(3)	3(6)	2(8)
TAMPA FL	64	X	X(X)	X(X)	X(X)	1(1)	1(2)	1(3)
CEDAR KEY FL	34	X	X(X)	X(X)	X(X)	6(6)	8(14)	6(20)
CEDAR KEY FL	50	X	X(X)	X(X)	X(X)	1(1)	3(4)	2(6)
TALLAHASSEE FL	34	X	X(X)	X(X)	X(X)	3(3)	7(10)	7(17)
TALLAHASSEE FL	50	X	X(X)	X(X)	X(X)	1(1)	1(2)	2(4)
ST MARKS FL	34	X	X(X)	X(X)	X(X)	3(3)	8(11)	7(18)
ST MARKS FL	50	X	X(X)	X(X)	X(X)	1(1)	1(2)	3(5)
APALACHICOLA	34	X	X(X)	X(X)	X(X)	4(4)	10(14)	10(24)
APALACHICOLA	50	X	X(X)	X(X)	X(X)	1(1)	4(5)	4(9)
APALACHICOLA	64	X	X(X)	X(X)	X(X)	X(X)	2(2)	2(4)
GFMX 290N 850W	34	X	X(X)	X(X)	X(X)	7(7)	12(19)	10(29)
GFMX 290N 850W	50	X	X(X)	X(X)	X(X)	1(1)	5(6)	5(11)
GFMX 290N 850W	64	X	X(X)	X(X)	X(X)	1(1)	2(3)	3(6)
PANAMA CITY FL	34	X	X(X)	X(X)	X(X)	3(3)	10(13)	11(24)
PANAMA CITY FL	50	X	X(X)	X(X)	X(X)	1(1)	2(3)	5(8)
PANAMA CITY FL	64	X	X(X)	X(X)	X(X)	X(X)	2(2)	2(4)
COLUMBUS GA	34	X	X(X)	X(X)	X(X)	X(X)	3(3)	4(7)
MONTGOMERY AL	34	X	X(X)	X(X)	X(X)	X(X)	4(4)	7(11)
PENSACOLA FL	34	X	X(X)	X(X)	X(X)	2(2)	9(11)	10(21)
PENSACOLA FL	50	X	X(X)	X(X)	X(X)	1(1)	2(3)	6(9)
PENSACOLA FL	64	X	X(X)	X(X)	X(X)	X(X)	1(1)	2(3)
GFMX 290N 870W	34	X	X(X)	X(X)	X(X)	4(4)	15(19)	13(32)
GFMX 290N 870W	50	X	X(X)	X(X)	X(X)	1(1)	6(7)	7(14)
GFMX 290N 870W	64	X	X(X)	X(X)	X(X)	X(X)	3(3)	4(7)
MOBILE AL	34	X	X(X)	X(X)	X(X)	1(1)	8(9)	11(20)
MOBILE AL	50	X	X(X)	X(X)	X(X)	X(X)	2(2)	5(7)
MOBILE AL	64	X	X(X)	X(X)	X(X)	X(X)	1(1)	2(3)
GULFPORT MS	34	X	X(X)	X(X)	X(X)	1(1)	10(11)	11(22)
GULFPORT MS	50	X	X(X)	X(X)	X(X)	X(X)	3(3)	5(8)
BURAS LA	34	X	X(X)	X(X)	X(X)	2(2)	11(13)	12(25)
BURAS LA	50	X	X(X)	X(X)	X(X)	X(X)	4(4)	6(10)
BURAS LA	64	X	X(X)	X(X)	X(X)	X(X)	2(2)	3(5)
GFMX 280N 890W	34	X	X(X)	X(X)	X(X)	4(4)	15(19)	14(33)
GFMX 280N 890W	50	X	X(X)	X(X)	X(X)	1(1)	6(7)	6(13)
GFMX 280N 890W	64	X	X(X)	X(X)	X(X)	1(1)	2(3)	5(8)
JACKSON MS	34	X	X(X)	X(X)	X(X)	1(1)	3(4)	5(9)

NEW ORLEANS LA	34	X	X(X)	X(X)	X(X)	1(1)	9(10)	11(21)
NEW ORLEANS LA	50	X	X(X)	X(X)	X(X)	X(X)	3(3)	4(7)
NEW ORLEANS LA	64	X	X(X)	X(X)	X(X)	X(X)	1(1)	2(3)
GFMX 280N 910W	34	X	X(X)	X(X)	X(X)	2(2)	11(13)	11(24)
GFMX 280N 910W	50	X	X(X)	X(X)	X(X)	X(X)	6(6)	6(12)
GFMX 280N 910W	64	X	X(X)	X(X)	X(X)	X(X)	3(3)	3(6)
BATON ROUGE LA	34	X	X(X)	X(X)	X(X)	1(1)	7(8)	9(17)
BATON ROUGE LA	50	X	X(X)	X(X)	X(X)	X(X)	2(2)	3(5)
NEW IBERIA LA	34	X	X(X)	X(X)	X(X)	1(1)	6(7)	9(16)
NEW IBERIA LA	50	X	X(X)	X(X)	X(X)	X(X)	3(3)	3(6)
NEW IBERIA LA	64	X	X(X)	X(X)	X(X)	X(X)	1(1)	2(3)
GFMX 280N 930W	34	X	X(X)	X(X)	X(X)	1(1)	6(7)	9(16)
GFMX 280N 930W	50	X	X(X)	X(X)	X(X)	X(X)	2(2)	5(7)
GFMX 280N 930W	64	X	X(X)	X(X)	X(X)	X(X)	1(1)	3(4)
SHREVEPORT LA	34	X	X(X)	X(X)	X(X)	X(X)	1(1)	4(5)
PORT ARTHUR TX	34	X	X(X)	X(X)	X(X)	1(1)	2(3)	6(9)
PORT ARTHUR TX	50	X	X(X)	X(X)	X(X)	X(X)	1(1)	3(4)
GALVESTON TX	34	X	X(X)	X(X)	X(X)	X(X)	3(3)	5(8)
GALVESTON TX	50	X	X(X)	X(X)	X(X)	X(X)	1(1)	2(3)
HOUSTON TX	34	X	X(X)	X(X)	X(X)	X(X)	2(2)	4(6)
AUSTIN TX	34	X	X(X)	X(X)	X(X)	X(X)	1(1)	2(3)
FREEPORT TX	34	X	X(X)	X(X)	X(X)	X(X)	2(2)	5(7)
GFMX 280N 950W	34	X	X(X)	X(X)	X(X)	X(X)	3(3)	6(9)
GFMX 280N 950W	50	X	X(X)	X(X)	X(X)	X(X)	1(1)	2(3)
PORT O CONNOR	34	X	X(X)	X(X)	X(X)	X(X)	1(1)	4(5)
CORPUS CHRISTI	34	X	X(X)	X(X)	X(X)	X(X)	1(1)	2(3)
GFMX 270N 960W	34	X	X(X)	X(X)	X(X)	X(X)	2(2)	4(6)
GFMX 270N 960W	50	X	X(X)	X(X)	X(X)	X(X)	1(1)	2(3)
BROWNSVILLE TX	34	X	X(X)	X(X)	X(X)	X(X)	1(1)	2(3)
GFMX 250N 960W	34	X	X(X)	X(X)	X(X)	X(X)	2(2)	3(5)
FRONTERA MX	34	X	X(X)	X(X)	X(X)	X(X)	1(1)	2(3)
MERIDA MX	34	X	X(X)	X(X)	X(X)	3(3)	6(9)	6(15)
MERIDA MX	50	X	X(X)	X(X)	X(X)	X(X)	2(2)	3(5)
COZUMEL MX	34	X	X(X)	X(X)	X(X)	9(9)	9(18)	6(24)
COZUMEL MX	50	X	X(X)	X(X)	X(X)	3(3)	3(6)	2(8)
COZUMEL MX	64	X	X(X)	X(X)	X(X)	1(1)	2(3)	1(4)
BELIZE	34	X	X(X)	X(X)	X(X)	1(1)	2(3)	2(5)
GUANAJA	34	X	X(X)	X(X)	X(X)	2(2)	2(4)	1(5)
GRAND BAHAMA	34	X	X(X)	X(X)	2(2)	7(9)	3(12)	1(13)
GRAND BAHAMA	50	X	X(X)	X(X)	X(X)	2(2)	1(3)	X(3)
NEW PROVIDENCE	34	X	X(X)	1(1)	5(6)	7(13)	2(15)	X(15)
NEW PROVIDENCE	50	X	X(X)	X(X)	1(1)	1(2)	1(3)	1(4)
ANDROS	34	X	X(X)	3(3)	8(11)	9(20)	1(21)	1(22)

ANDROS	50	X	X(X)	X(X)	2(2)	2(4)	1(5)	X(5)
GREAT EXUMA	34	X	1(1)	4(5)	4(9)	3(12)	1(13)	X(13)
SAN SALVADOR	34	X	X(X)	2(2)	2(4)	2(6)	X(6)	X(6)
MAYAGUANA	34	X	2(2)	2(4)	1(5)	1(6)	X(6)	X(6)
GRAND TURK	34	X	2(2)	X(2)	1(3)	X(3)	X(3)	X(3)
CP SAN ANTONIO	34	X	X(X)	X(X)	3(3)	25(28)	11(39)	4(43)
CP SAN ANTONIO	50	X	X(X)	X(X)	X(X)	12(12)	6(18)	3(21)
CP SAN ANTONIO	64	X	X(X)	X(X)	X(X)	5(5)	4(9)	1(10)
HAVANA	34	X	X(X)	1(1)	13(14)	38(52)	7(59)	2(61)
HAVANA	50	X	X(X)	X(X)	3(3)	21(24)	5(29)	2(31)
HAVANA	64	X	X(X)	X(X)	2(2)	11(13)	2(15)	1(16)
ISLE OF PINES	34	X	X(X)	2(2)	17(19)	30(49)	5(54)	3(57)
ISLE OF PINES	50	X	X(X)	X(X)	5(5)	19(24)	3(27)	2(29)
ISLE OF PINES	64	X	X(X)	X(X)	2(2)	10(12)	2(14)	X(14)
CIENFUEGOS	34	X	X(X)	7(7)	29(36)	25(61)	2(63)	1(64)
CIENFUEGOS	50	X	X(X)	1(1)	9(10)	17(27)	2(29)	1(30)
CIENFUEGOS	64	X	X(X)	X(X)	3(3)	10(13)	1(14)	X(14)
CAMAGUEY	34	X	4(4)	24(28)	22(50)	8(58)	X(58)	X(58)
CAMAGUEY	50	X	X(X)	4(4)	9(13)	4(17)	X(17)	X(17)
CAMAGUEY	64	X	X(X)	X(X)	3(3)	2(5)	X(5)	X(5)
GUANTANAMO BAY	34	1	24(25)	19(44)	3(47)	X(47)	X(47)	X(47)
GUANTANAMO BAY	50	X	2(2)	5(7)	1(8)	X(8)	X(8)	X(8)
GRAND CAYMAN	34	X	X(X)	6(6)	18(24)	13(37)	3(40)	1(41)
GRAND CAYMAN	50	X	X(X)	1(1)	7(8)	9(17)	1(18)	1(19)
GRAND CAYMAN	64	X	X(X)	X(X)	3(3)	4(7)	2(9)	X(9)
MONTEGO BAY	34	X	8(8)	33(41)	11(52)	2(54)	1(55)	X(55)
MONTEGO BAY	50	X	1(1)	16(17)	8(25)	2(27)	X(27)	X(27)
MONTEGO BAY	64	X	X(X)	6(6)	3(9)	1(10)	X(10)	X(10)
KINGSTON	34	1	21(22)	27(49)	4(53)	X(53)	1(54)	X(54)
KINGSTON	50	X	4(4)	17(21)	3(24)	X(24)	X(24)	X(24)
KINGSTON	64	X	X(X)	6(6)	1(7)	X(7)	1(8)	X(8)
LES CAYES	34	16	51(67)	3(70)	X(70)	1(71)	X(71)	X(71)
LES CAYES	50	X	11(11)	2(13)	X(13)	X(13)	X(13)	X(13)
PORT-AU-PRINCE	34	13	12(25)	1(26)	1(27)	X(27)	X(27)	X(27)
CAPE BEATA	34	26	2(28)	1(29)	X(29)	X(29)	X(29)	X(29)
PUERTO PLATA	34	2	2(4)	X(4)	X(4)	X(4)	X(4)	X(4)
SANTO DOMINGO	34	2	1(3)	X(3)	X(3)	X(3)	X(3)	X(3)

- - - - WIND SPEED PROBABILITIES FOR FORECAST POSITIONS - - - -

TIME PERIODS	FROM 18Z SAT TO 06Z SUN	FROM 06Z SUN TO 18Z SUN	FROM 18Z SUN TO 06Z MON	FROM 06Z MON TO 18Z MON	FROM 18Z MON TO 18Z TUE	FROM 18Z TUE TO 18Z WED	FROM 18Z WED TO 18Z THU
FORECAST HOUR	(12)	(24)	(36)	(48)	(72)	(96)	(120)

HR POSITIONS KT

```
 12 168N  733W 34 65  14(79)   1(80)   X(80)   X(80)   X(80)   X(80)
 12 168N  733W 50 19   8(27)   X(27)   X(27)   X(27)   X(27)   X(27)
 12 168N  733W 64  2   1( 3)   X( 3)   X( 3)   X( 3)   X( 3)   X( 3)

 24 181N  754W 34  2  60(62)  13(75)   1(76)   1(77)   X(77)   X(77)
 24 181N  754W 50  X  24(24)  11(35)   1(36)   X(36)   X(36)   X(36)
 24 181N  754W 64  X   6( 6)   5(11)   1(12)   X(12)   X(12)   X(12)

 36 194N  776W 34  X  11(11)  43(54)  12(66)   3(69)   1(70)   X(70)
 36 194N  776W 50  X   1( 1)  26(27)   9(36)   2(38)   X(38)   X(38)
 36 194N  776W 64  X   X( X)  10(10)   6(16)   1(17)   1(18)   X(18)

 48 208N  798W 34  X   1( 1)  18(19)  31(50)  14(64)   2(66)   1(67)
 48 208N  798W 50  X   X( X)   4( 4)  22(26)   9(35)   2(37)   1(38)
 48 208N  798W 64  X   X( X)   1( 1)  10(11)   5(16)   2(18)   X(18)


 72 235N  835W 34  X   X( X)   X( X)   8( 8)  36(44)  11(55)   4(59)
 72 235N  835W 50  X   X( X)   X( X)   2( 2)  17(19)   7(26)   3(29)
 72 235N  835W 64  X   X( X)   X( X)   1( 1)  10(11)   5(16)   2(18)


 96 255N  860W 34  X   X( X)   X( X)   1( 1)  20(21)  20(41)   9(50)
 96 255N  860W 50  X   X( X)   X( X)   X( X)   7( 7)  12(19)   5(24)
 96 255N  860W 64  X   X( X)   X( X)   X( X)   3( 3)   6( 9)   3(12)


120 280N  870W 34  X   X( X)   X( X)   X( X)   7( 7)  18(25)  12(37)
120 280N  870W 50  X   X( X)   X( X)   X( X)   2( 2)   8(10)   7(17)
120 280N  870W 64  X   X( X)   X( X)   X( X)   1( 1)   4( 5)   3( 8)

               - - - - FORECAST INTENSITIES - - - -
FCST MAX WIND     50     60      70      80      85      95     105
FORECAST HOUR    (12)   (24)    (36)    (48)    (72)    (96)   (120)


FORECASTER BEVEN


$$
NNNN
```

NOTE: Above probability table is provided as an example depicting the format. The probabilities included do no necessarily agree with the predicted forecast positions.

Example: Subtropical Cyclone Public Advisory

WTNT31 KNHC 040255
TCPAT1
BULLETIN
SUBTROPICAL DEPRESSION ONE ADVISORY NUMBER 2
NWS TPC/NATIONAL HURRICANE CENTER MIAMI FL
11 PM EDT WED OCT 04 2000

...SUBTROPICAL DEPRESSION TURNS EAST-NORTHEAST WITH LITTLE CHANGE IN STRENGTH...
AT 11 PM EDT...0300Z...THE CENTER OF THE SUBTROPICAL DEPRESSION WAS LOCATED NEAR LATITUDE 29.8 NORTH...LONGITUDE 79.5 WEST OR ABOUT 105 MILES...165 KM...EAST-NORTHEAST OF DAYTONA BEACH FLORIDA.

THE DEPRESSION IS MOVING TOWARD THE EAST-NORTHEAST NEAR 9 MPH...15 KM/HR...AND THIS MOTION IS EXPECTED TO CONTINUE FOR THE NEXT 24 HOURS.

MAXIMUM SUSTAINED WINDS ARE NEAR 35 MPH... 55 KM/HR...WITH HIGHER GUSTS....MAINLY WELL TO THE EAST AND SOUTHEAST OF THE CENTER. SOME STRENGTHENING IS FORECAST DURING THE NEXT 24 HOURS.

THE LATEST MINIMUM CENTRAL PRESSURE REPORTED BY A NOAA HURRICANE HUNTER AIRCRAFT IS 1010 MB...29.83 INCHES.

REPEATING THE 11 PM EDT POSITION...29.8 N... 79.5 W. MOVEMENT TOWARD...EAST-NORTHEAST NEAR 9 MPH. MAXIMUM SUSTAINED WINDS... 35 MPH. MINIMUM CENTRAL PRESSURE...1010 MB.

THE NEXT ADVISORY WILL BE ISSUED BY THE NATIONAL HURRICANE CENTER AT 5 AM EDT...THURSDAY.

FORECASTER BEVEN

CHAPTER 4

GROUND RADAR OBSERVATIONS

4.1 General

Radar reports during tropical cyclones are among the most important and useful observations available to the hurricane forecaster and to those whose responsibility it is to issue warnings. It is essential that continuous radar observations be taken whenever a tropical cyclone is under surveillance by a particular radar, and that all responsible officials co-operate to ensure that the observations are distributed to hurricane centers and other concerned meteorological offices.

4.1.1 Observations

Adherence to the following procedures when radar operators observe a tropical cyclone will enhance their value to users:

(a) Scheduled observations

Transmission of complete observations at the regularly scheduled times. These observations will include data on the eye when observed;

(b) Special observations

Any observation containing an eye or centre position will be designated as a special observation, including the latitude and longitude of the eye or centre and any other appropriate remarks.

4.1.2 Definition of the eye or centre

The eye position is derived from a continuous and logical sequence of observations. Ideally, the radar-observed eye is readily apparent as a circular echo-free area surrounded by the wall cloud. The geometric centre of this echo-free area should be reported as the eye location. If the wall cloud is not completely closed it is usually still possible to derive an eye location by sketching the smallest circle or oval that can be superimposed inside the observed part of the wall cloud. When the circulation is identifiable but no wall cloud is observed, the centre of the circulation should be reported as a centre.

4.1.3 Terminology

When the central region of a storm is defined by an identifiable wall cloud, the central region should be reported as an "EYE". If the centre of circulation is recognizable, but not well defined by a wall cloud, the centre should be reported as a "CNTR". If an eye or centre is only occasionally recognizable, or if there is reason to suspect a central organization, the fix should be reported as a "PSBL EYE" or "PSBL CNTR".

Eye fixes should include a remark to indicate the degree of confidence in the fix. When the wall cloud is closed or nearly closed and the eye is symmetrical, the remark "GOOD FIX" will usually be used. When the wall cloud is poorly formed or the eye asymmetrical, the remark "POOR FIX" should be used and the remark "FAIR FIX" to express an intermediate level of confidence.

4.1.4 Use of spiral band overlays

Spiral band overlays may be used to estimate the location of the eye when the centre of a hurricane or tropical storm is over water. Normally, at least 90^{o} and preferably 180^{o} of arc of the spiral band should be observed when using spiral band overlays. Standard overlays are available with 10^{o}, 15^{o} and 20^{o} crossing angles. Since the crossing angle of a given spiral band may increase from near 0^{o} at the eye to more that 20^{o} at distances over 160 km (100 miles) from the centre, the best results can be expected by using the spiral band overlay which best fits the intermediate portion of the band (usually 45-140 km (25-75 nautical miles) from the eye). The radar-control settings should be adjusted

to enhance the definition of the spiral band when using spiral band overlays. When spiral band overlays are used, a remark specifying which crossing angle was used should be included.

4.2 USA coastal radars

These are operated by the US National Weather Service at the following sites:

Location	Radar type	Latitude	Longitude	Id.
Boston, MA	WSR-88D	41 57' N	71 08' W	BOX
Brownsville, TX	WSR-88D	25 55' N	97 29' W	BRO
Caribou, ME	WSR-88D	46 02' N	67 48' W	CBW
Charleston, SC	WSR-88D	32 54' N	80 02' W	CHS
Corpus Christi, TX	WSR-88D	27 46' N	97 30' W	CRP
Houston, TX	WSR-88D	29 28' N	95 05' W	HGX
Jacksonville, FL	WSR-88D	30 29' N	81 42' W	JAX
Key West, FL	WSR-88D	24 33' N	81 45' W	EYW
Lake Charles, LA	WSR-88D	30 07' N	93 13' W	LCH
Miami, FL	WSR-88D	25 37' N	80 25' W	AMX
Melbourne, FL	WSR-88D	28 07' N	80 39' W	MLB
Mobile, AL	WSR-88D	30 41' N	88 14' W	MOB
Morehead City, NC	WSR-88D	34 47' N	76 53' W	MHX
New York City, NY	WSR-88D	40 52' N	72 52' W	OKX
Norfolk, VA	WSR-88D	36 59' N	77 00' W	AKQ
Philadelphia, PA	WSR-88D	39 57' N	74 27' W	DIX
Portland, ME	WSR-88D	43 53' N	70 15' W	GYX
San Juan, PR	WSR-88D	18 07' N	66 05' W	TJSJ
Slidell, LA	WSR-88D	30 20' N	89 49' W	LIX
State College, PA	WSR-88D	40 55' N	78 00' W	CCX
Sterling, VA	WSR-88D	38 58' N	77 29' W	LWX
Tampa, FL	WSR-88D	27 42' N	82 24' W	TBW
Tallahassee, FL	WSR-88D	30 24' N	84 20' W	TLH
Wilmington, NC	WSR-88D	33 59' N	78 26' W	LTX
Coastal Department of Defence sites, TPC/NHC access:				
Dover AFB, DE	WSR-88D	38 50' N	75 26' W	DOX
Eglin AFB, FL	WSR-88D	30 34' N	85 55' W	EVX
Fort Hood, TX	WSR-88D	30 43' N	97 23' W	GRK
Fort Rucker, AL	WSR-88D	31 28' N	85 28' W	EOX
Maxwell AFB, AL	WSR-88D	32 32' N	85 47' W	MXX
Robbins AFB, GA	WSR-88D	32 40' N	83 21' W	JGX

4.3 Panama radar

Engineering Hill	WGS-84	08°58'N	79°33'W	

4.4 Bahamian radar

Nassau	EEC	25°03'N	77°28'W	MYNN

4.5 Canadian radars

Goose Bay, NL	53°17'N	60°32'W	WYR
Halifax – Gore, NS	45°5'N	63°42'W	XGO
Holyrood, NL	47°19'N	53°10'W	WTP
Marion Bridge, NS	45°56'N	60°12'W	XMB
Chipman, NB	46°13'N	65°41'W	XNC
Marble Mtn., NL	48°55'N	57°50'W	XME
Val d'Irène, QC	48°28'N	67°36'W	XAM
Landrienne, QC	48°33'N	77°48'W	XLA
Lac Castor, QC	48°34'N	70°39'W	WMB

Location	Radar type	Latitude	Longitude	Id.
McGill, QC		45°25'N	73°56'W	WMN
Villeroy, QC		46°27'N	71°54'W	WVY
King City, ON		43°57'N	79°34'W	WKR
Britt, ON		45°47'N	80°32'W	WBI
Dryden, ON		49°51'N	92°47'W	XDR
Exeter, ON		43°22'N	81°23'W	WSO
Franktown, ON		45°2'N	76°3'W	XFT
Montreal River, ON		47°14'N	84°35'W	WGJ
Thunder Bay, ON		48°51'N	89°7'W	XNI
Northeast Ont. (Cochrane), ON		49°16'N	81°47'W	XTI
Bethune, SK		50°34'N	105°10'W	XBE
Schuler, SK		50°18'N	110°11'W	XBU
Carvel, AB		53°33'N	114°8'W	WHK
Foxwarren, MN		50°32'N	101°5'W	XFW
Jimmy Lake/Cold Lake, AB		54°54'N	109°57'W	WHN
Radisson, SK		52°31'N	107°26'W	XRA
Spirit River, AB		55°41'N	119°13'W	WWW
Strathmore, AB		51°12'N	113°23'W	XSM
Woodlands, MN		50°9'N	97°46'W	XWL
Aldergrove, BC		49°0'N	122°29'W	WUJ
Victoria (Mt Sticker), BC		48°51'N	123°45'W	XSI
Mt Silver Star, BC		50°22'N	119°3'W	XSS
Prince George, BC		53°36'N	122°57'W	XPG

4.6 Caribbean Meteorological Organization network of radars

Belize*	RC-32B	17°32'N	88°18'W	MZBZ
Kingston, Jamaica	EEC doppler 10cm	18°04'N	76°51'W	MKJP
Crown Point, Tobago*	RC-32B	11°09'N	60°50'W	TTPT
Barbados*	RC-32B	13°09'N	59°37'W	TBPO

*Not in service. New radars to be instaled in 2008.

4.7 Cuban radars

Havana	MRL-5	23°IO'N	82°21'W	78325
Camaguey	MRL-5	21°25'N	77°51'W	78355
La Bajada	RC-32B	21°55'N	84°28'W	78311
Punta del Este	RC-32B	21°34'N	82°33'W	78324
Gran Piedra	RC-32B	20°00'N	75°38'W	78366
Pico San Juan	MRL-5	21°59'N	80°10'W	78336
Pilon	MRL-5	19°55'N	77°25'W	78379

4.8 Dominican Republic radar

Punta Cana	TDR-4350 Doppler	18°31'N	68°24'W	MDPC 78479

4.9 French radars

Le Moule, Guadeloupe	GEMA-TRONIKS(10 cm)	16°19'N	61°20'W	TFFR
Kourou French Guiana	EEC 5.6 cm doppler	04°50'N	52°22'W	SOCA
Diamant Martinique	GEMA-TRONIKS (10 cm) Doppler	14 ° 30'N	61 ° 01'W	TFFF

4.10 Mexican radars

Location	Radar type	Latitude	Longitude	Id.
Tampico, Tamaulipas	EEC	22°15'N	97°52'W	TAM
Guasave, Sinaloa	EEC	25°34'N	108°27'W	SIN
Los Cabos, Baja California Sur	EEC	22°22'N	109°55'W	BCS
El Palmito, Durango[1]	EEC	25°45'N	104°54'W	DGO
Acapulco, Guerrero	EEC	16°45'N	99°45'W	GRO
Sabancuy, Campeche	EEC*	18º56'N	91°05'W	CMP
Cancún, Quintana Roo	EEC*	21°01'N	86°51'W	QRO
Cerro de la Catedral, Estado de México	Ericsson	19°33'N	109°55'W	MEX
Cuyutlán, Colima	Ericsson	18°56'N	104°18'W	COL
Puerto Angel, Oaxaca	Ericsson	15°39'N	96°30'W	OAX
Alvarado, Veracruz	Ericsson	18°43'N	95°37'W	VER
Queretaro Qro**	5.6cm doppler	20°46'N	100°'32'W	

* Equipo de computo y controlador Enterprise; Antena y Pedestal Ericsson
** No operodo per el SMU / Not operated by the SMN

4.11 Netherlands Antilles and Aruba radars

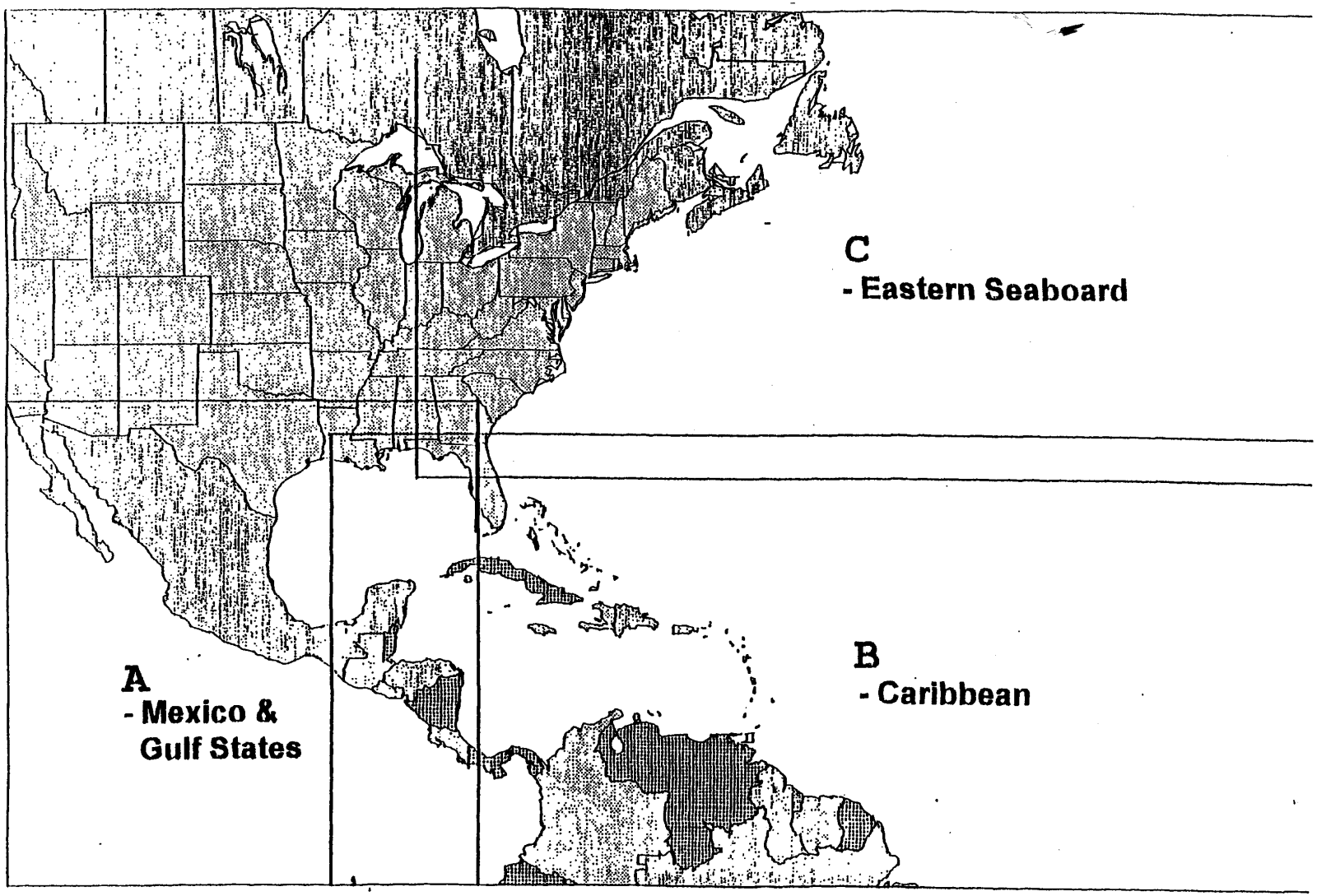
Hato Airport, Curaçao	WSR-74S 10 cm/250 mi	12°l0'N	68°56'W	TNCC
*Juliana Airport, St. Maarten	WSR-74S 10 cm/250 mi	18°03'N	63°04'W	TNCM

* will return to service in June 2005

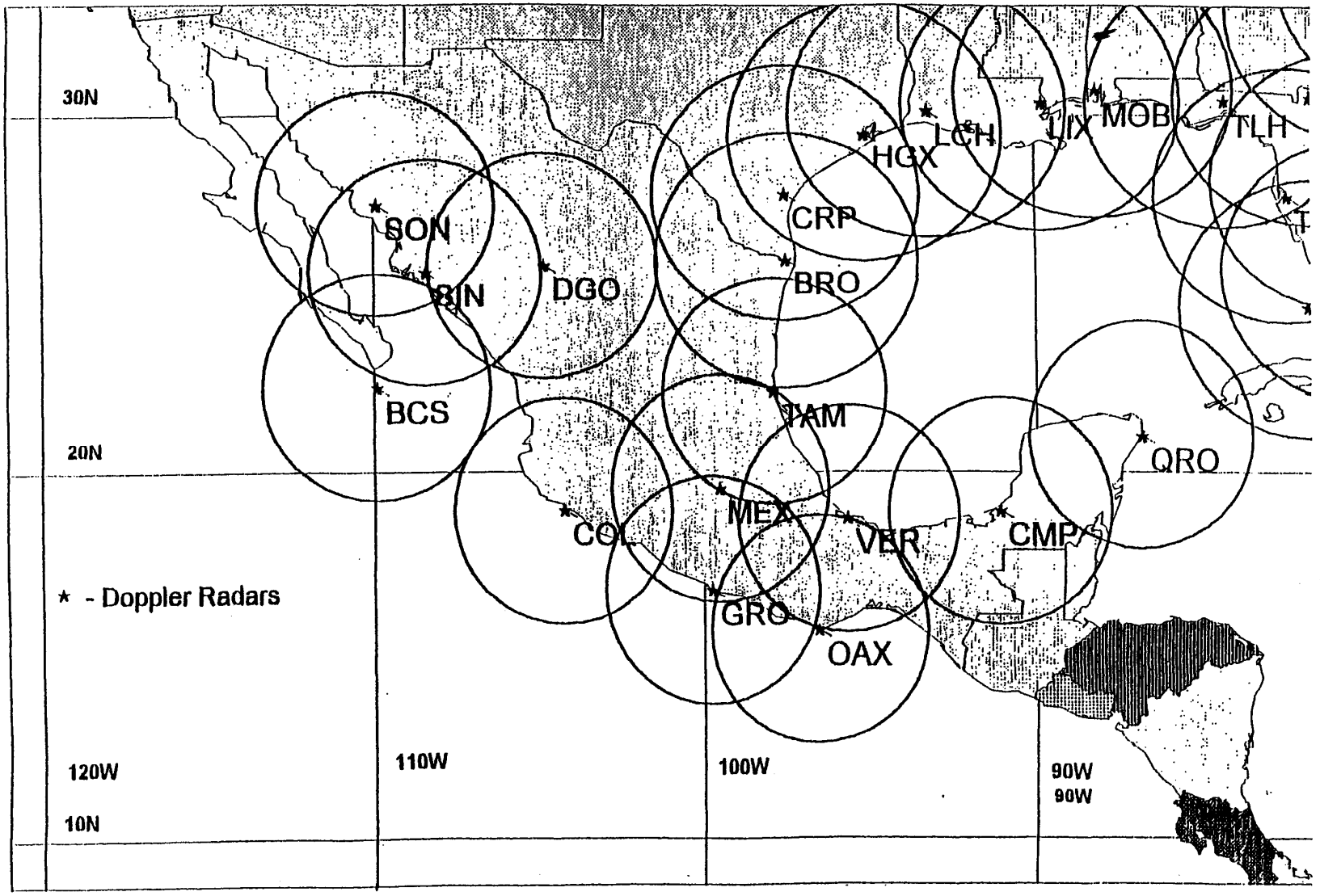
4.12 Bermuda

Bermuda Intl. Airport	10 cm/250 mi	32º18´N	64º42´W	TXKF

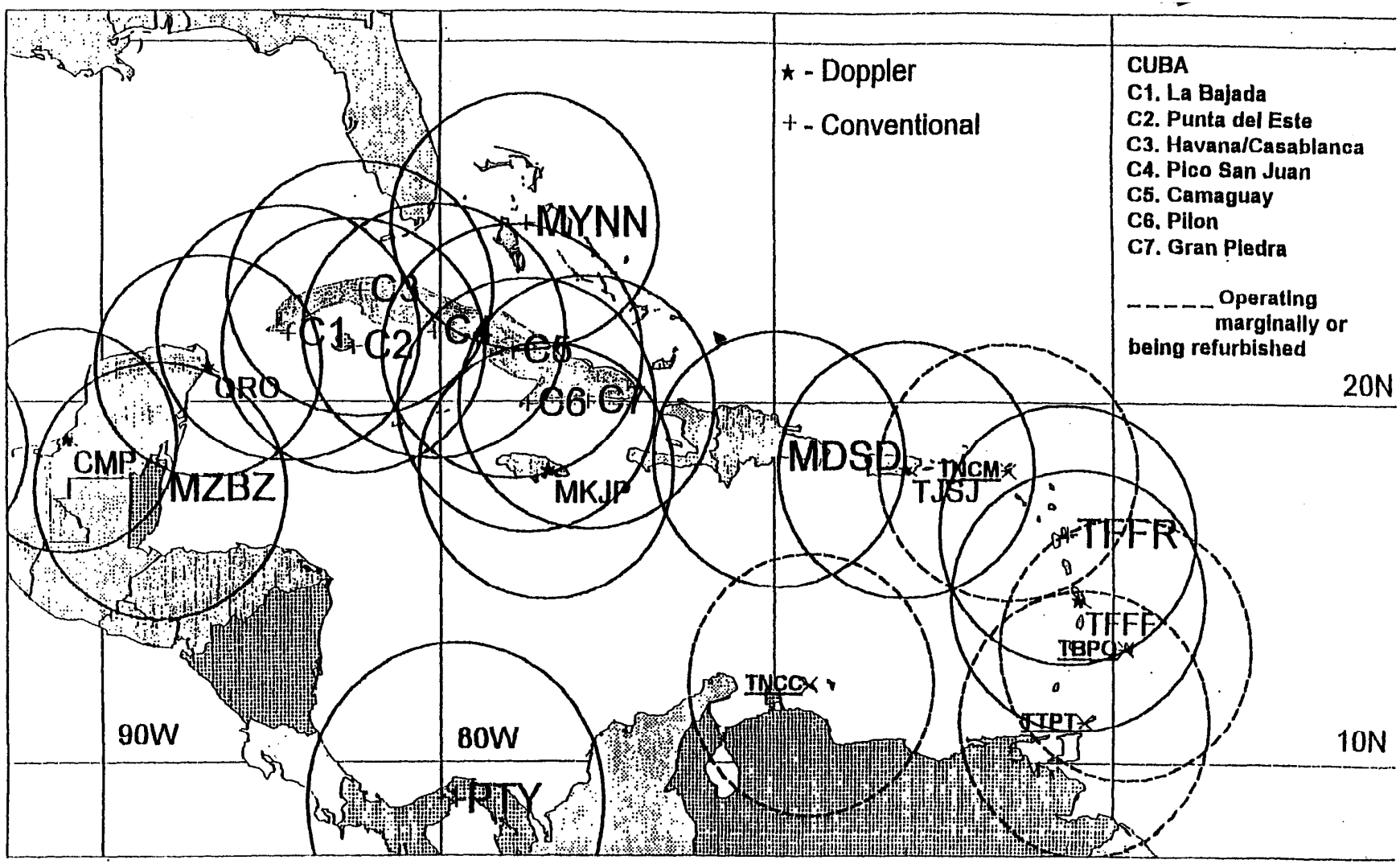
4.13 **Section map for the coastal radar coverage in RA IV**



4.13.1 **Coastal radar coverage (Doppler) - map A**

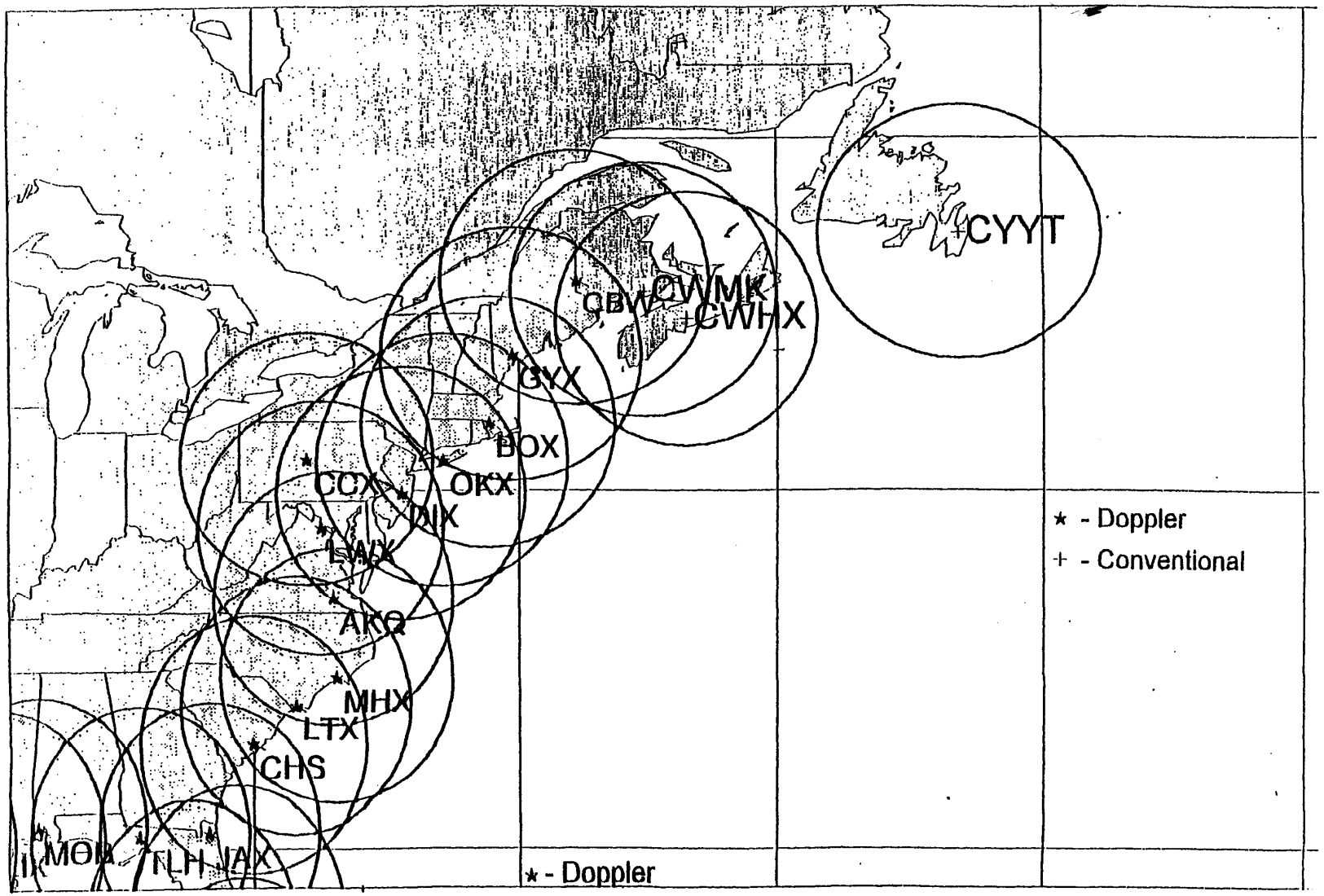


4.13.2 **Coastal radar coverage - map B**



4.13.3

Coastal radar coverage - map C
(not yet updated - 2000 Edition)



CHAPTER 5

SATELLITE SURVEILLANCE

5.1 Operational Meteorological Satellites

Latest detailed information on the status of operational meteorological satellites is available from http://www.wmo.int/pages/prog/sat/Satellites.html

5.2 Tropical Analysis and Forecast Branch Products

(a) Support concept

GOES imagery in support of the hurricane warning services provided by direct downlink to RSMC Miami - Tropical Prediction/Hurricane Center is distributed by the Central Data Distribution Facility at Marlow Heights, Maryland, to Honolulu and Washington.

(b) Station contact

TPC/NHC satellite meteorologists can be contacted as follows:
(i) Miami - 24 hours a day at (305) 229-4425.

(c) Satellite Products: Issuance Times and Geographic Areas

Tropical Weather Discussion

Heading	Issuance times	Oceanic area
AXNT20 KNHC	0005Z, 0605Z, 1205Z, 1805Z	Gulf of Mexico, Caribbean Sea, and Atlantic South of 32°N to equator
AXPZ20 KNHC	0135Z, 0735Z, 1335Z, 1935Z	Pacific South of 32°N to equator and east of 140°W

Tropical Disturbance Rainfall Estimate

Heading	Issuance times	Oceanic area
TCCA21 KNHC	6 Hourly as needed	Caribbean East of 67°W
TCCA22 KNHC	6 Hourly as needed	Caribbean between 67°W and a 22°N 81°W - 9°N 77°W line
TCCA23 KNHC	6 Hourly as needed	Caribbean West of 22°N 81°W – 9°N 77°W line and Mexico (Atlantic and Pacific Coasts)

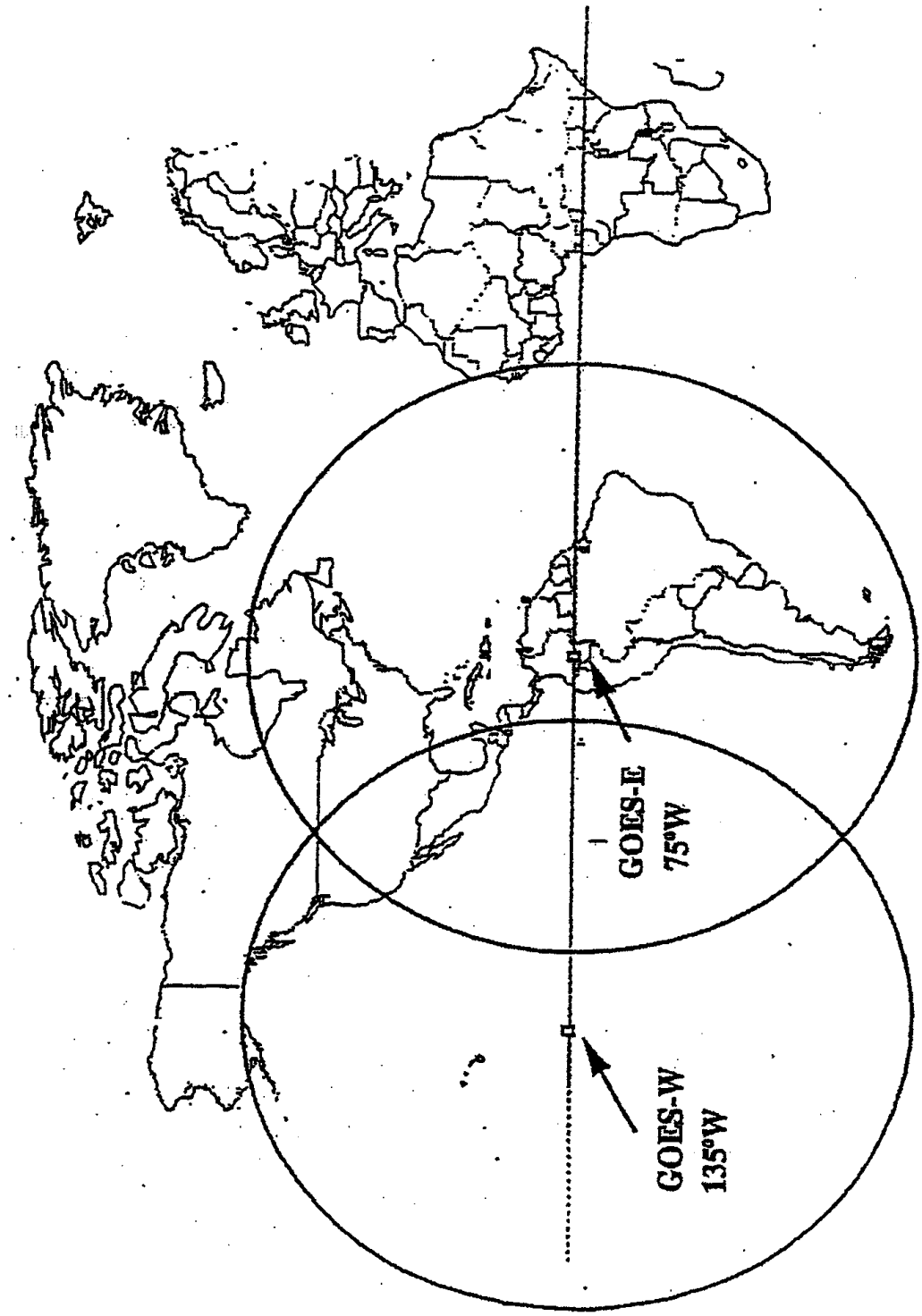
5.3 Tropical Numerical Guidance Interpretation Message

The National Centers for Environmental Prediction Tropical Desk in Washington issues a Tropical Numerical Guidance Interpretation Message once a day about 1900 UTC under the header FACA20 KWBC. The message includes a description of the initial model analysis, model comparison and a prognostic discussion.

5.4 NESDIS Satellite Analysis Branch

The SAB operates 24 hours a day to provide GOES and NOAA satellite data support to the National Weather Service forecast offices and the National Centers for Environmental Prediction (NCEP).

GOES-East and GOES-West COVERAGE



A T T A C H M E N T 5 A

OPERATIONAL METEOROLOGICAL SATELLITE INFORMATION FOR REGION IV

1. The space-based component of the GOS is comprised of three types of satellites: operational meteorological polar-orbiting, operational geostationary satellites and environmental R&D satellites.

2. With regard to operational meteorological satellites, both polar-orbiting and geostationary, the present operational meteorological satellites include the following geostationary and polar-orbiting satellites: GOES-10, GOES-11, GOES-12, NOAA-17 and NOAA-18 operated by the United States; MTSAT-1R operated by Japan; Meteosat-7, Meteosat-9 and MetOp operated by EUMETSAT; FY-2C, FY-2D and FY-1D operated by China. Additional satellites in orbit or in commissioning include GOES-13, NOAA-15 and NOAA-16 operated by the United States, Meteosat-6 and Meteosat-8 operated by EUMETSAT, MTSAT-2 operated by Japan,.

3. With regard to R&D satellites, the present constellation includes namely NASA's Aqua, Terra, TRMM, QuikSCAT, ESA's ENVISAT, and ERS-2 missions, CNSA's HY-1B, satellite, NASA-CNES's JASON-1and NASA-CSA's CloudSat.

Details for the status of operational space segment available in RA IV are given below.

Polar-orbiting satellites

CMA Status Report

FY-1D

4. The polar orbiting meteorological satellite FY-1D was launched on 15 May 2002 With a 2-year's planned lifetime, but is still operational. It carries a multi-channel visible and infrared scan radiometer (MVISR).

NOAA/NESDIS Status Report

NOAA-17

5. NOAA-17, was launched on 24 June 2002. As the primary spacecraft on a morning orbit, , it operates with a 10:20 a.m. descending node. Its AMSU-A1 microwave temperature sounder failed in 2003 but other imaging and sounding instruments are operational.

NOAA-18

6. NOAA-18 was launched in May 2005. As the primary spacecraft such, it operates in an orbit with a 1:55 p.m. ascending node and utilizes a similar set of instruments as NOAA-17 except the Microwave Humidity Sounder (MHS) replacing AMSU-B.

EUMETSAT Report

MetOp-A

MetOp-A, launched in October 2006 is operated on a morning orbit with a 09:30 descending node. It is expected to become the new morning primary spacecraft after NOAA-17 once commissioning will be completed. Its instruments include namely an Infrared Atmospheric Sounding Interferometer (IASI), an MHS, an advanced scatterometer (ASCAT) as well as NOAA provided instruments for VIS/IR imaging and sounding. At the time of writing this report, the instrument commissioning process was well advanced and global data were being disseminated but the direct broadcast service was interrupted by an on-board anomaly

Geostationary satellites

NOAA/NESDIS Status Report

7. The current Geostationary Operational Environmental Satellites (GOES) are three-axis stabilized spacecraft in geosynchronous orbits. The current primary satellites, GOES-11 and GOES-12, are stationed over the east and west coasts of the United States at 135°W and 75°W respectively. These satellites are used to provide simultaneous images and soundings of the Western Hemisphere. GOES-13 is stored in orbit at 89.5° W and ready for the replacement of the older operational spacecraft if necessary. In addition, GOES-10 has been relocated at 60°W in order to provide additional and more frequent coverage of Central and South-America.

GOES-12

8. GOES-12, the operational East Coast satellite at 75°W, was successfully launched on 23 July 2001. It carries a new instrument called the Solar X-ray Imager (SXI), which is capable of measuring and imaging the Sun in four X-ray energy bands.

GOES-11

9. The GOES-11 spacecraft was successfully launched on 3 May 2000. GOES-11 is the primary spacecraft in GOES-West position over the Pacific.

GOES-10

GOES-10 , launched on 25 April 1997, initially GOES-10 suffered a near-fatal anomaly when its solar array stopped moving, either due to a gear train jam or due to an external jam. The anomaly was studied over a period of months, and it was decided to invert the satellite (180 degrees in relation to the Earth) and run the array drive in the reverse direction to track the sun. This operational strategy was coupled with extensive ground and spacecraft software modifications to allow the imagery to look "non-flipped" to the users. Once the GOES-East and West positions were filled by GOES-11 and -12, and after the successful launch of GOES-13, it became possible for NOAA to relocate GOES-10 to 60°W and use it in order to provide an essential support through frequent coverage of Central and South-America.

JMA's Report

MTSAT

MTSAT-1R, launched on 26 February 2005, is operated at 140°E. In addition to the direct broadcast within its field of view, its high resolution data are made available in near-real time via Internet by JMA.

EUMETSAT's Report

Meteosat-9

Meteosat-9, launched in December 2005, is the operational spacecraft located at 0°. Its visible and infrared imager data are disseminated by EUMETSAT over Regions III and IV via the DVB-S System in C-band EUMETCast.

CHAPTER 6

AIRCRAFT RECONNAISSANCE

6.1 General

The tropical cyclone reconnaissance system of the USA will normally be prepared to generate up to five reconnaissance aircraft sorties per day in the Atlantic when a storm is within 500 nm of landfall and west of 55°W. Notification of requirements must generally be levied by RSMC Miami - Hurricane Center early enough to allow 16 hours plus en route flying time to ensure that the aircraft will reach the area on time. In the Eastern Pacific, reconnaissance missions may be tasked when necessary to carry out warning responsibilities.

The USA has a Gulfstream jet aircraft for determining the environmental conditions on the periphery of tropical cyclones that threaten landfall. The environmental conditions will be determined with GPS dropwindsondes. The flight pattern will be tailored to the storm situation on a case-by-case basis.

To assure the uninterrupted flow of operational reconnaissance data, all Member countries hosting or conducting research or operational flights into tropical cyclones in the RA IV Region will coordinate such activities. The RSMC Miami - Hurricane Center will serve as the focus for this coordination. Whenever possible, this co-ordination will be accomplished in advance by telephone. All other means of contact will be utilized, including inflight aircraft to aircraft radio/voice contacts, to assure proper co-ordination.

6.2 Aircraft reconnaissance data

6.2.1 Parameter requirements

Data needs in order of priority are:

(a) Geographical position of vortex centre (surface centre, if known);

(b) Central sea-level pressure (by dropsonde or extrapolation from within 1,500 ft. of sea surface);

(c) Minimum 700 hPa height (if available);

(d) Wind-profile data (surface and flight level);

(e) Temperature (flight level);

(f) Sea-surface temperature;

(g) Dewpoint temperature (flight level);

(h) Height of eye wall.

6.2.2 Meteorological instrument capabilities

Required aircraft reconnaissance data instrument capabilities are as follows:

(a) Data positions - within 18.5 km (10 naut. mls.);

(b) Sea-level pressure - $\pm$ 2 hPa;

(c) Pressure heights - $\pm$ 10 m;

(d) Temperatures (including dewpoint and sea-surface temperatures (SST)) - $\pm$ 0.5^{o};

(e) Winds - speed $\pm$ 9 km h^{-1} ($\pm$ 5 kn); direction $\pm$ 10^{o}.

6.3 Mission identifier

Each reconnaissance report will include the mission identifier as the opening text of the message. Regular weather and hurricane reconnaissance messages will include the five digit agency/aircraft indicator followed by the 5 digit assigned mission-system indicator. Elements of the mission identifier are:

Agency - aircraft indicator - mission indicator

Agency - aircraft number	# of missions this system (two digits)	TD # or XX if not at least a TD (two digits)	Alpha letter showing area A-Atlantic E-East Pacific C-Central Pacific	Storm name or words CYCLONE or DISTURB

AF plus last three digits of tail #

NOAA plus last digit of registration #

Examples:

AF985 01XXA DISTURB (lst mission on a disturbance in the Atlantic) AF987 0503E CYCLONE (5th mission, depression #3, in the Eastern Pacific) NOAA2 0701C Agnes (7^{th} mission on TD #1 which was named Agnes, Central Pacific)

6.4 Observation numbering and content

(a) The first weather observation will have appended as remarks the ICAO four-letter departure station identifier, time of departure and estimated time of arrival (ETA) at the co-ordinates or storm. It will be transmitted as soon as possible after take-off.

AF966 0308 EMMY OB I
97779 TEXT...DPTD KBIX AT 102100Z ETA
31.5N 75.0W AT 110015Z;

(b) All observations on tropical cyclone missions requested by Hurricane Centres will be numbered sequentially from the first to the last.

6.5 Aerial reconnaissance weather encoding and reporting

6.5.1 Horizontal and vertical observations

Horizontal meteorological observations and vertical observations will be coded and transmitted in RECCO code and TEMP DROP code, respectively. En route RECCO observations will be taken and transmitted at least hourly until the aircraft is within 370 km (200 naut. mls.) of the centre of the storm at which time observation frequency will become at least every 30 minutes.

6.5.2 Vortex data

All observed vortex fix information will be included in the detailed vortex data message (see Attachment 6A) prepared and transmitted for all scheduled fixes and in all detailed vortex data messages prepared and transmitted on an "as required" basis for intermediate non-scheduled fixes. An abbreviated vortex data message (Attachment 6A, items A-H) may be sent in lieu of the detailed message for intermediate fixes. These messages should be transmitted as soon as possible.

6.5.3 Coded reports

Other than vortex data and supplementary vortex data messages, teletype aerial reconnaissance observation messages will have the following format:

$9xxx9\ GGggi_d\ YQL_aL_aL_a\ L_oL_oL_oBf_c\ h_ah_ah_ad_td_a\ ddfff\ TTT_dT_dw\ m_wjHHH$

4ddff and $9V_iT_wT_wT_w$ 95559 $GGggi_d$ $YQL_aL_aL_a$ $L_oL_oL_oBf_c$ ddfff TTT_dT_dw

m_wjHHH 4ddff plus $9V_iT_wT_wT_w$

Symbol identification

9xxx9 - RECCO indicator group specifying type of observation

xxx = 222 - Basic observation without radar data

555 - Intermediate observation

777 - Basic observation with radar data

GGgg - Time of observation (hours and minutes -UTC)

i_d - Humidity indicator (0-no humidity; 4-^oC dewpoint)

Y - Day of week (Sun-1)

Q - Octant of the globe (0- 0^o - 90^{o}W N.H.)
(1-90^o - 180^{o}W N.H.)

$L_aL_aL_a$ - Latitude degrees and tenths
$L_oL_oL_o$ - Longitude degrees and tenths

B - Turbulence (range 0 (none) to 9 (frequent, severe))

fc - Cloud amount (range 0 (less than 1/8) to 9 (in clouds all the time))

$h_ah_ah_a$ - Absolute altitude of aircraft (decametres)

d_t - Type of wind (range 0 (spot wind) to 9 (averaged over more than 740 km (400 naut. mls.))

d_a - Reliability of wind (range 0 (90 % to 100 % reliable) to 7 (no reliability) and 8 (no wind))

dd - Wind direction at flight level (tens of degrees true)

fff - Wind speed at flight level (knots)

TT - Temperature (whole degrees C; 50 added to temperature for negative temperatures)

T_dT_d - Dewpoint temperature (whole degrees C), (when // with i_d;=;4 indicates relative humidity less than 10 %)

w - Present weather (0 (clear), 4 (thick dust or haze), 5 (drizzle), 6 (rain), 8 (showers), 9 (thunderstorms))

m_w - Remarks on weather (range 0 (light intermittent) to 5 (heavy continuous) and 6 (with rain))

j - Index to level ((0 (sea-level pressure in whole hectopascals (hPa), thousands omitted: 1 - 1,000 hPa surface height in geopotential metres, 500 added to HHH if negative; 2 - 850 hPa and 3 - 700 hPa height in gpm, thousands omitted; 4 - 500 hPa, 5 - 400 hPa and 6 - 300 hPa height in geopotential decametres; 7 - 250 hPa height in geopotential decametres, tens of thousands omitted; 8 - D - value in geopotential decametres, 500 added to HHH if negative; 9 - no absolute altitude available)

4 - Group indicator for surface wind direction and speed

V_i - In-flight visibility (1 (0 to 1.8 km) (0 to 1 naut. ml.); 2 (greater than 1.8 km) (1 naut. ml.), but not exceeding 5.5 km (3 naut. mls.); 3 (greater than 5.5 km (3 naut. mls.))

$T_wT_wT_w$ - Sea-surface temperature (degrees and tenths ^oC)

ABBREVIATED/DETAILED VORTEX DATA MESSAGE

DATE	SCHEDULED FIX TIME	AIRCRAFT NUMBER	ARWO
WX MISSION IDENTIFICATION			OB

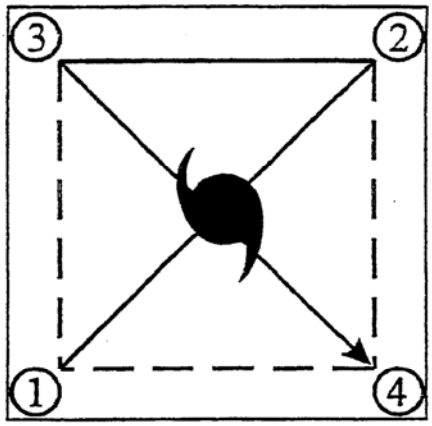
VORTEX DATA MESSAGE

A		Z	DATE AND TIME OF FIX
B	DEG MIN N S		LATITUDE OF VORTEX FIX
	DEG MIN E W		LONGITUDE OF VORTEX FIX
C	MB	M	MINIMUM HEIGHT AT STANDARD LEVEL
D		KT	ESTIMATE OF MAXIMUM SURFACE WIND OBSERVED
E	DEG	NM	BEARING AND RANGE FROM CENTER OF MAXIMUM SURFACE WIND
F	DEG	KT	MAXIMUM FLIGHT LEVEL WIND NEAR CENTER
G	DEG	NM	BEARING AND RANGE FROM CENTER OF MAXIMUM FLIGHT LEVEL WIND
H		MB	MINIMUM SEA LEVEL PRESSURE COMPUTED FROM DROPSONDE OR EXTRAPOLATED FROM FLIGHT LEVEL. IF EXTRAPOLATED, CLARIFY IN REMARKS.
I	C/	M	MAXIMUM FLIGHT LEVEL TEMP/PRESSURE ALTITUDE OUTSIDE EYE
J	C/	M	MAXIMUM FLIGHT LEVEL TEMP/PRESSURE ALTITUDE INSIDE EYE
K	C/	C	DEWPOINT TEMP/SEA SURFACE TEMP INSIDE EYE
L			EYE CHARACTER: Closed wall, poorly defined, open SW, etc.
M			EYE SHAPE/ORIENTATION/DIAMETER. Code eye shape as: C -Circular; CO - Concentric; E-Elliptical. Transmit orientation of major axis in tens of degree, i.e., 01-010 to 190; 17-170 to 350. Transmit diameter in nautical miles. *Examples*: C8 - Circular eye 8 miles in diameter. EO9/15/5 - Elliptical eye, major axis 090-270, length of major axis 15 NM, length of minor axis 5NM. CO8-14 - Concentric eye, diameter inner eye 8 NM, outer eye 14 NM.
N	/		FIX DETERMINED BY/FIX LEVEL. FIX DETERMINED BY: 1 - Penetration; 2 - Radar; 3 - Wind; 4 - Pressure; 5 - Temperature. FIX LEVEL (Indicate surface center if visible; indicate both surface and flight level centers only when same): 0 - Surface; 1 - 1500ft; 9-925mb; 8 - 850 mb; 7 - 700 mb; 5 - 500 mb; 4 - 400 mb; 3 - 300 mb; 2 - 200 mb; NA - Other.
O	/	NM	NAVIGATION FIX ACCURACY/METEOROLOGICAL ACCURACY
P	REMARKS		

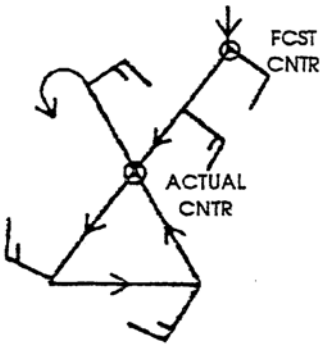
MAX FL WIND_____KT_____QUAD_____Z
SLP EXTRAP FROM (1500 FT/ 925 MB/ 850 MB/ DROPSONDE)
SFC CNTR_____/_____NM FROM FL CNTR
MAX FL TEMP _____C_____/_____NM FROM FL CNTR

INSTRUCTIONS: Items A through G (and H when extrapolated) are transmitted from the aircraft immediately following the fix. The remainder of the message is transmitted as soon as available for scheduled fixes and at the ARWO's discretion for unscheduled (intermediate) fixes.

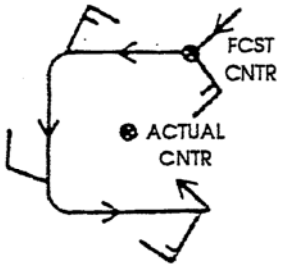
OPERATIONAL HURRICANE RECONNAISSANCE FLIGHT PATTERN



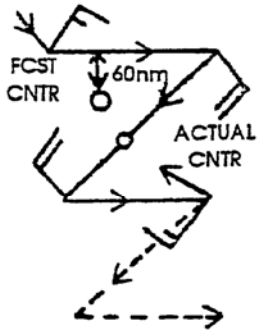
Flight pattern ALPHA



X-PATTERN



BOX PATTERN



DELTA PATTERN

CHAPTER 7

SURFACE AND UPPER-AIR OBSERVATIONS

7.1 General

In addition to regularly scheduled surface and upper-air observations, additional observations are required at key locations when a tropical cyclone is an imminent threat to Members. These requests for additional observations are normally initiated by the RSMC Miami - Hurricane Center. The frequency of special observations depends on the individual tropical cyclone situation. Additional observations may require 24-hour staffing of a station. Requests will normally be made by telephone to the relevant NMC.

7.2 Surface observations

Additional surface observations at one- three- or six-hourly intervals may be requested from implemented stations in Region IV. A list of key stations is given in Attachment 7 A.

7.3 Upper-air observations

Additional upper-air observations at six hourly intervals may be requested from implemented stations in Region IV. A list of key stations is given in Attachment 7 B.

7.4 Moored buoys

Information on the operational status of moored buoys may be required. This information is provided for those located in the North Atlantic Ocean, Caribbean Sea and Gulf of Mexico in Attachment 7 C.

7.5 Post-storm country reports

A post-storm country report should be issued by National Meteorological Services in RA IV, based on the format as given in Attachment 7 D and sent to the RSMC/NHC Miami (max.mayfield@noaa.gov, lixion.a.avila@noaa.gov) preferably within 15 days after being affected, directly or indirectly, by any tropical depression, tropical storm or hurricane.

STATIONS FROM WHICH ADDITIONAL SURFACE OBSERVATIONS MAY BE REQUESTED DURING TROPICAL CYCLONES

Country	Station name	Block and station number	Int. location indicators for addressed messages
Antigua	Coolidge Field (Aux. AFB)	78861	TAPA
	V.C. Bird Airport	78862	TAPA
Bahamas	Freeport, Grand Bahama	78062	MYGF
	Green Turtle Cay, Abaco	78066	
	Alice Town, Bimini	78070	MYBS
	Nassau, New Providence	78073	MYNN
	Dunmore Town, Harbour Island, Eleuthera	78077	MYER
	Kemps Bay, Andros	78086	
	The Bight, Cat Island	78087	
	Cockburn Town, San Salvador	78088	MYSM
	George Town, Exuma	78092	MYEG
	Clarence Town, Long Island	78095	
	Duncan Town, Ragged Island	78101	
	Church Grove, Crooked Island	78104	
	Abraham Bay, Mayaguana	78109	MYMM
	Matthew Town, Inagua	78121	MYIG
Barbados	Grantley Adams	78954	TBPB
Belize	Philip Goldson Int'l Airport	78583	MZBZ
Bermuda	International Airport	78016	TXKF
Canada	Halifax International, NS	71395	CYHZ
	Sable Island, NS	71600	CWSA
	Shearwater, NS	71601	CYAW
	Sydney, NS	71707	CYQY
	Yarmouth, NS	71603	CYQI
	Fredericton, NB	71700	CYFC
	Gagetown, NB	71701	CYCX
	Moncton, NB	71705	CYQM
	Saint John, NB	71609	CYSJ

Country	Station name	Block and station number	Int. location indicators for addressed messages
Canada (continued)	Charlottetown, PEI	71706	CYYG
	Burgeo, Nfld	71194	CWBD
	St. John's/Torbay, Nfld	71801	CYYT
	Stephenville, Nfld	71815	CYJT
Cayman Island	Grand Cayman Owen Roberts Intl.	78384	MWCR
Colombia	San Andres (Isla)	80001	SKSP
	Providencia (Isla)	80002	SKPV
	Admirante Padilla	80035	SKRH
Costa Rica	San Jose/Juan Santamaria	78762	MROC
	Puerto Limon	78767	MRLM
Cuba	Cabo de San Antonio	78310	
	Santa Lucia	78312	
	Isabel Rubio	78313	
	Pinar del Rio	78315	
	Paso Real de San Diego	78317	
	Bahia Honda	78318	
	Güira de Melena	78320	
	La Fé	78321	
	Batabano	78322	
	Punta del Este	78324	
	Casablanca	78325	
	Union de Reyes	78327	
	Varadero	78328	
	Colon	78332	
	Playa Giron	78333	
	Sagua la Grande	78338	
	Cayo Coco	78339	
	Bainoa	78340	
	Yabu	78343	
	Cantarrana	78344	
	Jucaro	78345	
	Ciego de Avila	78346	
	Caibarién	78348	

Country	Station name	Block and station number	Int. location indicators for addressed messages
Cuba (continued)	Sancti Spiritus	78349	
	Sta. Cruz del Sur	78351	
	Nuevitas	78353	
	Camaguey	78355	
	Victoria de Las Tunas	78357	
	Puerto Padre	78358	
	Manzanillo	78359	
	Cabo Cruz	78360	
	Contramaestre	78363	
	Santiago de Cuba	78364	
	Punta Lucrecia	78365	
	Gran Piedra	78366	
	Guantánamo	78368	
	Punta Maisi	78369	
	Santiago de Las Vegas	78373	
Dominica	Melville Hall	78905	TDPD
	Canefield	78906	TDCF
Dominican Republic	Monte Cristi	78451	MDMC
	Puerto Plata Int'l Airport	78458	MDPP
	Santiago	78460	MDST
	Arroyo Barril	78466	MDAB
	Sabana de la Mar	78467	MDSM
	San Juan de la Maguana	78470	MDSJ
	Bayaguana	78473	
	Punta Cana Int'l Airport	78478	MDPC
	Jimani	78480	
	Barahona	78482	MDBH
	Aeropuerto Int'l Joaquin Balaguer	78484	MDJB
	Las Americas Int'l Airport	78485	MDLA
	Santo Domingo	78486	MDSD
El Salvador	Puerto Acajutla	78650	MSAC
	Ilopango	78663	MSSS

Country	Station name	Block and station number	Int. location indicators for addressed messages
France.. Guadeloupe			
	Le Raizet	78897	TFFR
Martinique			
	Le Lamentin	78925	TFFF
Grenada	Pt. Salines	78958	TGPY
Guatemala	Flores	78615	MGFL
	Puerto Barrios	78637	MGPB
	Guatemala	78641	MGGT
	San Jose	78647	MGSJ
	Huehuetenango	78627	MGHP
Haiti	Cap Haitien	78409	
	Port-au-Prince	78439	MTPP
	Cayes	78447	MTCH
Honduras			
	Amapala	78700	MHAM
	Guanaja	78701	MHNJ
	Roatan	78703	MHRO
	Trujillo	78704	MHTR
	La Ceiba/Goloson	78705	MHLC
	Tela	78706	MHTE
	Yoro	78707	MHYR
	La Mesa/San Pedro Sula	78708	MHLM
	Puerto Lempira	78711	MHPL
	Catacamas	78714	MHCA
	Santa Rosa de Copan	78717	MHSR
	Nueva Ocotepeque	78718	MHNO
	La Esperanza	78719	MHLE
	Tegucigalpa	78720	MHTG
	Choluteca	78724	MHCH
Jamaica	Montego Bay	78388	MKJS
	Kingston	78397	MKJP
	Morant Point	78399	

Country	Station name	Block and station number	Int. location indicators for addressed messages
Mexico	San Felipe, B.C.	76055	
(on the Pacific)	Santa Rosalia, B.C.S.	76253	
	Loreto, B.C.S.	76305	
	Empalme, Son.	76256	
	La Paz, B.C.	76405	
	Mazatlan, Sin.	76458	
	Manzanillo, Col.	76654	
	Isla Socorro, Col.	76723	
	Acapulco, Gro.	76805	
	Salina Cruz, Oax.	76833	
	Tapachula. Chis.	76904	
Mexico	Tampico, Tamps.	76548	
(on the Gulf	Tuxpan, Ver.	76640	
of Mexico)	Merida, Yuc.	76644	
	Veracruz, Ver.	76692	
	Campeche, Camp.	76695	
	Coatzacoalcos, Ver.	76741	
Mexico	Cozumel, Q. Roo	76648	
(on the	Chetumal, Q. Roo	76750	
Caribbean)			
(continental	Monterrey, N.L.	76394	
locations)	Felipe Carrillo Puerto, Q. Roo	76698	
	Mexico, D.F.	76679	
Neth.	Juliana Airport, St. Maarten	78866	TNCM
Antilles and	Roosevelt Airport, St. Eustatius	78873	TNCE
Aruba	Queen Beatrix Airport, Aruba	78982	TNCA
	Hato Airport, Curaçao	78988	TNCC
	Flamingo Airport, Bonaire	78990	TNCB

Country	Station name	Block and station number	Int. location indicators for addressed messages
Nicaragua	Puerto Cabezas	78730	MNPC
	Bluefields	78745	MNBL
	Managua	78741	MNMG
	Rivas	78733	MNRS
	Jinotega	78734	MNJG
	Juigalpa	78735	MNJU
	Chinandega	78739	MNCH
Panama	Tocumen	78792	MPTO
	David	78793	MPDA
	Santiago	78795	MPSA
	Changonioca		MPCH
	Albrook		MPMG
St. Kitts/ Nevis	Robert Bradshaw Airport	78858	TKPK
St. Lucia	George F. L. Charles	78947	TLPC
	Hewanorra International Airport	78948	TLPL
St Vincent	Arnos Vale	78951	TVSV
Trinidad and Tobago	Scarborough/Crown Point Airport	78962	TTCP
	Piarco	78970	TTPP
Turks and Caicos Islands	Grand Turk, Auxiliary AFB	78118	MBJT
	Grand Turk	78119	
USA	Mainland coastal stations*		
Puerto RicoSan Juan		78526	TJSJ
	Ponce		TJPS
	Mayaguez		TJMZ
	Aguadilla		TJBQ
	Ceiba (Rossevelt Road/Navy)	78535	TJNR
Cuba	Guantanamo	78367	
U.S. Virgin Islands	Saint Thomas		TIST
	Saint Croix		TISX
Venezuela	Aves Island	80400	

STATIONS FROM WHICH ADDITIONAL UPPER-AIR OBSERVATIONS MAY BE REQUESTED DURING TROPICAL CYCLONES

Country	Station name	Block and station number	Int. location indicators for addressed messages
Antigua	Coolidge Field (Aux. AFB)*	78861	TAPA
Bahamas	Nassau	78073	MYNN
Barbados	Grantley Adams	78954	TBPB
Belize	Philip Goldson Int'l Airport	78583	MZBZ
Bermuda	International Airport	78016	TXKF
Canada	Sable Island, NS	71600	CWSA
	Gagetown, NB	71701	CYCX
	St. John's/Torbay, Nfld.	71801	CYYT
	Stephenville, Nfld.	71815	CZJT
	Yarmouth, NS	71603	CYQI
Cayman Islands	Georgetown, Grand Cayman	78384	MWCR
Colombia	San Andres (Isla)	80001	SKSP
	Riohacha/Admirante Padilla	80035	SKRH
Costa Rica	San Jose/Juan Santamaria	78762	MROC
Cuba	Camaguey	78355	
	Casa Blanca	78325	
Dominican Republic	Santo Domingo	78486	MDSD
France: Guadeloupe			
	Le Raizet	78897	TFFR

Country	Station name	Block and station number	Int. location indicators for addressed messages
Haiti	Port-au-Prince	78439	MTPP
Honduras	Tegucigalpa	78720	MHTG
Jamaica	Kingston	78397	MKJP
Mexico	Acapulco, Gro.*	76805	
	Cancún, Q.R.	76695	
	Chihuahua, Chi.	76225	
	Empalme, Son.*	76256	
	Isla Socorro, Col.*	76723	
	La Paz, B.C.S.*	76405	
	Monterrey, N.L.	76394	
	Mazatlan, Sin.*	76458	
	Guadalajara, Jal.	76612	
	Merida. Yuc.	76644	
	Manzanillo, Col.*	76654	
	Mexico City, D.F.	76679	MMMX
	Villahermosa, Tab.	76743	MMVA
	Veracruz, Ver.	76692	
	* Stations at the Pacific coast		
Netherlands Antilles	Hato Airport, Curacao	78988	TNCC
	Juliana Airport, St. Maarten	78866	TNCM
Nicaragua	Puerto Cabezas**	78730	MNPC
Panama	Corozal	78808	MPCZ
Trinidad and Tobago	Port of Spain	78970	TTPP
USA	Rawinsonde stations within 300 miles of the coast		

* Stations on the Pacific coast
** Out of Service

A T T A C H M E N T 7 C

INFORMATION ON OPERATIONAL STATUS OF AUTOMATIC MARINE STATIONS - MOORED BUOYS

Legend - Observed or technical parameters

Column	Parameters	Column	Parameters
1	Wind direction and speed	5	Sea-surface temperature
2	Air temperature	6	Wave period and height
3	Air pressure	7	Wave spectra
4	Pressure tendency	8	Peak wind gust
		9	Wave direction

1. Canada

Data from moored buoys are collected via geostationary satellites. Meteorological reports from moored buoys using FM 13-IX SHIP code are distributed on the GTS from the Direct Readout Station located in Vancouver, B.C.

North-west Atlantic Ocean:

WMO buoy	ARGOS	Position		Observed or technical parameters								
Identifier	Identifier	Latitude	Longitude	1	2	3	4	5	6	7	8	9
44137	05579	41°45'N	60°55'W	X	X	X	X	X	X	X	X	
44138	05577	44°15'N	53°37'W	X	X	X	X	X	X	X	X	
44139	03448	44°12'N	57°30'W	X	X	X	X	X	X	X	X	
44140	05576	43°50'N	51°30'W	X	X	X	X	X	X	X	X	
44141	03449	42°04'N	56°09'W	X	X	X	X	X	X	X	X	
44142	05578	42°30'N	64°00'W	X	X	X	X	X	X	X	X	
44251	09234	47°26'N	53°23'W	X	X	X	X	X	X	X	X	
44255	09233	47°17'N	57°21'W	X	X	X	X	X	X	X	X	

2. France

Data from the moored buoys are available on the GTS in BUOY code from CLS/ARGOS with the same heading. The wave spectra is not available in the BUOY code, but is available in WAVEOB code. Buoys 41096 and 41097 are sensitive to Atlantic swells while buoy 41098 on the west coast of Martinique in the bay of Fort de France is not directly sensitive to Atlantic swells but westerly swells.

Eastern Caribbean Islands:

WMO buoy	ARGOS	Position:		Observed or technical parameters								
Identifier	Identifier	Latitude	Longitude	1	2	3	4	5	6	7	8	9
41096	05833	16.4 N	60.9 W	.	.	.	.	X	X	X	.	X
.41097	05834	14.9 N	60.9 W	.	.	.	.	X	X	X	.	X
41098	05832	14.5 N	61.1 W					X	X	X		X
41100		15.9 N	57. 9 W	X	X	X	X	X	X	X	X	
41101		14.6 N	56 .2 W	X	X	X	X	X	X	X	X	

3. United States of America

Up-to-date list of U.S.A. Ocean Data Acquisition System (ODAS) is available at the web site of the National Data Buoy Centre of the National Oceanic and Atmospheric Administration (NOAA) www.ndbc.noaa.gov . Data from moored buoys and platforms are collected by geostationary meteorological satellites and reports are distributed on the GTS in SHIP code

WMO buoy Identifier	ARGOS Identifier	Position: Latitude	Longitude	Observed or technical parameters 1	2	3	4	5	6	7	8	9
41001**		34.7 N	72.6 W	.	.	.		.	.		.	
41002**		32.3 N	75.2 W	X	X	X		X	X		X	
41004		32.5 N	79.1 W	X	X	X		X	X		X	
41009		28.5 N	80.2 W	X	X	X		X	X		X	
41010		28.9 N	78.5 W	X	X	X		X	X		X	
41040		14.5 N	53.0 W	X	X	X		X	X		X	
41041		14.5 N	46.0 W	X	X	X		X	X		X	
42001**		25.9 N	89.7 W	X	X	X		X	X		X	
42002**		25.9 N	93.6 W	X	X	X		X	X		X	
42003**		25.9 N	85.9 W	X	X	X		X	.		.	
42007		30.1 N	88.8 W	X	X	X		X	.		.	
42019		27.9 N	95.4 W	X	X	X		X	X		X	
42020		26.9 N	96.7 W	X	X	X		X	X		X	
42035		29.2 N	94.4 W	X	X	X		X	X		X	
42036		28.5 N	84.5 W	X	X	X		X	X		X	
42037		24.5 N	81.4 W	X	X	X		X	X		X	
42039		28.8 N	86.0 W	X	X	X		X	X		X	
42040		29.2 N	88.3 W	X	X	X		X	X		X	
42055		22.0 N	94.0 W	X	X	X		X	X		X	
42056		20.0 N	85.0 W	X	X	X		X	X		X	
42057		15.0 N	80.0 W	X	X	X		X	X		X	
42058		15.0 N	75.0 W	X	X	X		X	X		X	
44004**		38.5 N	70.7 W	X	X	X		X	X		X	
44005**		42.9 N	68.9 W	X	X	X		X	X		X	
44007		43.5 N	70.1 W	X	X	X		X	X		X	
44008		40.5 N	69.4 W	X	X	X		X	X		X	
44009		38.5 N	74.7 W	X	X	X		X	X		X	
44011**		41.1 N	66.6 W	X	X	X		X	X		X	
44013		42.4 N	70.7 W	X	X	X		X	X		X	
44014		36.6 N	74.8 W	X	X	X		X	X		X	
44025		40.3 N	73.2 W	X	X	X		X	X		X	

** Primarily for National Weather Service (NWS) support; however, all stations report data to NWS.

POST STORM COUNTRY REPORTS

A Post-storm Country Report should be issued by National Meteorological Services in RA IV and sent to the RSMC National Hurricane Center, Miami (ncep.nhc.hsu@noaa.gov, lixion.a.avila@noaa.gov), preferably within 15 days after being affected, directly or indirectly, by any Tropical Depression, Tropical Storm or Hurricane. This document will be of utmost importance to gather all relevant data necessary for the Hurricane Season Report.

This Report should have the following format:

a) Document headings:

Post-Storm Country Report.
Country_____
Tropical Cyclone name
Date of data: _____; Date of issuance _____

b) Data for each meteorological station within the affected area:

- Maximum sustained wind reported (10-min wind/ 1-min wind): (direction, velocity, date and time)
- Maximum wind gust reported (direction, velocity, date and Zulu time)
- Duration of Calm (Zulu Time of onset and of end)
- Total rainfall during the event
- Minimum sea level pressure (date and Zulu time)

c) Remarks:

- Data concerning storm surge: height, instrument used, etc.
- Data on type of instrument or observation methodology if different from WMO standards.

Other relevant information.

Example**:**

POST-STORM COUNTRY REPORT
Country: CUBA
Tropical Cyclone: Hurricane MICHELLE
Date of data: November 4, 2001 Date of issuance: November 10, 2001

Station	Maximum Sustained Wind			Maximum Wind Gust			Calm	Total Rainfall	Minimum SL Pressure	
	Direction	Veloc. (km/h) 10 min/1 min	Z Time	Direction	Veloc (km/h)	Z Time	Z Time	(mm)	Pressure (hPa)	Z Time
78325 Casablanca	NNE	112/xx x	21:00-22:00	NNE	134	21:15	-	44.4	993.4	21:10
78373 Stgo Las Vegas	NNE	90	20:00-22:45	NNE	138	20:55	-	57.6	997.8	20:40
78340 Bainoa	NE	90	20:00-21:00	NE	140	22:40	-	83.2	996.1	20:45
78374 Tapaste	NE	70	19:00-04:00 (5^{th})	NNE	120	20:00	-	97.6	995.5	20:50
78323 Güines	NE	82	20:30-02:40 (5^{th})	NNE	118	01:25 (5^{th})	-	23.7	993.4	20:30
78375 Melena del Sur	N	80	20:00 -02:30 (5^{th})	N	135	22:53	-	60.8	994.8	20:00
78320 Güira de Melena	NNE	60	19:00-03:00 (5^{th})	NNE	103	00:50 (5^{th})	-	78.4	997.7	20:55
78376 Bauta	N	90	21:00-01:00 (5^{th})	N	112	20:50	-	40.3	999.1	20:30
78322 Batabanó	NNE	84	21:00-01:00 (5^{th})	NNE	100	23:10	-	64.3	995.3	19:00
78324 Punta del Este	N	128	16:45-17:00	N	160	03:55 (5^{th})	-	304.0	981.4	17:00
78321 La Fe	N	100	18:35-19:00	N	112	19:00	-	118.9	991.6	15:00

Station	Maximum Sustained Wind			Maximum Wind Gust			Calm	Total Rainfall	Minimum SL Pressure	
	Direction	Veloc. (km/h) 10 min/1 min	Z Time	Direction	Veloc (km/h)	Z Time	Z Time	(mm)	Pressure (hPa)	Z Time
78309 Cuba-Francia	N	100	12:15-12:23	N	132	13:32	-	103.8	991.7	16:56
78221 Nueva Gerona	NNE	92	04:15-04:45	NNE	120	18:00	-		994.3	17:30
78331 Jagüey Grande	ENE	135	21:00-00:00 (5^{th})	-	210	-	-	234.3	992.8	00:00 (5^{th})
78333 Playa Girón	ESE	101	18:00-21:00	W	194	23:00	16:30-17:30	129.5	960.5	23:00
78328 Varadero	NNE	85	00:00 (5^{th})-03:00 (5^{th})	N	151	00:40 (5^{th})	-	101.1	-	-
78327 Unión de Reyes	N	85	00:30 (5^{th})-03:00 (5^{th})	NNE	150	01:15 (5^{th})	-	116.0	986.6	00:00 (5^{th})
78332 Colón	ENE	70	19:00-23:00	NE	147	22:45	-	86.2	980.9	23:00
78330 Jovellanos	N	68	23:00-01:00 (5^{th})	N	101	00:00 (5^{th})	-	164.8	985.3	00:00 (5^{th})
78344 Cienfuegos	SE	120	23:00-02:00 (5^{th})	S	168	00:00 (5^{th})	-	-	958.9	01:00 (5^{th})
78335 Aguada de Pasajeros	ESE	120	22:00-23:00	ESE	176	23:00	19:45-20:45	-	958.5	00:30 (5^{th})
78338 Sagua La Grande	ESE	90	02:20 (5^{th})-03:30 (5^{th})	N	150	05:58 (5^{th})	23:20 – 23:45	57.0	977.0	04:10 (5^{th})
78326 Santo Domingo	SE	119	02:40 (5^{th})	N	157	05:44 (5^{th})	22:50 – 23:00	61.2	962.8	03:00 (5^{th})
78343 Yabú	SE	112	03:00 (5^{th})	SW	136	01:58 (5^{th})	-	46.5	963.7	04:55 (5^{th})
78349 Sancti Spíritus	S	90	04:25 (5^{th})-04:55 (5^{th})	S	120	04:30 (5^{th})	-	75.4	990.1	06:00 (5^{th})

Station	Maximum Sustained Wind			Maximum Wind Gust			Calm	Total Rainfall	Minimum SL Pressure	
	Direction	Veloc. (km/h) 10 min/1 min	Z Time	Direction	Veloc (km/h)	Z Time	Z Time	(mm)	Pressure (hPa)	Z Time
78337 Trinidad	WNW	70	04:30 (5^{th})-04:40 (5^{th})	WNW	118	04:45 (5^{th})	-	121.5	991.3	04:00 (5^{th})
78341 Jíbaro	S	68	04:10 (5^{th})-04:20 (5^{th})	ESE	108	04:25 (5^{th})	-	86.0	995.5	04:00 (5^{th})
78342 T. de Collantes	W	100	05:00 (5^{th})-05:10 (5^{th})	W	120	04:50 (5^{th})	-	193.0	-	04:00 (5^{th})

Remarks:

1. A maximum Storm Surge 2.5 - 3 meters high was reported in Cayo Largo del Sur (observational). The coastline retreated up to 500 meters in Batabanó, some people walked through the exposed sea bottom. Large waves battered both coasts of western and central Cuba with waves up to 4 – 5 meters high, causing extensive coastal floodings.

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C H A P T E R 8

COMMUNICATIONS

8.1 General

The RMTN (Regional Meteorological telecommunication Network) will be the basic communication system for the interchange of warnings, forecasts and observations among members. It is implemented through the International Satellite Communications System (ISCS) operated by the National Weather Service of the USA. The RMTN is a multipoint system via satellite utilizing two - way and one-way very small aperture terminal (VSAT) antenna and microcomputer - based systems. It will carry GTS data and products along with the world Area Forecast System (WAFS) products in GRIB (gridded binary), fax, and alpha - numeric data formats. The user terminals include the necessary software application to handle binary information

Other communication systems are in place to complement the ISCS and are an integral part of the RMTN. These include the Emergency Managers Weather Information Network (EMWIN), the GOES Satellite Data Collection Platform (DCP), and the ICAO Aeronautical Fixed telecommunication Network (AFTN). Several alternate mechanisms for data exchange exist which use the Internat and TCP/IP technologies being implemented by RTH Washington,including HTTP and FTP servers, E-mail Data Ingest Systems, RTH Web-based Bulletin Input, FTP Input Service and Dial-up Data Input.

A list containing telephone numbers of national Meteorological Service and homes of key officials is given in attachment 8A.

8.2 Procedures to be followed

WMO communications headings, station location identifiers, and international block and station index numbers will be used to send surface and upper-air observations.

8.3 Tropical cyclone warning headings

Tropical cyclone warning headings to be used by Members are listed in Attachment 8B. Headings to be used by the USA for tropical/subtropical cyclone releases are listed in Attachments 8 C and 8D.

ATTACHMENT 8 B / ADJUNTO 8 B

TROPICAL CYCLONE WARNING HEADINGS/
ENCABEZAMIENTO DE LOS AVISOS DE CICLON

Country/País	Tropical depression heading/Encabezamiento depresión tropical	Tropical storm or hurricane heading/ Encabezamiento de tormenta tropical o de huracán
Antigua	WOCA31 TAPA	WHCA31 TAPA
Bahamas	WOBA31 MYNN	WHBA31 MYNN
Barbados	WOCA31 TBPB	MHCA31 TBPB
Belize/Belice	WOCA31 MZBZ	WHCA31 MZBZ
Canada/Canadá		WWCN1-4 CWHX WPCN3-4 CWHX WWCN1-6 CYQX WWCN1-2 CWVR WPCN3-4 CWVR
Costa Rica	WOCA31 MRSJ	WHCA31 MRSJ
Cuba	WOCA31 MUHV	WHCA31 MUHV
Dominican Republic/ República Dominicana	WOCA31 MDSD	WHCA31 MDSD
France (Martinique)/ Francia (Martinica)	WOMR31 TFFF	WHMR31 TFFF
France (Guadeloupe)/ Francia (Guadalupe)	WOMF31 TFFR	WHMF31 TFFR
Guatemala	WOCA31 MGGT	WHCA31 MGGT
Honduras	WOCA31 MHTG	WHCA31 MHTG
Jamaica	WOCA31 MKJP	WHCA31 MKJP
Mexico/México	WOMXl MMMX	WHMXl MMMX
	WOMX2 MMMX	WHMX2 MMMX

Country/País	Tropical depression heading/Encabezamiento depresión tropical	Tropical storm or hurricane heading/ Encabezamiento de tormenta tropical o de huracán
Nicaragua	WOCA31 MNMG	WHCA31 MNMG
Panama	WOCA31 MPTO	WHCA31 MPTO
Trinidad and Tobago/ Trinidad y Tabago	WOCA31 TTPP	WHCA31 TTPP

USA HEADINGS FOR TROPICAL CYCLONE RELEASES

	Public Tropical Cyclone	Forecast/Advisory Tropical Cyclone	Tropical Cyclone Discussion
Miami, FL	WTNT31-35 KNHC	WTNT21-25 KNHC	WTNT41-45 KNHC
		(Atlantic, Caribbean, Gulf of Mexico)	
Miami, FL	WTPZ31-35 KNHC	WTPZ21-25 KNHC	WTPZ41-45 KNHC
		(Eastern North Pacific)	
Honolulu, HI	WTPA31-35 PHNL	WTPA21-25 PHNL	
Miami, FL	WTNT71-75 KNHC	(Strike probabilities for Atlantic, Caribbean and Gulf of Mexico)	

NOTE: US advisory headings range from 1 to 5 and are re-cycled with the sixth, eleventh, and sixteenth tropical cyclone.

USA HEADINGS FOR ADDITIONAL TROPICAL/ SUBTROPICAL METEOROLOGICAL RELEASES

1. SPECIAL DISTURBANCE STATEMENT

2. TROPICAL CYCLONE POSITION ESTIMATE
   WTNT51 KNHC (NORTH ATLANTIC)
   WTPZ51 KNHC (EASTERN NORTH PACIFIC)

3. TROPICAL CYCLONES UPDATE
   WTNT61-65 KNHC (NORTH ATLANTIC)
   WTPZ61-65 KNHC (EASTERN NORTH PACIFIC)

4. TROPICAL WEATHER OUTLOOK
   ABNT20 KNHC (NORTH ATLANTIC)
   ABPZ20 KNHC (EASTERN NORTH PACIFIC)

5. TROPICAL WEATHER SUMMARY
   ABNT30 KNHC (NORTH ATLANTIC)
   ABPZ30 KNHC (EASTERN NORTH PACIFIC)

6. TROPICAL WEATHER DISCUSSION
   AXNT20 KNHC (NORTH ATLANTIC)
   AXPZ20 KNHC (EASTERN NORTH PACIFIC)

7. SATELLITE - DERIVED RAINFALL
   TCCA21 KNHC (EASTERN CARIBBEAN)
   TCCA22 KNHC (CENTRAL CARIBBEAN)
   TCCA23 KNHC (WESTERN CARIBBEAN)

8. TROPICAL NUMERICAL GUIDANCE MESSAGE
   (TROPICAL NORTH ATLANTIC/CARIBBEAN)
   FACA20 KWBC

ATTACHMENT 8 E / ADJUNTO 8 E

LIST OF WEB SITES OF NATIONAL METEOROLOGICAL SERVICES/
LISTA DE WEB SITES DE LOS SERVICIOS METEOROLOGICOS -

ANTIGUA AND BARBUDA / ANTIGUA Y BARBUDA	
Meteorological Services	www.antiguamet.com
BAHAMAS/BAHAMAS	
Meteorological Services	www.bahamasweather.org.bs
BELIZE / BELICE	
Meteorological Services	www.hydromet.gov.bz
BERMUDA / BERMUDA	
Bermuda Weather Service	www.weather.bm
BRAZIL/ BRASIL	
Instituto Nacional de Meteorologia (INMET)	http://www.inmet.gov.br/
CANADA / CANADA	
Canadian Hurricane Centre Meteorological Service of Canada	www.ns.ec.gc.ca/weather/hurricane/
CAYMAN ISLANDS/ ISLAS CAIMAN	
Meteorological Services	www.gov.ky/weather
COLOMBIA / COLOMBIA	
Institudo de Hidrologia, Meteorología y Estudios Ambientales	www.ideam.gov.co
COSTA RICA / COSTA RICA	
Instituto Meteorológico Nacional	www.imn.ac.cr
CUBA / CUBA	
Instituto de Meteorología	www.insmet.cu
DOMINICA/ DOMINICA	
Met Office	www.meteo.dm
DOMINICAN REPUBLIC/ REPUBLICA DOMINICANA	
Oficina Nacional de Meteorología	www.onamet.gov.do

EL SALVADOR /EL SALVADOR

Servicio Meteorológico Nacional	www.snet.gob.sv

FRANCE / FRANCIA

Météo France	www.meteo.fr www.meteo.gp

for access for NMS's to radar imagery ask for password from webmaster

GUATEMALA / GUATEMALA

INSIVUMEH	www.insivumeh.gob.gt

HONDURAS / HONDURAS

Servicio Meteorológico Nacional	www.smn.gob.hn

JAMAICA/JAMAICA

Meteorological Service of Jamaica	www.metservice.gov.jm

MEXICO / MEXICO

Servicio Meteorológico Nacional	http://smn.cna.gob.mx/SMN.html

NETHERLANDS ANTILLES AND ARUBA / ANTILLAS NEERLANDESAS Y ARUBA

Meteorological Service	www.weather.an

NICARAGUA/NICARAGUA

Meteorological Services	www.ineter.gov.ni

PANAMA / PANAMA

Meteorological Services	www.hidromet.com.pa

SPAIN / ESPAÑA

Meteorological Services	www.inm.es

ST. LUCIA / SAN LUCIA

Meteorological Service	www.slumet.gov.lc

UNITED STATES OF AMERICA / ESTADOS UNIDOS DE AMERICA

National Hurricane Centre / Nacional de Huracanes	www.nhc.noaa.gov

PUERTO RICO / PUERTO RICO USA

Weather Service Forecast Office	www.srh.noaa.gov www.upr.clu.edu/nws

VENEZUELA / VENEZUELA

Servicio de Meteorología (FAV)	www.meteorologia.mil.ve
Navy	www.dhn.mil.ve

TROPICAL CYCLONE ADVISORY MESSAGE
FOR INTERNATIONAL CIVIL AVIATION

1. TC ADVISORY:	
2. DTG:	Year month date (yyyymmdd)/time (in UTC) (using “Z”) of issue
3. TCAC:	Name of TCAC (location indicator or full name)
4. TC :	Name of tropical cyclone
5. NR:	Advisory number (starting with “01” for each cyclone)
6. PSN:	Position of the center in degrees and minutes (Nnnnn” or “Snnnn”, “Wnnnnn” or “Ennnnn”)
7. MOV:	Direction and speed of movement respectively to at least eight compass points (“N”, “NE”, “E”, “SE”, “S”, “SW”, “W”, “NW”) and in km/h (or kt)
8. C:	Central pressure (in hPa)
9. MAX WIND:	Maximum surface wind near the center (mean over 10 minutes, in km/h (or kt))
10. FCST PSN +12 HR:	Forecast of center position for fixed valid time of … UTC (12 hours after time of issuance of the advisory)
11: FCST MAX WIND +12 HR:	Forecast of maximum surface wind for fixed valid time of …UTC (12 hours after time of issuance of the advisory
12. FCST PNS +18 HR:	Forecast of center position for fixed valid time of … UTC (18 hours after time of issuance of the advisory)
13. FCST MAX WIND +18HR:	Forecast of maximum surface wind for fixed valid time of ….UTC (18 hours after the issuance of the advisory)
14. FCST PSN +24HR:	Forecast of center position for fixed valid time of UTC (24 hours after issuance of the advisory)
15. FCST MAX WIND +24HR:	Forecast of maximum surface wind for fixed valid time of….UTC (24 hours after the issuance of the advisory)
16. NXT MSG:	Expected year month date (yyyymmdd)/time (in UTC) (using “Z” of issuance of next advisory (using “BFR”, if applicable) or NO MSG EXP”

Note.— The numbers 1 to 16 are included only for clarity and they are not part of the advisory message shown in the example below.

EXAMPLE

ADVISORY MESSAGE FOR TC

TC ADVISORY	
DTG:	19970925/1600Z
TCAC:	YUFO
TC:	GLORIA
NR:	01
PSN:	N2706 W07306
MOV:	NW 10KT
C:	965HPA
MAX WIND:	45KT
FCST PSN +12HR:	260400 N2830 W07430
FCST MAX WIND +12HR:	45KT
FCST PSN +18HR:	261000 N2852 W07500
FCST MAX WIND +18HR:	40KT
FCST PSN +24HR:	261600 N2912 W07530
FCST MAX WIND +24HR:	45KT
NXT MSG:	19970925/2000Z

C H A P T E R 9

TROPICAL CYCLONE NAMES

The lists in Table I and Table II contain the names to be used during 2005-2010 to identify the named tropical cyclones of the Caribbean Sea, the Gulf of Mexico, the North Atlantic Ocean and the eastern North Pacific, respectively. These lists of names will be rotated forward beyond 2010 so that the 2005 names will be used again in 2011. However, if a tropical cyclone acquires special notoriety because of its strength, deaths, damage or other special reasons, its name may be withdrawn at the request of any Member and the agreement at the session of the RA IV Hurricane Committee. In such a case, the RA IV Hurricane Committee will select a replacement for the withdrawn name. Whenever more storms develop in a given year than the number of names in the relevant list, the Greek alphabet (Alpha, Beta, etc.) will be used to name the subsequent systems.

A tropical cyclone which passes from one basin to another will retain its name.

TABLE I

Names to be used for named tropical cyclones in the Caribbean Sea, the Gulf of Mexico and the North Atlantic Ocean

2007	2008	2009	2010	2011	2012
Andrea	Arthur	Ana	Alex	Arlene	Alberto
Barry	Bertha	Bill	Bonnie	Bret	Beryl
Chantal	Cristobal	Claudette	Colin	Cindy	Chris
Dean	Dolly	Danny	Danielle	Don	Debby
Erin	Edouard	Erika	Earl	Emily	Ernesto
Felix	Fay	Fred	Fiona	Franklin	Florence
Gabrielle	Gustav	Grace	Gaston	Gert	Gordon
Humberto	Hanna	Henri	Hermine	Harvey	Helene
Ingrid	Ike	Ida	Igor	Irene	Isaac
Jerry	Josephine	Joaquin	Julia	Jose	Joyce
Karen	Kyle	Kate	Karl	Katia	Kirk
Lorenzo	Laura	Larry	Lisa	Lee	Leslie
Melissa	Marco	Mindy	Matthew	Maria	Michael
Noel	Nana	Nicolas	Nicole	Nate	Nadine
Olga	Omar	Odette	Otto	Ophelia	Oscar
Pablo	Paloma	Peter	Paula	Philippe	Patty
Rebekah	Rene	Rose	Richard	Rina	Rafael
Sebastien	Sally	Sam	Shary	Sean	Sandy
Tanya	Teddy	Teresa	Tomas	Tammy	Tony
Van	Vicky	Victor	Virginie	Vince	Valerie
Wendy	Wilfred	Wanda	Walter	Whitney	William

TABLE II

Names to be used for named tropical cyclones in the eastern North Pacific Ocean

2007	2008	2009	2010	2011	2012
Alvin	Alma	Andres	Agatha	Adrian	Aletta
Barbara	Boris	Blanca	Blas	Beatriz	Bud
Cosme	Cristina	Carlos	Celia	Calvin	Carlotta
Dalila	Douglas	Dolores	Darby	Dora	Daniel
Erick	Elida	Enrique	Estelle	Eugene	Emilia
Flossie	Fausto	Felicia	Frank	Fernanda	Fabio
Gil	Genevieve	Guillermo	Georgette	Greg	Gilma
Henriette	Hernan	Hilda	Howard	Hilary	Hector
Ivo	Iselle	Ignacio	Isis	Irwin	Ileana
Juliette	Julio	Jimena	Javier	Jova	John
Kiko	Karina	Kevin	Kay	Kenneth	Kristy
Lorena	Lowell	Linda	Lester	Lidia	Lane
Manuel	Marie	Marty	Madeline	Max	Miriam
Narda	Norbert	Nora	Newton	Norma	Norman
Octave	Odile	Olaf	Orlene	Otis	Olivia
Priscilla	Polo	Patricia	Paine	Pilar	Paul
Raymond	Rachel	Rick	Roslyn	Ramon	Rosa
Sonia	Simon	Sandra	Seymour	Selma	Sergio
Tico	Trudy	Terry	Tina	Todd	Tara
Velma	Vance	Vivian	Virgil	Veronica	Vincente
Wallis	Winnie	Waldo	Winifred	Wiley	Willa

Other names available:

2006, 2008, etc.	2005, 2007 etc.
Xavier	Xina
Yolanda	York
Zeke	Zelda

TABLE III

Names of Atlantic Storms Retired into Hurricane History

Name	Year/Key	Location(s) affected
Agnes	1972 +*	Florida, Northeast USA
Alicia	1983 *	North Texas
Allen	1980 *	Antilles, Mexico, South Texas
Allison	2001 *	Texas
Andrew	1992 *	Bahamas, South Florida and Louisiana
Anita	1977	Mexico
Audrey	1957 +*	Louisiana, North Texas
Betsy	1965 +*	Bahamas, Southeast Florida, Southeast Louisiana
Beulah	1967 *	Antilles, Mexico, South Texas
Bob	1991 *	North Carolina and Northeast U.S.
Camille	1969 +*	Louisiana, Mississippi and Alabama
Carla	1961 +*	Texas
Carmen	1974	Mexico, Central Louisiana
Carol[1]	1954 +*	Northeast U.S.
Celia	1970 *	South Texas
César	1996	Costa Rica, Nicauragua
Charley	2004 +	Cuba, USA
Cleo	1964 *	Lesser Antilles, Haiti, Cuba, Southeast Florida
Connie	1955 +	North Carolina
Dennis	2005	Cuba, Florida
David	1979 *	Lesser Antilles, Hispaniola, Bahamas, Florida and Eastern U.S.
Diana	1990	Mexico
Diane	1955 +*	Mid-Atlantic U.S. & Northeast U.S.
Donna	1960 +*	Bahamas, Florida and Eastern U.S.
Dora	1964 *	Northeast Florida
Elena	1985 *	Mississippi, Alabama, Western Florida
Eloise	1975 *	Antilles, Northwest Florida, Alabama
Fabian	2003	Bermuda
Fran	1996	North Carolina
Fifi	1974	Belize, Guatemala, Honduras, El Salvador
Flora	1963	Haiti, Cuba, Tobago
Floyd	1999	Bahamas, North Carolina
Frances	2004 +	Bahamas, Florida
Frederic	1979 *	Alabama and Mississippi
Georges	1998	U.S Virgin Is., Puerto Rico, Dominican Republic, Haiti, Cuba, Florida, Mississippi
Gilbert	1988	Lesser Antilles, Jamaica, Yucatan Peninsula, Mexico, El Salvador
Gloria	1985 *	North Carolina, Northeast U.S.
Greta	1978	Belize
Hattie	1961	Belize, Guatemala
Hazel	1954 +*	Antilles, North and South Carolina, Southern Ontario
Hilda	1964 +*	Louisiana
Hortense	1996	Puerto Rico, Dominican Republic, Nova Scotia
Hugo	1989 *	Antilles, Guadeloupe, Virgin Islands, Puerto Rico, South Carolina
Ione	1955 *	North Carolina
Inez	1966	Lesser Antilles, Hispaniola, Cuba, Florida Keys, Mexico
Isabel	2003 +	North Carolina, District of Colombia, Virgina, Maryland
Isidore	2002	Cuba, Mexico, Louisiana, Mississippi
Iris	2001	Belize, Guatemala
Ivan	2004 +	Grenada, Jamaica, Cayman Islands, Cuba, Alabama, Florida

Name	Year/Key	Location(s) affected
Janet	1955	Lesser Antilles, Belize, Mexico, Costa Rica
Jeanne	2004 +	Domincan Republic, Haiti, Bahamas, Turks and Caicos, Florida
Joan	1988	Curaçao, Venezuela, Colombia, Costa Rica, Nicaragua < crossed into the Pacific and became Miriam >
Juan	2003	Canada
Katrina	2005	Louisiana, Mississippi
Keith	2000	Belize and Mexico
Klaus	1990	Martinique
Lenny	1999	Lesser Antilles
Lili	2002	Cuba, Louisianna
Luis	1995	Lesser Antilles
Marilyn	1995	Lesser Antilles, Puerto Rico
Michelle	2001	Cuba
Mitch	1998	Cayman Is, Colombia, Honduras, Nicaragua, Guatemala, Belize, Costa Rica, Mexico, Florida
Opal	1995	Central America, Mexico, Florida
Rita	2005	Louisiana, Texas
Roxanne	1995	Mexico
Stan	2005	Guatamela, El Savador, Mexico
Wilma	2005	Mexico, Florida

Key: + within the list of top 36 most deadly US tropical cyclones
* within the list of top 31 most costly US tropical cyclones in 1990 US dollars

[1] The name "Carol" was used again to denote a hurricane in the mid-Atlantic Ocean in 1965. However, because the name does not appear after that time, it is assumed that the name was retired retrospectively for the damages caused by the 1954 storm of the same name.

TABLE IV

Names of Eastern North Pacific Ocean Storms Retired into Hurricane History

Eastern Pacific naming began in 1960 apparently with two lists of twenty female names. The scheme began with A (Annette) and continued until mid 1962 without starting over. The year 1961 began with Iva, and 1962 began with Valerie. The years 1963-65 completed the second alphabet and then the second alphabet was unexplainedly started over again in early 1965 after the last two names from the same alphabet had started the season. Interestingly in 1963, two named systems apparently merged, or appeared to merge, so their names were also merged and Jennifer and Katherine became Jen-Kath. In 1966 a scheme using four alphabetical lists of female names was instituted where one of the four, in turn, was started at the beginning of each year. This continued until 1978 when alternating male and female names were used. Prior to 1978, only two names were retired, Hazel and Adele, and it is not clear why either was retired.

In 1978, when alternating male and female names were first used, there were initially four lists, and so a list beginning with Aletta was used in 1978 and again in 1982. At that time two additional lists were added, so in 1983 and 1984, the new lists were used. Thereafter, until today, each list is reused every six years.

Several names have been retired, some for practical reasons such as a pronunciation ambiguity or a “socially unacceptable” meaning in one of the languages and others because they represented a significant human disaster. I assume any name was retired if it appeared in a sequence one or more times, and was subsequently missing when the other names in the sequence were reused.

Name	Year
Adele	1970
Adolph	2001
Fefa	1991
Fico	1978
Hazel	1965
Ismael	1995
Israel (replaced)	2001
Iva	1988
Kenna	2002
Knut	1987
Pauline	1997

C H A P T E R 10

ARCHIVAL OF TROPICAL CYCLONE DATA

In accordance with the directive of the WMO Executive Council (EC-XLV), Geneva, July 1993) an international format for the archiving of tropical cyclone data is to be used by all RSMCs with activity specialization in tropical cyclones.

In the international format given in Attachment 10A, the Dvorak T-number (Position 35-36) and Dvorak CL-number (position 37-38) will be the ones determined at the centre submitting the data, in the case of the RA IV Hurricane Committee, by RSMC Miami-Hurricane Center.

Complete historic data using this format will be made available for research applications. RSMC Miami will provide such data, to the Director of the National Climatic Data Center (NCDC), USA.

The Tropical Cyclone Programme (TCP) Division of the WMO Secretariat has the responsibility for the maintenance of the format, including assignment of the source codes to appropriate organizations, and authorizing additions and changes.

A T T A C H M E N T 10 A

GLOBAL TROPICAL CYCLONE TRACK AND INTENSITY DATA SET - REPORT FORMAT

Position	Content
1- 9	Cyclone identification code composed by 2 digit numbers in order within the cyclone season, area code and year code. 01SWI2000 shows the 1st system observed in South-West Indian Ocean basin during the 2000/2001 season. Area codes are as follows: ARB = Arabian Sea ATL = Atlantic Ocean AUB = Australian Region (Brisbane) AUD = Australian Region (Darwin) AUP = Australian Region (Perth) BOB = Bay of Bengal CNP = Central North Pacific Ocean ENP = Eastern North Pacific Ocean ZEA = New Zealand Region SWI = South-West Indian Ocean SWP = South-West Pacific Ocean WNP = Western North Pacific Ocean and South China Sea
10-19	Storm Name
20-23	Year
24-25	Month (01-12)
26-27	Day (01-31)
28-29	Hour- universal time (at least every 6 hourly position -00Z,06Z,12Z and 18Z)
30	Latitude indicator: 1=North latitude; 2=South latitude
31-33	Latitude (degrees and tenths)
34-35	Check sum (sum of all digits in the latitude)
36	Longitude indicator: 1=West longitude; 2=East longitude
37-40	Longitude (degrees and tenths)
41-42	Check sum (sum of all digits in the longitude)
43	position confidence* 1 = good (<30nm; <55km) 2 = fair (30-60nm; 55-110 km) 3 = poor (>60nm; >110km) 9 = unknown
Note*	Confidence in the center position: Degree of confidence in the center position of a tropical cyclone expressed as the radius of the smallest circle within which the center may be located by the analysis. **"position good"** implies a radius of less than 30 nm, 55 km; "position fair", a radius of 30 to 60 nm, 55 to 110km; and "position poor", radius of greater than 60 nm, 110km.
44-45	Dvorak T-number (99 for no report)
46-47	Dvorak CI-number (99 for no report)
48-50	Maximum average wind speed (whole values) (999 for no report)
51	Units 1=kt, 2=m/s, 3=km per hour
52-53	Time interval for averaging wind speed (minutes for measured or derived wind speed, 99 if unknown or estimated)
54-56	Maximum Wind Gust (999 for no report)
57	Gust Period (seconds, 9 for unknown)
58	Quality code for wind reports: 1=Aircraft or Dropsonde observation 2=Over water observation (e.g. buoy) 3=Over land observation 4=Dvorak estimate 5=Other

59-62 Central pressure (nearest hectopascal) (9999 if unknown or unavailable)
63 Quality code for pressure report (same code as for winds)
64 Units of length: 1=nm, 2=km
65-67 Radius of maximum winds (999 for no report)
68 Quality code for RMW:
- 1=Aircraft observation
- 2=Radar with well-defined eye
- 3=Satellite with well-defined eye
- 4=Radar or satellite, poorly-defined eye
- 5=Other estimate

69-71 Threshold value for wind speed (gale force preferred, 999 for no report)
72-75 Radius in Sector 1: 315^{o}-45^{o}
76-79 Radius in Sector 2: 45^{o}-135^{o}
80-83 Radius in Sector 3: 135^{o}-225^{o}
84-87 Radius in Sector 4: 225^{o}-315^{o}
88 Quality code for wind threshold
- 1=Aircraft observations
- 2=Surface observations
- 3=Estimate from outer closed isobar
- 4=Other estimate

89-91 Second threshold value for wind speed (999 for no report)
92-95 Radius in Sector 1: 315^{o}-45^{o}
96-99 Radius in Sector 2: 45^{o}-135^{o}
100-103 Radius in Sector 3: 135^{o}-225^{o}
104-107 Radius in Sector 4: 225^{o}-315^{o}
108 Quality code for wind threshold (code as for row 88)
109-110 Cyclone type:
- 01= tropics; disturbance (no closed isobars)
- 02= <34 knot winds, <17m/s winds and at least one closed isobar
- 03= 34-63 knots, 17-32m/s
- 04= >63 knots, >32m/s
- 05= extratropical
- 06= dissipating
- 07= subtropical cyclone (nonfrontal, low pressure system that comprises initially baroclinic circulation developing over subtropical water)
- 08= overland
- 09= unknown

111-112 Source code (2 - digit code to represent the country or organization that provided the data to NCDC USA. WMO Secretariat is authorized to assign number to additional participating centers, organizations)
- 01 RSMC Miami-Hurricane Center
- 02 RSMC Tokyo-Typhoon Center
- 03 RSMC-tropical cyclones New Delhi
- 04 RSMC La Reunion-Tropical Cyclone Centre
- 05 Australian Bureau of Meteorology
- 06 Meteorological Service of New Zealand Ltd.
- 07 RSMC Nadi-Tropical Cyclone Centre
- 08** Joint Typhoon Warning Center, Honolulu
- 09** Madagascar Meteorological Service
- 10** Mauritius Meteorological Service
- 11** Meteorological Service, New Caledonia
- 12 Central Pacific Hurricane Center, Honolulu

Note** No longer used

Headings
1-19 Cyclone identification code and name; 20-29 Date time group;
30-43 Best track positions;
44-110 Intensity, Size and Type;
111-112 Source code.