European Flood Awareness System

EFAS *Bulletin*

April – May 2022

Issue 2022(3)

NEWS

New features

CEMS MDCC integrated meteorological station data from Flanders Environment Agency (Belgium)

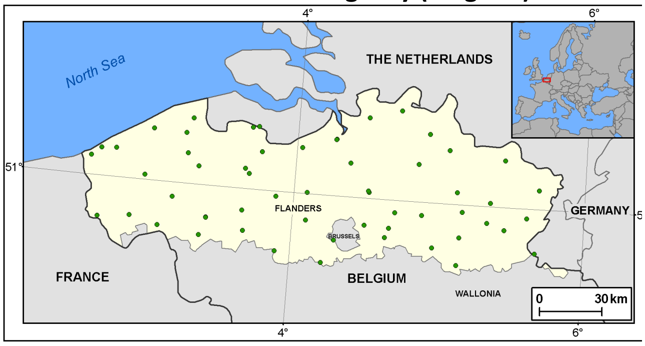

Figure 1: Map of VMM active stations

The CEMS MDCC team integrated the meteorological station data from the Flanders Environment Agency (VMM) into the operational processing routines. VMM provides precipitation, temperature, dewpoint temperature, evaporation, relative air humidity, as well as wind speed and direction data on a 15-minute basis. Data of 63 active meteorological stations are loaded into the CEMS MDCC database in the daily routine. The data are processed and included into the gridded precipitation, temperature, solar radiation and wind speed fields produced every day in the early morning as input for the EFAS forecasts as well as for EFFIS.

CEMS MDCC would like to thank VMM very much for providing their data through the open data portal and for providing help to resolve questions from their data users.

CEMS MDCC integrated NWP data of DWD's ICON model to cover data gaps in the Ukraine during the war

Since the beginning of the war in Ukraine, meteorological data from nearly all Ukrainian weather stations have not been available. Meteorological observations have been reported only sporadically or not at all. Missing meteorological data for an area such as large as the Ukraine during a long time period could lead to degradation of the forecasts by the hydrological model which is used for EFAS. To prevent such implications, CEMS decided to cover the Ukraine with data of DWD's numerical weather prediction (NWP) model ICON (Icosahedral Nonhydrostatic) to ensure a data coverage as reliable as possible.

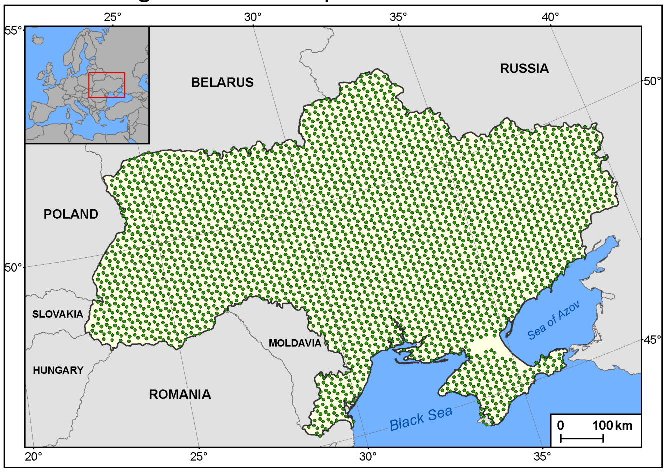

Figure 2: Icon station for Ukraine

After intense work on integrating the ICON data into the system during the last weeks, CEMS MDCC could finally include the ICON data in the daily products, that are used by the other CEMS centers.

ICON data for Ukraine is now included in the MDCC's operational processing routines with the following parameters: 6-hourly accumulated precipitation, hourly temperature, dew point temperature, relative air humidity, solar radiation, as well as wind speed and direction. Data of 3374 gridded stations are loaded into the CEMS MDCC's database in the daily routine and processed and included into the gridded precipitation, temperature, solar radiation and wind speed fields produced every day in the early morning as input for EFAS forecasts.

CEMS MDCC would like to thank DWD very much for providing their data in an uncomplicated and efficient way to solve the urgent issue of Ukraine's missing data.

We hope that we will not need to depend on this temporary solution for very long.

New EFAS partners

Two new institutions have recently joined the network of EFAS partners! We gladly welcome the Wasserverband Eifel-Rur (Germany) and the Slovak Water Management Company (Slovakia) as new EFAS third party partners.

RESULTS

Summary of EFAS Flood and Flash Flood Notifications

The 22 formal and 6 informal EFAS flood notifications issued in April – May 2022 are summarised in Table 1. The locations of all notifications are shown in Figure 16 and Figure 18 in the appendix.

114 Flash flood notifications were issued in April – May 2022. They are summarised in Table 2. The locations of all notifications are shown in Figure 17 and Figure 19 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

April

During the month of April, there were 94 stations with exceedances. The majority of these stations with exceedances are in Spain, with 20 stations across 14 basins. Many of the stations are discharge exceedances, centered in the northeast region (Ter and Llobregat basins) and in the east, where we find several basins. Regarding water level values, only one station in Guadalorce basin presents an exceedance and the rest are situated in the Ebro basin.

Additionally, there is a large concentration of stations in Italy (Po and Tiber basins), and in Ukraine (mainly in the Danube and Dnieper basins and to a lesser extent on the Don and Dniester). Nine exceedances can be found in Germany, centered on the Rhine basin. There are also some countries with exceedances at more than two stations, such as Poland (7), Croatia and Bosnia and Herzegovina (6), Slovakia (5), and Serbia (4). Sweden, Romania, and Georgia all have two stations with exceedances.

In terms of river basins, the two prominent basins with values above the threshold are the Danube (with 27 stations) and the Po (with 13 stations).

Regarding the stations that recorded values above the 90% quantile, 55 exceeded this threshold in April. Twenty-five of them are located in Spain, in the south and east. The basin with the highest number of stations in Spain is the Jucar Basin, with 10. The Mijares, Guadalhorce, Guadalquivir, and Ebro Basins have more than one station with exceedances. The Scandinavian peninsula is once again an area with the most stations exceeding this quantile; where Sweden has eight stations, followed by Finland with seven, and Norway with the three stations.

By basins, in addition to the aforementioned Jucar and Mijares, there are those of the Torne rivers (4 stations) and those of the Rhine and Tana (3 stations each).
Additionally, other stations exceeding the 90% quantile value are found in France, Ukraine, Iceland, Italy, Germany, Austria, Latvia, and Luxembourg.
Finally, and according to the number of stations recording mean values below the 10% quantile, we find a decrease of more than 50%. In the month of April, there are only 60 stations with mean values below this quantile.

Germany is the country with the most stations (11) followed by Spain (10), which continues to reduce the number of stations in this month (about half of March). Norway presents a similar number of stations (9), and seven stations are found in Italy. In terms of basins, the Danube is again the watershed with the highest number of stations, but with one-sixth of the previous month and mainly centered on Germany and Austria.
Lastly, the Elbe and Oder river basins present six and five stations with values below the 10% quantile, respectively. Lastly, presenting four stations each, it is worth mentioning the Po river (Italy) and the Dnieper river (Ukraine).

May

by EFAS Hydrological Data Collection Centre

During the month of May, there were 63 stations with exceedances. The majority of these stations are located in Italy (17) and in Spain (14). In Italy, where all exceedances are related to the water level threshold, the stations are centered in the Po river basin, with almost all of them. Garigliano and Tiber have one station each. On the other hand, exceedances in Spain are mainly due to discharges values. The Llobregat river basin has the most stations (6) and the Mijares basin has two stations.

In addition, there is a considerable concentration of stations in Ukraine, mainly in the Dnieper and, to a lesser extent, in the Danube basins. The Scandinavian peninsula (central and northern areas) has eleven stations, with six of them in Norway and five in Sweden. In addition, Austria, Poland, Serbia, and Georgia present more than one station with exceedances.

As for the river basins, the two main river basins with station values above the threshold are, as in the previous month, the Po (15) and the Danube (9). The exceedances in the Danube basin are spread over six different countries.

Regarding the stations that recorded values above the 90% quantile, 34 exceeded this threshold in May. Again, this month, Spain is the country with the highest number of them. The Spanish basins have 23 stations, with the Júcar river the basin with the highest number of stations (9). Even in the east, in the south of the Iberian Peninsula we can find the Guadalhorce and Guadalquivir basins. Ukraine has four stations, followed by Italy with three stations exceeding this quantile.

Categorizing by basins, in addition to the Júcar basin, the Dnieper river basin stands out with four stations.

In addition, other stations exceeded the 90% quantile value in Italy, Germany, Austria, United Kingdom, and Luxembourg.

Finally, and according to the number of stations that register average values below the 10% quantile, the trend changes and we find an increase of 130%. In the month of May, there are 139 stations with mean values below this threshold.

France is the country with the most stations (31), followed by Spain, which doubled since the previous month by recording 20 stations in May. Norway recorded a similar number of stations (17) and Germany produced 15 stations. Poland and Ukraine have ten stations each and nine stations can be found in Italy.

In terms of basins, the Loire river in France is the one with the highest number of stations (21). The Danube and Oder river basins present 13 and 12 stations with values below the 10% quantile. All in all, up to 40 different basins present values below this limit.

Verification

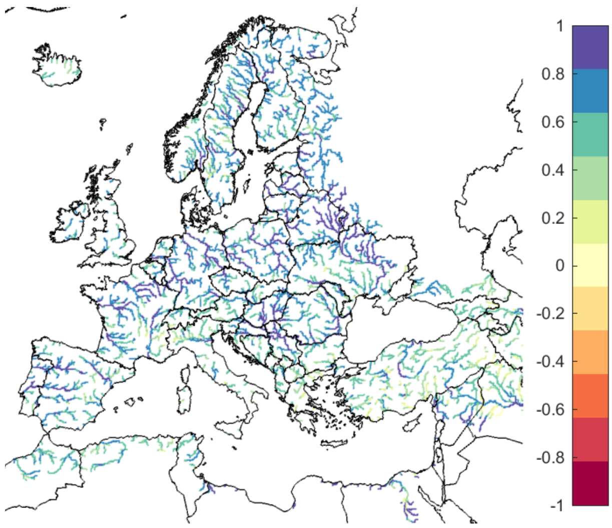

Figure 3: EFAS CRPSS at lead-time 1 day for April-May 2022, for catchments >2000km2. The reference score is persistence of using previous day's forecast.

Figure 3 and Figure 4 shows the EFAS headline score, the continuous ranked probability skill score (CRPSS) for lead times 1 and 5 days for April-May 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.

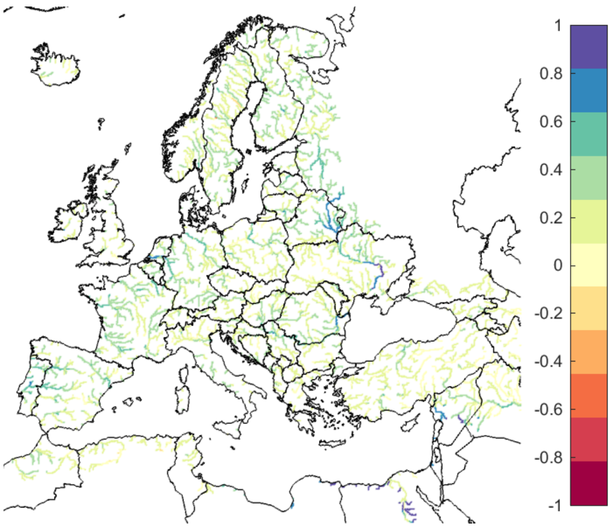

Figure 4. EFAS CRPSS at lead-time 5 days for April-May 2022 for catchments >2000km2. The reference score is persistence of using previous day's forecast.

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 5). 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.

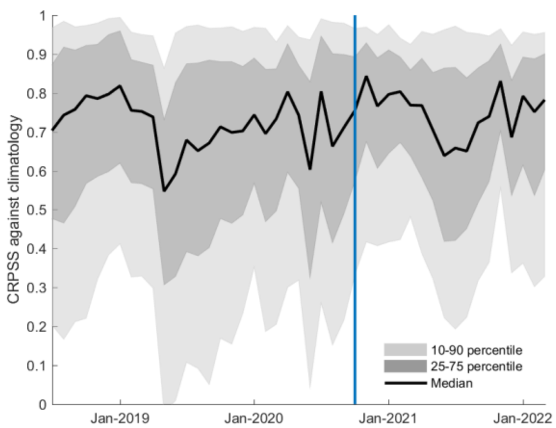

Figure 5. Monthly means of CRPSS the for lead-time 5 days for all the major river points in Europe with ECMWF ENS as forcing. Reference forecast was climatology. The skill is largest during the winter months, when there is less variation in the flow in large parts of Europe. The blue line indicates the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

ARTICLES

Southern and Central Spain flooding, early May 2022

by Richard Davies, floodlist

Record rainfall fell in the metropolitan area of Valencia, Spain on 03 May 2022, causing flooding across the city and surrounding areas

Agencia Estatal de Meteorología (AEMET) reported a total of 232.4 l/m² of rain in Valencia in 24 hours, which is a record amount for the month of May and one of the highest totals on record for the city.

Figures from Associació Valenciana de Meteorologia (AVAMET) show the weather station at Camins al Grau in the city recording 260.9 l/m².

AEMET added that in the 2-month period from 03 March to 03 May, the city of Valencia accumulated 488.6 l/m², an amount higher than the normal value for an entire year (474.9 l/m²).

Firefighters rescued several occupants of vehicles trapped in floodwaters in Paterna municipality to the north of the city, and in Carlet municipality to the south.

Figure 6: Flooded tunnel in Valencia, 03 May 2022. Credit: Policía Local Valencia

In total firefighters carried out over 50 interventions, including clearing flooded roads and removing downed trees. Local police said their officers responded to 94 rain-related interventions in 2 hours late on 03 May. At least four road tunnels in the city were flooded at one point. Some schools were closed and rail services were interrupted or suspended.

A city official pointed out that investment in the Cano de la Molinera pumping station and clearing of drainage systems, together with natural drainage systems in the city such as the Turia riverbed, helped control the flooding at times of greatest intensity.

Other areas of the country also saw severe weather around this time. On 02 May, hail and heavy rain caused flooding and damage in parts of the Murcia Region. Murcia emergency services (112 Murcia) said around 30 mm of rain fell in 1 hour on 02 May 2022, causing floods in Caravaca de la Cruz. Emergency crews responded to 48 weather-related incidents, including 6 rescues. An intense hailstorm caused damage in Bullas, Mula, and Yecla.

Hail and heavy rain also affected areas further north, including parts of the capital, Madrid. Madrid 112 reported 29 incidents, including 16 interventions for flood water clearance, mostly in Leganés and Móstoles.

Social media links:

https://twitter.com/BombersValencia/status/1521648587280683008

https://twitter.com/AEMET_CValencia/status/1521757771544375297

https://twitter.com/112rmurcia/status/1521207262680920070

TAMIR workshop, Helsinki 2022

by Eleanor Hansford, ECMWF

The final workshop of the TAMIR project took place on the 04 and 05 May 2022. The hybrid meeting attracted 85 registrations in total, with 12 participants gathering in Helsinki and the remainder joining virtually. Funded by the European Commission's Civil Protection Mechanism, the project aims to enhance emergency response capacity by developing rapid risk assessment products to provide improved impact forecasting.

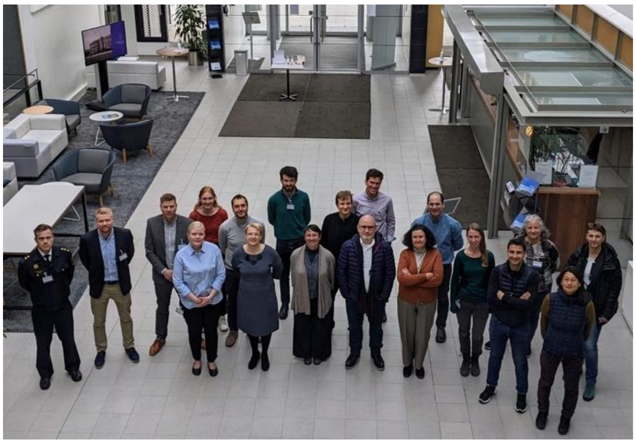

Figure 7: The on-site participants of the final TAMIR workshop, coordinated by the Finnish Meteorological Institute (FMI) hosted in Helsinki, Finland.

Hosted by the Finnish Meteorological Institute (FMI), the workshop was the last stage of the 'co-design' process. A key part of the TAMIR project, this process has enabled the project team to incorporate the needs and opinions of end-users throughout the project lifecycle. The workshop began with a series of presentations demonstrating the various stages of scientific work required to create the final products shown on the platform. This included presentations from Calum Baugh, Corentin Carton De Wiart, and Eleanor Hansford of ECMWF, along with colleagues from the Polytechnic University of Catalonia (UPC) and FMI also presenting their work. The design journey of the TAMIR products was presented by Christel Prudhomme of ECMWF, who gave valuable insights into how the iterative design process was driven by feedback from end-users.

Participants spent the remainder of the first day examining the extent to which TAMIR products would have aided impact forecasting using case studies of flash flood events across Europe. Each event was introduced by an 'event champion', with Luca Molini (CIMA Foundation), Rosa Torres Saavedra (National Civil Protection in Valencia), Petri Tiainen (Kymenlaakso rescue, KYMPE) and Michaela Mikuličková (Slovak Hydrometeorological Institute, SHMU) giving excellent introductions to their respective flooding events. After being given some time to explore the products, feedback was collected on both an online rating platform and through open-ended questions put to both the physical and virtual attendees.

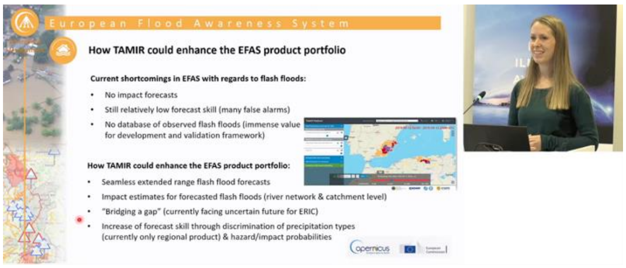

Figure 8: Vera Thiemig of JRC presents how TAMIR could enhance the products portfolio of EFAS.

Summaries of the findings from these case study sessions were presented on the morning of the 05 May by several members of the TAMIR consortium. From these findings, it was clear there were recurrent themes to the feedback. Most importantly, the TAMIR products were found to have high complementarity to the existing products used by participants when forecasting flash floods and their impacts. Also apparent was the significant benefit end-users would gain from having more comprehensive training materials and documentation. Longer term, many participants also felt it would be very advantageous to have help in integrating the TAMIR products into their existing workflows. Looking to the future, the TAMIR consortium are seeking to implement this feedback to ensure as wider and complete uptake of the products as possible, and in turn ensure all those involved with civil protection have the best flash flood impact forecasting tools possible.

Following these summaries, Xavior Llort of Hydrometeorological Innovative Solutions (HYDS) gave a presentation on the integration of TAMIR products into legacy platforms. Afterwards, an engaging talk on the future of TAMIR products in EFAS was given by Vera Thiemig of the Joint Research Centre (JRC). Particularly interesting was her explanation of how they will enhance the current EFAS product portfolio and improve some of the shortcomings of EFAS regarding forecasting flash flood impacts.

The workshop finished with a thought-provoking panel discussion chaired by Christel Prudhomme. On the panel were Vera Thiemig (JRC), Tatjana Vujnovic (Croatian Meteorological and Hydrological Service, DHMZ), and Sami Lindberg (Helsinki Rescue Services) who were present in Helsinki; they were joined virtually by Luca Molini (CIMA Foundation), Ioannis Andredakis (ERCC) and Daniel Sempere-Torres (UPC-CRAHI). A series of open-ended questions led to some interesting discussions. The results of live polls, put to participants on the workshop platform, gave rise to some insightful debate on subjects such as the possible benefits and drawbacks of making comprehensive flash flood risk information publicly available.

Figure 9: The hybrid format of the workshop allowed the TAMIR consortium to engage with a wide range of stakeholders, ensuring the final stages of the project are effectively implemented.

Overall, this two-day workshop was an excellent opportunity for the TAMIR consortium to engage with a wide range of stakeholders and has helped ensure the final stages will be as effective as the rest of the project. The TAMIR layers are expected to be visible on the EFAS map viewer during the next operational release and will also be made available as WMS-T layers to enable easy integration into other existing forecasting systems.

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: Flooded tunnel in Valencia, 03 May 2022. Credit: Policía Local Valencia

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.

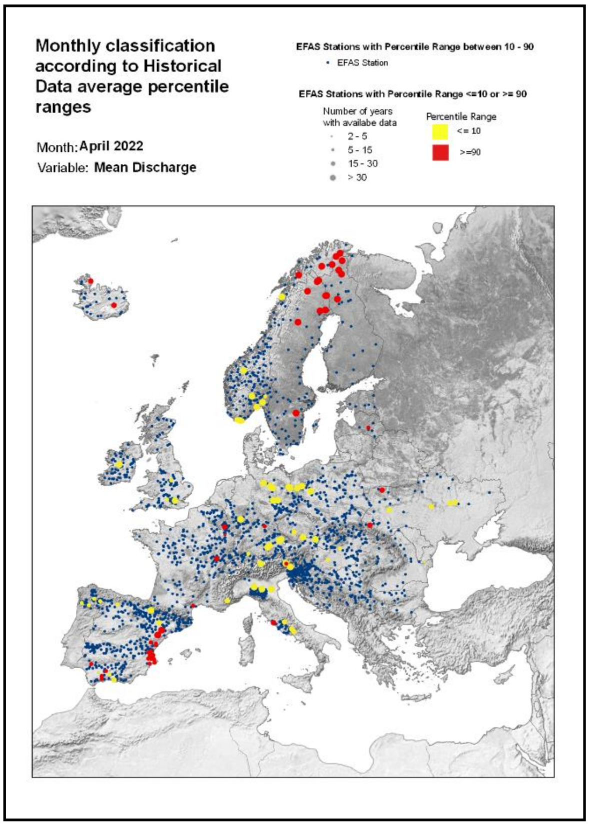

Figure 10: Monthly discharge anomalies April 2022.

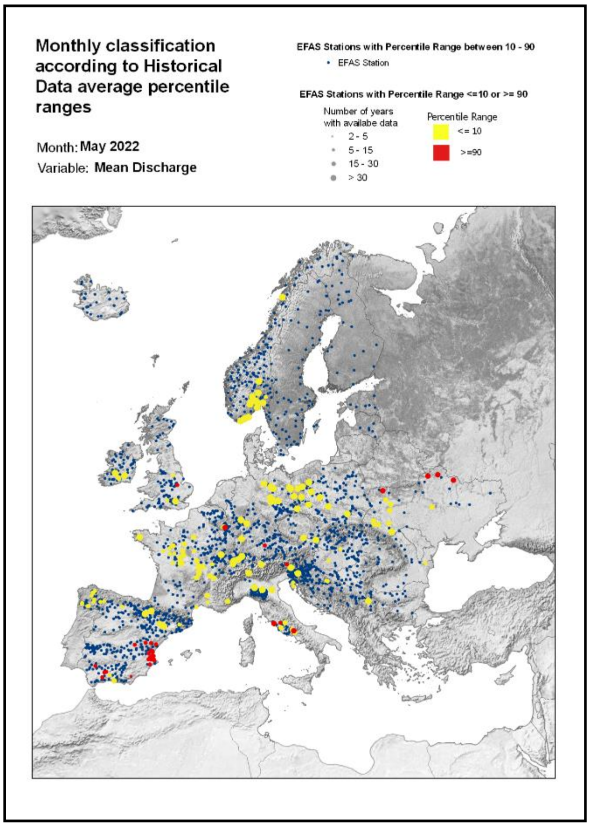

Figure 12: Monthly discharge anomalies May 2022.

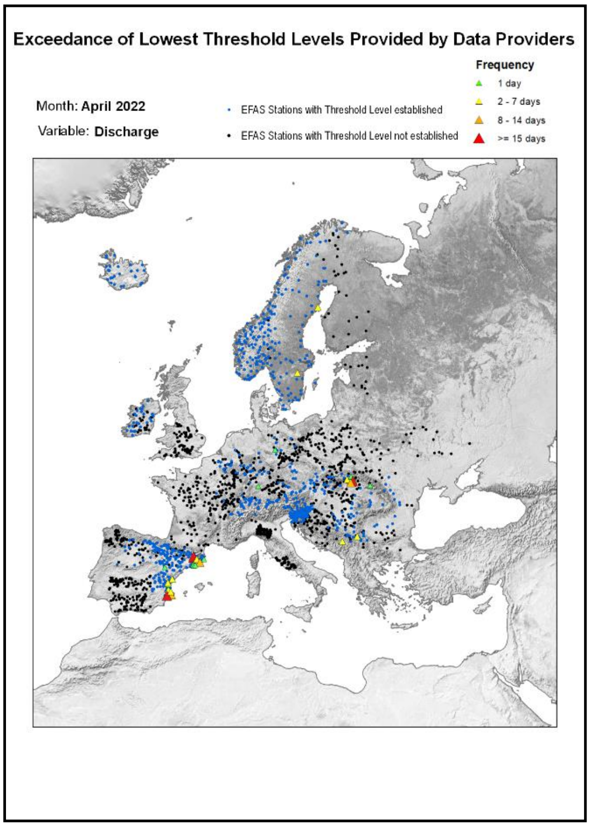

Figure 11: Lowest alert level exceedance for April 2022.

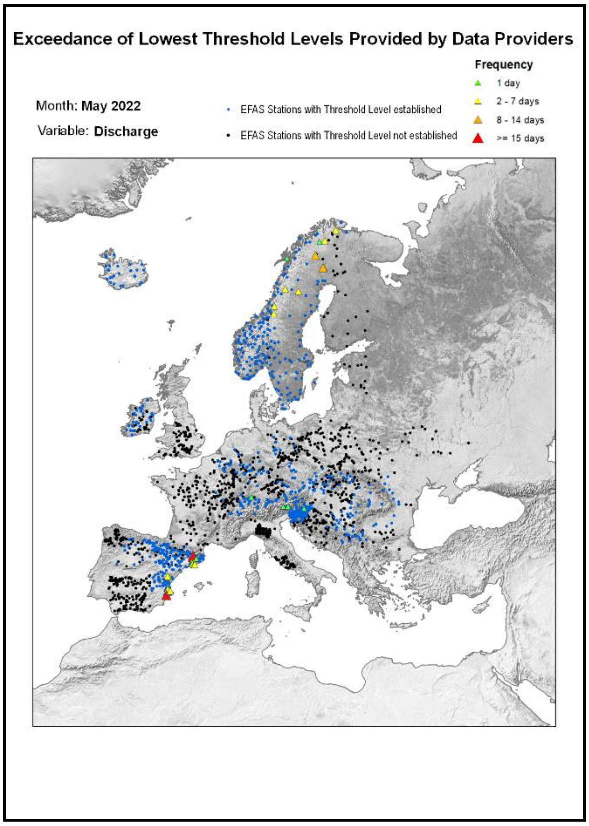

Figure 13: Lowest alert level exceedance for May 2022.

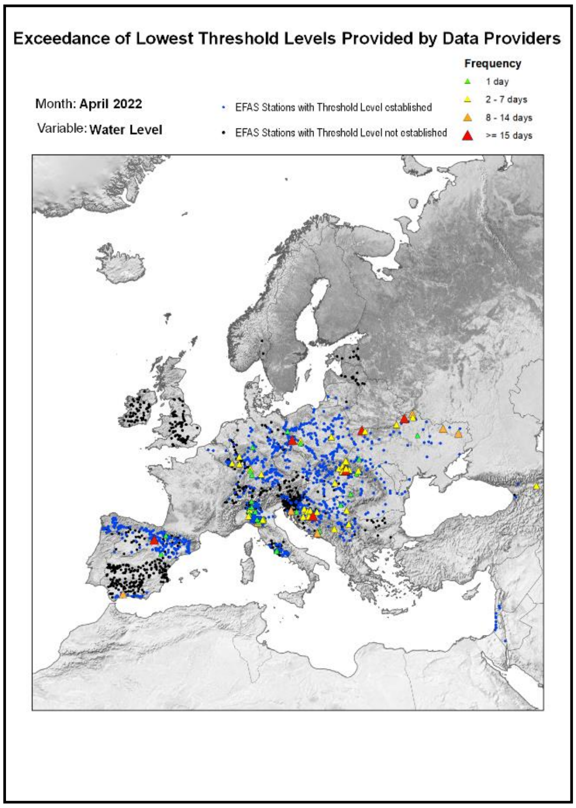

Figure 14: Lowest threshold exceedance for April 2022.

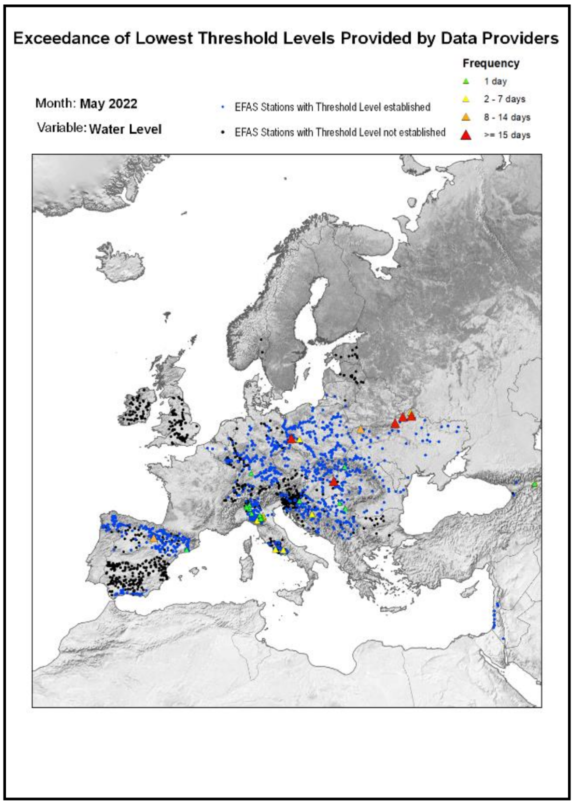

Figure 15: Lowest threshold exceedance for May 2022.

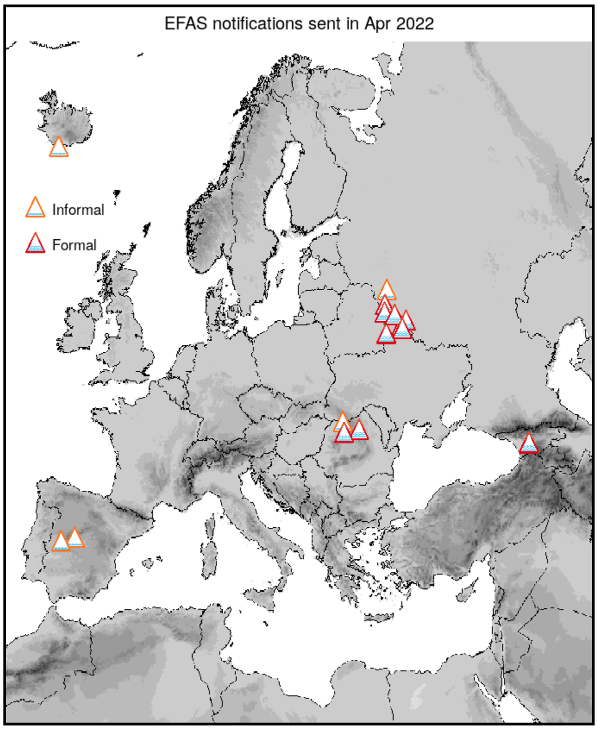

Figure 16: EFAS flood notifications sent for April 2022.

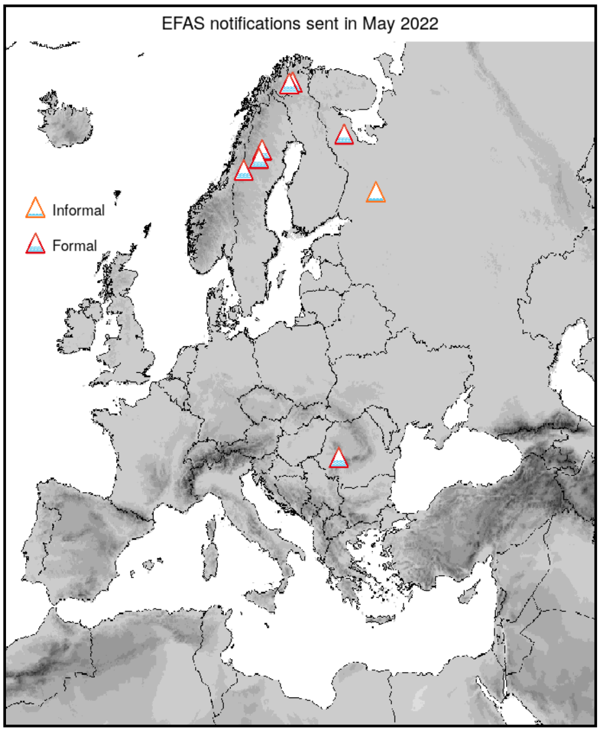

Figure 18: EFAS flood notifications sent for May 2022.

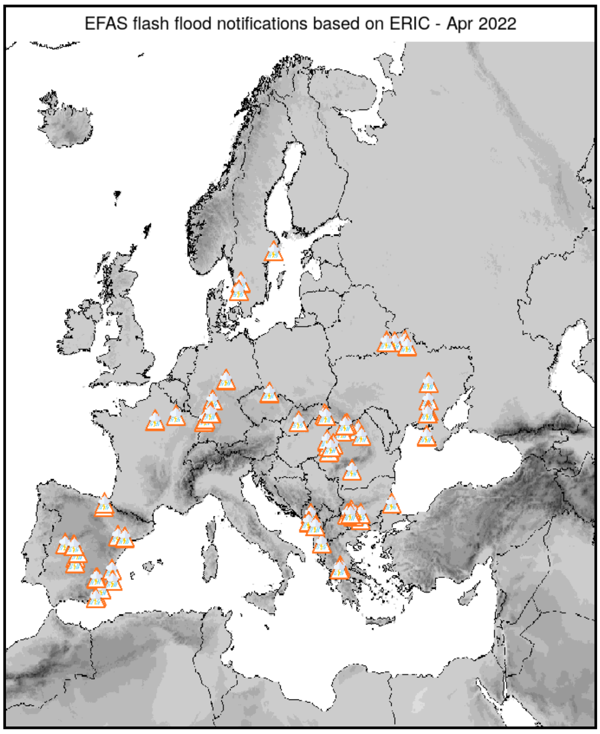

Figure 17: Flash flood notifications sent for April 2022.

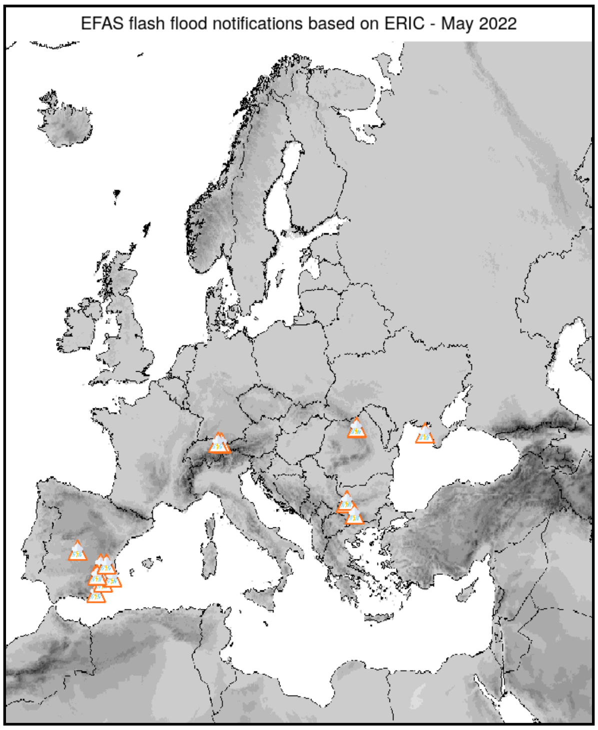

Figure 19: Flash flood notifications sent for May 2022.

Appendix - tables

Table 1: EFAS flood notifications sent in April – May 2022

Type	Forecast Date	Issue Date	Lead Time	River	Country
Formal	03/04/2022 00 UTC	03/04/2022	90	Rioni	Georgia
Informal	06/04/2022 12 UTC	07/04/2022	66	Viseu	Romania
Formal	07/04/2022 12 UTC	08/04/2022	60	Somesul Mare	Romania
Formal	08/04/2022 12 UTC	09/04/2022	78	Rioni	Georgia
Formal	10/04/2022 12 UTC	11/04/2022	72	Desna	Ukraine
Informal	12/04/2022 12 UTC	13/04/2022	54	Coastal zone	Iceland
Informal	14/04/2022 12 UTC	15/04/2022	36	Dnepr, above Drut	Russia
Formal	17/04/2022 00 UTC	17/04/2022	36	Desna, section Bolava - Sudost	Russia
Formal	17/04/2022 12 UTC	18/04/2022	78	Sozh	Belarus
Formal	17/04/2022 12 UTC	18/04/2022	96	Iput	Russia
Formal	19/04/2022 00 UTC	19/04/2022	36	Sudost	Russia
Formal	18/04/2022 12 UTC	19/04/2022	30	SOZHENKA	Russia
Formal	18/04/2022 12 UTC	19/04/2022	30	SOZHENKA	Russia
Formal	20/04/2022 00 UTC	20/04/2022	108	Iput	Belarus
Informal	21/04/2022 00 UTC	21/04/2022	36	Tietar	Spain
Informal	21/04/2022 12 UTC	22/04/2022	30	Tajo	Spain
Formal	26/04/2022 00 UTC	26/04/2022	48	Somesul Mare	Romania
Formal	26/04/2022 00 UTC	26/04/2022	48	Somesul Mare	Romania
Formal	25/04/2022 12 UTC	26/04/2022	60	Bistrita	Romania
Formal	30/04/2022 12 UTC	01/05/2022	48	Oulankajoki	Russia
Informal	11/05/2022 12 UTC	12/05/2022	36	Verkhne Svirskoye Vod.	Russia
Formal	23/05/2022 00 UTC	23/05/2022	102	Umeälven	Sweden
Formal	22/05/2022 12 UTC	23/05/2022	72	Karasjokka	Norway
Formal	22/05/2022 12 UTC	23/05/2022	72	Lesjokka	Norway
Formal	23/05/2022 12 UTC	24/05/2022	42	Ångerman Älven	Sweden
Formal	26/05/2022 12 UTC	27/05/2022	54	Strei	Romania
Formal	29/05/2022 00 UTC	29/05/2022	60	Umeälven	Sweden
Formal	29/05/2022 12 UTC	30/05/2022	48	Umeälven	Sweden

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

Table 2: EFAS flash flood notifications sent in April – May 2022

Type	Forecast Date	Issue Date	Lead Time	Region	Country
Flash Flood	31/03/2022 12 UTC	01/04/2022	42	Crni Drim / Drin,Drini i Zi	Albania
Flash Flood	02/04/2022 00 UTC	02/04/2022	30	Danube	Romania
Flash Flood	02/04/2022 00 UTC	02/04/2022	18	Danube	Romania
Flash Flood	02/04/2022 00 UTC	02/04/2022	30	Acheloos	Greece
Flash Flood	01/04/2022 12 UTC	02/04/2022	96	Rhine	Germany
Flash Flood	01/04/2022 12 UTC	02/04/2022	102	Spain (South-East Coast)	Spain
Flash Flood	01/04/2022 12 UTC	02/04/2022	114	Segura	Spain
Flash Flood	03/04/2022 12 UTC	04/04/2022	48	Rhine	Germany
Flash Flood	03/04/2022 12 UTC	04/04/2022	66	Segura	Spain
Flash Flood	03/04/2022 12 UTC	04/04/2022	24	Sweden	Sweden
Flash Flood	05/04/2022 00 UTC	05/04/2022	30	Coastal Catchment	

Flash Flood	06/04/2022 00 UTC	06/04/2022	36	Sweden	Sweden
Flash Flood	06/04/2022 00 UTC	06/04/2022	42	Elbe	Germany
Flash Flood	06/04/2022 00 UTC	06/04/2022	42	Seman	Albania
Flash Flood	05/04/2022 12 UTC	06/04/2022	42	Moraca/Bojana	Montenegro
Flash Flood	07/04/2022 00 UTC	07/04/2022	36	Elbe	Czech Republic
Flash Flood	07/04/2022 00 UTC	07/04/2022	48	Danube	Slovakia
Flash Flood	07/04/2022 00 UTC	07/04/2022	24	Sweden	Sweden
Flash Flood	06/04/2022 12 UTC	07/04/2022	30	Elbe	Germany
Flash Flood	08/04/2022 00 UTC	08/04/2022	42	Danube	Slovakia
Flash Flood	08/04/2022 00 UTC	08/04/2022	42	Danube	Ukraine
Flash Flood	08/04/2022 00 UTC	08/04/2022	48	Danube	Romania
Flash Flood	08/04/2022 00 UTC	08/04/2022	24	Rhine	France
Flash Flood	08/04/2022 00 UTC	08/04/2022	18	Seine	France
Flash Flood	08/04/2022 00 UTC	08/04/2022	18	Seine	France
Flash Flood	08/04/2022 00 UTC	08/04/2022	18	Rhine	Germany
Flash Flood	07/04/2022 12 UTC	08/04/2022	36	Rhine	Germany
Flash Flood	07/04/2022 12 UTC	08/04/2022	42	Rhine	Germany
Flash Flood	07/04/2022 12 UTC	08/04/2022	42	Seine	France
Flash Flood	07/04/2022 12 UTC	08/04/2022	48	Danube	Romania
Flash Flood	09/04/2022 00 UTC	09/04/2022	42	Danube	Bulgaria
Flash Flood	08/04/2022 12 UTC	09/04/2022	48	Danube	Bulgaria
Flash Flood	09/04/2022 12 UTC	10/04/2022	42	Dnepr	Ukraine
Flash Flood	09/04/2022 12 UTC	10/04/2022	36	Strimonas(GR)/Struma(BG)	Bulgaria
Flash Flood	11/04/2022 00 UTC	11/04/2022	30	Dnepr	Ukraine
Flash Flood	10/04/2022 12 UTC	11/04/2022	36	Tajo	Spain
Flash Flood	10/04/2022 12 UTC	11/04/2022	48	Segura	Spain
Flash Flood	10/04/2022 12 UTC	11/04/2022	36	Sea of Azov	Ukraine
Flash Flood	12/04/2022 00 UTC	12/04/2022	48	J	Spain
Flash Flood	12/04/2022 00 UTC	12/04/2022	48	Dnepr	Ukraine
Flash Flood	11/04/2022 12 UTC	12/04/2022	42	Spain (South-East Coast)	Spain
Flash Flood	11/04/2022 12 UTC	12/04/2022	48	Dnepr	Ukraine
Flash Flood	13/04/2022 00 UTC	13/04/2022	30	Sea of Azov	Ukraine
Flash Flood	13/04/2022 00 UTC	13/04/2022	24	Ebro	Spain
Flash Flood	16/04/2022 00 UTC	16/04/2022	42	Evros / Maritsa	Bulgaria
Flash Flood	15/04/2022 12 UTC	16/04/2022	48	Danube	Bulgaria
Flash Flood	17/04/2022 00 UTC	17/04/2022	36	Dnepr	Ukraine
Flash Flood	17/04/2022 00 UTC	17/04/2022	12	Evros / Maritsa	Bulgaria
Flash Flood	16/04/2022 12 UTC	17/04/2022	48	Dnepr	Ukraine
Flash Flood	16/04/2022 12 UTC	17/04/2022	48	Acheloos	Greece
Flash Flood	16/04/2022 12 UTC	17/04/2022	48	Black Sea Coast (West)	Bulgaria
Flash Flood	16/04/2022 12 UTC	17/04/2022	36	Mesta(BG)/Nestos(GR)	Bulgaria
Flash Flood	18/04/2022 00 UTC	18/04/2022	42	Segura	Spain
Flash Flood	18/04/2022 00 UTC	18/04/2022	48	Dnepr	Ukraine
Flash Flood	19/04/2022 00 UTC	19/04/2022	42	Mesta(BG)/Nestos(GR)	Bulgaria
Flash Flood	19/04/2022 00 UTC	19/04/2022	48	Ebro	Spain
Flash Flood	19/04/2022 00 UTC	19/04/2022	48	Ebro	Spain
Flash Flood	19/04/2022 00 UTC	19/04/2022	42	Tajo	Spain
Flash Flood	19/04/2022 00 UTC	19/04/2022	42	Coastal Catchment	
Flash Flood	20/04/2022 00 UTC	20/04/2022	24	Oria	Spain
Flash Flood	20/04/2022 00 UTC	20/04/2022	18	Danube	Bulgaria
Flash Flood	20/04/2022 00 UTC	20/04/2022	18	Strimonas(GR)/Struma(BG)	Bulgaria

Flash Flood	21/04/2022 00 UTC	21/04/2022	48	Tajo	Spain
Flash Flood	21/04/2022 00 UTC	21/04/2022	48	Guadiana	Spain
Flash Flood	20/04/2022 12 UTC	21/04/2022	48	Tajo	Spain
Flash Flood	22/04/2022 00 UTC	22/04/2022	24	Moraca/Bojana	Montenegro
Flash Flood	21/04/2022 12 UTC	22/04/2022	48	Dnepr	Ukraine
Flash Flood	23/04/2022 00 UTC	23/04/2022	24	Ebro	Spain
Flash Flood	24/04/2022 00 UTC	24/04/2022	42	Danube	Romania
Flash Flood	23/04/2022 12 UTC	24/04/2022	48	Danube	Romania
Flash Flood	23/04/2022 12 UTC	24/04/2022	48	Danube	Romania
Flash Flood	24/04/2022 12 UTC	25/04/2022	48	Dnepr	Ukraine
Flash Flood	24/04/2022 12 UTC	25/04/2022	12	Danube	Romania
Flash Flood	26/04/2022 00 UTC	26/04/2022	48	Segura	Spain
Flash Flood	25/04/2022 12 UTC	26/04/2022	36	Dnepr	Ukraine
Flash Flood	26/04/2022 12 UTC	27/04/2022	48	Danube	Romania
Flash Flood	26/04/2022 12 UTC	27/04/2022	48	Danube	Romania
Flash Flood	26/04/2022 12 UTC	27/04/2022	48	Danube	Romania
Flash Flood	26/04/2022 12 UTC	27/04/2022	48	Danube	Romania
Flash Flood	26/04/2022 12 UTC	27/04/2022	48	Danube	Romania
Flash Flood	26/04/2022 12 UTC	27/04/2022	42	Danube	Romania
Flash Flood	28/04/2022 00 UTC	28/04/2022	18	Tajo	Spain
Flash Flood	28/04/2022 00 UTC	28/04/2022	30	Evros / Maritsa	Bulgaria
Flash Flood	27/04/2022 12 UTC	28/04/2022	30	Guadiana	Spain
Flash Flood	28/04/2022 12 UTC	29/04/2022	24	Evros / Maritsa	Bulgaria
Flash Flood	02/05/2022 00 UTC	02/05/2022	36	J	Spain
Flash Flood	02/05/2022 00 UTC	02/05/2022	48	Tajo	Spain
Flash Flood	01/05/2022 12 UTC	02/05/2022	48	Segura	Spain
Flash Flood	01/05/2022 12 UTC	02/05/2022	48	J	Spain
Flash Flood	04/05/2022 00 UTC	04/05/2022	18	Coastal Catchment	
Flash Flood	04/05/2022 00 UTC	04/05/2022	24	Spain (South-East Coast)	Spain
Flash Flood	04/05/2022 00 UTC	04/05/2022	18	Segura	Spain
Flash Flood	04/05/2022 00 UTC	04/05/2022	18	Coastal Catchment	
Flash Flood	16/05/2022 00 UTC	16/05/2022	48	Danube	Romania
Flash Flood	17/05/2022 12 UTC	18/05/2022	30	Evros / Maritsa	Bulgaria
Flash Flood	17/05/2022 12 UTC	18/05/2022	30	Sea of Azov	Ukraine
Flash Flood	23/05/2022 00 UTC	23/05/2022	24	Danube	Germany
Flash Flood	23/05/2022 00 UTC	23/05/2022	24	Rhine	Austria
Flash Flood	27/05/2022 00 UTC	27/05/2022	48	Danube	Bulgaria
Flash Flood	29/05/2022 00 UTC	29/05/2022	18	Danube	Bulgaria

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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