Building Resiliance to Disasters in Western Balkans and Turkey

REGIONAL FORUM ON MULTI-HAZARD EARLY WARNING SYSTEM & BUILDING RESILIENCY TO DISASTERS

15 October 2014, Ankara, Turkey

Analysis and lessons learnt from the floods in Bosnia and Herzegovina, Croatia and Serbia

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Joint presentation from Representatives from Bosnia and Herzegovina, Croatia and Serbia

(Hydromet services)

DHMZ **RHMZ Serbia** **RHMZ RS** **FHMZ FBiH**

Overview

Croatia

The most affected areas are along the ***Sava river***

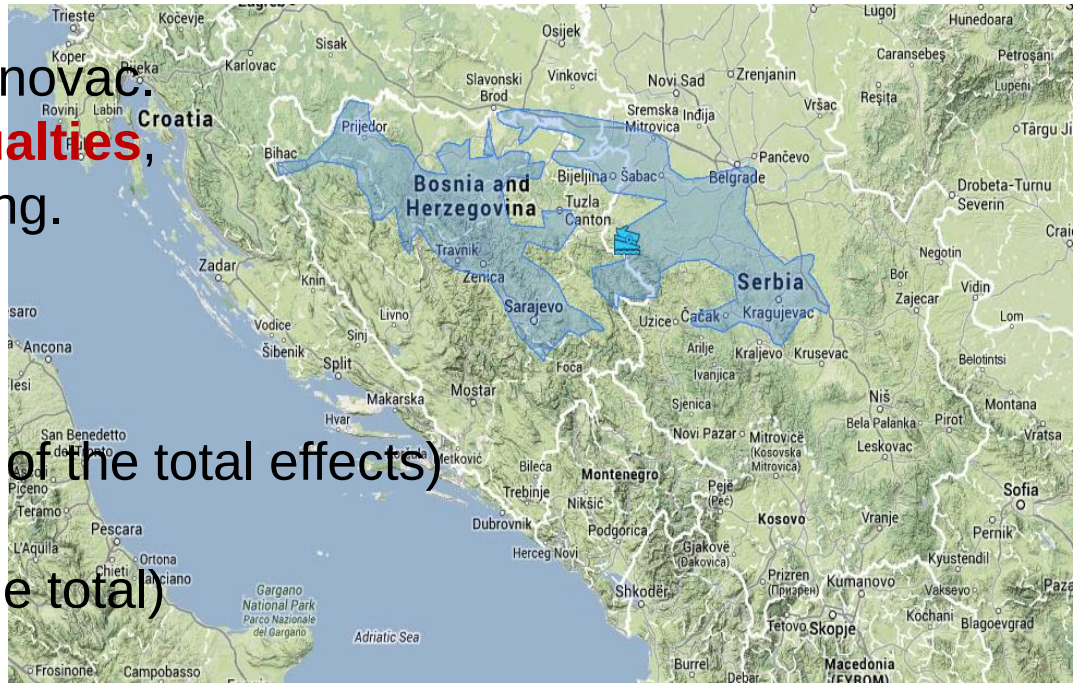
- the economic impact is enormous (297.629.000 EUR)
- the floods forced the evacuation of ~20.000 poeple in eastern Croatia
- there have been 3 casualties
- ~ 4.500 housing units have been flooded (around 30% of them need to be demolished)

Overview

Serbia

Three months' worth of rain fell on the region in just a few days, **causing Sava and Kolubara rivers** to burst their banks and sweep into people's homes.**Worst affected areas:Šabac and Obrenovac, municipalities of Ub, Krupanj, Svilajnac and Paraćin**

- **32,000 people** were evacuated, of which **25,000** were from Obrenovac.
- The disaster resulted in **51 casualties**, of which 23 were due to drowning.
- the total effects of the disaster
- in the 24 affected municipalities amounts to **EUR 1,525 million**, of which **EUR 885 million** (57% of the total effects) is destroyed physical assets, and **EUR 640 million** (43% of the total) refer to losses in production.



Overview

Bosnia and Herzegovina

Extraordinary rainfall affected Bosnia and Herzegovina between 14 and 19 May 2014, the largest precipitation in 120 years. The rainfall caused sudden and extreme flooding of several rivers **(Bosna, Drina, Una, Sava, Sana, Vrbas and their tributaries), as well as landslides and mass movements.**

- **81 local governments** suffered damages, losses,
- Around **90,000 persons** were displaced from their homes
- The disaster resulted in **25 casualties**,
- economic impact of the disaster reached **3.98 Billion BAM.** Most of it impacted the private sector;
- For the Federation of Bosnia and Herzegovina (FBiH) are **2.03 Billion BAM,**
- for Republika Srpska (RS) damages and losses **are 1.89 Billion BAM**
- and **57.89 Million BAM** for the Brcko District of Bosnia and Herzegovina (BD).

Overview

Every year, disasters related to meteorological, hydrological and climate hazards cause significant loss of life, and set back economic and social development by years, if not decades.

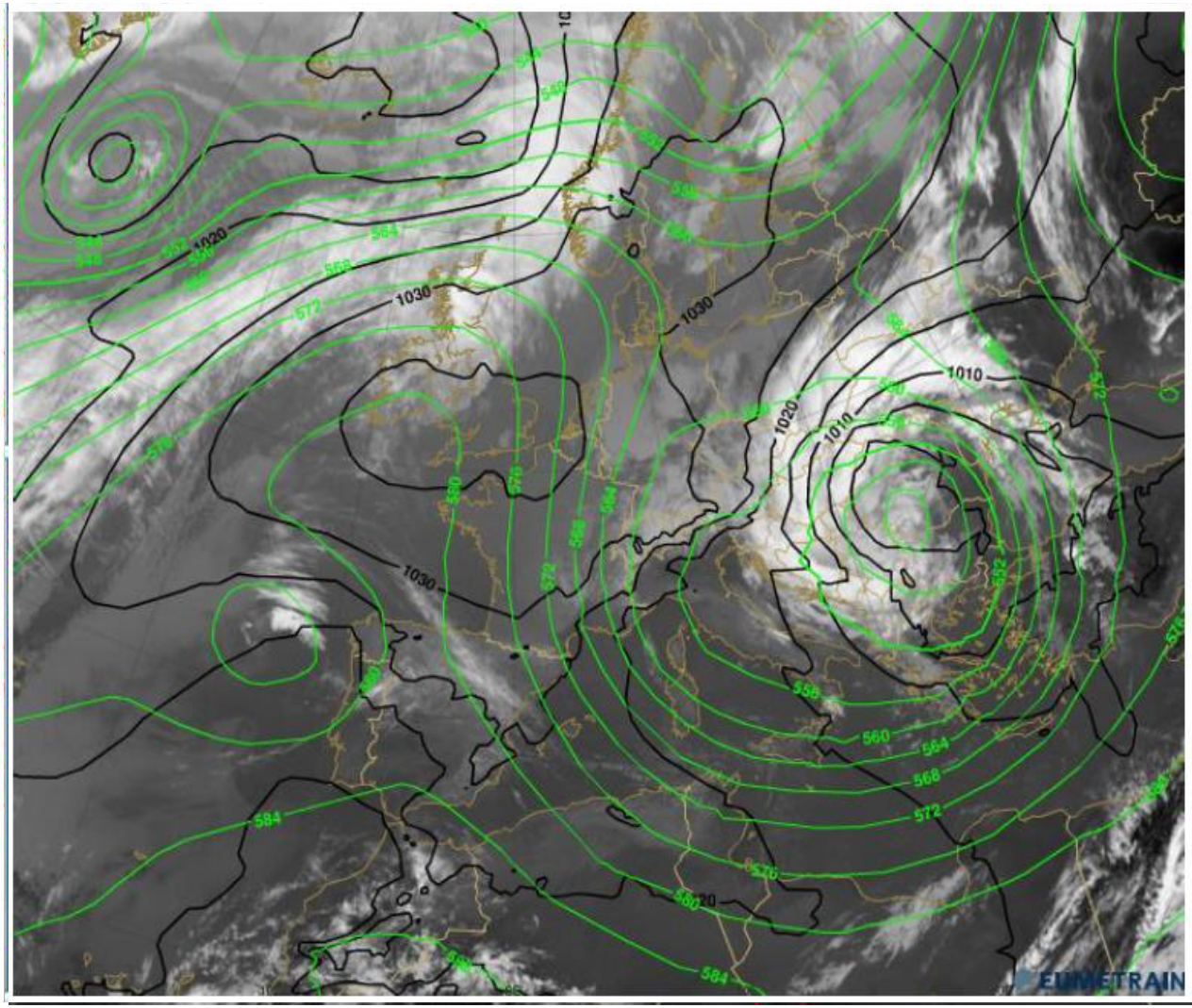
What causes floods?

Extreme meteorological and hydrological conditions and dam failure mostly in Sava river basin

1. Extreme rainfall during April and May 2014 cause in parts of Croatia, Serbia and Bosnia and Herzegovina (in both Entity) worst flooding in over a century.
2. From mid April to the end of second week of May were extremly rainy period of time (nearly every day was rainy)
3. Measured high horary intensities of rain which overcome all the peaks daily and total monthly precipitation, from historical series of measurements

The disaster has made evident a number of vulnerabilities of the population and economy of hole region that – in view of climate change – deserve special attention and require the reduction of disaster risks.

Weather conditions – sinoptic situation



15 May 2014, 06 UTC
IR+MSLP+AT500

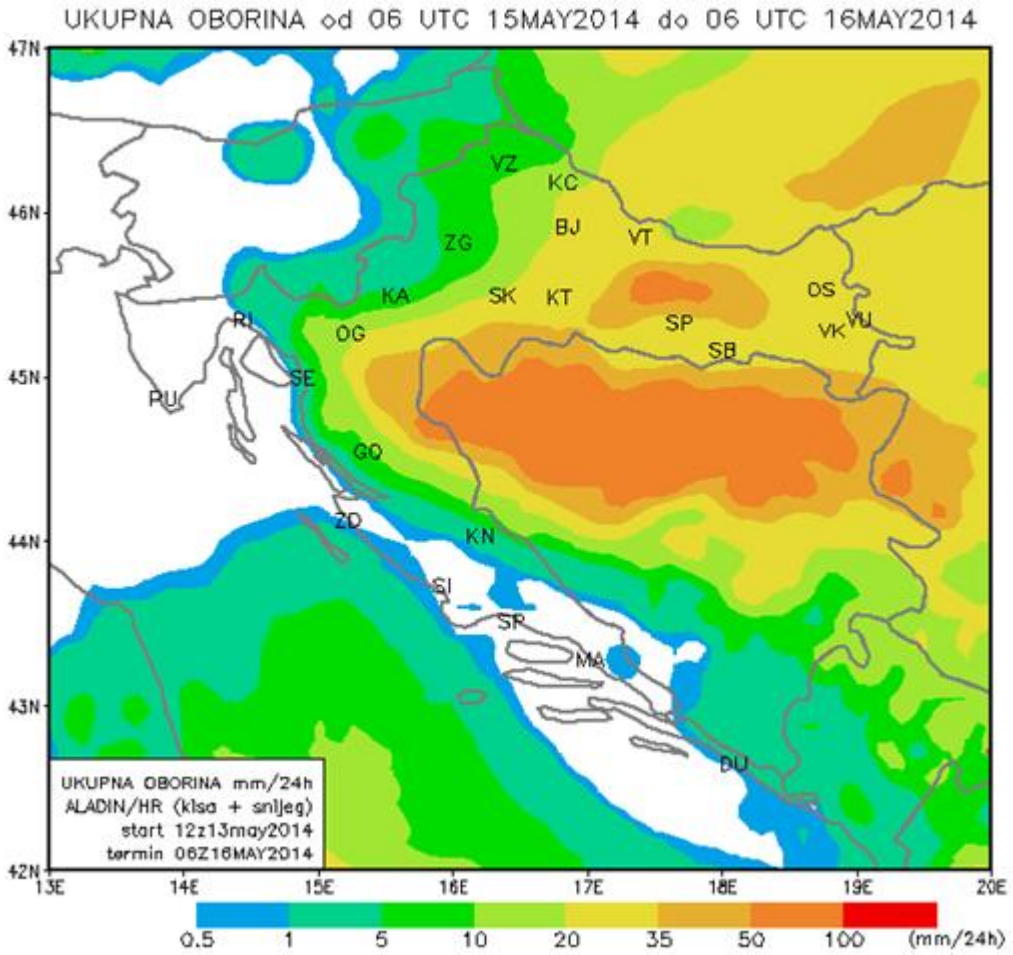
- Within the next 24 hours a deep low intensifies, stretching vertically throughout the whole troposphere..
- The axis of the low is vertical, with no tilt, making the cyclone stationary and very intense

Summary of sinoptic situation from 13th to 17th May

- Deep cyclone developed in the Adriatic on 13 May 2013
- The cyclone remained quasi-stationary for more than 3 days over SE Europe
- Very cold polar air coming from the north, warm and moist Mediterranean air injected from the south
- Precipitation forecast by the models – underestimating the quantities, but was very good sign for warnings
- Record precipitation, in some places more than 200 mm in just a few days
- Soil already saturated from rainy spring season
- Sava river, together with affluent rivers Vrbas, Bosna and Drina, flooded large areas of Bosnia, Serbia and Croatia
- Thousands of people left without a home
- Together with rain some damage was caused by windstorm
- At the coast wind gusts up to 42 m/s, over the northern parts of Croatia very strong northerly wind with constant gusts of 15 to 22 m/s for 24 hours, with maximum gust 28 m/s!

Forecasts and warnings – Croatia: ECMWF 24 hr total precipitation

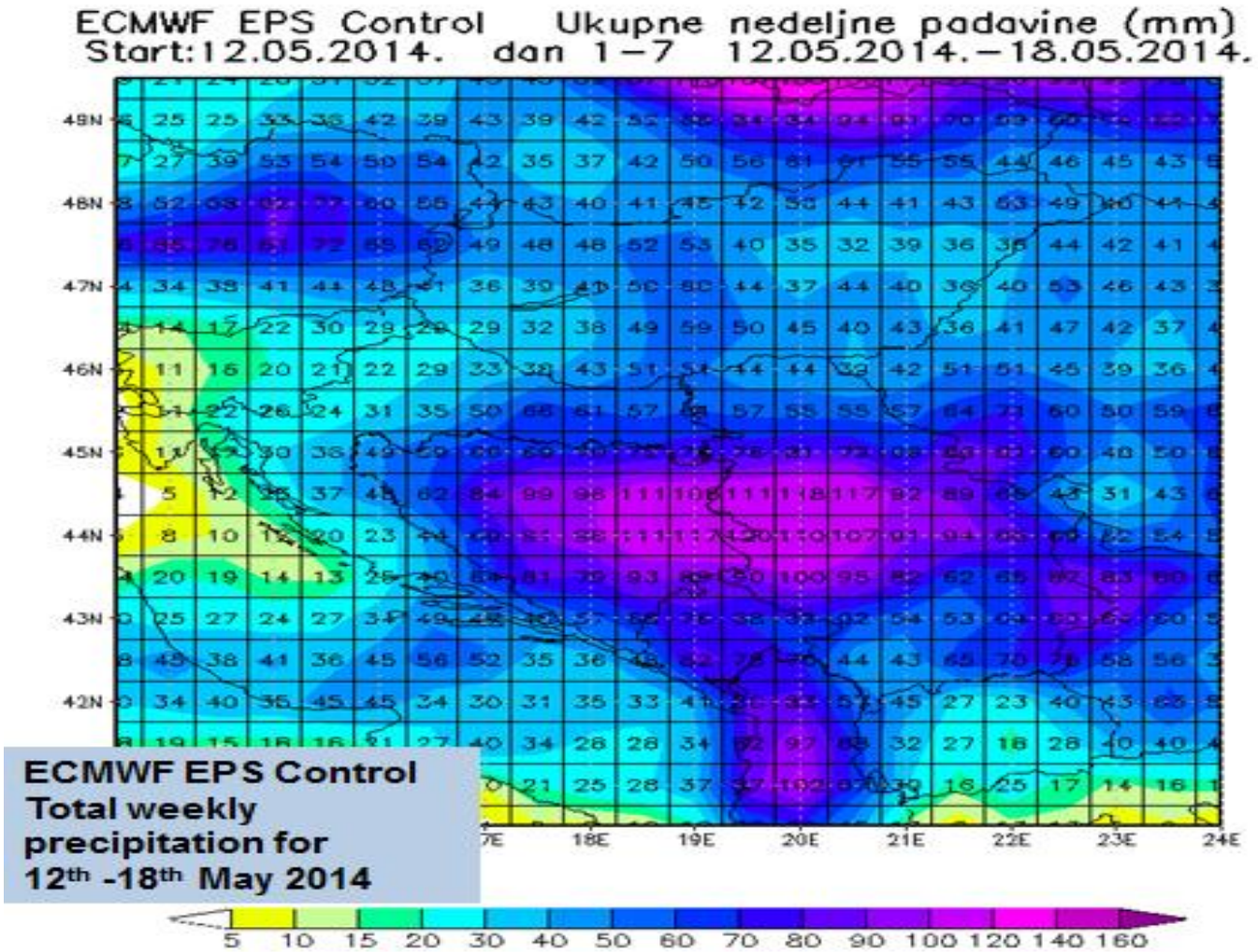
Models captured the process correctly in space and time but



Forecasts and warnings – Serbia: NWP products

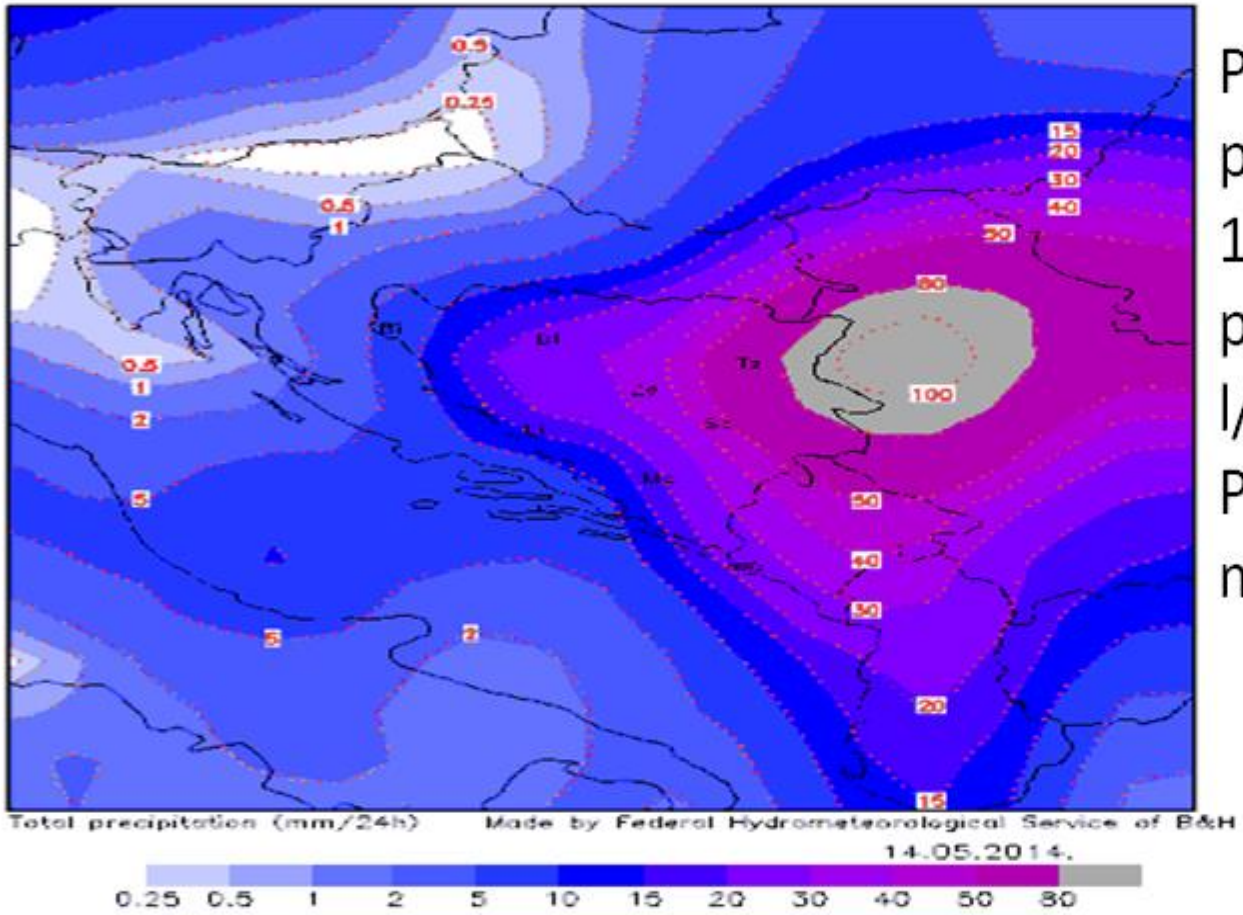
RHMSS in its forecasting operative work utilise the products and data of WMO Global Producing Centres, EUMETSAT, as well as data and products from its own NWP and climate model suits.

Most of them predicted extreme rainfall in central Balkans.



ECMWF EPS Control Total weekly precipitation for 12th -18th May 2014

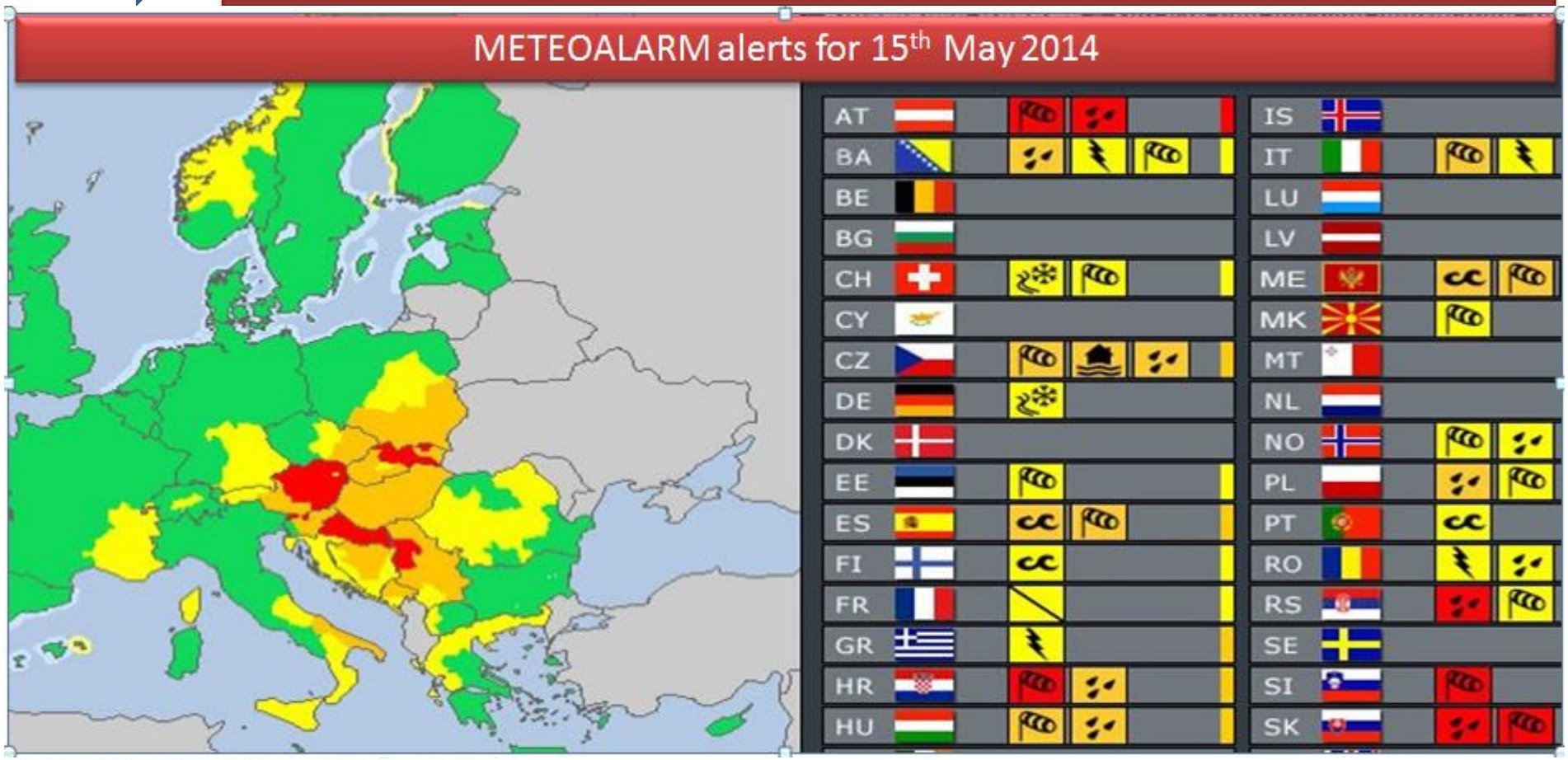
Forecasts and warnings – Bosnia and Herzegovina



Picture shows precipitation on May 14th 2014. Most precipitation (over 100 l/m^2) on same region. Picture is output of GFS model.

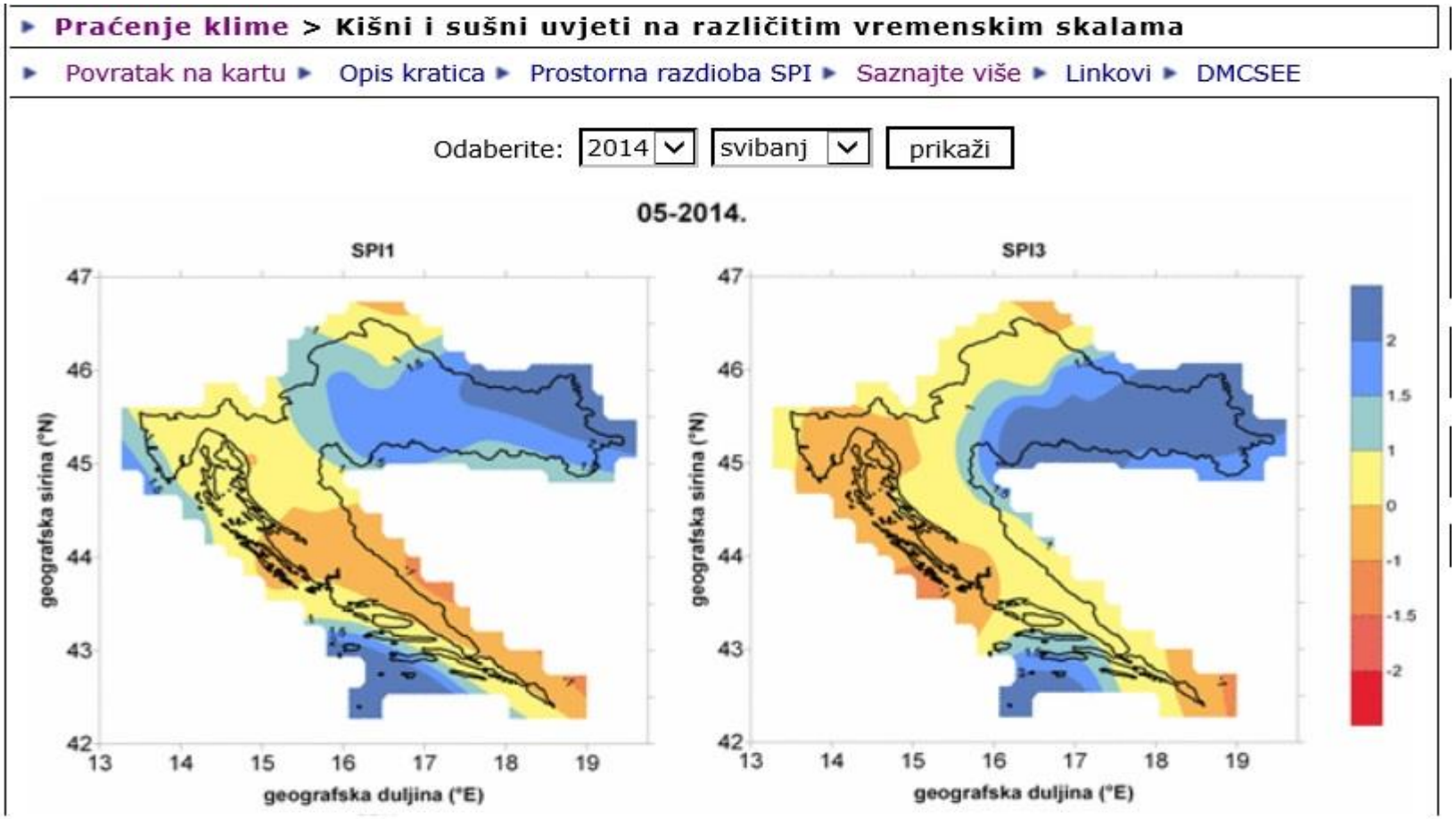
Forecasts and warnings – Conclusions

The event had been forecasted on time in hole region!



Meteorological context - Overview of total amount of rainfall

Croatia - DHMZ



Meteorological context - Overview of total amount of rainfall

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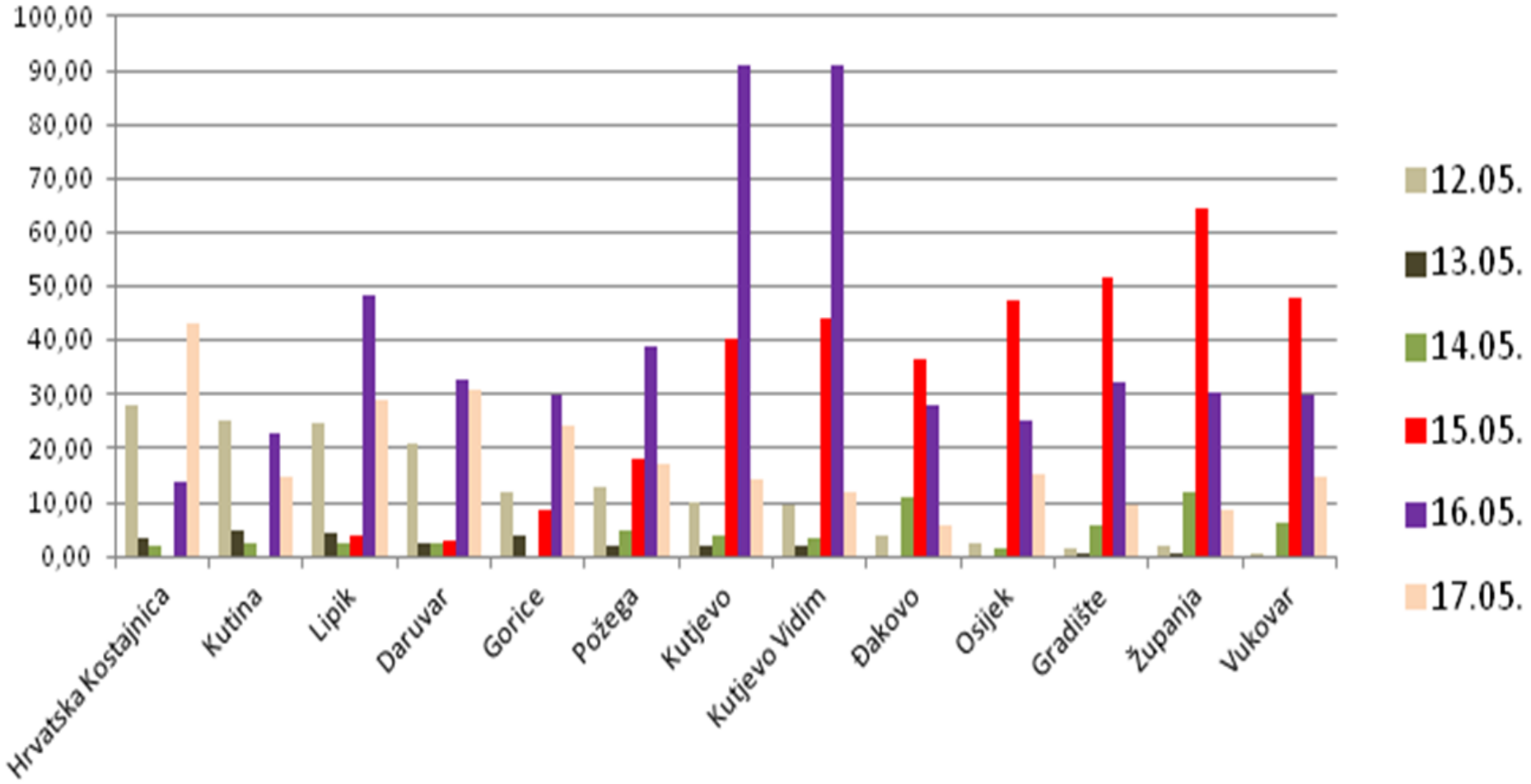


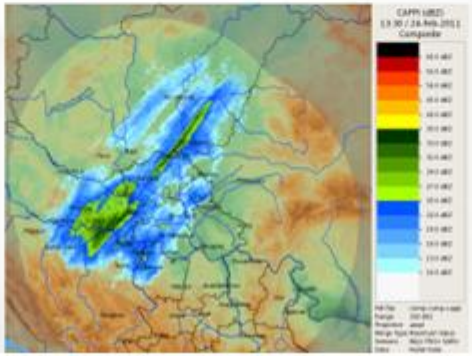
Meteorological context - Overview of total amount of rainfall

Serbia – RHMZS

Modernization of the State meteorological radar centers network (Centers of the RHMSS and hail suppression Centers of the Ministry for interior-responsible for DRM)

Gematronic	S band	3 (hail supp.)
Mitsubishi	S band	10 (hail supp.)
MRL 5	X/S band	1 (RHMSS)
LAWR	X band	1 (RHMSS)

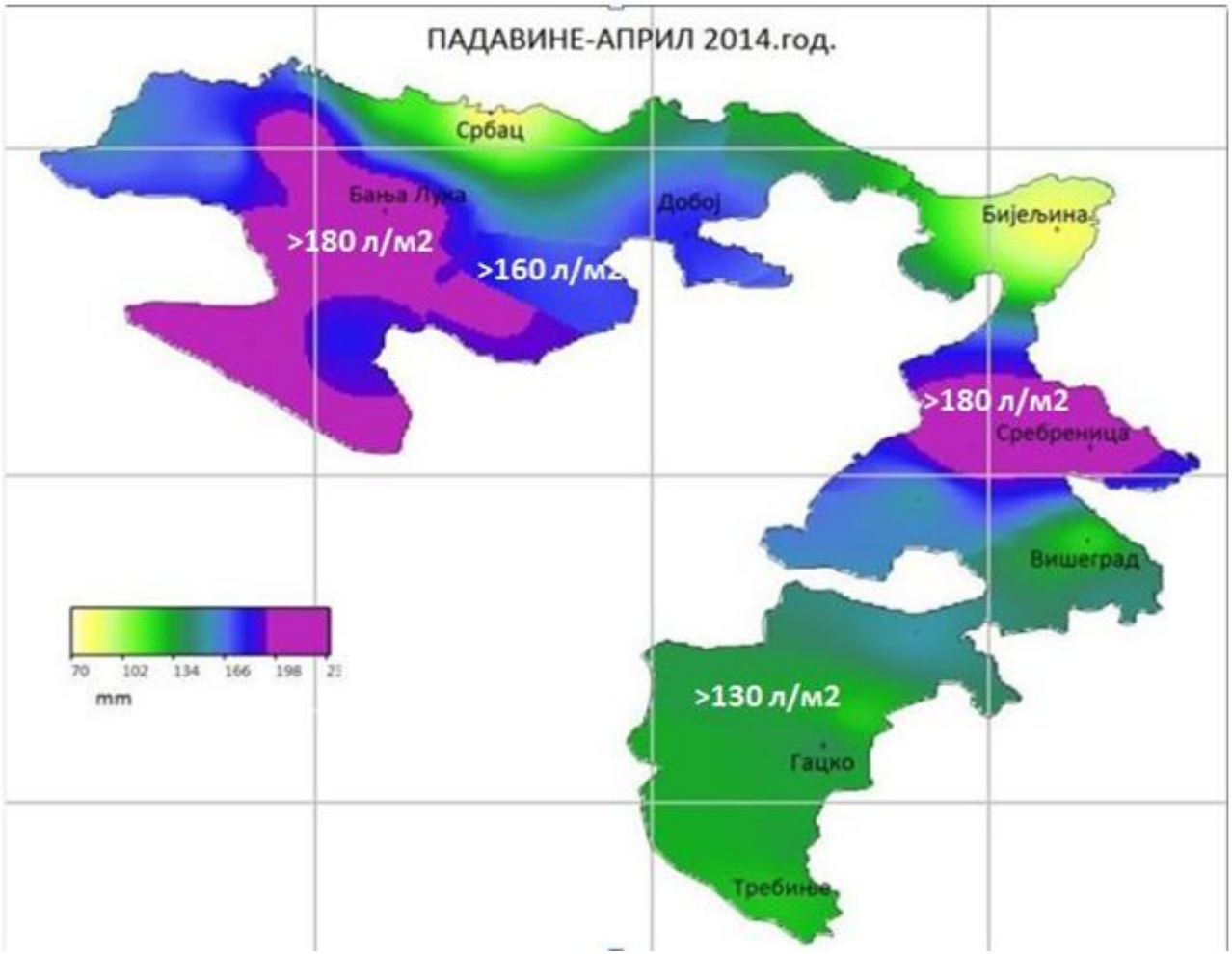
New Gematronic S band – dual polarization radar at Jastrebac mountain operational from October 2013 (RHMSS)



With the installation of new radar at Jastrebac (2013) all parts of Serbia are covered with Doppler Radars (Gematronik) with Rainbow softwer which is one of the most comprehensive, state-of-the-art sensor management system for multi-radar network

Meteorological context - Overview of total amount of rainfall

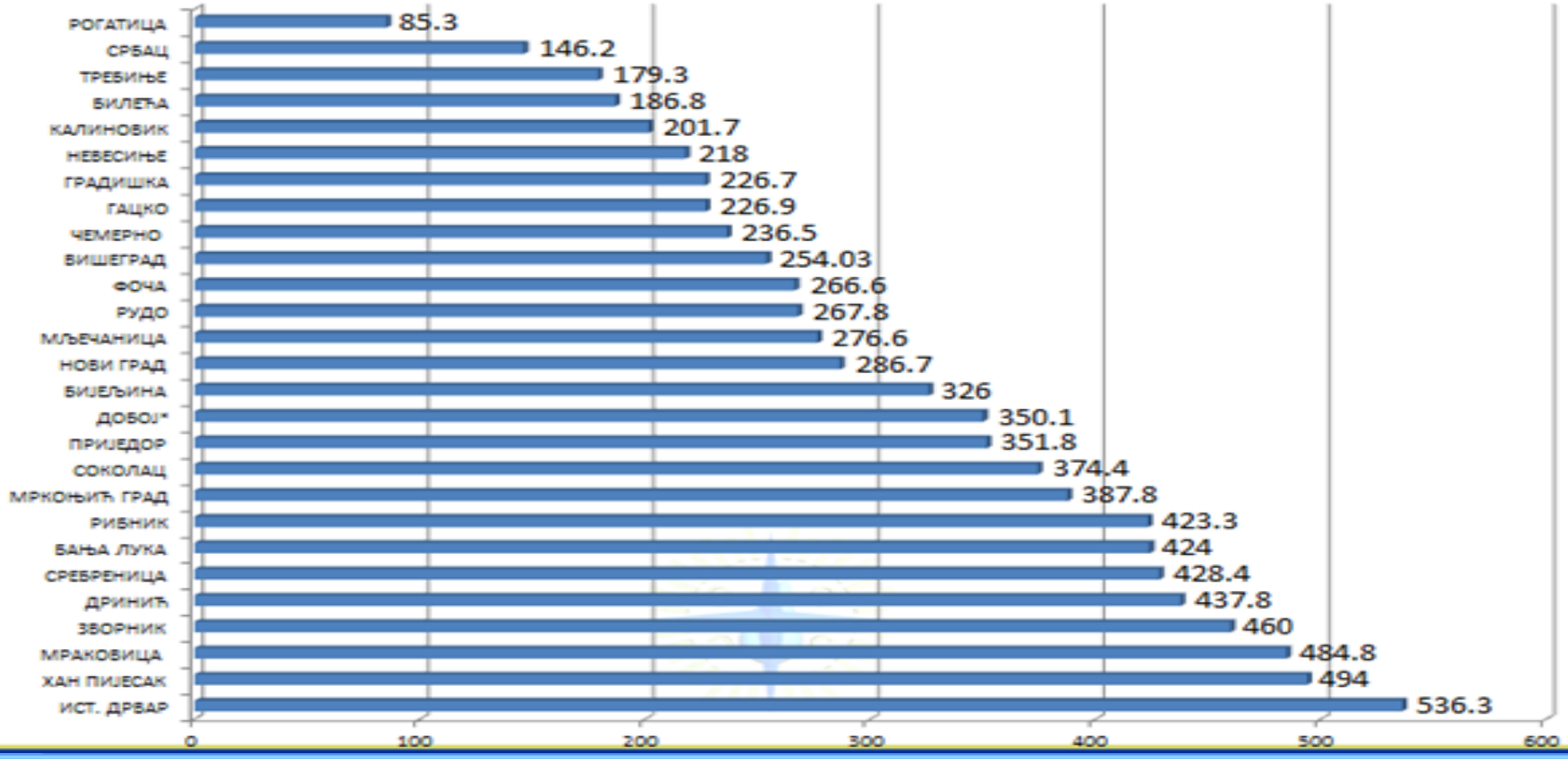
Bosnia and Herzegovina – RHMZ RS



Meteorological context - Overview of total amount of rainfall

Bosnia and Herzegovina – RHMZ RS

The total rainfall April + May 2014th, as a cause of extreme floods



Meteorological context - Overview of total amount of rainfall

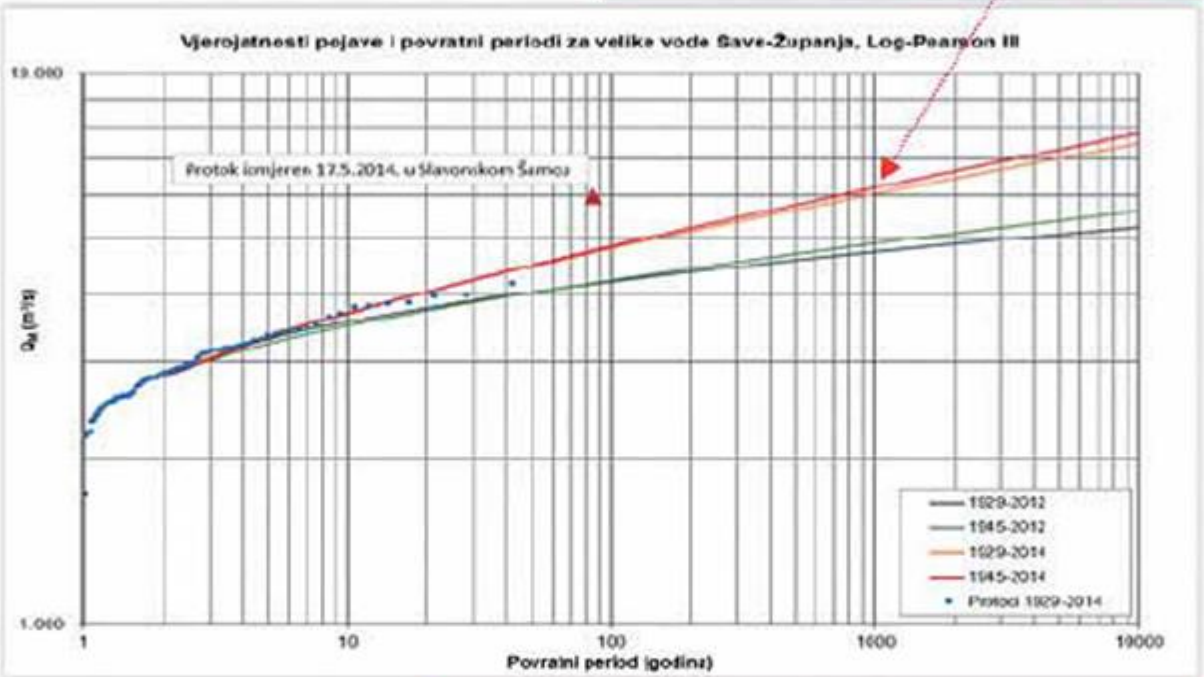
Bosnia and Herzegovina – FHMZ FB&H

Extreme precipitation that caused flooding in May of 2014 years in the territory of Bosnia and Herzegovina and the region, were the result of a cyclone that affected an unusually long time in our country. Besides floods it was activated a large number of landslides at several sites who had proportions of disaster. The weather conditions during the third decade of April month (heavy rainfall) are further deteriorating situation on the ground due to high soil saturation moisture.In the period from 12 to 18 May in Zenica, Sarajevo and Tuzla we have surpassed records in the amount of daily maximum precipitation.

Hydrological context – Croatia, Bosnia and Herzegovina, Serbia

Hydrological aspects – Croatia,

Discharge 6.007,96 m3/s

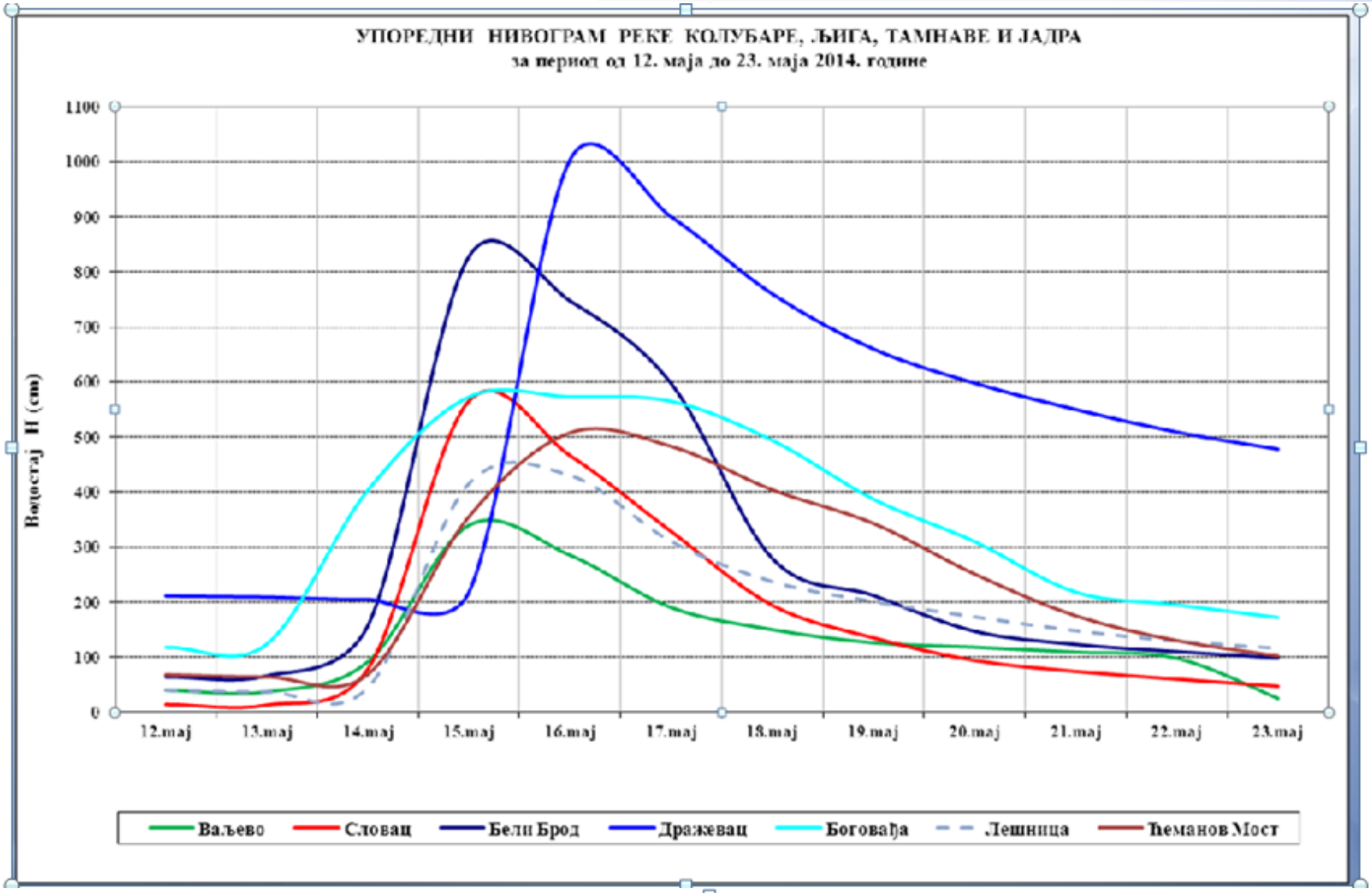


Return period (RP) = 1000 years

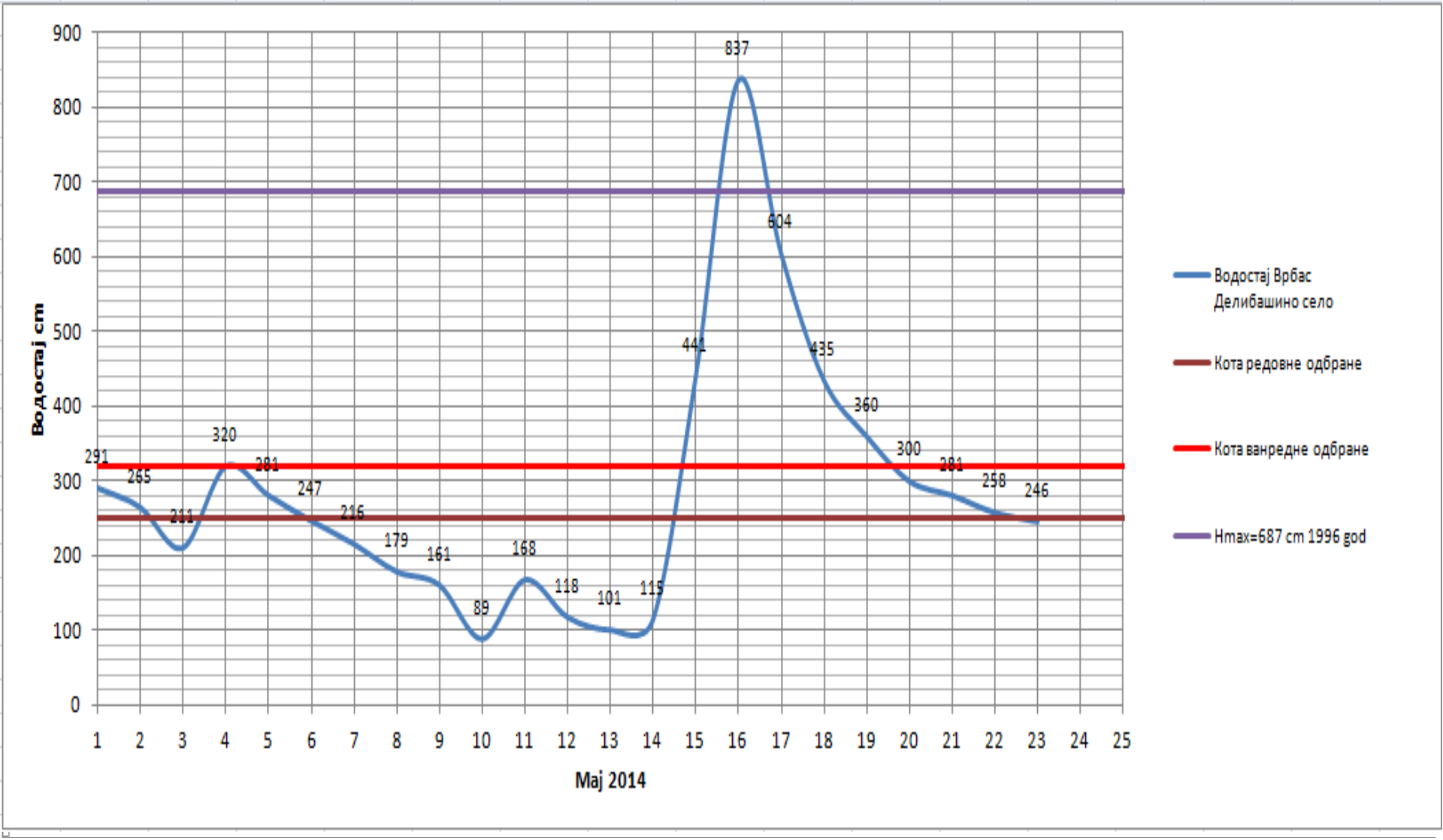
The incorporation of recorded flow rate maxima in the calculations of project parameters for flood protection systems should correct the existing parameters for this area and ensure the relevant values.

exceeding the above mentioned discharge values by 30 per cent.

Hydrological aspects – Serbia



Hydrological aspects – Bosnia and Herzegovina – RHMZ RS



Croatia has been able to address the immediate humanitarian relief needs in the flooded areas on its territory with its own capacities.

All relevant line ministries have introduced measures for immediate relief, e.g. shelter, food and care for the displaced, books for the children, chemical (disinfection) and physical (removal of carcasses) decontamination of the area, feed for the evacuated cattle etc.

Disinfection of vehicles on border with Bosnia and Herzegovina and Serbia – preventive measure

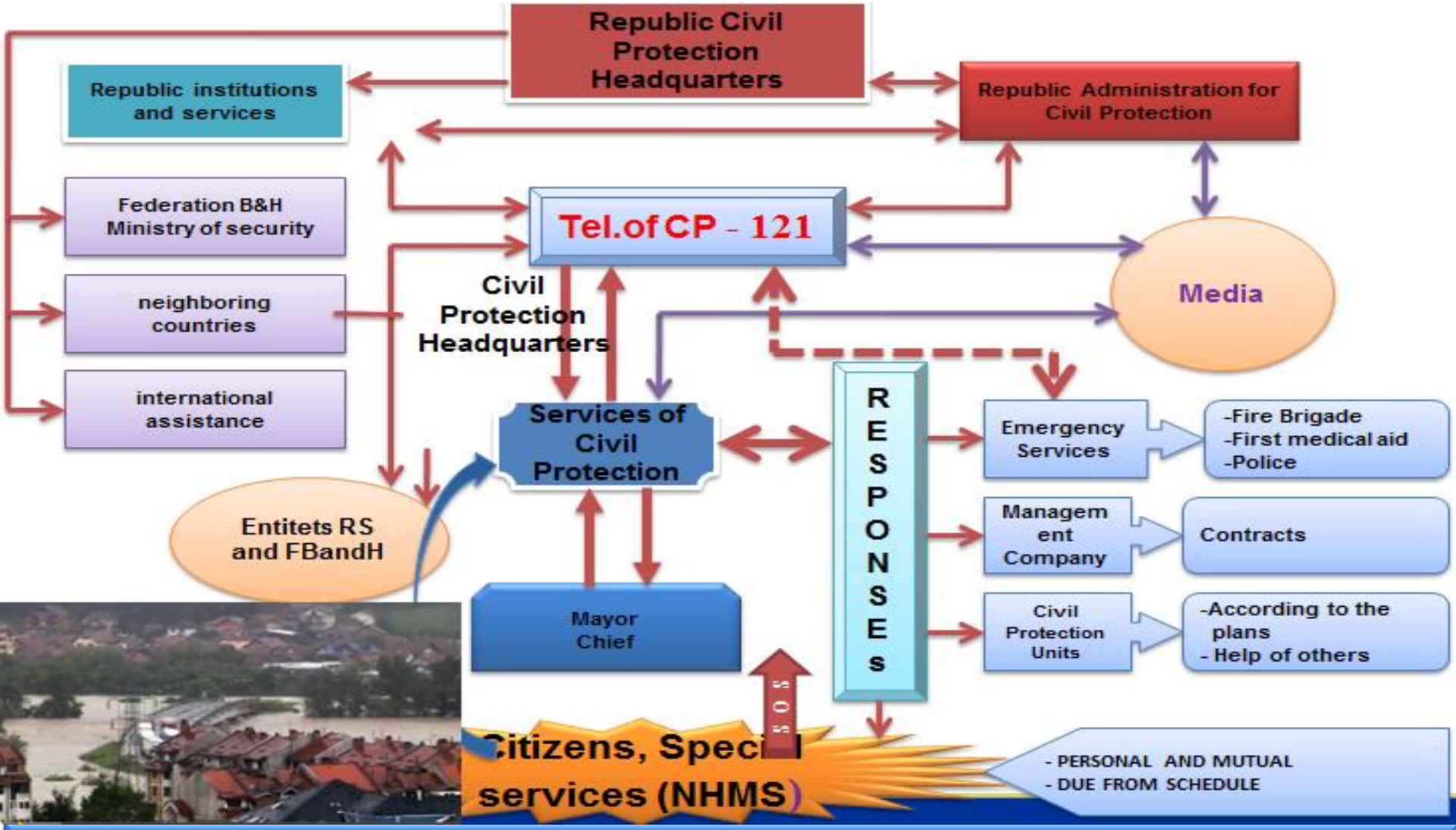
Flood protection – Serbia

The Serbian government declared an emergency situation (the Official Gazette of the Republic of Serbia No 52 from 15 May 2014)

- The government established "Flood Emergency Headquarters" within the Sector for Emergency Menagement inThe Ministry of Interior ;
- Important activities of the Serbian RedCross ;
- On 16th May the Ministry of Foreign Affairs established its Crises Response Team Tasked with coordinating the activities related to relief and donations from aboard.

The meeting of the Republican Headquarters for Emergency Situations, 15 May 2014.

Flood protection – Bosnia and Herzegovina_RHMS RS



The consequences of floods in the picture :

Croatia

The consequences of floods in the picture :

Serbia

The consequences of floods in the picture :

Bosnia and Herzegovina

Lessons Learned from the Floods this May :

Croatia

How could we overcome such tragic events in the future?

flooded

dry phase

Kopački rit – natural park

Serbia

Lessons Learned from the Floods this May :

Bosnia and Herzegovina

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Thank you for your attention
on behalf of my colleagues and me personally