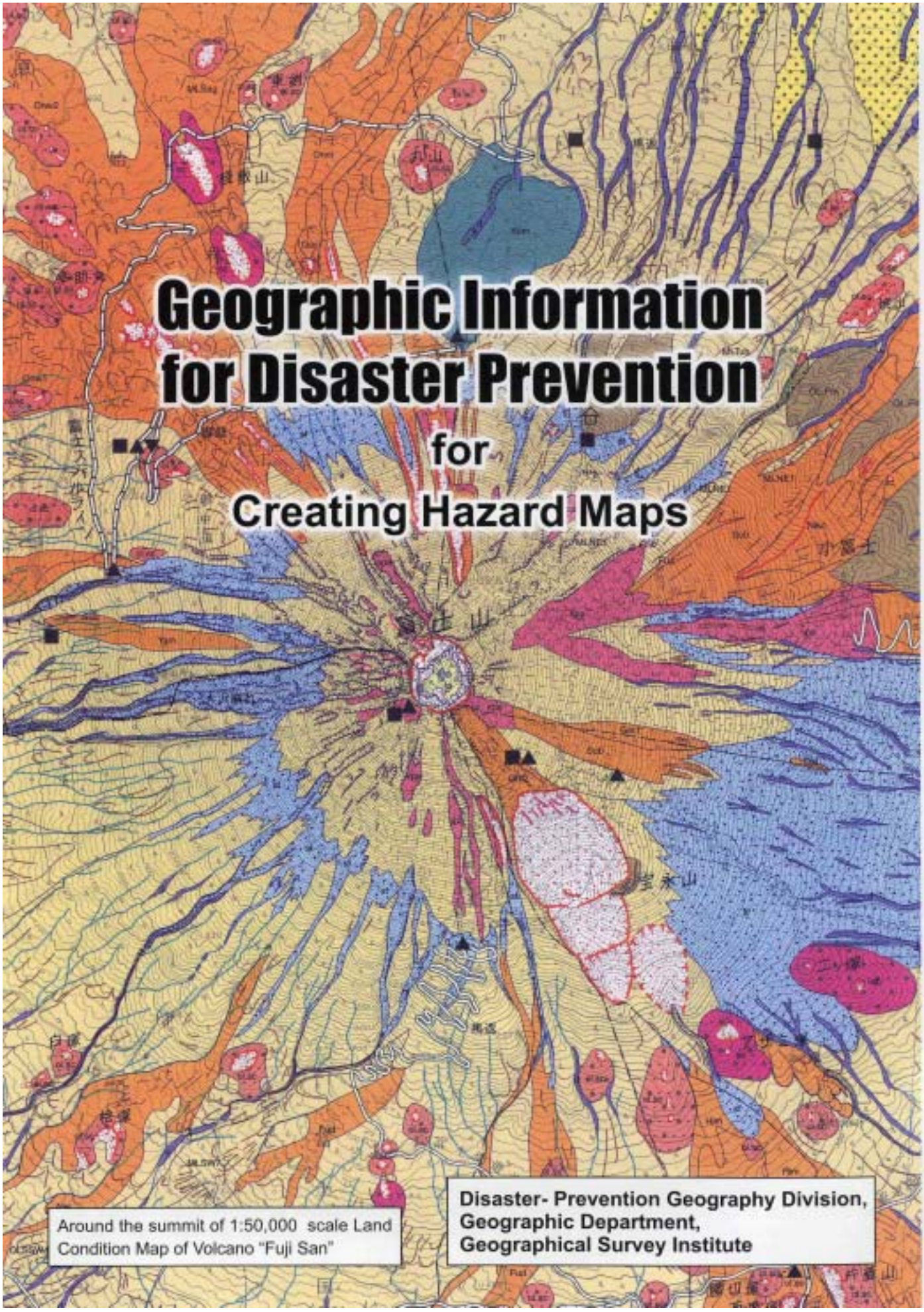

Geographic Information
for Disaster Prevention
for
Creating Hazard Maps
Around the summit of 1:50,000 scale Land Condition Map of Volcano "Fuji San"
Disaster- Prevention Geography Division,
Geographic Department,
Geographical Survey Institute

Introduction to Geographic Information on Disaster Prevention

Since the 1995 Great Hanshin-Awaji Earthquake, Japan has been particularly plagued by major natural disasters, including the eruptions at Usu Zan and Miyakejima, the torrential rains in Niigata, Hyogo, Kagawa, Okayama, etc., and the earthquakes in northern Miyagi, off-shore Tokachi (Hokkaido), and Chuetsu (Niigata). These disasters have emphasized the urgent need to compile hazard maps as a part of emergent disaster prevention measures.

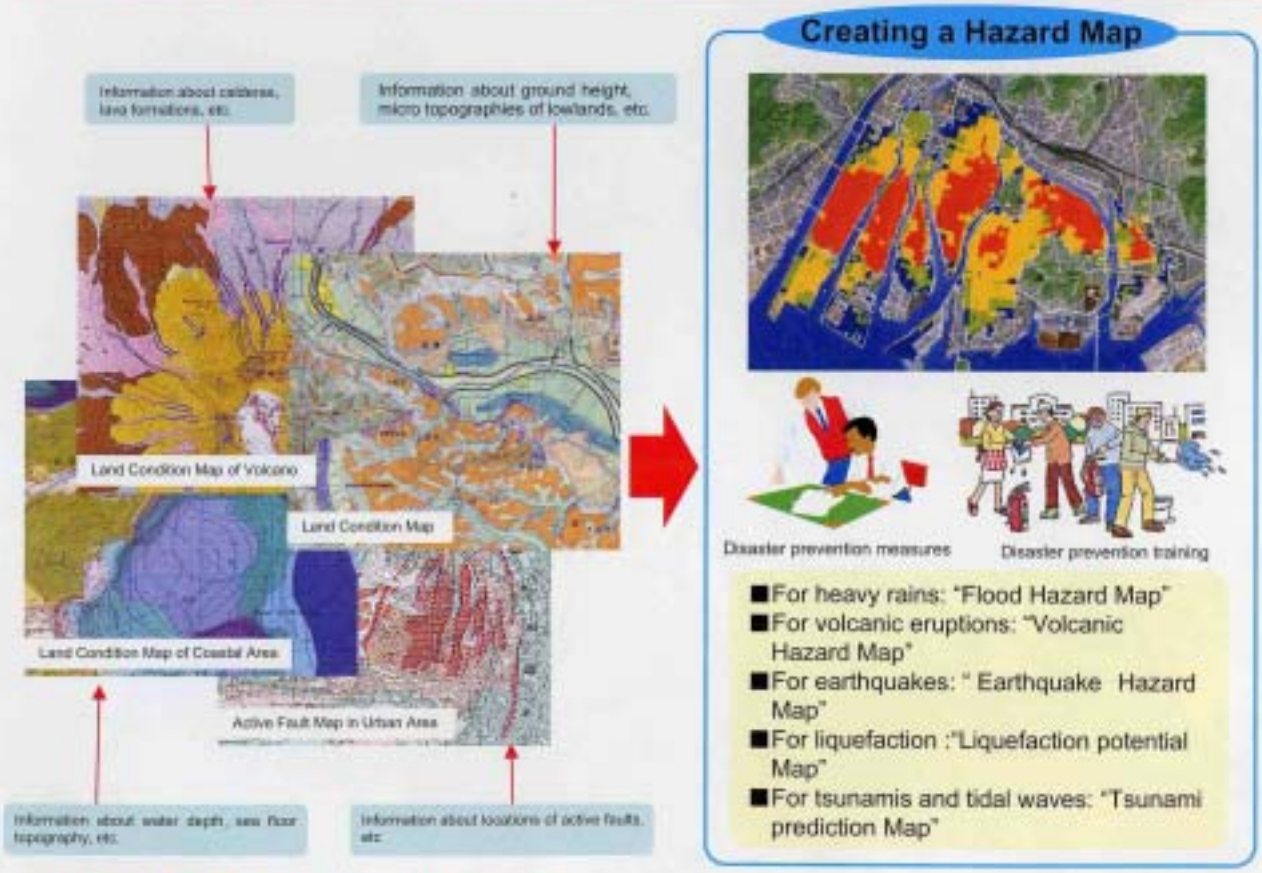
■What exactly is geographic information on disaster prevention for creating hazard maps?

This term refers to the geographical information that is required for making maps that are used for dealing with natural hazards. Such information can include the soil structure of an area, characteristics of the bedrock and topography, past disaster history, locations of shelters and evacuation routes, and so on.

Geographic information on disaster prevention means " landform," "ground conditions," "disaster-related facilities such as shelters," etc., that are used for compiling hazard maps for potential disasters such as typhoons, volcanic eruptions, and earthquakes.

Such geographical information is depicted on Land Condition Map, Land Condition Map of Volcano, Active Fault Map in Urban Area, and Land Condition Map of Coastal Area, and provides basic information for creating hazard maps.

Thematic maps showing geographic information on disaster prevention



■What exactly are hazard maps?

Hazard maps are designed to reduce the amount of damage caused by natural disasters by depicting areas where damage would be likely to occur, the locations of disaster-related facilities such as evacuation routes, and other necessary information. These are also called hazard prediction maps, potential damage maps, "avoid" maps, and risk maps, among other names.

Land Condition Map

What exactly is Land Condition Map?

Land Condition Maps are maps that provide the basic information that is required to formulate measures for preventing floods and landslide, for maintaining land quality and for planning regional development.

Land Condition Maps show landform classification, contours (1 meter intervals), disaster prevention facilities, and so on. These maps were made because flooding and tidal wave damage by the 1959 Ise Bay typhoon was deeply linked to landform

What are obtained from these maps?

- 1-meter contour lines show areas and depth of inundation during floods
- Landform classification of low-land areas shows areas vulnerable to damage
- Locations of existing disaster prevention facilities and shelters, and selection of suitable locations of them

Areas of use include

Against Flood

- Preventive measures and evacuation planning
- Predicting inundation and understanding ground conditions
- Basic information for compiling and reviewing flood hazard maps

Main Landform classification categories of 1:25,000 Land Condition Map

	Lower surface (terrace and table land)		Valley plain /flood plain
	Talus		Coastal plains/delta
	Colluvial slope		Back marsh
	Sedimented ravine		Former river bed
	Alluvial fan		Raised bed river
	Gentle frontage of fan		High-water channel
	Natural levee		Low-water bed, shore

A section of the 1:25,000 "Fukui" Land Condition Map

Land Condition Map of Volcano and Volcanic Base Map

■What exactly are Land Condition Map of Volcano and Volcanic Base Map?

These are maps that are mainly used to provide basic information required to predict volcanic damage and formulate disaster prevention measures and plans.

Land Condition Map of Volcano show lava beds, pyroclastic flows, and mudflows formed by volcanic activities, and disaster prevention facilities.

Volcanic Base Maps are highly accurate, large-scale maps having contour intervals of 5 m that show details of topographic features such as craters, lateral cones and valleys.

■What are obtained from these maps?

- ○Locations of past craters, lava flows, mud flows, debris flows
- ○Prediction of flow path of pyroclastic materials during an eruption (5 m contour intervals)
- ○Locations of existing disaster prevention facilities and shelters, and selection of suitable locations of them

■Areas of use include

Against Eruption

- ■Preventive measures and evacuation planning
- ■Predicting damage
- ■Basic information for compiling and reviewing eruption hazard maps
- ■Providing information for co-existing with volcanoes

■Main landform classifications of the "Fuji San" Land Condition Map of Volcano

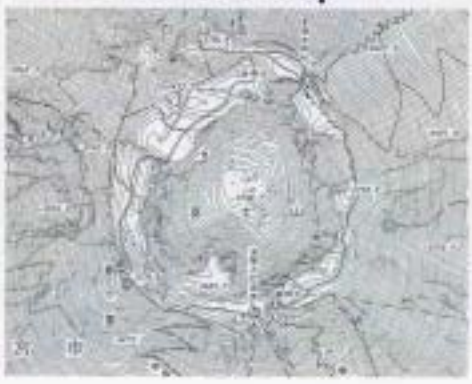
New lava flow		Gotemba mudflow (secondary depositional area)	Gos
Old lava flow		Old Fuji San mud flow accumulation	Kod
Lava microtopography		Yukishiro depositional area	Yt
Spatter sedimentary area	Ass	Talus	To
New scoria cone		Debris flow deposits	Ds
Old scoria cone		Old alluvial fan at the foot of a volcano (Holocene)	Fo
Old Fuji San volcano slope	OLFm	Alluvial fan at the foot of a volcano	Ot
Lava caves and cavities		Dike or dike group	

■Main map terminology of the "Fuji San" Volcanic Base Map

- Clater/steam vent
- Hot/mineral spring
- Police box
- Fire station

■A section of the "Fuji San" Land Condition Map of Volcano

■A section of the "Fuji San" Volcanic Base Map



Active Fault Map in Urban Area

What exactly is Active Fault Map in Urban Area?

They are maps that show detailed locations of active faults and active flexures. In the aftermath of the 1995 Great Hanshin-Awaji Earthquake (Hyogo-ken Nanbu Earthquake), there was a dramatic increase in the demand to compile and publicly release information about active faults, especially in areas of dense population. In response, the GSI worked with research on active fault to create these maps in urban areas that are vulnerable to damage from earthquakes.

What are obtained from these maps?

- Precise length and location of active faults
- Landforms used in assessing active faults
- Locations of existing disaster prevention facilities and shelters, and selection of suitable locations of them

Areas of use include

Against Earthquake

- Preventive measures and evacuation planning
- Predicting damage and investigating ground conditions
- Compiling earthquake and liquefaction hazard maps

Terminology used in Active Fault Map in Urban Area

———	Active Fault	·····	Earthquake Fault
- - - - -	Active Fault (site indistinct)		Trench Survey Site
	Active flexure		Name of Active Fault
·····	Active Fault Trace (concealed)	– – – –	Presumed Active Fault
	Strike Slip	▭ ▭ ▭	Presumed Active Fault (by prospecting data)
	Dip Slip		Active Fold

Section of the "Akashi" Active Fault Map in Urban Area

Land Condition Map of Coastal Area and Topographical Map of Coastal Area

■What exactly are Land Condition Map of Coastal Area and Topographical Map of Coastal Area?

These are maps that mainly provide basic information required to formulate measures to prevent disasters by tsunamis, tidal waves, coastal erosion, etc., and for to develop and conserve coastal areas properly.

Land Condition Maps of Coastal Area show the elevations of land areas (with 1 m contour lines), landform classifications and constituent of the sea bed, disaster prevention facilities, and other information.

Topographical Maps of Coastal Area show sea bed topography (with 1 m contour lines), port and harbor areas, fishing ports, and port facilities.

■Types of geographical disaster prevention information depicted

○Information on topography vulnerable to tsunami/tidal wave disaster based on 1 m contour lines and landform classifications of coastal areas

○Locations of existing disaster prevention facilities and shelters, and selection of suitable locations of them

■Areas of use include

Against Tsunami/high wave

- ■Preventive measures and evacuation planning
- ■Predicting damage
- ■Compiling tsunami hazard maps
- ■Compiling high wave hazard maps

■Main landform classifications of Land Condition Map of Coastal Area (Sea areas)

	Mainly offing of river mouth	Mainly offing of coastal plain	Mainly offing of rocky coast/straits
Coast/Inter tidal zone	Tidal flat	Shore	Tide rock Wave cut bench
Extremely shallow sea	Topset flat Foreset flat	Upper slope Middle slope Lower slope	Abrasion platform
	Transition zone		
Shallow sea	Erosion sea floor surface (Bottomset bed)		Outcropping basement Valley walls of caldron/ submarine valley Step-like topography Valley bottom of caldron/ submarine valley
		Seabottom sand bank Seabottom sand bank slope	

■Terminology used in Topograhical Map of Coastal Area

△ 22.7	Triangulation point	・18.2	Water depth point
・88	Elevation point		Depth contour
□12.5	Bench mark		Index depth contour
			Depth measurement line

■Section of "Central Amakusa" Land Condition Map of Coastal Area (bottom half) and Topographical Map of Coastal Area (top half)

Relationship between disasters and topographic / ground conditions

The following chart lists important points about the ground conditions, vulnerability to disaster, and things to note about disaster prevention for types of landforms such as uplands, terraces, alluvial fans, floodplains, back marshes, and so on.

Ground condition, level of disaster vulnerability, etc., in the table, are based on empirical observations of past disasters and should not be considered to be clearly classified.

In addition, in man-made changes ground condition and vulnerability to disaster differ from type of construction method and also from the landforms that existed before construction. For example, even in the same embankment area, reclaimed areas in water are vulnerable to liquefaction, while housing areas created by filling in valley, etc., can fissure and collapse during a major earthquake and embanked slopes run the risk of collapsing.

Landform type	Ground quality (A: good - E: bad)	Vulnerability to disaster	Points to note in disaster prevention
Terrace /Tabel land			Near terracescarp, there is a danger of landslides. Furthermore, in depressed areas of terrace surfaces, heavy rains could cause inside water inundation.
Upper, high,middle surface	A	Almost none	
Low,lower surface	A, B	Occasional inside water inundation	
Piedmont aggraded slope	B	Occasional debris avalanche	In valleys filled by sediments, there is a danger of debris flow damage during heavy rains.
***1 Lowland, relatively higher and well drained**			Usually there is little danger of inundation of buildings during a flood. There is inundation during heavy floods, but inundation is relatively shallow. In addition, as water drains well, the period of inundation is short. On sand bars and sand banks near coastal areas, high tides can cause inundation.
Alluvial fan, natural levee	B	Debris avalanche River flooding Inside water inundation High tide flooding etc.	
Sand(gravel)bank,sand bar			
Sand dune		Occasional tsunamis	
***2 Lowland, general surface**		River flooding Inside water inundation High tide flooding Damages by earthquakes	These areas are generally vulnerable to flood damage. This is especially true of back marsh and past river channels which, being low-land areas, tend to hold stagnant overflow from rivers, etc., for a long period of time. Furthermore, the ground conditions are usually bad, so these areas are severely shaken by earthquake and vulnerable to earthquake-induced damage.
Valley plain, flood plain	D		
Coastal plain, delta			
Back marsh, Former river bed	E		
Man-made landform		River flooding Inside water inundation High tide flooding Damages by earthquakes	The depth of inundation and degree of flood damage depend on the height of the embankment. Ordinarily, the period of inundation is short. During strong earthquakes, land made by reclaiming and filling water bodies are vulnerable to liquefaction. Filled-in areas of ravines are vulnerable to damages ground such as depressing and fissuring.
Reclaimed and drained land (waterway)			
Filled up and banked up surface(lowland)			
Filled in valley, etc.			

Terminology at a glance

*1 Elevated areas of lowlands: Lowlands are generally more vulnerable to inundation than uplands, drainage is poor, and the ground consists of weak soils. However, as these elevated areas are somewhat higher than general lowlands, they drain relatively easily, and their ground is better because it consists of relatively coarse structural elements.

*2 General areas of lowlands: These areas are not much higher than coasts and rivers. As a result, this ground is easier to inundate than elevated areas and it is poorly drained. Furthermore, its ground is weak because it consists of mainly fine substances such as silt and clay.

Aerial photograph of liquefaction that occurred during the Great Hanshin-Awaji Earthquake.

How to get geographic information on disaster prevention

Published information

Information published by the GSI can be obtained as follows

Mail order (postage extra)

Sales Department, Japan Map Center
4-9-6 Aobadai,
Meguro-ku, Tokyo 153-8522
Tel: +81-3-3485-5414
Fax: +81-3-3465-7591
Web page: http://www.jmc.or.jp

Store sales

Available nationwide at book stores that handle GSI maps

*For a detailed list of stores, please consult the home page of either GSI or Japan Map Center
*Some maps are short in stock, so please confirm availability by telephone or other means

Price list of disaster prevention maps

Type of map		Specifications	Number of colors	Price (yen)
1:25,000 Land Condition Map		46.0×58.0cm	13	440
		63.6×93.9cm	12	690
		63.6×93.9cm	13	770
		78.8×109.1cm	12	890
			13	920
			16	1,010
		78.8×109.1cm	6	780
			9	870
			13	990
1:15,000 Land Condition Map of Volcano	Kusatsushirane San	63.6×93.9cm	14	800
	Miyakejima			
	Sakurajima	78.8×109.1cm	11	930
1:25,000 Land Condition Map of Volcano	Usu Zan	52.0×73.8cm	10	550
	Tarumae Yama	78.8×109.1cm	9	870
	Unzen Dake		11	930
1:30,000 Land Condition Map of Volcano	Kirishima Yama	78.8×109.1cm	10	900
	Bandai San			
	Hokkaido Komagatake		12	960
	Aso San		13	990
1:50,000 Land Condition Map of Volcano	Tokachi Dake	63.6×93.9cm	14	800
	Fuji San	84.1×118.9cm	10	980
1:5,000 Volcanic Base Map		78.8×109.1cm	1	560
			2	590
1:10,000 Volcanic Base Map			2	590
1:25,000 Topographical Map of Coastal Area		46.0×58.0cm	3	270
		46.0×58.0cm		290
		63.6×93.9cm		460
		63.6×93.9cm		520
		78.8×109.1cm		620
1:25,000 Land Condition Map of Coastal Area		46.0×58.0cm	9	380
		46.0×58.0cm	12	410
		63.6×93.9cm	8	590
		63.6×93.9cm	9	670
		63.6×93.9cm	12	690
		78.8×109.1cm	9	870
		78.8×109.1cm	12	890
1:25,000 Active Fault Map in Urban Area	Survey in 1995	63.6×93.9cm	5	830
	Surveys from 1996 on			1,000

For more information about geographic information on disaster prevention, please contact

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