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European Flood Awareness System

EFAS *Bulletin*

June – July 2022

Issue 2022(4)

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NEWS

New features

Release of new EFAS version 4.4

The latest version of EFAS v4.4, was released operationally on Monday 20 June 2022.

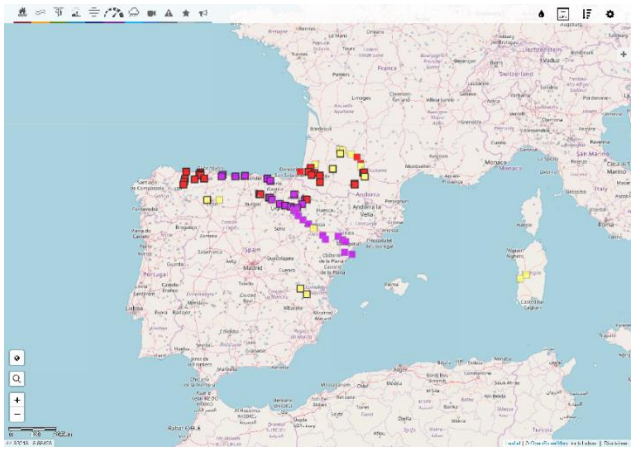

Figure 1: The new EFAS Reporting Points layers that was released operationally with version 4.4 on 20 June 2022.

EFAS v4.4 introduced minor changes to the system, as well as some general bug fixes. Here is a summary of the main changes:

- **Reporting Points** layer modified with points exceeding 20-year return period threshold (purple points) are added for quick overview of regions with expected severe events and an updated dynamic reporting points algorithm and reporting point thresholds to better align with the notification criteria. Minor changes were also made to the overview table in the reporting points pop-up window
- **New 'Probability persistence' layer**, allowing users to better understand how reporting points are created
- **Improvements to EFAS entries on the Climate Data Store (CDS)**: a new functionality to subset the geographical area when downloading EFAS data, so that users can request data only for their area of interest, reducing file size and download time. Time invariant variables (including upstream area, elevation, soil depth, wilting point, and field capacity) now available alongside the hydrological variables to download
- **Upgrade of the post-processed forecasts**, with new calibration of the post-processed model and post-processed forecasts available for an additional 398 stations.
- **Upgrades to the EFAS Information System**. Introducing two new layers (flood probability persistence and Social Media Activity Analysis), an EFAS informal feedback collection functionality, and a feature allowing to share information from the EFAS dashboard through social media
- **Significant updates to our CEMS-Flood documentation**, with a new 'CEMS-Flood Service User Guide' (including information on data access, data catalog/structure/formats, guides on how to work with CEMS-Floods data). Please note the new web address of the EFAS and GloFAS wikis has changed to https://confluence.ecmwf.int/display/CEMS/CEMS-Flood and will be visible following the release.

For more technical information on the release of EFAS version 4.4 please see the dedicated wiki page following the date of release.

Upcoming EFAS Reporting Points Webinar – September 2022

A webinar to introduce the upgrades to the EFAS Reporting Points layer introduced in version 4.4 is organised by CEMS Hydrological Forecast Centre - Computation, with the support of the JRC. It will be hosted on Microsoft Teams Webinar on **13 September 2022 at 14:00 – 15:00 BST or UTC+1** (15:00 – 16:00 CEST) and aims to present the following topics:

- The rationale for updating the Reporting Points.
- Updates to the EFAS Reporting Points layer (purple points).
- How the Reporting Points are generated.
- Introduction of new EFAS Flood Probability Persistence layer.

The webinar will include a presentation and question-answer session. The webinar is open to pre-registered participants only. To register, please follow this link and enter your details. You will then receive a confirmation email with a link to the Teams Webinar.

Note the webinar will be recorded for EFAS training purposes, and some content made available afterwards.

RESULTS

Summary of EFAS Flood and Flash Flood Notifications

The 9 formal and 36 informal EFAS flood notifications issued in June – July 2022 are summarised in Table 1. The locations of all notifications are shown in Figure 17 and Figure 19 in the appendix.

54 Flash flood notifications were issued in June – July 2022. They are summarised in Table 2. The locations of all notifications are shown in Figure 18 and Figure 20 in the appendix.

Meteorological situation

As of February 2022, reporting of the meteorological situation by the Meteorological Data Collection Centre (MDCC) will no longer be published in the EFAS bulletin. Instead, the state of recent meteorology will be conducted by the Copernicus Climate Change Service (C3S) and published as monthly Climate Bulletins.

Hydrological situation

by EFAS Hydrological Data Collection Centre

June

During the month of June, there were 76 stations with exceedances, many of which are located in Norway (25), Spain, and Sweden (nine stations each). In Norway, where all exceedances are related to the discharge threshold, one-in-three stations are mainly located in the Glomma river basin. The remainder of stations are distributed over 14 basins. In Sweden, exceedances are also related to discharge. However, in Spain we can find both types of exceedance: the Minho river basin has exceedances due to water level, the Llobregat basin due to discharge, and the Ebro river shows both types.

In addition, there is a considerable concentration of stations in Austria and Italy (seven stations each) and Bosnia and Herzegovina (six). Poland, Slovenia, and Ukraine each have more than one station exhibiting an exceedance this month.

In terms of river basins, the two main basins with values above the threshold are the Danube (18) and the aforementioned Glomma (eight). The exceedances in the Danube basin are spread over six different countries, but most of them are in Austria and Bosnia and Herzegovina. In the Po river basin in Italy, the number of stations with exceedances has decreased from 15 to six.

Regarding the stations that recorded values above the 90% quantile, 34 exceeded this threshold in June. Again, Spain has the highest number of exceedances. Spanish basins have 19 stations, with the Júcar river having the largest number (8). In the Iberian Peninsula, we find the Douro, Guadalhorce, and Guadalquivir basins, each with two stations recording values above the 90% quantile. Italy has four stations, followed by Slovenia with three stations exceeding this quantile. By basins, in addition to the aforementioned Jucar basin, the Danube river basin stands out with four stations. Other stations exceeded the 90% quantile value in Ukraine, Latvia, Austria, Estonia, Norway, and Luxembourg.

Finally, and according to the number of stations recording average values below the 10% quantile, the upward trend is maintained from last month, and we find an increase of more than 60%. In the month of June, there are 227 stations with average values below this cliff.

This month, Germany has the most stations (47), followed by Spain (27) and France (26). Poland has increased the number of stations below this quantile from nine to 21 this month. Switzerland has 19 stations and Hungary and Ukraine have more than 10 stations each. Eleven more countries present stations with values below this quantile, notably Italy, Norway, Romania, Slovakia, Slovenia, and United Kingdom.

In terms of basins, the Danube river in France is the one with the highest number of stations (50). The Rhine basin has 41 stations with values below the 10% quantile. In total, as many as 42 different basins have values below this limit.

July

During the month of July, there were 33 stations with exceedances. the majority of these stations are in Spain (10), in Norway (nine), and Italy (eight). In Spain, where almost all exceedances are related to the water level threshold, the stations are mainly located in north-east of the Iberian Peninsula. The Minho river basin is the only instance in Spain with exceedance

related with discharge. In Norway, all exceedances are related to the discharge threshold, and stations are distributed across eight different basins in the west of the country. On the other hand, in Italy all exceedances are centered on the Po river and are related to the water level threshold.

Additionally, there are two stations with exceedances in Poland, and the remainder of countries show exceedances of only one station each for the month.

In terms of river basins, the main basin showing values above the threshold is the aforementioned Po basin, Italy. The Llobregat river basin in Spain is another basin which can be highlighted in this way, with five exceedances.

Regarding the stations that recorded values above the 90% quantile, 37 exceeded this threshold in July. Once again this month, Spain is the country with the highest number of stations (18), with the Júcar river being the most numerous with seven. In the south of the Iberian Peninsula the Guadalhorce, the Guadalquivir and the Guadiaro are the basins with stations recording values above the 90% quantile, and in the eastern area the Jucar stands out. In Norway there are eight stations exceed this quantile, four in Italy and three in Ukraine.

Other stations exceeded the 90% quantile value in Autria, Finland, Slovenia and England.

By basins, in addition to the aforementioned Jucar, the Dnieper river stands out with three stations, the same as the Guadalquivir river. The sum of 24 different river basins shows exceedance over the 90% quantile.

Finally, and according to the number of stations recording mean values below the 10% quantile, the trend is maintained and we find an increase of more than 60%. In the month of July, there are 364 stations with average values below this cliff, which impacts 23 different countries.

Also this month, Germany is the country with the most stations (75), followed by France (45) stations. Different countries have 24 stations below this threshold: Spain, Poland and Hungary, and more than 20 can be found in Austria, Croatia, Ukraine, and Switzerland.

In terms of basins, it is again the Danube river the one with the highest number of stations, with nearly three times the value of the previous month, reaching 143 station with average discharge below the 10% quantile. The Rhine basin has 69 stations in the same situation. In total, as many as 42 different basins have values below this limit.

Verification

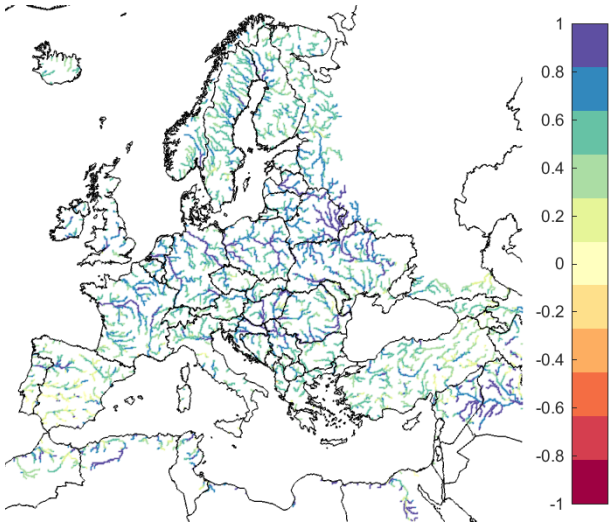

Figure 2: EFAS CRPSS at lead-time 1 day for June-July 2022, for catchments >2000km2. The reference score is persistence of using previous day's forecast.

Figure 2 and Figure 3 shows the EFAS headline score, the continuous ranked probability skill score (CRPSS) for lead times 1 and 5 days for June-July 2022 across the EFAS domain for catchments larger than 2000km^2. A CRPSS of 1 indicates perfect skill, 0 indicates that the performance is equal to that of the reference, and any value <0 (shown in orange-red on the maps) indicates the skill is worse than the reference. The reference score is using yesterday's forecast as today's forecast, which is slightly different than we used previously and very difficult to beat.

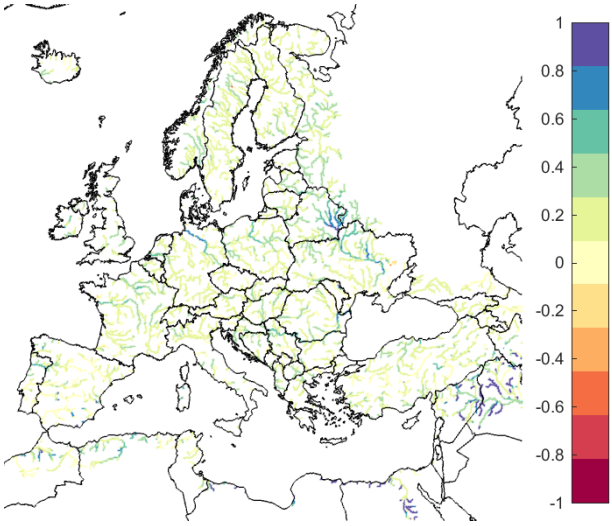

Figure 3. EFAS CRPSS at lead-time 5 days for June-July 2022 for catchments >2000km2. The reference score is persistence of using previous day's forecast.

These maps indicate that across much of Europe for forecasts are more skilful than persistence at both lead times. Regions shown in blue are those where EFAS forecasts are more skilful than persistence, with darker shading indicating better performance.

The skill of the forecast was quite good over the period, and similar to the same period last year (Figure 4). An inter-annual variability of the scores is to be expected. The long-term trend is neutral over the first two years since the domain was extended, but there is an indication of increase in skill with EFAS 4.0, especially for the areas with generally lower skill.

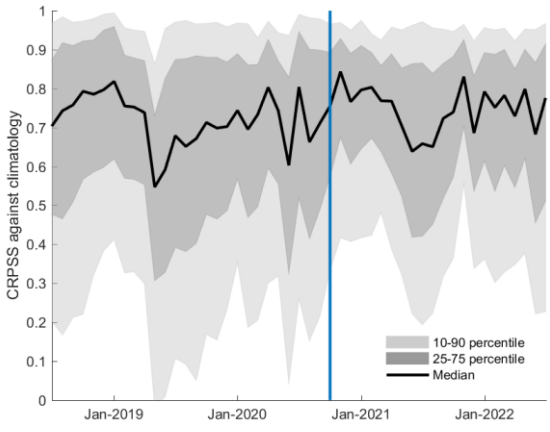

Figure 4. Monthly means of CRPSS the for lead-time 5 days for all the major river points in Europe with ECMWF ENS as forcing. Reference forecast was climatology. The skill is largest during the winter months, when there is less variation in the flow in large parts of Europe. The blue line indicates the release of EFAS 4.0.

ARTICLES

Floods and mudslides in Austria, June 2022

by Richard Davies, floodlist

Figure 5: Fooding in Villach-Land District, Carinthia, Austria, June 2022. Credit: Government of Carinthia

Storms and heavy rain hit overnight, 28 to 29 June 2022, affecting areas of the state of Carinthia (Kärnten) in the south of Austria, in particular the districts of Feldkirchen and Villach-Land.

Austria's Central Institute for Meteorology and Geodynamics (ZAMG) said the city of Villach recorded 118 mm of rain in 3 to 4 hours, which is more than seen for an average June month. Arriach in Villach-Land record 97 mm of rain in 3 hours. Both are record high amounts.

Figure 6: Fooding in Villach-Land District, Carinthia, Austria, June 2022. Credit: Government of Carinthia

"Statistically speaking, one can speak of an event that is to be expected approximately every 100 years" says ZAMG meteorologist Gerhard Hohenwarter. Strong winds with gusts of 128 km/h were also reported.

The heavy rain caused rivers and streams to break their banks, resulting in floods and mudslides in the

municipalities of Laastadt, Treffen am Ossiacher See and Arriach.

Authorities requested residents to stay in their homes where necessary. Schools were closed in 5 locations, the state government said. Dozens of homes were flooded, and evacuations carried out. Damage to power infrastructure left thousands of households without electricity.

Figure 7: Fooding in Villach-Land District, Carinthia, Austria, June 2022. Credit: Government of Carinthia

Floods and debris flows blocked roads across the affected area and cut all road access to Arriach. Police and army helicopters were deployed to the area to help with rescues and relief operations.

Police reported one person died in a mudslide in Treffen am Ossiacher See. Another person was reported missing but was later found safe.

Minor Flood Events, Europe, July 2022

by Richard Davies, floodlist

July 2022 passed largely without any significant major flood events in Europe. However FloodList did record over 20 flood events across 14 European countries that could be described as minor floods. Such events receive little coverage outside of the immediate local area, so are classified as minor flood events. Material and human damages are usually minimal. However monitoring such flood events plays an important role in the development of flood forecasting and response. Reports of minor events will be used within EFAS during the next model cycle upgrade to evaluate the criteria used for issuing flash flood notifications

Figure 8: Minor flood events affected multiple regions of Europe in July 2022. Credit: https://unsplash.com/photos/f3XnA2S9-Sw

Romania

Local media reported a 30 minute storm caused wind damage and minor flooding in Craiova, Dolj County, Romania on 02 July 2022. Emergency services received 70 calls for assistance. Media said 60 streets were flooded, along with buildings including 8 houses, a hospital and a museum. Around 25 cars were damaged.

Severe weather including heavy rain and some flooding was reported in Bistrița-Năsăud County on 01 July.

On 06 July media reported storms in the Oltenia Region, with some minor flooding reported in Drobeta-Turnu Severin and Târgu-Jiu.

Local media in Romania reported storms caused minor flooding in Cluj County, Romania, on 30 July 2022.

Austria

Local media in Austria reported storms in Lower Austria State on 01 July 2022, mostly affecting the districts of Krems, St. Pölten and Baden. Some minor flooding was reported. Most of the damage was a result of strong winds.

Heavy rain caused minor flooding in parts of Carinthia, Austria, on 15 July, 2022, including in Treffen which had seen severe floods in June 2022.

A period of heavy rain caused floods and landslides in parts of Tyrol, Austria on 22 July and again on 25 July 2022. One person was reported missing near Ruetz after flooding from the overflowing Ruetzbach stream

on 22 July. Two people were injured after their car was swept away by a mudslide in Fulpmes.

Serbia and North Macedonia

Storms from 01 July 2022 caused minor flooding in Serbia and North Macedonia. Local media reported a 10 minute period of heavy rain caused flooding in the city of Niš, Serbia, while storms caused wind damage and minor flooding in the city of Zaječar and its surroundings.

Local media reported storms caused minor flooding in Kragujevac, Serbia, in late July 2022.

Switzerland

Heavy rain caused flooding and debris flows in the canton of Bern on 04 July 2022. A hotel was damaged in Schangnau municipality. A debris flow near Lake Brienz damaged a vehicles and blocked a road. Media also reported a train derailed between Brienz and Oberried after it struck a tree that had fallen onto the tracks during the storm. According to Meteo Swiss figures, 20 mm of rain fell in 1 hour in Thun between 15:00 and 16:00 on 04 July 2022. Heavy hail affected parts of the country including Geneva during this period.

Ukraine

Local media reported a powerful storm affected the city of Lviv in western Ukraine on 05 July 2022. Heavy rain flooded streets. Lightning, thunder and hail was also reported. Public transport was disrupted, in particular the electric tram system. Local media quoting the city government reported 20 homes damaged.

Spain

Heavy rain and hail caused minor flooding and damages in parts of Madrid, Spain, on 06 July 2022. Media reported 45 interventions by firefighters in 4 hours in Madrid.

Heavy rain and hail also affected parts of the province of Teruel, Aragon Region. Media reported damaged roads and fruit crops in areas of Andorra, Calanda and Valjunquer. Andorra City Council activated an emergency protocol.

A storm, hail and heavy rain and hail flooded streets and houses in Samper de Calanda and Castelnou in Teruel Province, Aragon region, on 18 July 2022. Media reported the town of Híjar recorded 36 mm of rain in 1 hour.

Extremely high temperatures were followed by storms in parts of Galicia Region, Spain, on 14 July 2022. Local media reported over 4,000 lightning strikes. Heavy rain caused minor flooding in Monforte de Lemos municipality in the province of Lugo. Wind damage was also reported.

Italy

Heavy rain caused minor flooding in the province of Frosinone in the Lazio Region of Italy on 07 July 2022. Severe hail storms affected other parts of northern Italy at this time, including Veneto and Lombardy.

Media reported severe weather in Colle di Val d'Elsa comune in the province of Siena, Tuscany Region, Italy, on 17 July 2022. A bridge was flooded and wind downed trees which damaged a building.

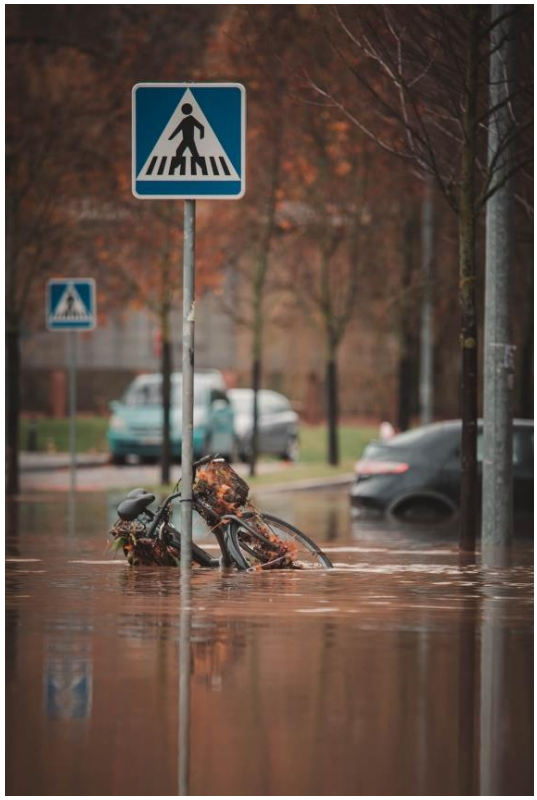

Figure 9: Minor floods across Europe in July 2022 caused transport disruptions. Credit: https://unsplash.com/photos/3daFYk7HkvE

Finland

Local media in Finland reported thunderstorms, strong winds and heavy rain caused damages in parts of North and South Karelia Regions on 12 July 2022. Flooding was minor.

Sweden

Swedish Transport Administration reported flooding on the E4 road between Sörböle and Skellefteå in Västerbotten County, northern Sweden on 14 July 2022.

Belarus

Heavy rain with hail flooded streets in the city of Gomel, Belarus, on 17 July 2022. Local media reported water level was chest deep in some areas. Rescue operation were carried out by the Ministry of Emergency Situations, including passengers trapped on public transport.

Germany

Thunderstorms caused damage in several places in Baden-Württemberg, Germany, late on 20 July 2022. Strong winds downed trees and lightning strikes caused fires. One person died in a road accident that was partly blamed on the poor road conditions. Some basements were flooded in Sigmaringen.

Northern Ireland

Six people were rescued during heavy flooding in the Londonderry and Strabane areas of the Northern Ireland 23 to 24 July 2022. One person was rescued from a vehicle in water, while five people trapped in flooded properties were also rescued. A number of roads were flooded and impassable. Northern Ireland Fire and Rescue Service (NIFRS) said it received a total of 106 emergency calls related to flooding 23 to early 24 July. As a result of the calls, fire crews responded to 49 incidents. Later the BBC said more than 300 homes in the north west have reported flood damage to Derry City and Strabane District Council and that 70 mm of rain fell in 5 hours.

Poland

Heavy rain caused minor flooding in areas around Kutno in Łódź Voivodeship, Poland on 23 July 2022. Two roads were damaged. Strong winds also caused damages. On the same day media reported violent storms in Lower Silesian Voivodeship, mostly affecting Dzierżoniów and Strzelin. Some flooding was reported. Strong winds caused severe damage. One person died when a tree fell in the village of Biały Kościół.

EFAS and GloFAS training for ERCC duty officers

by CEMS-Floods Analytics and Dissemination Centre (DISS)

On 16 June 2022 the CEMS-Floods Analytics and Dissemination Centre provided an EFAS and GloFAS training to Duty Officers at the Emergency Response Coordination Centre (ERCC) in Brussels. ERCC provides supports for natural hazards (including flooding, droughts, fires, earthquakes), humanitarian crisis (in conflict areas and wars) as well as other situations requiring international support such as the Covid-19 pandemics.

With regards to floods, the ERCC Duty Officers receive daily for Europe the "EFAS ERCC overview report" which shows a summary of active EFAS flood notifications as well as national information about forecasted and observed events, and globally standardised reports of observed flood events through GDACS. In case of an upcoming or ongoing large-scale flood event, the ERCC Duty Officers need to follow-up the information in more detail on the websites of EFAS and GloFAS.

The training was targeted to provide guidance on the products and the usage of the systems. In detail the following topics were covered:

- Forecasting chain and notification criteria
- Probabilistic scenarios and thresholds
- Forecast products (incl. Rapid flood mapping and assessment)
- Flash flood modelling
- Model performance and forecast skill
- Limitations of EFAS and GloFAS

The training was held both in presence and on-line, was provided by Assoc. Prof. Ilias Pechlivanidis, Project Manager of the CEMS-Floods Analytics and Dissemination Centre.

Figure 10: Ilias Pechlivanidis (CEMS-Floods) at the ERCC room

or EFAS, the presentation addressed the different types of flooding that EFAS assesses (fluvial and flash flooding) and the different types of notifications (Formal and Informal Flood Notifications, and Flash Flood Notifications) issued. This included a background on meteorological forecasting systems used, i.e. deterministic and probabilistic, and on the criteria selected to issue notifications, also including the persistency and consistency in the forecasts. Specifically, for the EFAS products, the presentation focused on monitoring and ongoing situation, flood hazard forecast, flood impact forecast, and flash flood forecast. The model performance and forecasting skill were also explained.

The training continued with a presentation on GloFAS. It started with a summary of the GloFAS main characteristics and then focused on monitoring and ongoing situation, flood hazard forecast, flood impact forecast, and seasonal outlook. Finally, the presentation included information about the Global Reporting Tool (GRT) and its connection with GDACS (Global Disaster Alert and Coordination System).

The hands-on session on the EFAS-IS gave everyone the opportunity to explore all layers of the EFAS-IS and GloFAS-IS interfaces.

At the end of the training, a summary was provided while ERCC made suggestions for the evolution of the services. Overall, it was a successful mission to the ERCC, and this type of training will be provided on a regular basis in the future.

Acknowledgements

The following partner institutes and contributors are gratefully acknowledged for their contribution:

- DG DEFIS - Copernicus and DG ECHO for funding the EFAS Project
- All data providers including meteorological data providers, hydrological services & weather forecasting centres
- The EFAS Operational Centres
- Richard Davies, Floodlist.com

Cover image: Flooding in Villach-Land District, Carinthia, Austria, June 2022. Credit: Government of Carinthia

Appendix – figures

As of February 2022, reporting of the meteorological situation by the Meteorological Data Collection Centre (MDCC) will **no longer** be published in the EFAS bulletin. Instead, the state of recent meteorology will be conducted by the Copernicus Climate Change Service (C3S) and published as monthly Climate Bulletins.

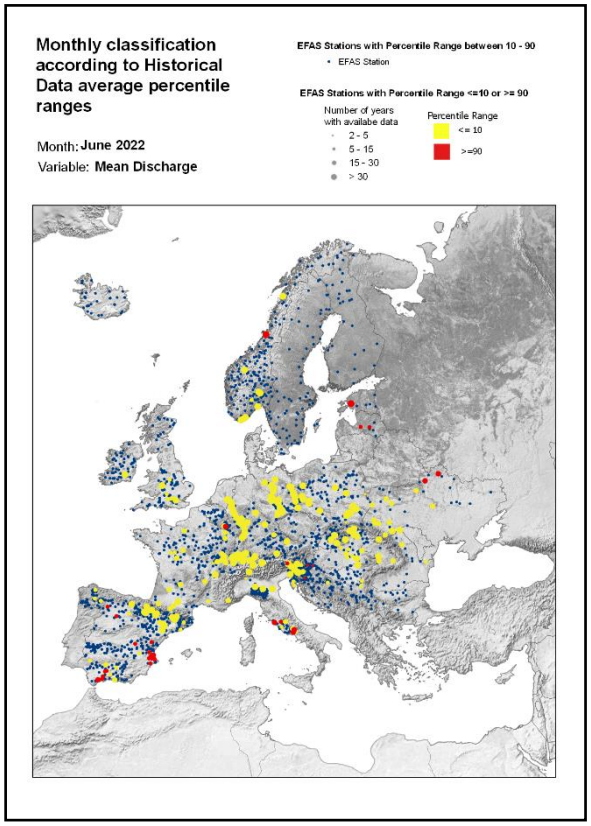

Figure 11: Monthly discharge anomalies June 2022.

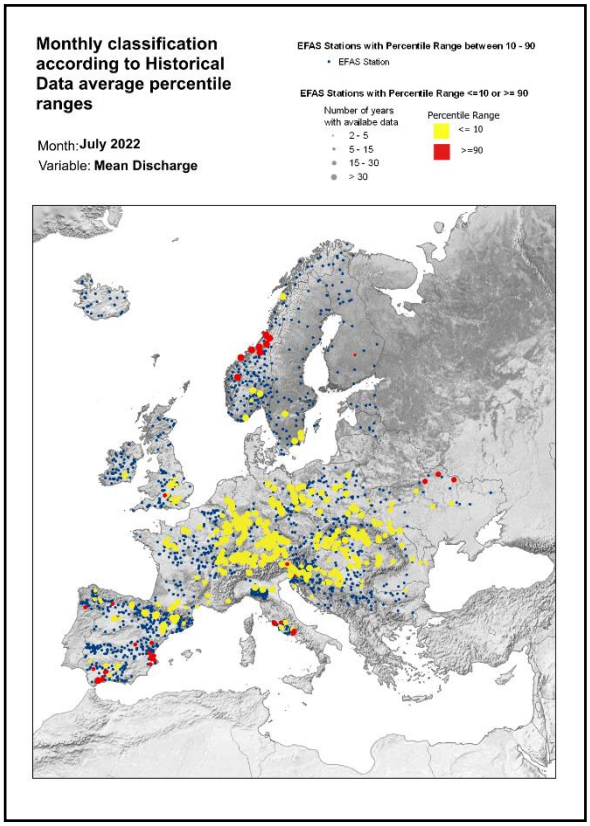

Figure 13: Monthly discharge anomalies July 2022.

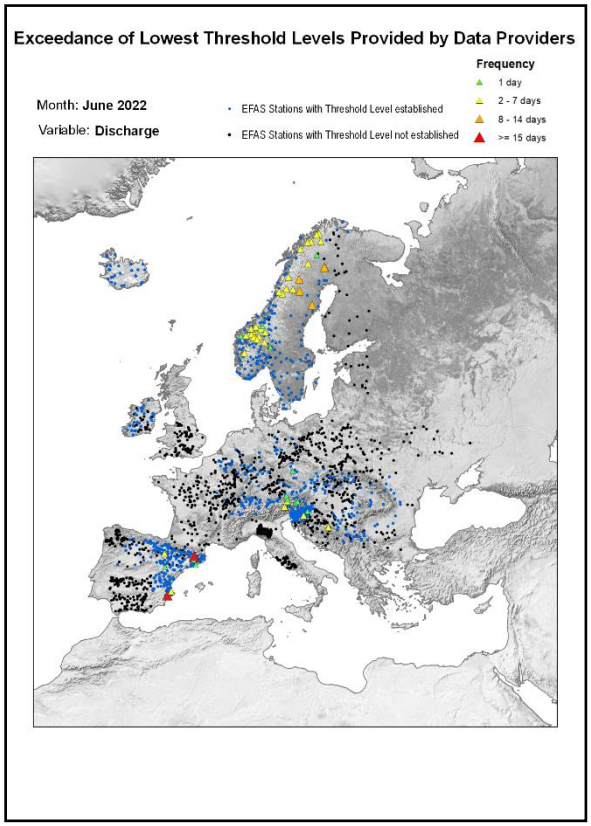

Figure 12: Lowest alert level exceedance for June 2022.

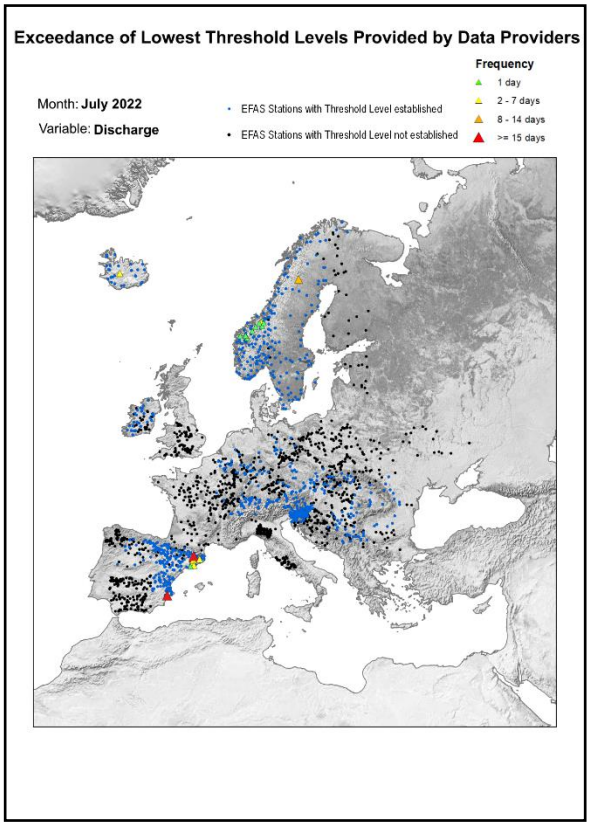

Figure 14: Lowest alert level exceedance for July 2022.

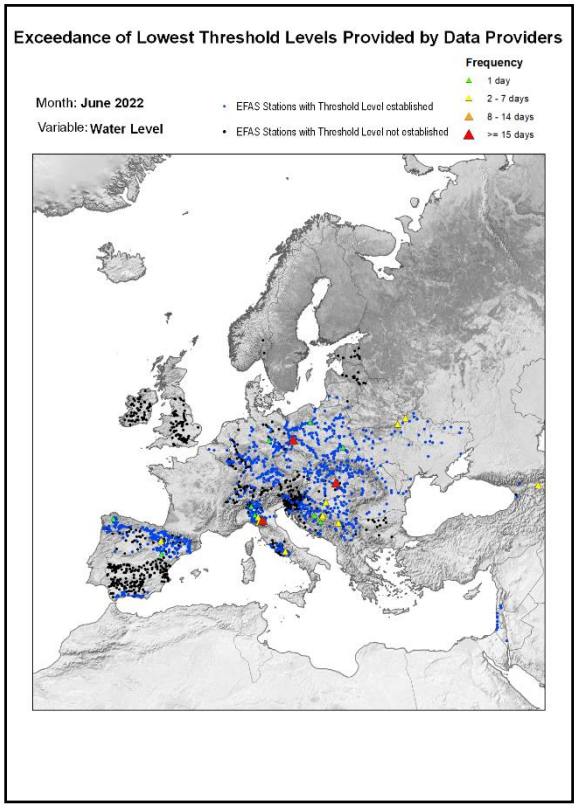

Figure 15: Lowest threshold exceedance for June 2022.

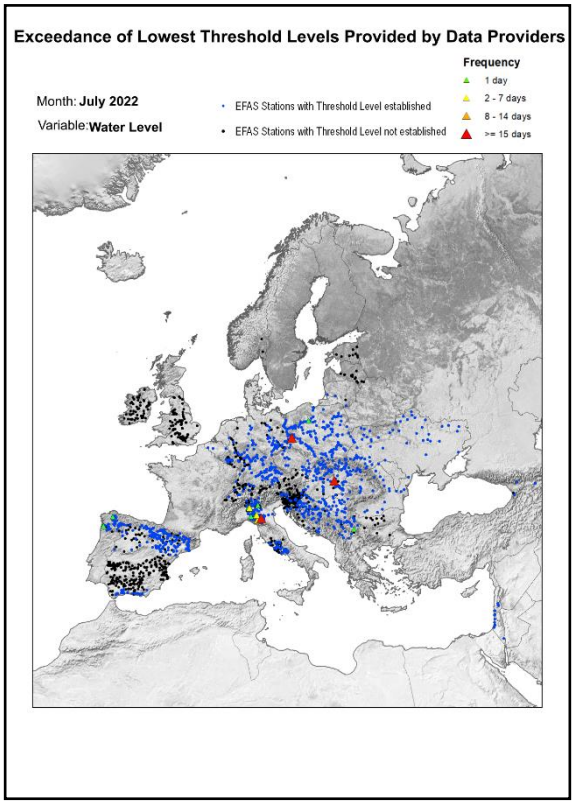

Figure 16: Lowest threshold exceedance for July 2022.

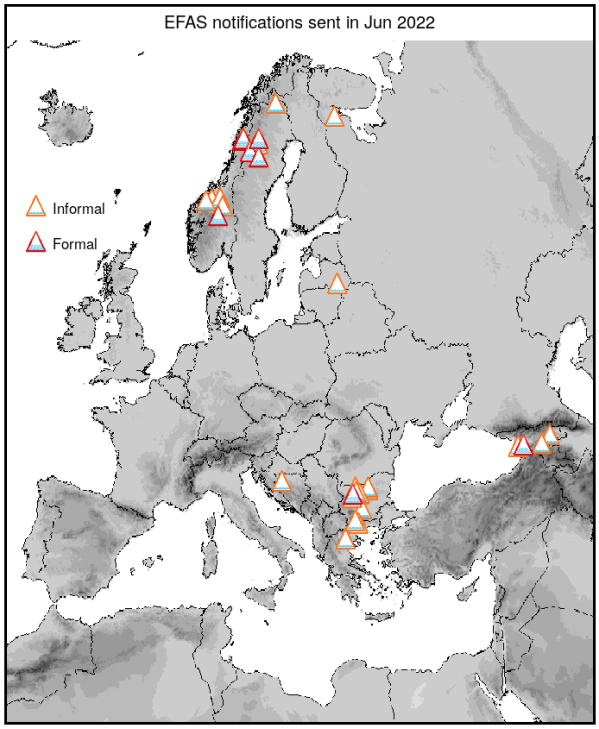

Figure 17: EFAS flood notifications sent for June 2022.

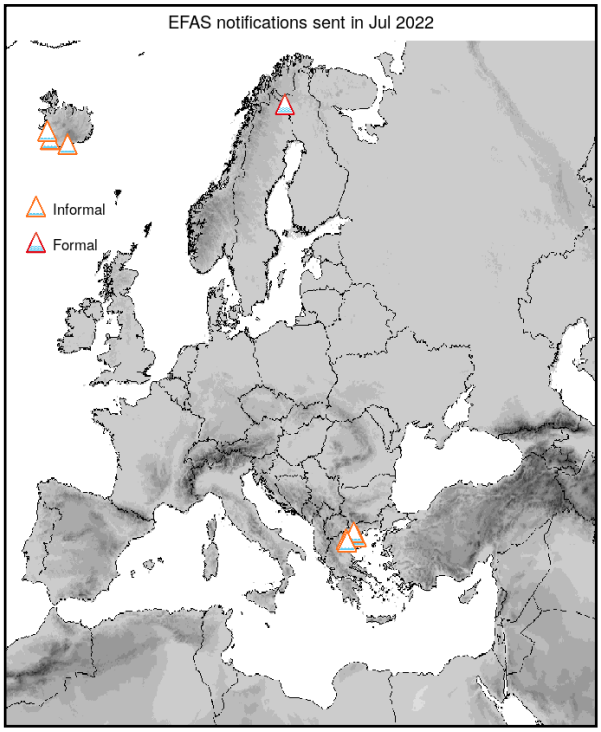

Figure 19: EFAS flood notifications sent for July 2022.

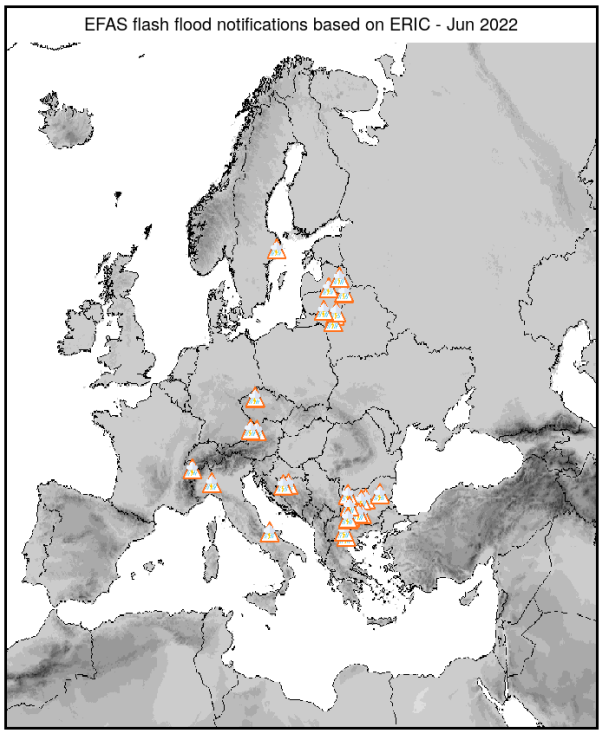

Figure 18: Flash flood notifications sent for June 2022.

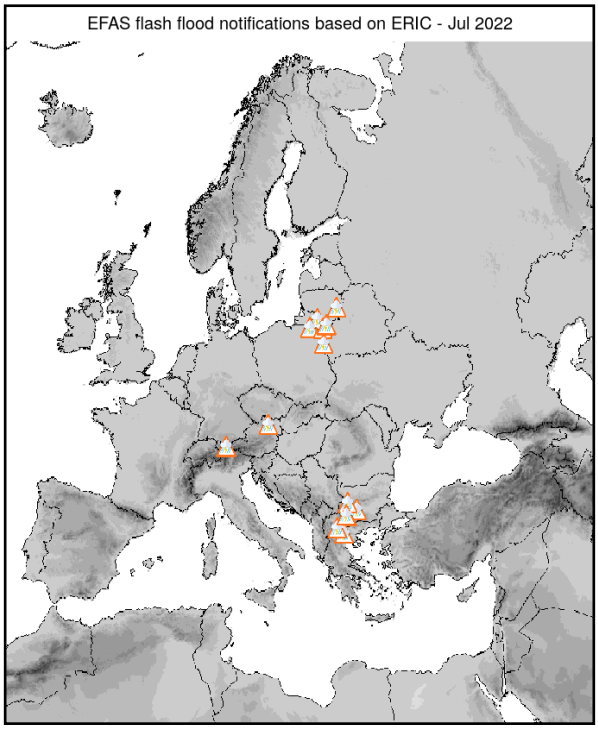

Figure 20: Flash flood notifications sent for July 2022.

Appendix - tables

Table 1: EFAS flood notifications sent in June – July 2022

Type	Forecast Date	Issue Date	Lead Time	River	Country
Formal	01/06/2022 00 UTC	01/06/2022	54	Skellefteälven	Sweden
Informal	02/06/2022 00 UTC	02/06/2022	36	Torneälven	Sweden
Formal	05/06/2022 00 UTC	05/06/2022	0	Umeälven	Sweden
Informal	07/06/2022 00 UTC	07/06/2022	24	Umeälven	Sweden
Informal	08/06/2022 00 UTC	08/06/2022	24	Nestos	Greece
Informal	08/06/2022 00 UTC	08/06/2022	18	MESTA (NESTOS)	Bulgaria
Informal	08/06/2022 00 UTC	08/06/2022	72	Bebresh	Bulgaria
Formal	09/06/2022 00 UTC	09/06/2022	54	Rana	Norway
Informal	09/06/2022 00 UTC	09/06/2022	72	Yantra	Bulgaria
Informal	09/06/2022 00 UTC	09/06/2022	24	Aliakmonas	Greece
Informal	08/06/2022 12 UTC	09/06/2022	42	Aliakmonas	Greece
Informal	08/06/2022 12 UTC	09/06/2022	30	Sana	Bosnia and Herzegovina
Informal	08/06/2022 12 UTC	09/06/2022	54	Maritsa\Evros	Bulgaria
Informal	08/06/2022 12 UTC	09/06/2022	66	Osum	Bulgaria
Formal	08/06/2022 12 UTC	09/06/2022	60	Umeälven	Sweden
Informal	08/06/2022 12 UTC	09/06/2022	72	Vit	Bulgaria
Formal	08/06/2022 12 UTC	09/06/2022	66	Iskur	Bulgaria
Informal	09/06/2022 12 UTC	10/06/2022	54	Iskar	Bulgaria
Informal	10/06/2022 12 UTC	11/06/2022	42	Yantra	Bulgaria
Informal	13/06/2022 12 UTC	14/06/2022	84	Rauma	Norway
Informal	13/06/2022 12 UTC	14/06/2022	24	Dubna	Latvia
Informal	17/06/2022 00 UTC	17/06/2022	30	Umeälven	Sweden
Informal	21/06/2022 00 UTC	21/06/2022	48	Tumcha	Russia
Informal	21/06/2022 00 UTC	21/06/2022	12	Umeälven	Sweden
Formal	21/06/2022 00 UTC	21/06/2022	90	Rana	Norway
Informal	21/06/2022 00 UTC	21/06/2022	90	Rana	Norway
Informal	20/06/2022 12 UTC	21/06/2022	42	Rioni	Georgia
Informal	21/06/2022 12 UTC	22/06/2022	84	Umeälven	Sweden
Informal	22/06/2022 12 UTC	23/06/2022	78	Umeälven	Sweden
Informal	22/06/2022 12 UTC	23/06/2022	36	Umeälven	Sweden
Formal	23/06/2022 12 UTC	24/06/2022	0	Rioni	Georgia
Informal	25/06/2022 00 UTC	25/06/2022	6	Iori	Georgia
Informal	24/06/2022 12 UTC	25/06/2022	30	Khrami	Georgia
Formal	25/06/2022 12 UTC	26/06/2022	54	Lagen	Norway
Informal	28/06/2022 00 UTC	28/06/2022	12	Driva	Norway
Informal	27/06/2022 12 UTC	28/06/2022	24	Orkla	Norway
Informal	27/06/2022 12 UTC	28/06/2022	24	Folla	Norway
Informal	08/07/2022 00 UTC	08/07/2022	18	Coastal Catchment Eastern Mediterranean Sea	Greece
Informal	08/07/2022 00 UTC	08/07/2022	18	Strimonas	Greece
Informal	07/07/2022 12 UTC	08/07/2022	30	Loudias	Greece
Informal	07/07/2022 12 UTC	08/07/2022	30	Vardar	Greece
Formal	17/07/2022 12 UTC	18/07/2022	0	Torneälven	Sweden
Informal	24/07/2022 12 UTC	25/07/2022	66	OELFUSA	Iceland

Informal	25/07/2022 12 UTC	26/07/2022	48	Coastal zone	Iceland
Informal	26/07/2022 12 UTC	27/07/2022	24	Coastal zone	Iceland

a. * Lead time [days] to the first forecasted exceedance of the 5-year simulated discharge threshold.

Table 2: EFAS flash flood notifications sent in June – July 2022

Type	Forecast Date	Issue Date	Lead Time	Region	Country
Flash Flood	31/05/2022 12 UTC	01/06/2022	30	Nemunas	Lithuania
Flash Flood	01/06/2022 12 UTC	02/06/2022	30	Sweden	Sweden
Flash Flood	04/06/2022 00 UTC	04/06/2022	48	Danube	Germany
Flash Flood	05/06/2022 00 UTC	05/06/2022	24	Danube	Austria
Flash Flood	07/06/2022 12 UTC	08/06/2022	48	Strimonas(GR)/Struma(BG)	Bulgaria
Flash Flood	09/06/2022 00 UTC	09/06/2022	36	Biferno	Italy
Flash Flood	09/06/2022 00 UTC	09/06/2022	42	Vardar(YG)/Axios(GR)	Greece
Flash Flood	09/06/2022 00 UTC	09/06/2022	42	Vardar(YG)/Axios(GR)	Republic of
Flash Flood	09/06/2022 00 UTC	09/06/2022	48	Evros / Maritsa	Bulgaria
Flash Flood	09/06/2022 00 UTC	09/06/2022	48	Strimonas(GR)/Struma(BG)	Bulgaria
Flash Flood	09/06/2022 00 UTC	09/06/2022	48	Danube	Bulgaria
Flash Flood	08/06/2022 12 UTC	09/06/2022	24	Strimonas(GR)/Struma(BG)	Bulgaria
Flash Flood	08/06/2022 12 UTC	09/06/2022	48	Danube	Bosnia and
Flash Flood	08/06/2022 12 UTC	09/06/2022	48	Danube	Bosnia and
Flash Flood	10/06/2022 00 UTC	10/06/2022	48	Evros / Maritsa	Bulgaria
Flash Flood	09/06/2022 12 UTC	10/06/2022	30	Strimonas(GR)/Struma(BG)	Bulgaria
Flash Flood	09/06/2022 12 UTC	10/06/2022	36	Strimonas(GR)/Struma(BG)	Bulgaria
Flash Flood	09/06/2022 12 UTC	10/06/2022	54	Danube	Bulgaria
Flash Flood	10/06/2022 12 UTC	11/06/2022	48	Black Sea Coast (West)	Bulgaria
Flash Flood	10/06/2022 12 UTC	11/06/2022	42	Danube	Bulgaria
Flash Flood	11/06/2022 12 UTC	12/06/2022	24	Danube	Bulgaria
Flash Flood	13/06/2022 00 UTC	13/06/2022	30	Nemunas	Lithuania
Flash Flood	13/06/2022 00 UTC	13/06/2022	36	Lielupe	Latvia
Flash Flood	12/06/2022 12 UTC	13/06/2022	48	Daugava	Latvia
Flash Flood	13/06/2022 12 UTC	14/06/2022	30	Daugava	Latvia
Flash Flood	20/06/2022 00 UTC	20/06/2022	42	Nemunas	Lithuania
Flash Flood	20/06/2022 12 UTC	21/06/2022	30	Nemunas	Lithuania
Flash Flood	23/06/2022 00 UTC	23/06/2022	12	Strimonas(GR)/Struma(BG)	Bulgaria
Flash Flood	25/06/2022 12 UTC	26/06/2022	30	Evros / Maritsa	Bulgaria
Flash Flood	27/06/2022 00 UTC	27/06/2022	30	Elbe	Czech Republic
Flash Flood	28/06/2022 00 UTC	28/06/2022	24	Po	Italy
Flash Flood	28/06/2022 00 UTC	28/06/2022	18	Rhone	France
Flash Flood	29/06/2022 00 UTC	29/06/2022	24	Elbe	Czech Republic
Flash Flood	03/07/2022 12 UTC	04/07/2022	42	Danube	Austria
Flash Flood	05/07/2022 12 UTC	06/07/2022	30	Nemunas	Lithuania
Flash Flood	05/07/2022 12 UTC	06/07/2022	24	Nemunas	Lithuania
Flash Flood	05/07/2022 12 UTC	06/07/2022	24	Wisla	Poland
Flash Flood	07/07/2022 00 UTC	07/07/2022	48	Strimonas(GR)/Struma(BG)	Bulgaria
Flash Flood	08/07/2022 00 UTC	08/07/2022	24	Vardar(YG)/Axios(GR)	Greece
Flash Flood	07/07/2022 12 UTC	08/07/2022	48	Vardar(YG)/Axios(GR)	Republic of
Flash Flood	08/07/2022 12 UTC	09/07/2022	30	Evros / Maritsa	Bulgaria
Flash Flood	08/07/2022 12 UTC	09/07/2022	30	Danube	Bulgaria
Flash Flood	08/07/2022 12 UTC	09/07/2022	30	Strimonas(GR)/Struma(BG)	Bulgaria

Flash Flood	11/07/2022 00 UTC	11/07/2022	36	Nemunas	Lithuania
Flash Flood	12/07/2022 00 UTC	12/07/2022	30	Nemunas	Lithuania
Flash Flood	12/07/2022 00 UTC	12/07/2022	36	Wisla	Poland
Flash Flood	11/07/2022 12 UTC	12/07/2022	42	Nemunas	Poland
Flash Flood	28/07/2022 00 UTC	28/07/2022	48	Danube	Austria

a. * Lead time [hours] to the forecasted peak of the event

The European Flood Awareness System (EFAS) produces European overviews of ongoing and forecasted floods up to 10 days in advance and contributes to better protection of the European citizens, the environment, properties and cultural heritage. It has been developed at the European Commission's in-house science service, the Joint Research Centre (JRC), in close collaboration with national hydrological and meteorological services and policy DG's of the European Commission.

EFAS has been transferred to operations under the European Commission's COPERNICUS Emergency Management Service led by DG GROW in direct support to the EU's Emergency Response Coordination Centre (ERCC) of DG ECHO and the hydrological services in the Member States.

ECMWF has been awarded the contract for the EFAS Computational centre. It is responsible for providing daily operational EFAS forecasts and 24/7 support to the technical system.
A consortium of Swedish Meteorological and Hydrological Institute (SMHI), Rijkswaterstaat (RWS) and Slovak Hydro-Meteorological Institute (SHMU) has been awarded the contract for the EFAS Dissemination centre. They are responsible for analysing EFAS output and disseminating information to the partners and the ERCC.
A Spanish consortium (REDIAM and SOOLOGIC) has been awarded the contract for the EFAS Hydrological data collection centre. They are responsible for collecting discharge and water level data across Europe.
A German consortium (KISTERS and DWD) has been awarded the contract for the EFAS Meteorological data collection centre. They are responsible for collecting the meteorological data needed to run EFAS over Europe.
Finally, the JRC is responsible for the overall project management related to EFAS and further development of the system.

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