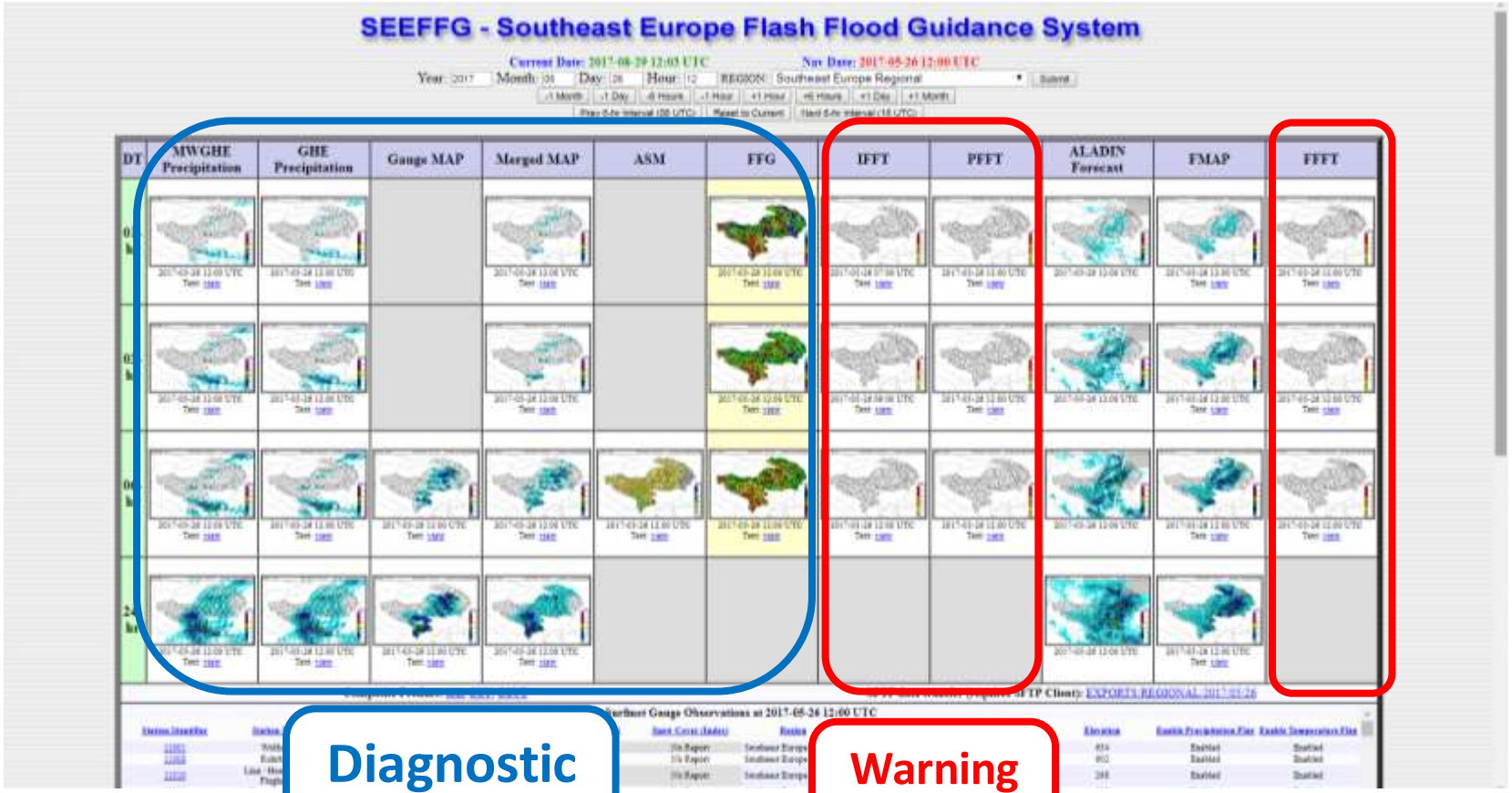
WEATHER CLIMATE WATER
TEMPS CLIMAT EAU

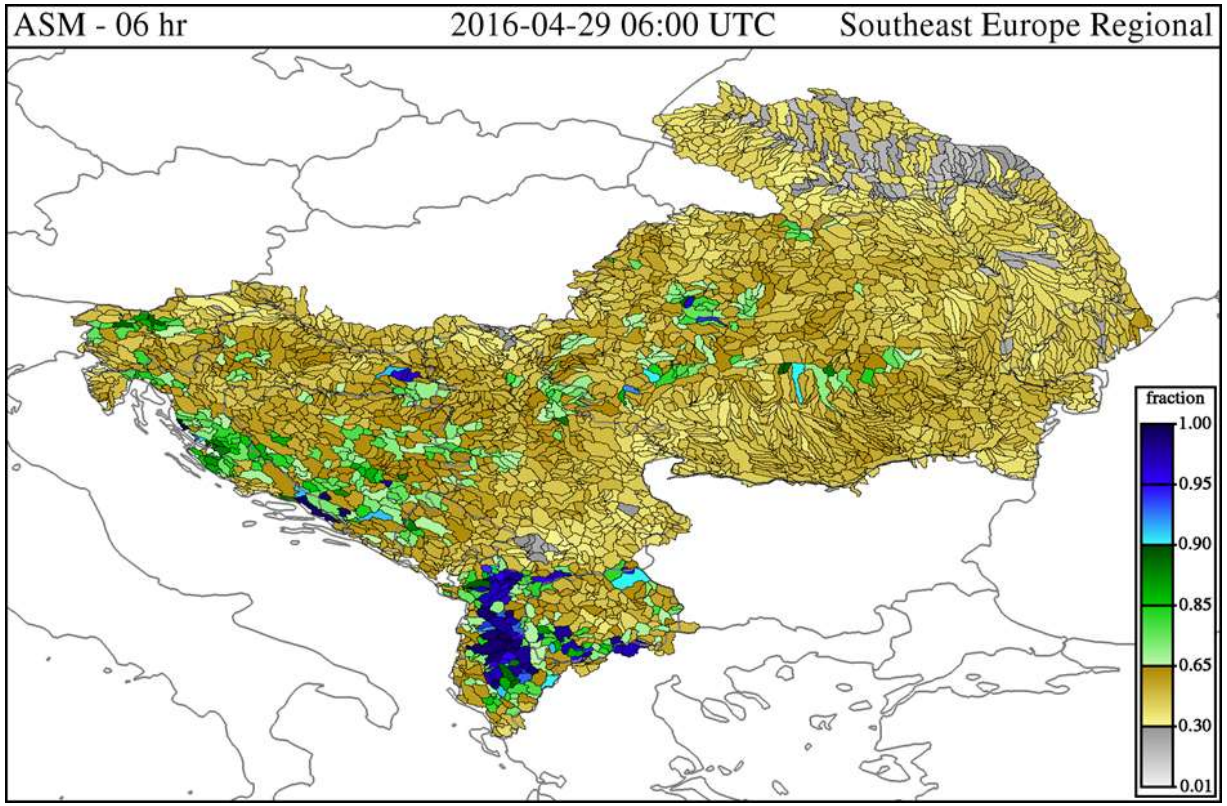
Overview of the SEEFFGS Products:
Average Soil Moisture
Flash Flood Guidance
Flash Flood Threats

WMO OMM
World Meteorological Organization
Organisation météorologique mondiale

SEEFFGS Forecaster (Product) Console



Average Soil Moisture (ASM)

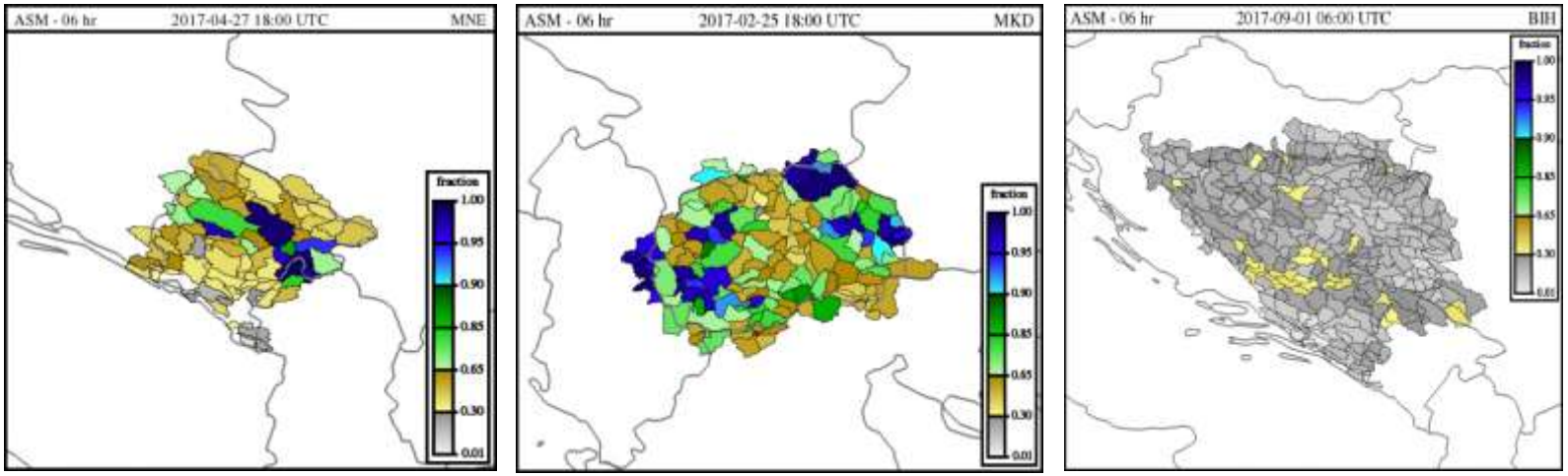


The Average Soil Moisture (ASM) product shows soil water saturation fraction (dimensionless ratio of contents over capacity) for the upper zone tension and free water contents (20-30 cm depth) of the SAC-SMA for each of the sub-basins.

- Saturation of the upper zone is very important for flash floods because if rainfall continues, most of the rainfall will become surface runoff.
- Temporal variation is quite rapid, depending on precipitation intensity and duration.

Average Soil Moisture (ASM)

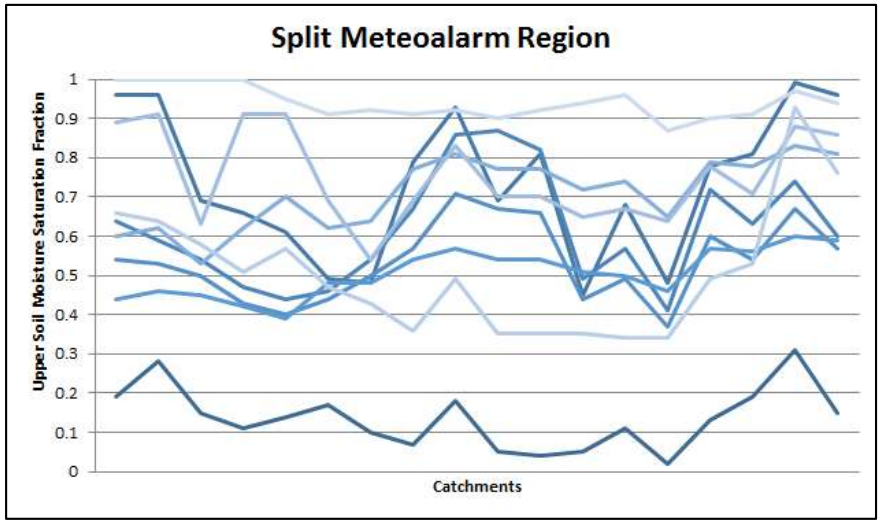
- The ASM products are updated every 6 hours at the model-processing hour at 00, 06, 12 and 18 UTC.

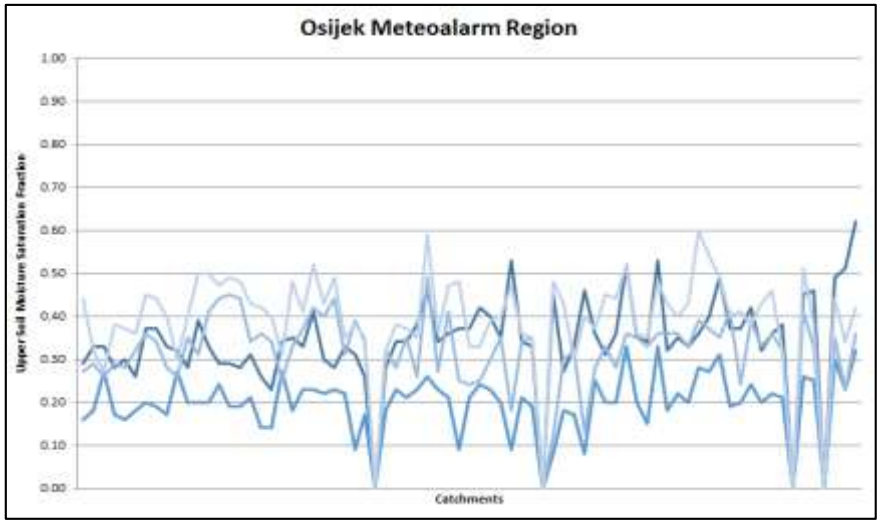


- Also, during the summer and when soil is dry, soil crusts can be formed. They can significantly reduce soil infiltration rate and increase surface runoff, especially during intense summer convective rainfall.

Average Soil Moisture (ASM)

- **The initial wetness conditions of the catchments can play a major role in their response to a rainfall event.**

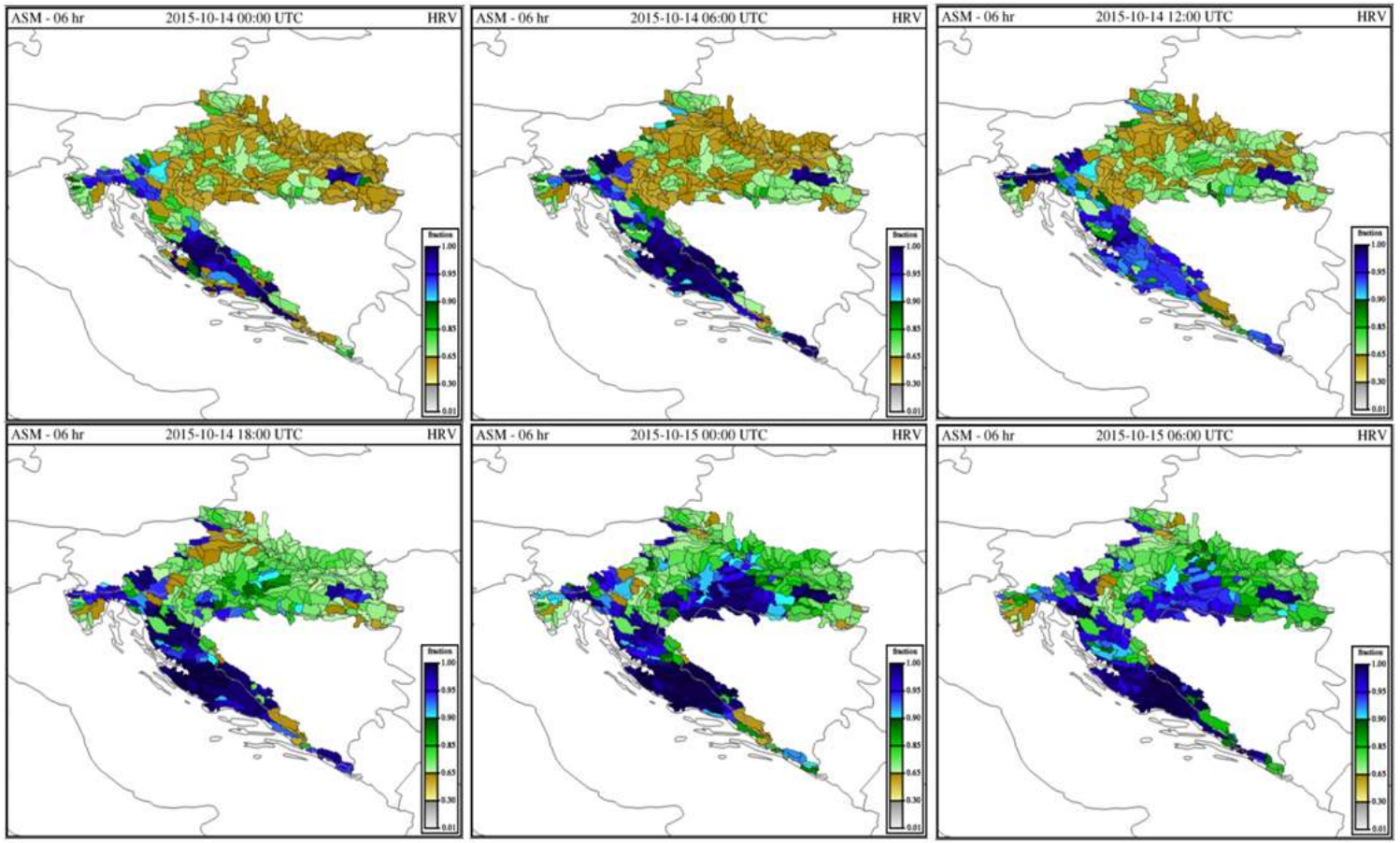




- Initial upper soil water contents estimates for every catchment in Split and Osijek regions in Croatia 6 hours before every flash flood event in 2016

Prepared by: Petra Mutic

Average Soil Moisture (ASM)



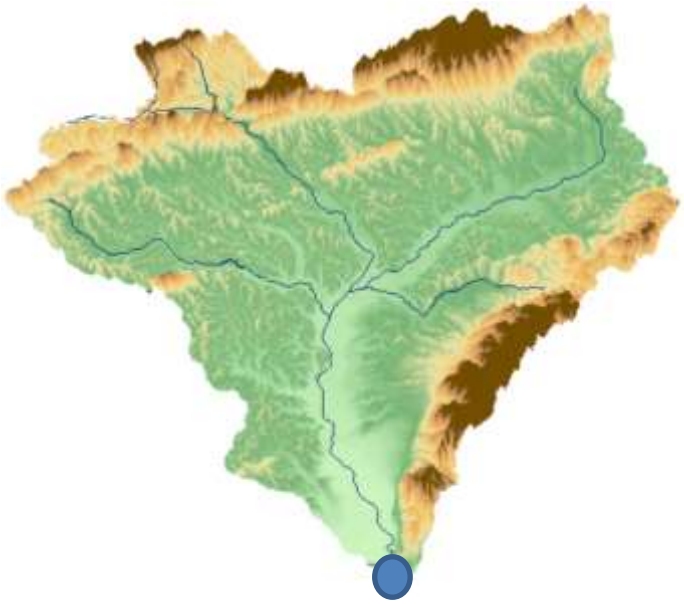
Temporal and spatial distribution of Average Soil Moisture (ASM), Croatia

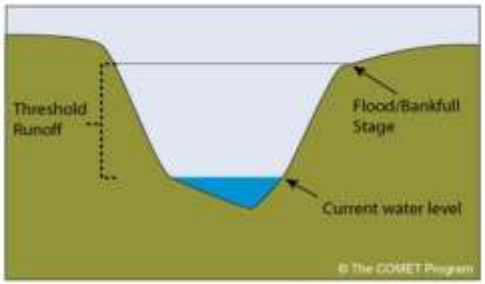
Flash Flood Guidance (FFG)

- The FFG is defined as the amount of actual rainfall of a given duration (e.g. 1, 3 or 6 hours) that is just enough to cause bankfull flow at the outlet of the catchment.

- Flash Flood Guidance then is an index that indicates how much rainfall is needed to overcome soil and channel storage capacities and to cause minimal flooding in a basin.

- The FFG is calculated and updated at every six hours at the model processing hour of 00, 06, 12 and 18 UTC and is valid for the next 1, 3 and 6 hours.

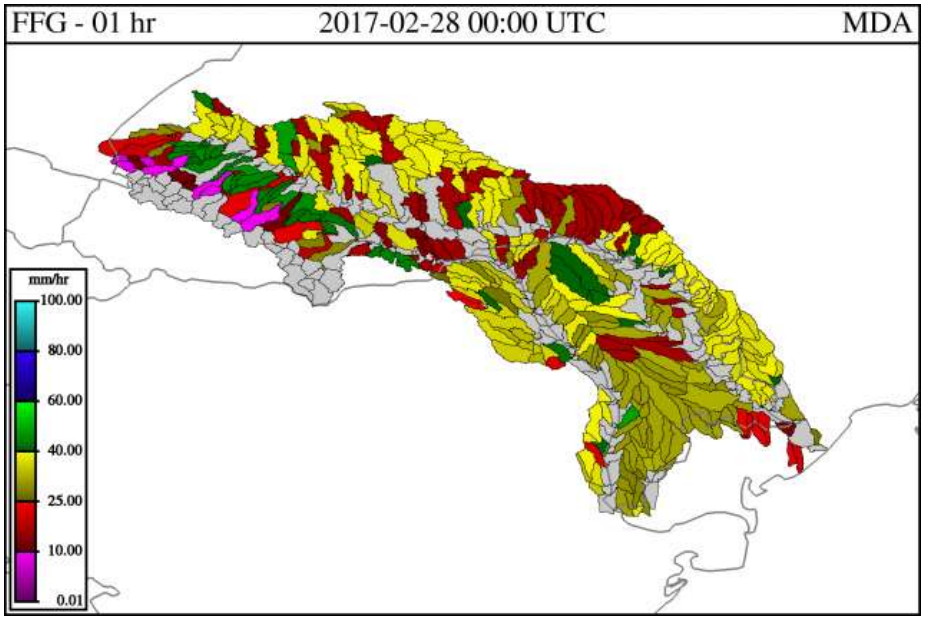


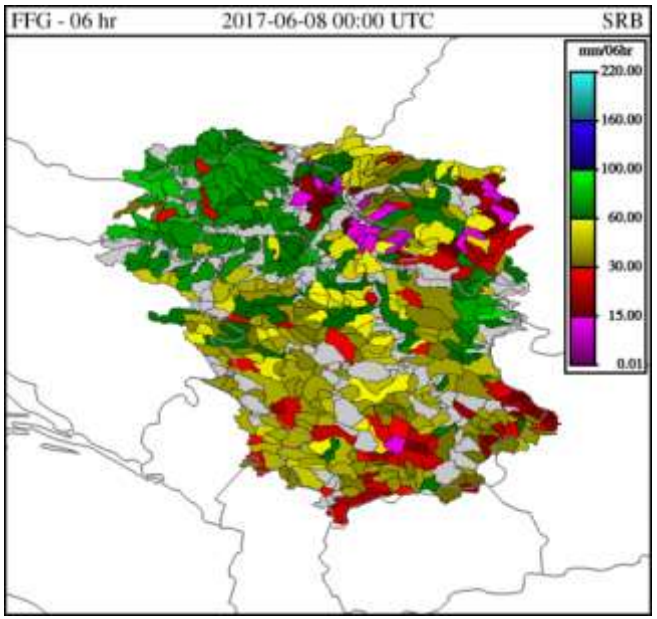


Flash Flood Guidance (FFG)

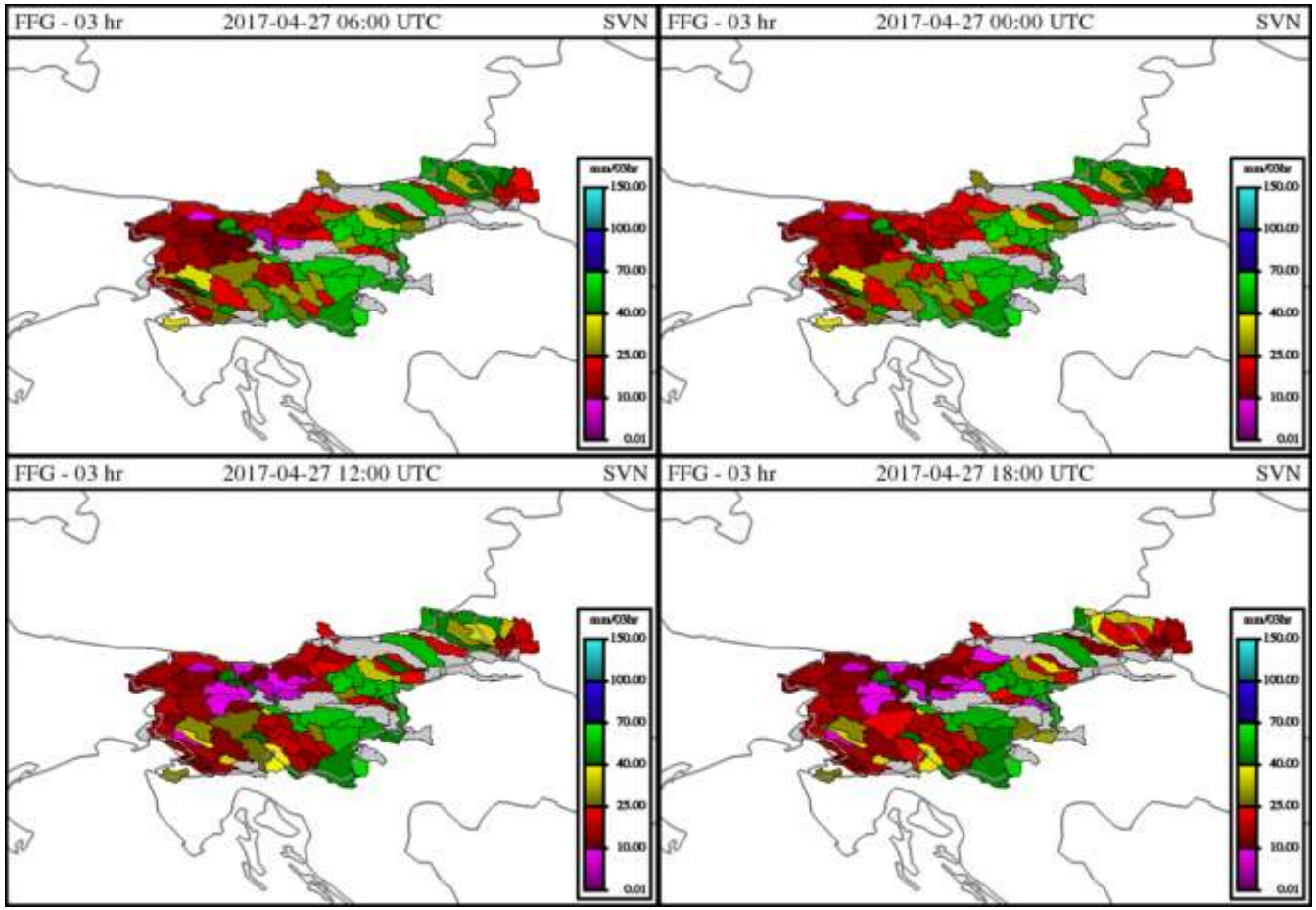
- Forecasters are advised to pay attention to the inverse relationship between possibility of flash flood occurrence and FFG values.

- The lower FFG, the higher possibility of flash flood occurrence.





Flash Flood Guidance (FFG)

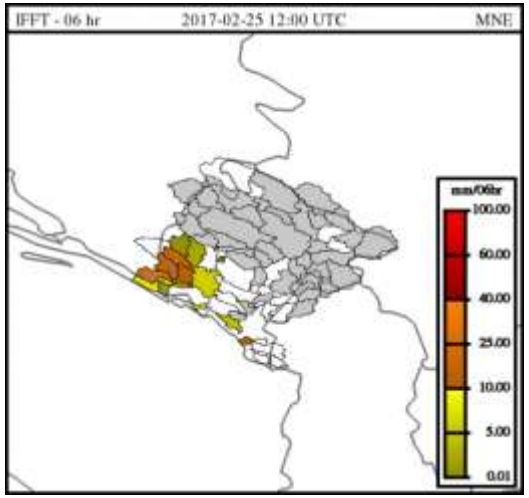


Temporal and spatial distribution of Flash Flood Guidance (FFG), Slovenia

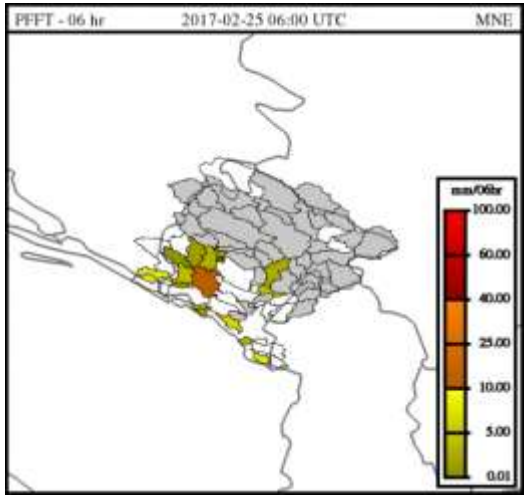
Flash Flood Threats

- FFT are amounts of rainfall of a given duration in excess of the corresponding Flash Flood Guidance value (existing/past or forecast) rainfall

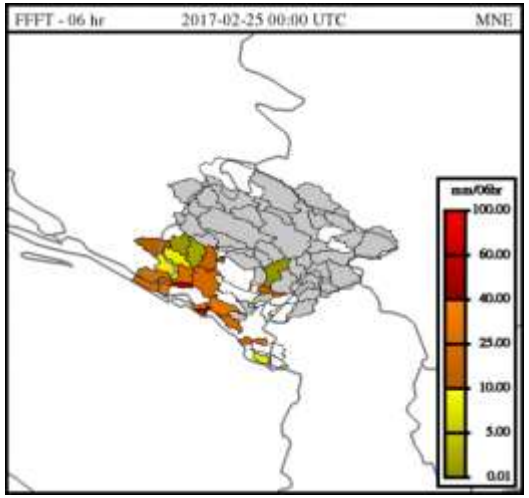
- Like FFG, FFT products are computed for 1-, 3-, and 6-hour durations and updated every 6 hours.



Imminent Flash Flood Threat (IFFT)



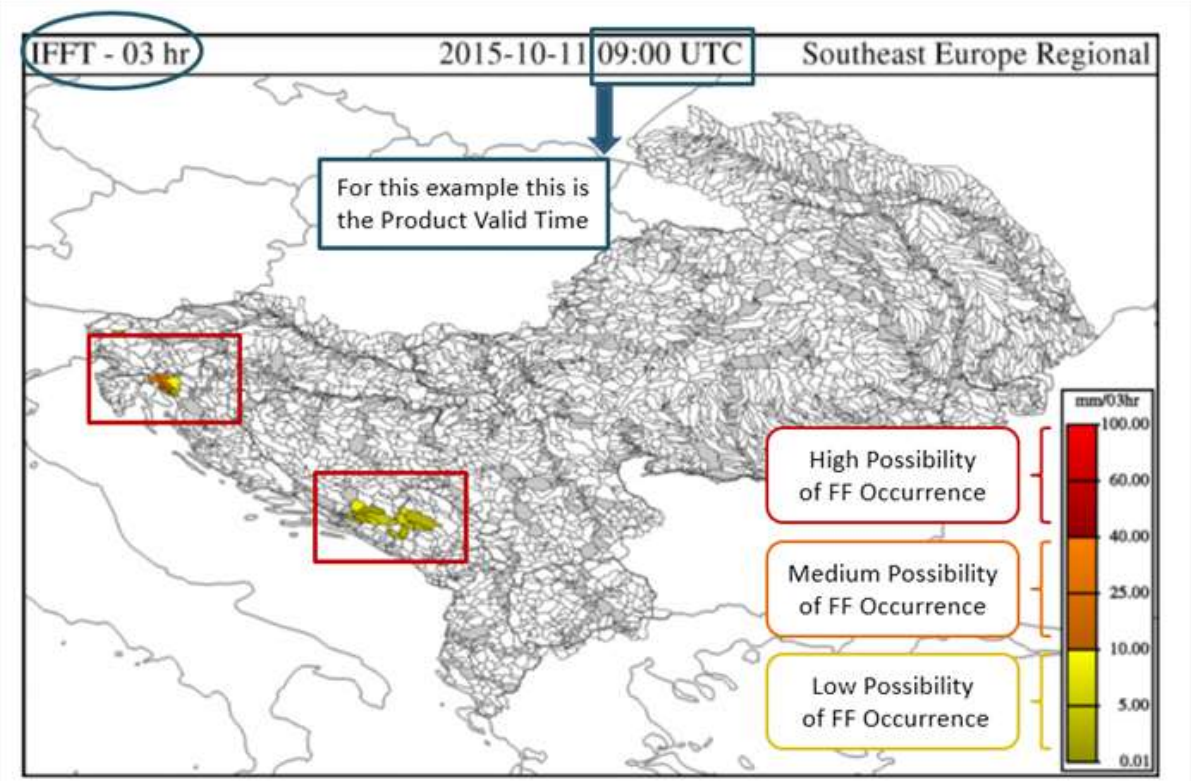
Persistent Flash Flood Threat (PFFT)



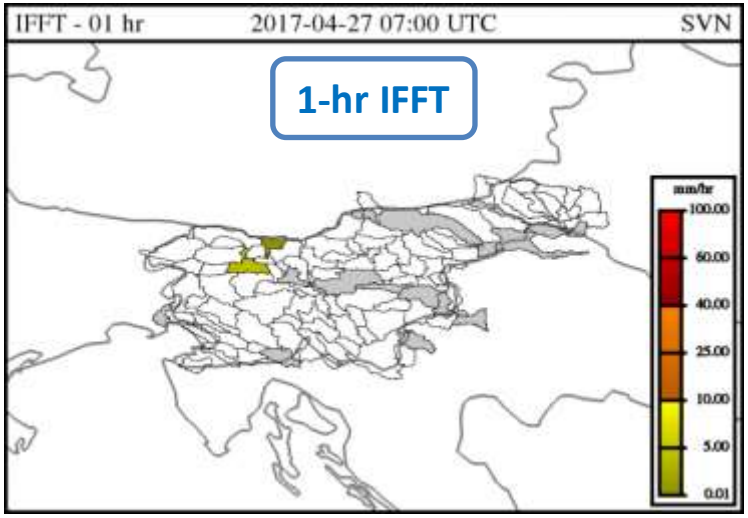
Forecasted Flash Flood Threat (FFFT)

Imminent Flash Flood Threat (IFFT)

- IFFT indicates that flash flood is happening now or is about to happen very soon (imminent).
- The values indicate the difference of the Merged MAP of a given duration and the corresponding past model processing hour FFG of the same duration for a given sub-basin.
- It should be noted that this product concerns the past rainfall and should be evaluated before using for warnings.
- Each IFFT product is updated every six hours.



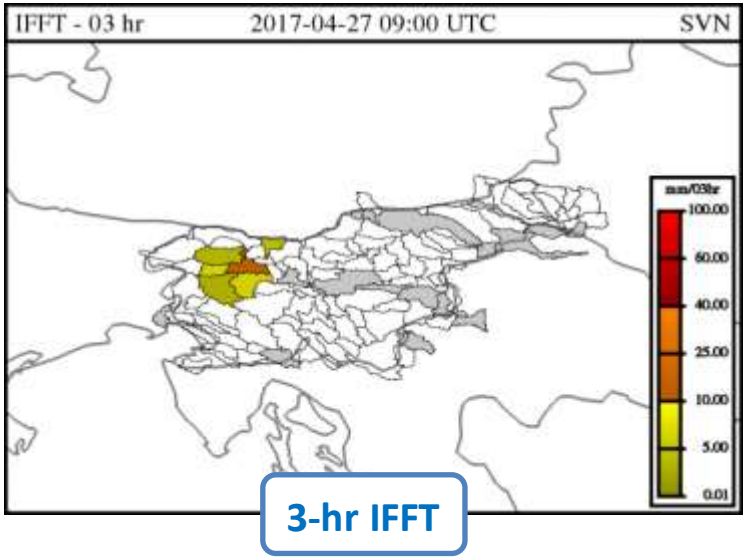
Imminent Flash Flood Threat (IFFT)

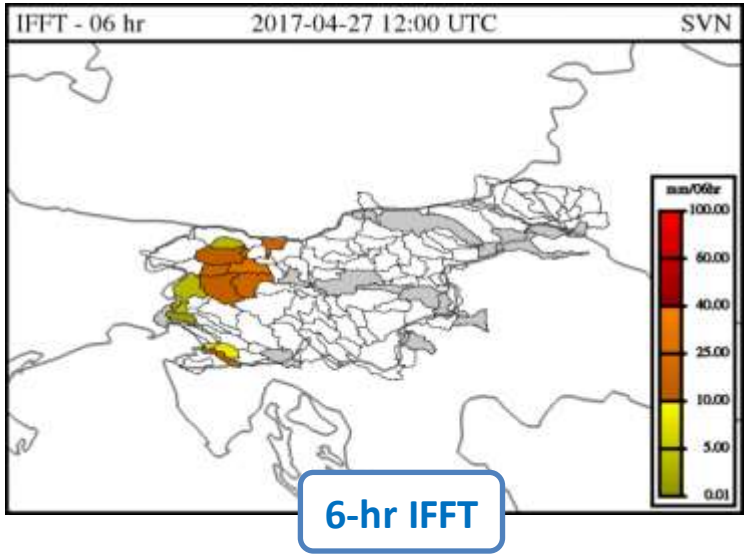


1 hr $IFFT_t$ = 1 hr merged MAP_t – 1 hr FFG_{t-1h}
where t = 01, 07, 13 and 19 UTC

3 hr $IFFT_t$ = 3hr merged MAP_t – 3 hr FFG_{t-3h}
where t = 03, 09, 15 and 21 UTC

6 hr $IFFT_t$ = 6 hr merged MAP_t – 6hr FFG_{t-6h}
where t = 00, 06, 12 and 18 UTC



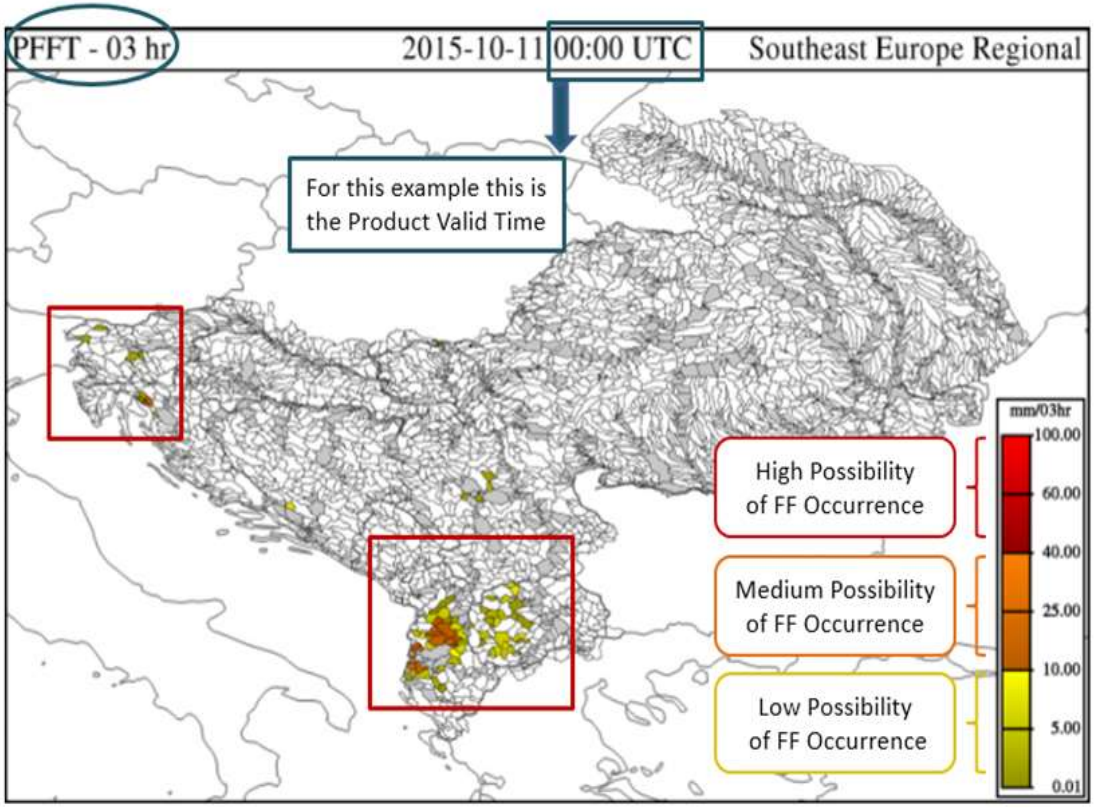


Persistent Flash Flood Threat (PFFT)

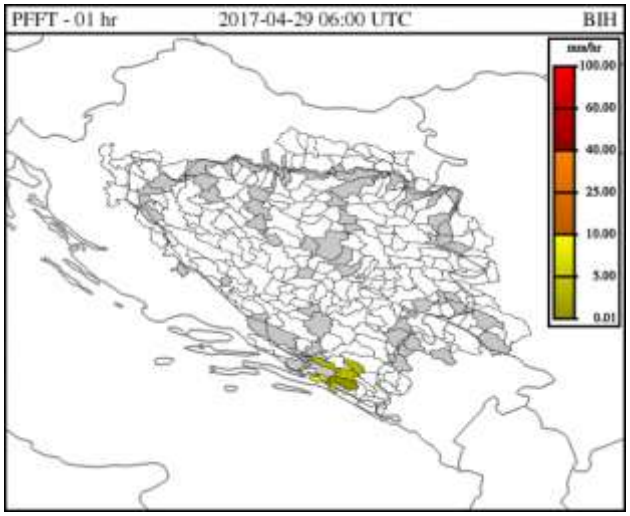
- PFFT is the difference between the merged MAP estimated and updated at the FFG model runtime and the corresponding FFG value. 1-hour, 3-hour and 6-hour Persistence Flash Flood Threat products are estimated and updated at 00 UTC, 06 UTC, 12 UTC and 18 UTC.

- The concept of PFFT is that previous precipitation of a given duration will persist for the same duration into the future.

- Uses a crude rainfall forecast and contains large uncertainties and because of that, forecasters should be very careful with this product.



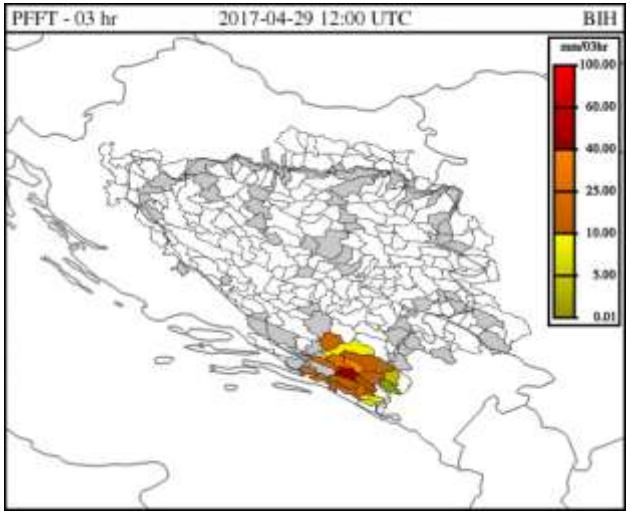
Persistent Flash Flood Threat (PFFT)

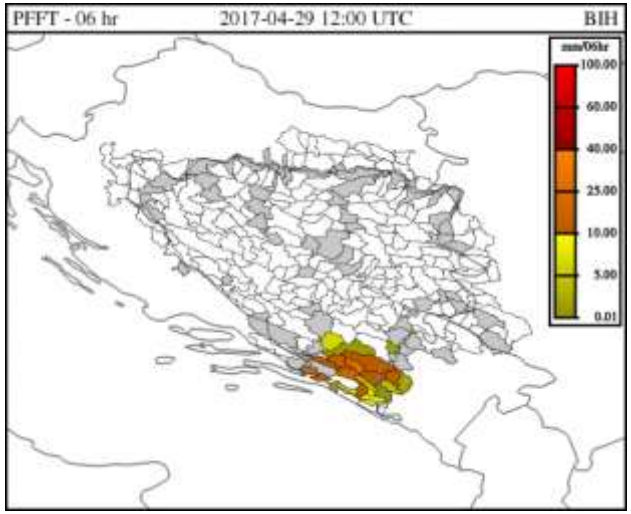


1 hr $PFFT_t$ = 1h merged MAP_t – 1h FFG_t
where t = 00, 06, 12 and 18 UTC

3 hr $PFFT_t$ = 3h merged MAP_t – 3h FFG_t
where t= 00,06, 12 and 18 UTC

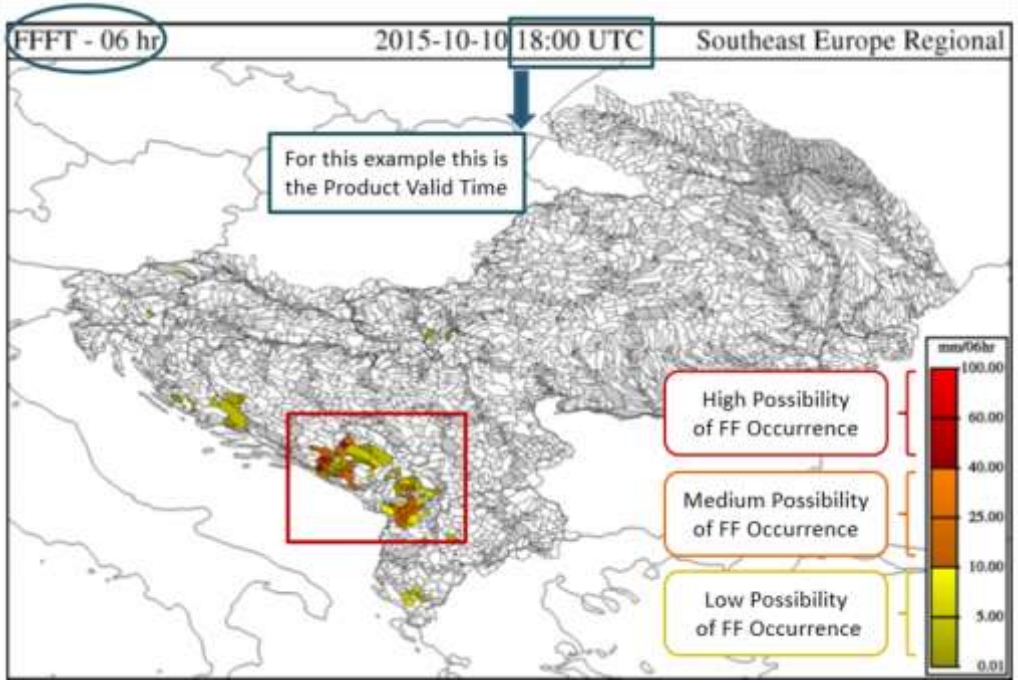
6 hr $PFFT_t$ = 6h merged MAP_t – 6h FFG_t
where t = 00, 06, 12 and 18 UTC





Forecasted Flash Flood Threat (FFFT)

- FFFT provides the forecaster with an idea of regions forecasted to be concern for flash flooding based on the difference of FMAP (generated by ALADIN) and the corresponding current FFG.
- In the computation of FFFT products the 1-, 3-, and 6-hour FMAP products are all considered with current corresponding FFG products.
- These products are updated at 00-hr, 06-hr, 12-hr and 18-hr UTC.

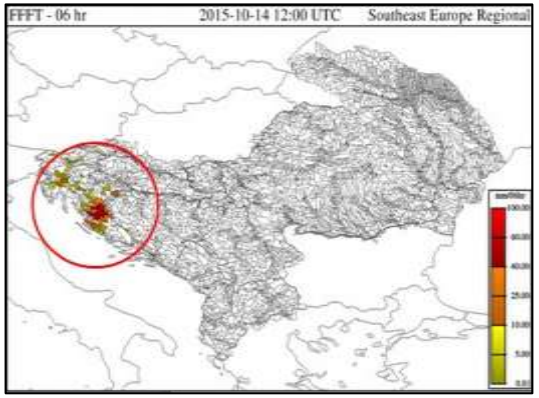


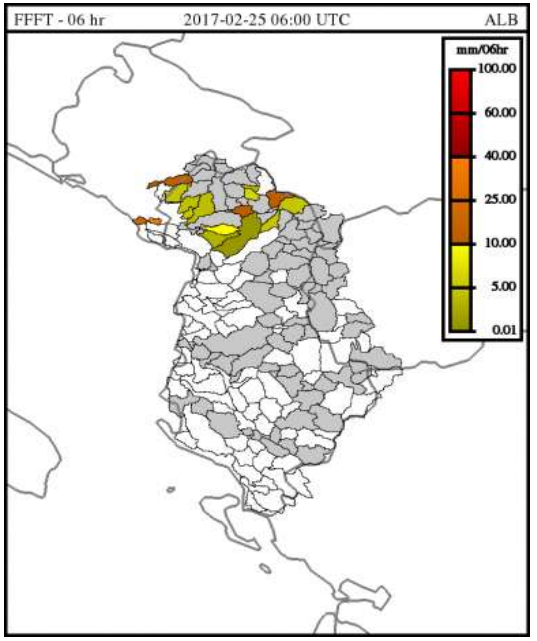
Forecasted Flash Flood Threat (FFFT)

1 hr $FFFT_t$ = 1 hr $FMAP_t$ – 1 hr FFG_t
where t = 00, 06, 12 and 18 UTC

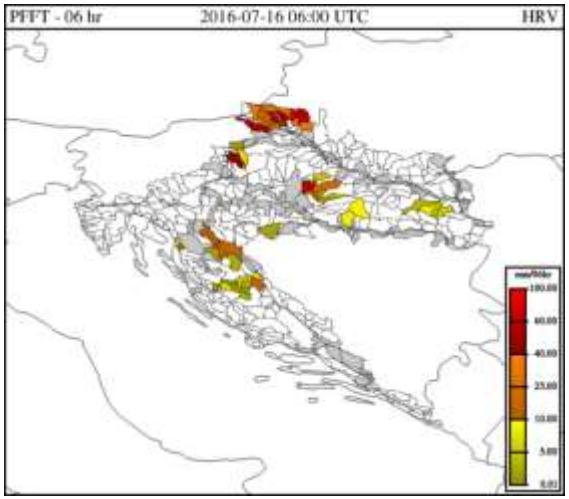
3h $FFFT_t$ = 3h $FMAP_t$ – 3h FFG_t
where t = 00, 06, 12 and 18 UTC

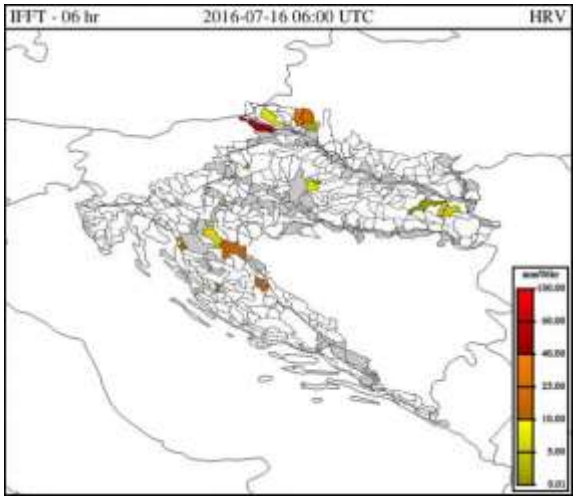
6 hr $FFFT_t$ = 6 hr $FMAP_t$ – 6 hr FFG_t
where t = 00, 06, 12 and 18 UTC

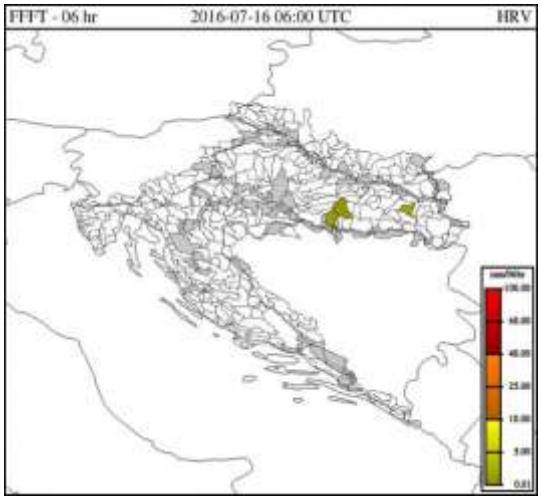




Flash Flood Threats (FFTs)







Flash Flooding caused by
Vucica River,
Croatia, 16 July 2016

WMO OMM

Flash Flood Threats (FFTs)

- Forecasters should note that Flash Flood Threat itself is not a flash flood warning product but a guide to forecasters using Flash Flood Guidance System products and hydrometeorological analysis to make decision whether to issue watches or warnings.

- Therefore, a forecaster's input is essential for the success of the warning process.

Thank you

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For more information please visit:	**http://www.wmo.int/ffgs**
	http://www.hrcwater.org

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