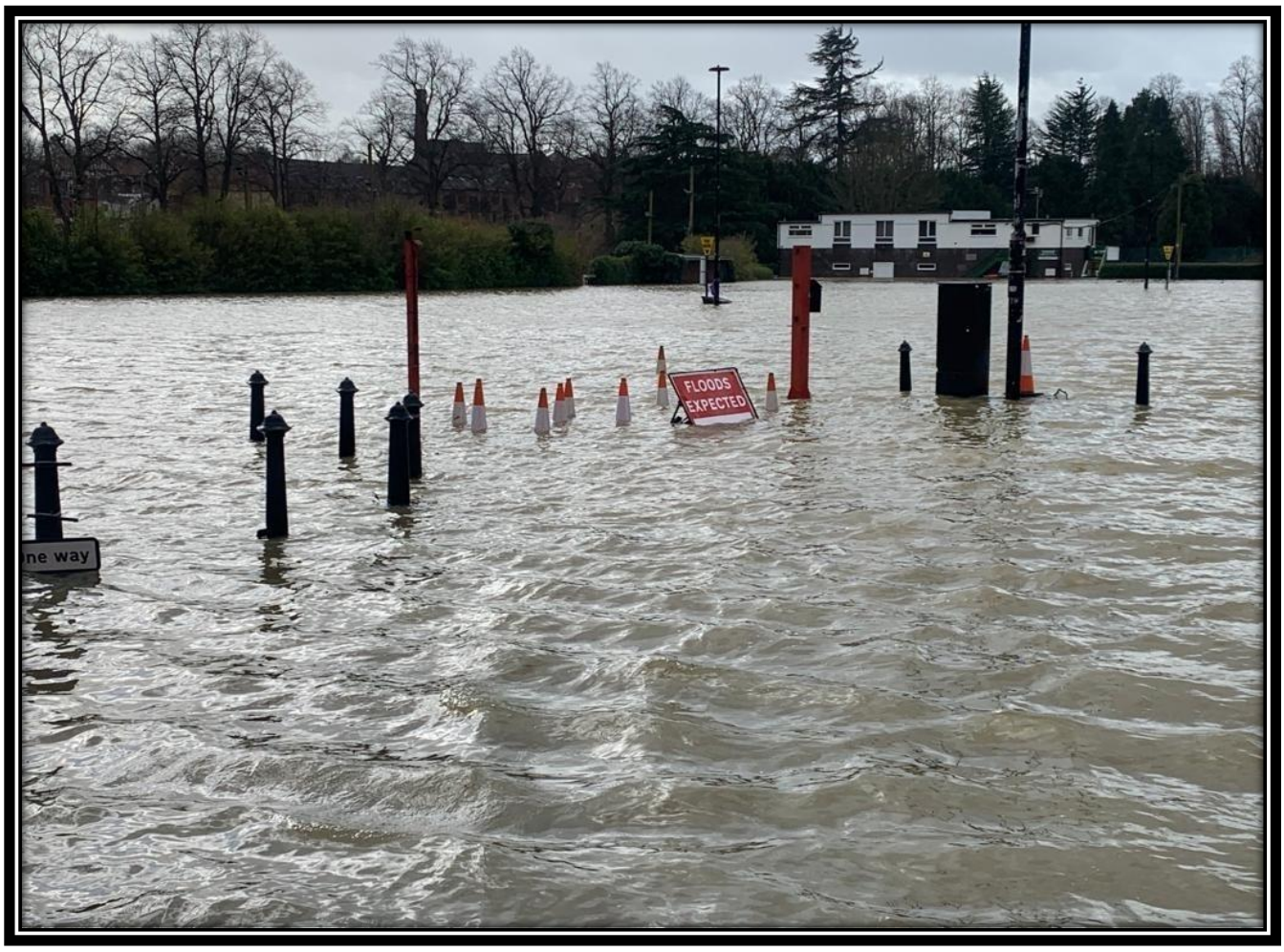
European Flood Awareness System

EFAS *Bulletin*

February – March 2022

Issue 2022(2)



NEWS

New features

Job opportunity – Hydrologic Model Developer (JRC)
The Joint Research Center (JRC) of the European Commission is responsible for the Copernicus Emergency Management Service which includes the flood and drought early warning and monitoring component with its European and Global Flood Awareness Systems (EFAS and GloFAS) as well as the European and Global Drought Observatories (EDO and GDO).

Common to all those systems is the usage of the hydrological model LISFLOOD to predict floods, low flow events or other hydrologic variables. LISFLOOD is an open-source, spatially distributed rainfall-runoff model which was developed at the JRC and is used across the JRC to support not only hydrological forecasting but also other water related policies, for example by assessing the impacts of climate change on water resources or flood risk.

JRC are seeking a hydrologic model developer to help improve LISFLOOD, in particular, the flood forecasting in EFAS and GloFAS as well as for assessing flood and drought risk under a changing climate.

Find out more about the job description and how to apply here Code: 2022-IPR-E1-FGIV-020509 - FG IV - Scientific Project Officer – Hydrologic model developer for flood and drought early warning systems- Ispra, Italy: Application deadline: **20 May 2022**

Job opportunity – Scientific Software Engineer (ECMWF)

ECMWF has published a vacancy for a Scientific Software Engineer for Hydrological Forecasts. This role is an exciting opportunity to work at the forefront of research to operations of the ECMWF's world-leading weather and hydrological forecast models (including CEMS EFAS/GloFAS projects).

The successful candidate will be responsible for the integration and testing of research developments of weather and hydrological forecast models in preparation for production. The candidate will work in close collaboration with our Forecast Department's Production and Development Sections to ensure that scientific solutions are well-designed, integrated and tested for pre-production. The candidate will have a strong background in developing, configuring and running complex test, calibration, reanalysis, and reforecast workflows that are required for successful production releases. Click the link to find more information on the job description and application details. Location of position: Reading, UK. Apply now!

New EFAS partners

Figure 1: EFAS Partner regions

In the last months, three new institutions have joined the network of EFAS partners! We gladly welcome the Landesbetrieb für Hochwasserschutz und Wasserwirtschaft Sachsen-Anhalt (LHW Sachsen-Anhalt, Germany) and the Direcció General d'Emergències i Interior (DGEI, Spain), as new EFAS full partners. Additionally, we welcome the Marine Forecasting Centre of Belgium as a new EFAS third party partner.

RESULTS

Summary of EFAS Flood and Flash Flood Notifications

The 23 formal and 15 informal EFAS flood notifications issued in February – March 2022 are summarised in Table 1. The locations of all notifications are shown in Figure 20 and Figure 22 in the appendix.

228 Flash flood notifications were issued in February – March 2022. They are summarised in

Table 2. The locations of all notifications are shown in Figure 21 and Figure 23 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

February

During the month of February, the number of stations with exceedance has been reduced compared to the previous month. The main groups of stations are in Poland and Germany (20 stations each), in the basins of the rivers Oder, Vistula, and Rhine. These are followed by Ireland with fourteen stations in various river basins.

Additionally, there is a high concentration of stations in the Danube river basin, in Bosnia & Herzegovina, Germany, Serbia, Slovakia, and Ukraine. The Dnieper river basin also has nineteen stations showing exceedances. Some stations can also be found in southern Sweden and Croatia.

Regarding the stations that registered values above the 90% quantile, 61 exceeded this threshold in February. Of these stations, 64% were in Norway, Sweden, and Finland, as the former month.

In terms of basins, the Dnieper River in northern Ukraine is remarkable with six stations. We found a similar situation for the Glomma river (Norway) with five stations, and the Tana (Norway) and Torne (northern Sweden and Finland) rivers with four stations in the Scandinavian peninsula.

Moreover, other stations exceeded the 90% quantile value in Spain (Guadalquivir basin and eastern area), Italy (Marta river basin) and Poland (Vistula river). As for England, two stations exceeded this threshold in February and the same number in Germany (Danube and Oder rivers).

Finally, and according to the number of stations registering average values below the 10% quantile, there is a large increase in the number of stations that meet this criterion, amounting to 103 (more than 5 times the former month).

Spain stands out with 64 of these stations, with 25 stations in the Minho basin and 15 in the Douro, as well as several stations in the south of Spain. The Ebro and Llobregat basins also have five stations each with values below 10%. Spain is followed by Austria, Croatia and Hungary with six stations and Italy with five stations.

Finally, more isolated stations have values below 10% quantile, such as different basins in France, Ukraine, the Thames River (England), the Rhine in Germany or the Danube with stations in Switzerland and Romania.

March

During the month of March, there were 68 stations with exceedances, the majority of which were in Spain (34 stations across 15 basins). Regarding water level, the exceedances are focused on the southern area (Guadalhorce and Guadiaro basins) and the Ebro basin. In terms of discharges values, the stations are centered in the north-east: in Llobregat, Ter and Ebro basins, and the east of Spain: Jucar, Muga and Serpis basins.

Additionally, there was a high concentration of stations with exceedances in Poland (in the Oder and Vistula basins) and in Iceland, mainly in the Oelfusa basin. There are also some countries with more than two stations with exceedances such as Italy, Switzerland, Ukraine, and Bosnia & Herzegovina.

Regarding the stations that recorded values above the 90% quantile, 81 exceeded this threshold in March (of which 31 are located in the south and east regions of Spain) The basin with the highest number of stations in Spain is the Jucar Basin (11). Norway has 28 stations, followed by Finland (7) and Sweden (6) on the Scandinavian peninsula, as in the previous month.

When evaluating by basin, in addition to the Jucar, there are the Glomma and Torne rivers with five stations each and the Tana basin with three. Many other stations exceeded the 90% quantile value in France, Italy, Germany, England, and Iceland.

Finally, and according to the number of stations recording average values below the 10% quantile, we find an increase of close to 50%, amounting to 150 stations. Spain remains in the lead with 22 stations (one third of which occurred in February), with 12 of them in the Minho basin. The rest are distributed on the south, northwest and northeast. Croatia has a similar number of stations (21), with a large increase this month, mainly in the Danube basin. This river is the one with the highest number of stations, with 76 distributed across ten countries.

Lastly, the Rhine basin presents 15 stations with values below 10% quantile, mainly in Germany and Switzerland. The Po river (Italy) or the Thames river (England) are also remarkable.

Verification

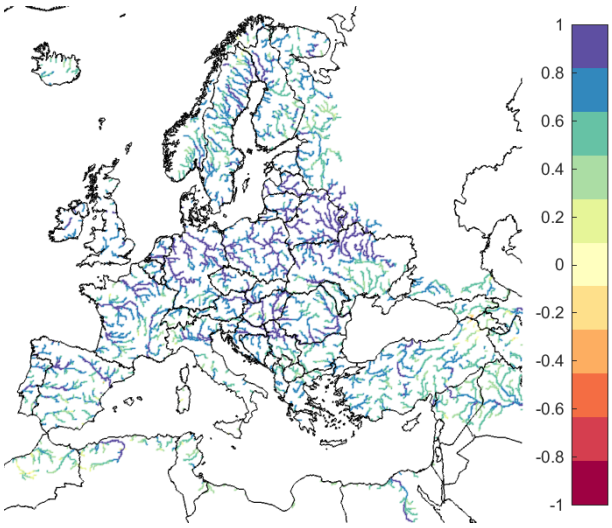


Figure 2: EFAS CRPSS at lead-time 1 day for February-March 2022, for catchments >2000km2. The reference score is persistence of using previous day's forecast.

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 February-March 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.

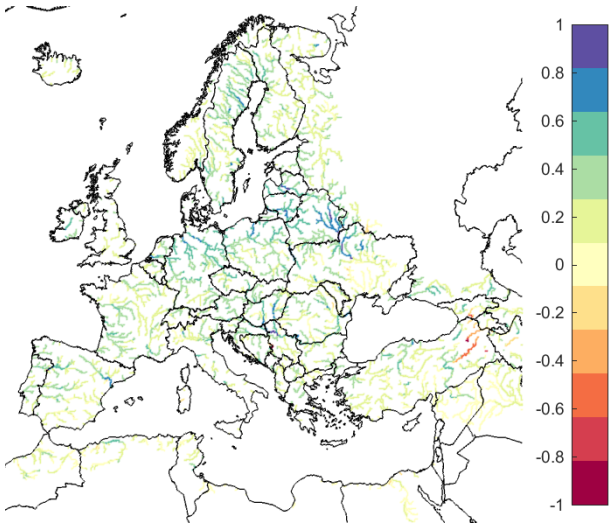


Figure 3. EFAS CRPSS at lead-time 5 days for February-March 2022 for catchments >2000km2. The reference score is persistence of using previous day's forecast.

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.

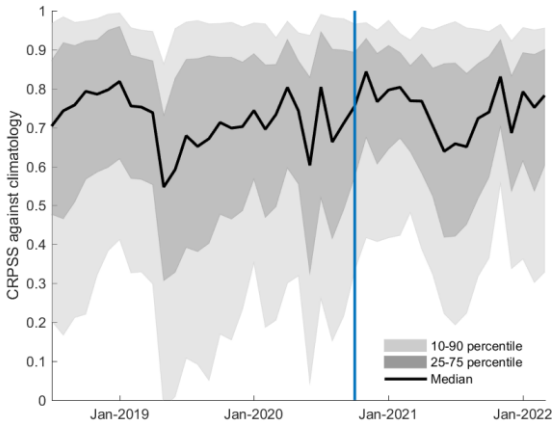


Figure 4. Monthly means of CRPSS the for lead-time 5 days for all the major river points in Europe with ECMWF ENS as forcing. Reference forecast was climatology. The skill is largest during the winter months, when there is less variation in the flow in large parts of Europe. The blue line indicates the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

ARTICLES

Floodlist Article

by Richard Davies, floodlist

Storm Franklin caused flooding in parts of the UK from 20 February 2022, prompting evacuations in England and Wales. Franklin was the third named storm to hit the UK within a week, following Storm Dudley and Storm Eunice in which three people died and 1.4 million homes were left without power as a result of strong winds.

In England, the Environment Agency said the worst of the flooding from Storm Franklin was along the River Ouse in Yorkshire and the River Severn in the West Midlands, where a severe flood warning (highest) was issued for Ironbridge in Shropshire and Bewdley in Worcestershire. Some residents evacuated homes in these areas, while roads were closed and rail services suspended.

The Buildwas measuring station near Ironbridge showed the Severn reached 6.55 metres late on 22 February, while the Severn at Bewdley reached 5.33 metres as of 23 February.

Rising rivers had caused flooding in other areas of the country from 20 February, including the Mersey in Greater Manchester, the Derwent in Derbyshire, the Wharfe in North and West Yorkshire and the Don in South Yorkshire.

Figure 5: Floods in Shropshire, England, during Storm Franklin, February 2022. Photo: Shropshire Council

The River Mersey at Brinksway in Greater Manchester reached a record 4.4 metres on 20 February, beating the previous high of 3.97 metres set in November 2000. As of 21 February around 70 households were evacuated. Manchester City Council said about 430 properties were at risk of flooding at one point.

In North Yorkshire the Fire Service rescued several people from a flooded caravan site in Knaresborough. The River Ouse flooded areas of York. Around 60 homes were flooded in Tadcaster after the River Wharfe overflowed. Flooding from the same river also caused damage to properties in Otley in West Yorkshire. The River Don burst its banks near Doncaster in South Yorkshire late 20 February.

According to the Environment Agency around 400 homes were damaged by flooding in England during Storm Franklin. The agency added that flood defences had protected more than 40,000 properties despite record river levels.

In Wales, Natural Resources Wales (NRW) reported high levels of the River Severn in Powys. Residents of Llandinam near Newtown evacuated their homes after flooding late on 20 February.

Franklin also cause some coastal flooding in parts of France. Two people drowned after their car was swept away by strong waves in Bricqueville-sur-Mer, northern France on 20 February 2022. Firefighters in Pas-de-Calais carried out more than 2,000 interventions during storms Eunice and Franklin, mostly for wind damage. Some localised flash flooding was reported in parts of Belgium and the Netherlands.

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: Floods in Shropshire, England, during Storm Franklin, February 2022. Photo: Shropshire Council

Appendix – figures

Figures for meteorological situation are no longer produced for the EFAS bulletin by Meteorological Data Collection Centre.

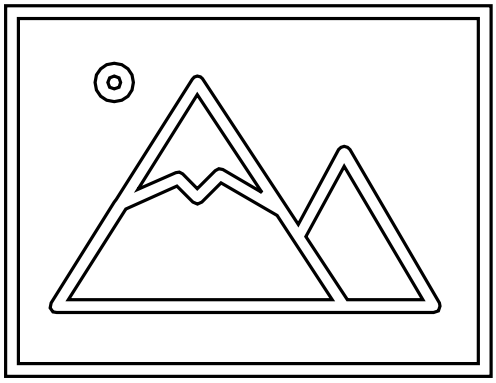


Figure 6: Accumulated precipitation [mm] for February 2022.

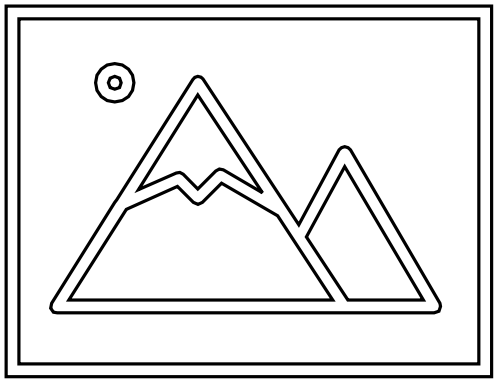


Figure 8: Accumulated precipitation [mm] for March 2022.

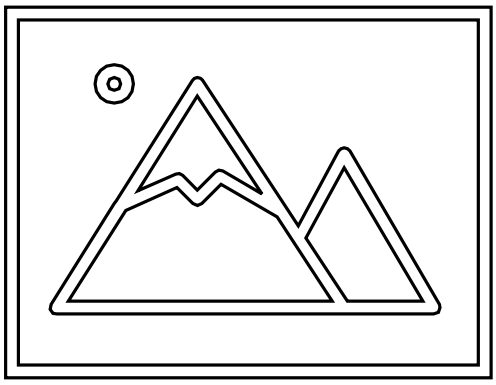


Figure 7: Precipitation anomaly [%] for February, relative to a long-term average (1990-2013). Blue (red) denotes wetter (drier) conditions than normal.

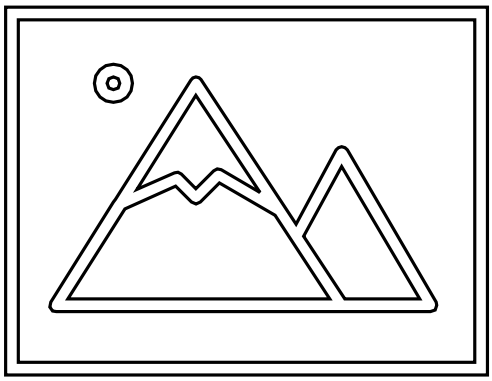


Figure 9: Precipitation anomaly [%] for March 2022 relative to a long-term average (1990-2013). Blue (red) denotes wetter (drier) conditions than normal.

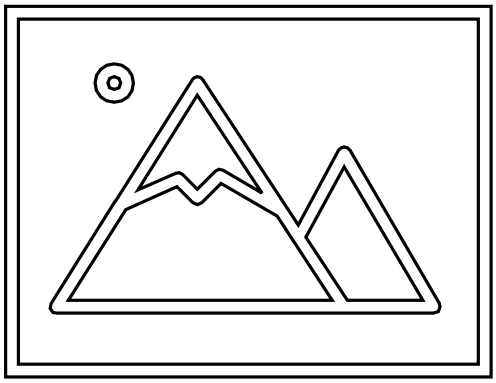


Figure 10: Mean temperature [°C] for February 2022.

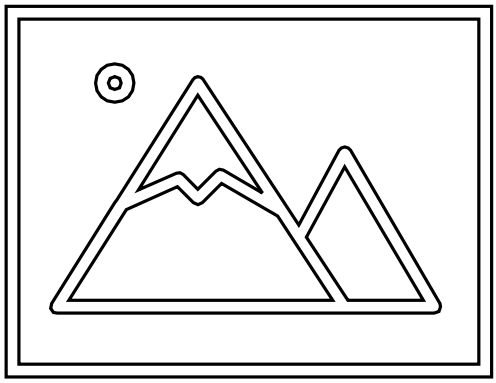


Figure 12: Mean temperature [°C] for March 2022.

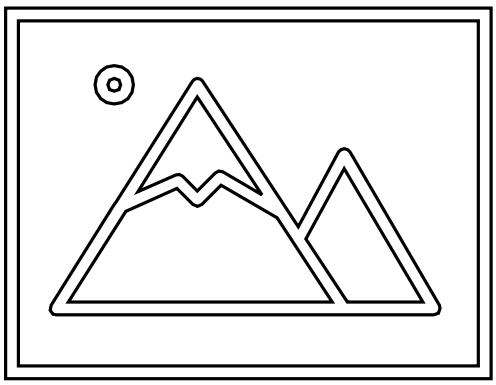


Figure 11: Temperature anomaly [°C] for February 2022, relative to a long-term average (1990-2013). Blue (red) denotes colder (warmer) temperatures than normal

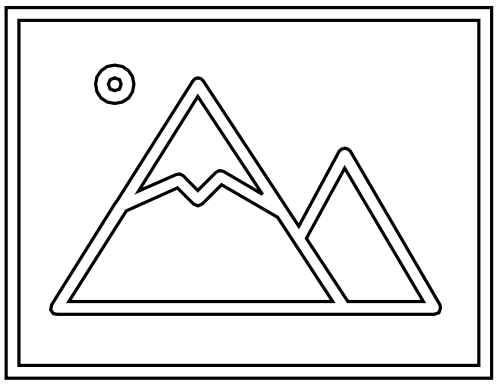


Figure 13: Temperature anomaly [°C] for March 2022, relative to a long-term average (1990-2013). Blue (red) denotes colder (warmer) temperatures than normal.

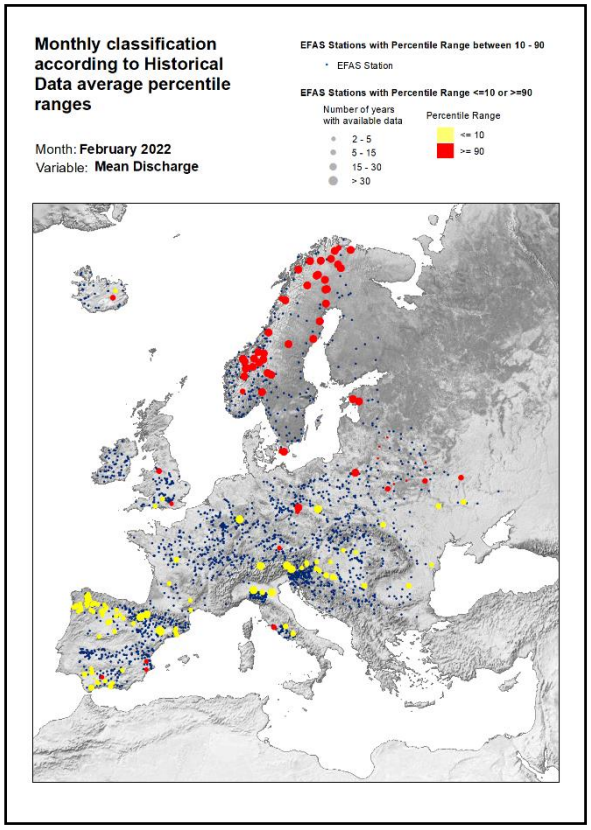


Figure 14: Monthly discharge anomalies February 2022.

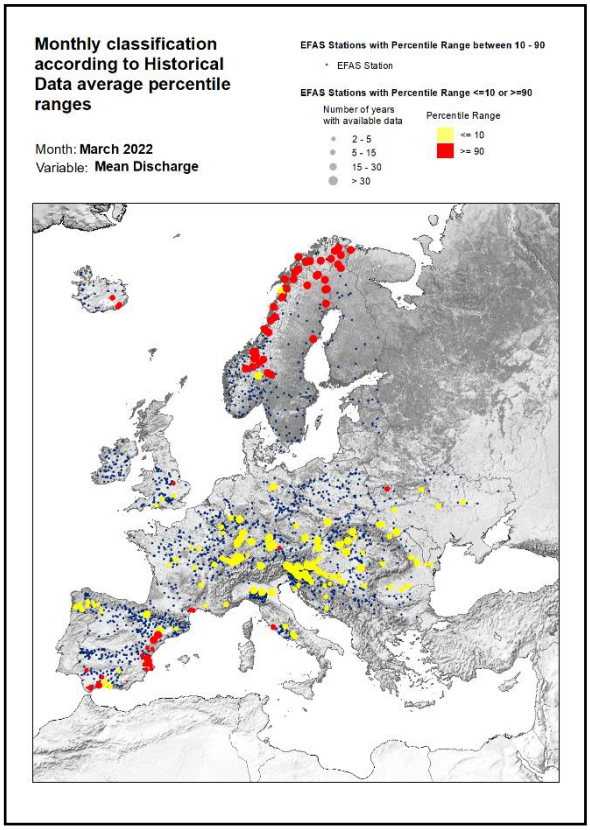


Figure 16: Monthly discharge anomalies March 2022.

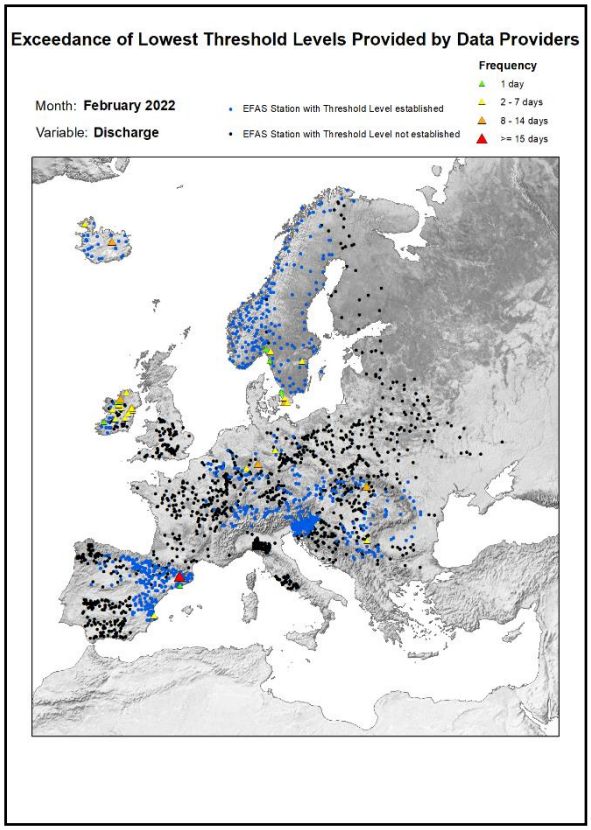


Figure 15: Lowest alert level exceedance for February 2022.

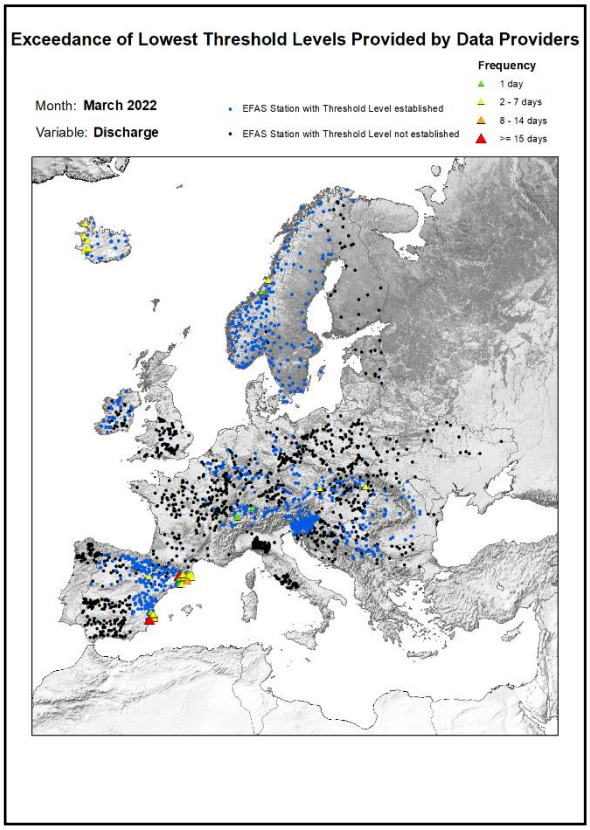


Figure 17: Lowest alert level exceedance for March 2022.

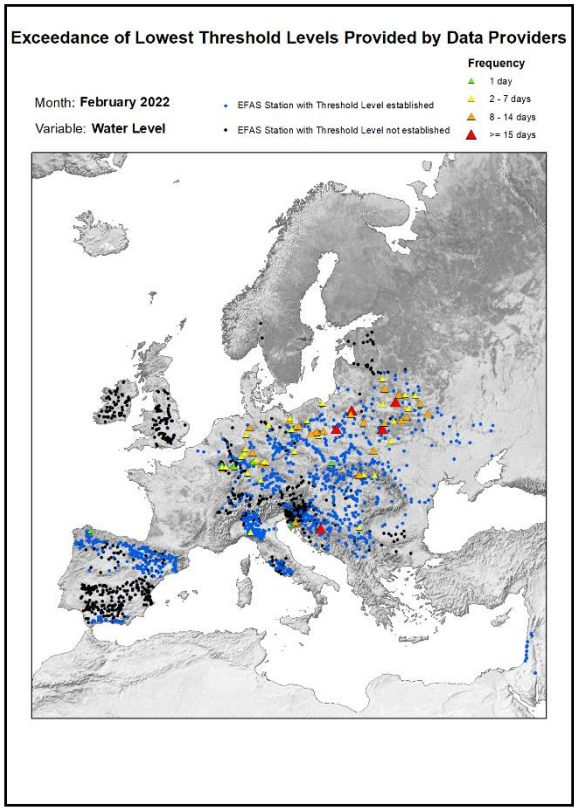


Figure 18: Lowest threshold exceedance for February 2022.

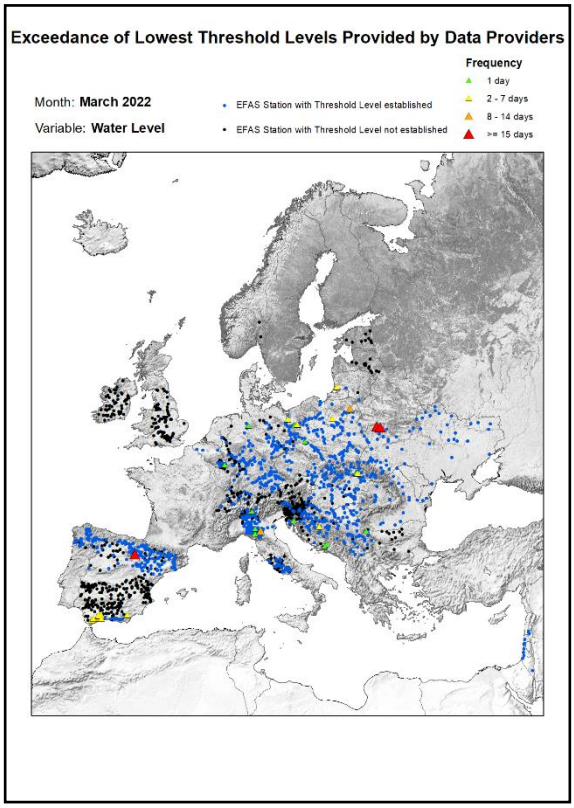


Figure 19: Lowest threshold exceedance for March 2022.

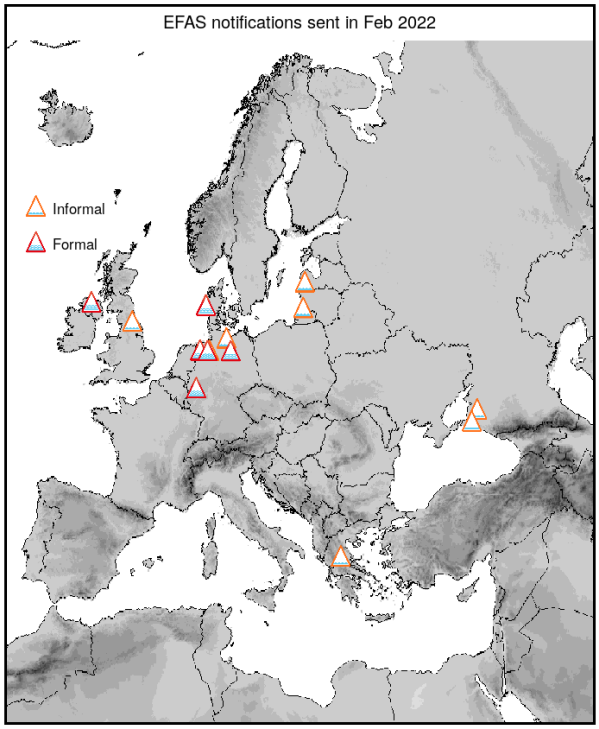


Figure 20: EFAS flood notifications sent for February 2022.

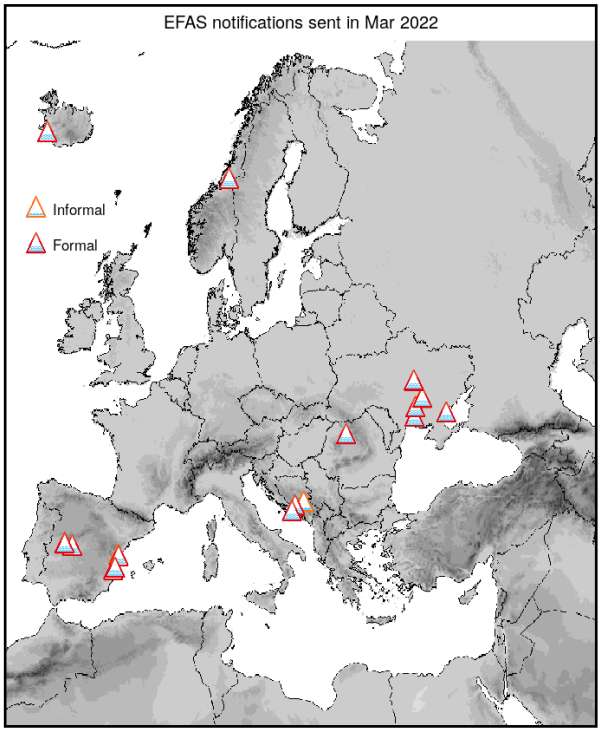


Figure 22: EFAS flood notifications sent for March 2022.

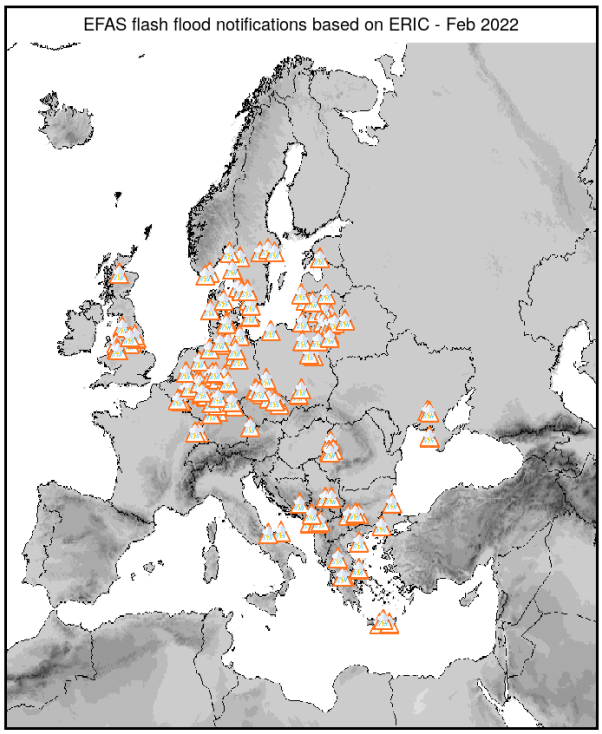


Figure 21: Flash flood notifications sent for February 2022.

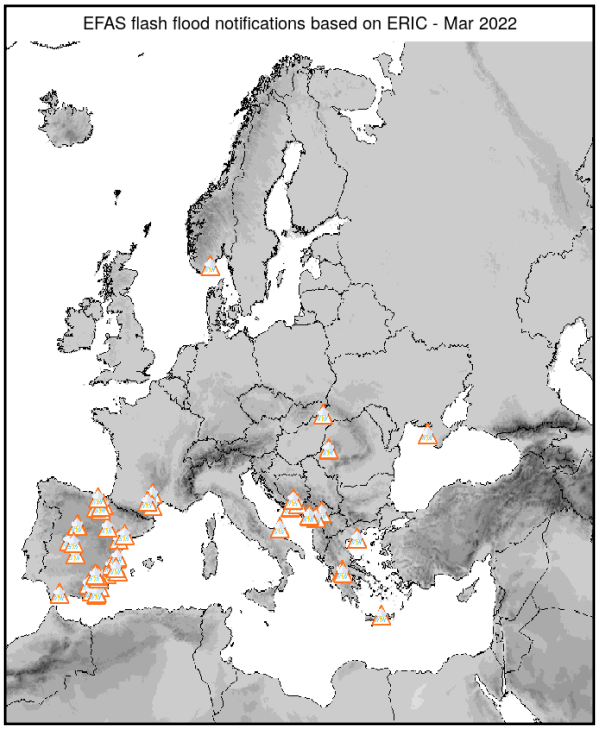


Figure 23: Flash flood notifications sent for March 2022.

Appendix - tables

Table 1: EFAS flood notifications sent in February – March 2022

Type	Forecast date	Issue date	Lead time	River	Country
Informal	05/02/2022 12UTC	06/02/2022	0	Coastal Catchment Black Sea	Russia
Informal	08/02/2022 00UTC	08/02/2022	18	Abin, Adagum	Russia
Formal	16/02/2022 00UTC	16/02/2022	36	Sieg	Germany
Informal	16/02/2022 12UTC	17/02/2022	30	Minija	Lithuania
Formal	18/02/2022 12UTC	19/02/2022	42	Foyle	Ireland
Informal	18/02/2022 12UTC	19/02/2022	48	River Skerne	United Kingdom
Formal	18/02/2022 12UTC	19/02/2022	18	Skjern	Denmark
Formal	18/02/2022 12UTC	19/02/2022	60	Muritz-Elde	Germany
Formal	19/02/2022 00UTC	19/02/2022	48	Ems	Germany
Informal	19/02/2022 00UTC	19/02/2022	42	Wumme	Germany
Formal	19/02/2022 12UTC	20/02/2022	48	Hunte	Germany
Informal	19/02/2022 12UTC	20/02/2022	30	Coastal zone	Germany
Formal	19/02/2022 12UTC	20/02/2022	36	Skjern	Denmark
Informal	22/02/2022 12UTC	23/02/2022	12	Venta	Latvia
Informal	25/02/2022 00UTC	25/02/2022	54	Pineios	Greece
Formal	10/03/2022 12 UTC	11/03/2022	72	Tietar	Spain
Formal	14/03/2022 00 UTC	14/03/2022	78	Jucar	Spain
Informal	13/03/2022 12 UTC	14/03/2022	84	Jucar	Spain
Formal	14/03/2022 12 UTC	15/03/2022	66	Albaida	Spain
Formal	18/03/2022 12 UTC	19/03/2022	60	Tietar	Spain
Formal	18/03/2022 12 UTC	19/03/2022	102	Alberche	Spain
Informal	20/03/2022 00 UTC	20/03/2022	42	Rambla De La Viuda	Spain
Formal	19/03/2022 12 UTC	20/03/2022	54	Mijares	Spain
Informal	19/03/2022 12 UTC	20/03/2022	174	INHUL	Ukraine
Informal	19/03/2022 12 UTC	20/03/2022	174	Inhulets	Ukraine
Informal	19/03/2022 12 UTC	20/03/2022	162	Dnepr	Ukraine
Formal	20/03/2022 12 UTC	21/03/2022	156	Coastal Catchment Black Sea	Ukraine
Formal	20/03/2022 12 UTC	21/03/2022	156	Pivdennyi Buh	Ukraine
Formal	20/03/2022 12 UTC	21/03/2022	150	INHUL	Ukraine
Formal	20/03/2022 12 UTC	21/03/2022	156	Inhulets	Ukraine
Formal	20/03/2022 12 UTC	21/03/2022	138	Dnepr	Ukraine
Informal	25/03/2022 00 UTC	25/03/2022	60	Byaelva	Norway
Formal	25/03/2022 00 UTC	25/03/2022	36	OELFUSA	Iceland
Formal	25/03/2022 12 UTC	26/03/2022	48	Byaelva	Norway
Formal	27/03/2022 12 UTC	28/03/2022	96	Neretva	Croatia
Formal	28/03/2022 12 UTC	29/03/2022	66	Neretva	Bosnia and Herzegovina
Informal	30/03/2022 00 UTC	30/03/2022	42	Drina	Bosnia and Herzegovina
Formal	29/03/2022 12 UTC	30/03/2022	66	Somesul Mare	Romania

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

Table 2: EFAS flash flood notifications sent in February – March 2022

Type	Forecast date	Issue date	Lead time	Region	Country
Flash Flood	01/02/2022 00UTC	01/02/2022	48	Crimea	Ukraine
Flash Flood	01/02/2022 00UTC	01/02/2022	30	Anatoliki Makedonia, Thraki	Greece
Flash Flood	01/02/2022 12UTC	02/02/2022	36	Kherson	Ukraine
Flash Flood	01/02/2022 12UTC	02/02/2022	36	Kriti	Greece
Flash Flood	02/02/2022 12UTC	03/02/2022	54	Vastra Gotalands lan	Sweden
Flash Flood	02/02/2022 12UTC	03/02/2022	102	Hallands lan	Sweden
Flash Flood	02/02/2022 12UTC	03/02/2022	102	Jonkopings lan	Sweden
Flash Flood	04/02/2022 00UTC	04/02/2022	66	Fyn	Denmark
Flash Flood	04/02/2022 12UTC	05/02/2022	48	Arnsberg	Germany
Flash Flood	05/02/2022 00UTC	05/02/2022	24	Hallands lan	Sweden
Flash Flood	05/02/2022 00UTC	05/02/2022	24	Jonkopings lan	Sweden
Flash Flood	05/02/2022 00UTC	05/02/2022	48	Hannover	Germany
Flash Flood	05/02/2022 00UTC	05/02/2022	48	Unterfranken	Germany
Flash Flood	05/02/2022 00UTC	05/02/2022	42	Darmstadt	Germany
Flash Flood	05/02/2022 00UTC	05/02/2022	42	Giessen	Germany
Flash Flood	05/02/2022 00UTC	05/02/2022	48	Limburg (NL)	Netherlands
Flash Flood	05/02/2022 00UTC	05/02/2022	48	Bas-Rhin	France
Flash Flood	05/02/2022 00UTC	05/02/2022	24	Vastra Gotalands lan	Sweden
Flash Flood	05/02/2022 00UTC	05/02/2022	42	Prov. Luxembourg (BE)	Belgium
Flash Flood	05/02/2022 00UTC	05/02/2022	42	Prov. Namur	Belgium
Flash Flood	05/02/2022 00UTC	05/02/2022	48	Stuttgart	Germany
Flash Flood	05/02/2022 00UTC	05/02/2022	48	Koblenz	Germany
Flash Flood	05/02/2022 00UTC	05/02/2022	48	Karlsruhe	Germany
Flash Flood	05/02/2022 00UTC	05/02/2022	48	Detmold	Germany
Flash Flood	05/02/2022 00UTC	05/02/2022	48	Dusseldorf	Germany
Flash Flood	05/02/2022 00UTC	05/02/2022	48	Kralovehradecky kraj	Czech Republic
Flash Flood	05/02/2022 00UTC	05/02/2022	42	Koln	Germany
Flash Flood	05/02/2022 00UTC	05/02/2022	42	Fyn	Denmark
Flash Flood	05/02/2022 12UTC	06/02/2022	30	Schleswig-Holstein	Germany
Flash Flood	05/02/2022 12UTC	06/02/2022	30	Gelderland	Netherlands
Flash Flood	05/02/2022 12UTC	06/02/2022	36	Mecklenburg-Vorpommern	Germany
Flash Flood	05/02/2022 12UTC	06/02/2022	36	Braunschweig	Germany
Flash Flood	05/02/2022 12UTC	06/02/2022	30	Weser-Ems	Germany
Flash Flood	05/02/2022 12UTC	06/02/2022	30	Kassel	Germany
Flash Flood	05/02/2022 12UTC	06/02/2022	48	Bihor	Romania
Flash Flood	06/02/2022 00UTC	06/02/2022	24	Bremen	Germany
Flash Flood	06/02/2022 00UTC	06/02/2022	24	Oberfranken	Germany
Flash Flood	06/02/2022 00UTC	06/02/2022	36	Arad	Romania
Flash Flood	06/02/2022 00UTC	06/02/2022	24	Vosges	France
Flash Flood	06/02/2022 12UTC	07/02/2022	30	Rasinska oblast	Serbia
Flash Flood	06/02/2022 12UTC	07/02/2022	30	Nisavska oblast	Serbia
Flash Flood	06/02/2022 12UTC	07/02/2022	48	Kherson	Ukraine
Flash Flood	07/02/2022 00UTC	07/02/2022	42	Crimea	Ukraine
Flash Flood	11/02/2022 00UTC	11/02/2022	48	Vastra Gotalands lan	Sweden
Flash Flood	11/02/2022 12UTC	12/02/2022	42	Sterea Ellada	Greece

Flash Flood	12/02/2022 12UTC	13/02/2022	48	Aust-Agder	Norway
Flash Flood	12/02/2022 12UTC	13/02/2022	48	Varmlands lan	Sweden
Flash Flood	12/02/2022 12UTC	13/02/2022	48	Vastmanlands lan	Sweden
Flash Flood	12/02/2022 12UTC	13/02/2022	48	Ostfold	Norway
Flash Flood	12/02/2022 12UTC	13/02/2022	48	Hallands lan	Sweden
Flash Flood	12/02/2022 12UTC	13/02/2022	48	Vest-Agder	Norway
Flash Flood	13/02/2022 00UTC	13/02/2022	48	Uppsala lan	Sweden
Flash Flood	14/02/2022 12UTC	15/02/2022	36	Crna Gora	Montenegro
Flash Flood	14/02/2022 12UTC	15/02/2022	48	Giessen	Germany
Flash Flood	14/02/2022 12UTC	15/02/2022	48	Unterfranken	Germany
Flash Flood	14/02/2022 12UTC	15/02/2022	48	Karlsruhe	Germany
Flash Flood	14/02/2022 12UTC	15/02/2022	42	Shkoder	Albania
Flash Flood	15/02/2022 00UTC	15/02/2022	132	Shkoder	Albania
Flash Flood	15/02/2022 00UTC	15/02/2022	48	Hallands lan	Sweden
Flash Flood	15/02/2022 00UTC	15/02/2022	48	Jonkopings lan	Sweden
Flash Flood	15/02/2022 00UTC	15/02/2022	48	Niederbayern	Germany
Flash Flood	15/02/2022 00UTC	15/02/2022	36	Kukes	Albania
Flash Flood	15/02/2022 00UTC	15/02/2022	24	Crna Gora	Montenegro
Flash Flood	15/02/2022 00UTC	15/02/2022	48	Karlsruhe	Germany
Flash Flood	15/02/2022 00UTC	15/02/2022	48	Darmstadt	Germany
Flash Flood	15/02/2022 00UTC	15/02/2022	48	Kralovehradecky kraj	Czech Republic
Flash Flood	15/02/2022 00UTC	15/02/2022	42	Giessen	Germany
Flash Flood	15/02/2022 00UTC	15/02/2022	48	Unterfranken	Germany
Flash Flood	15/02/2022 12UTC	16/02/2022	48	Zachodniopomorskie	Poland
Flash Flood	15/02/2022 12UTC	16/02/2022	48	Warminsko-mazurskie	Poland
Flash Flood	15/02/2022 12UTC	16/02/2022	48	Warszawski stoleczny	Poland
Flash Flood	15/02/2022 12UTC	16/02/2022	48	Hrodna	Belarus
Flash Flood	15/02/2022 12UTC	16/02/2022	48	Hrodna	Belarus
Flash Flood	15/02/2022 12UTC	16/02/2022	48	Panevezio apskritis	Lithuania
Flash Flood	15/02/2022 12UTC	16/02/2022	48	Klaipedos apskritis	Lithuania
Flash Flood	15/02/2022 12UTC	16/02/2022	48	Taurages apskritis	Lithuania
Flash Flood	15/02/2022 12UTC	16/02/2022	48	Kauno apskritis	Lithuania
Flash Flood	15/02/2022 12UTC	16/02/2022	48	Vilniaus apskritis	Lithuania
Flash Flood	15/02/2022 12UTC	16/02/2022	48	Marijampoles apskritis	Lithuania
Flash Flood	15/02/2022 12UTC	16/02/2022	48	Alytaus apskritis	Lithuania
Flash Flood	15/02/2022 12UTC	16/02/2022	48	Ustecky kraj	Czech Republic
Flash Flood	15/02/2022 12UTC	16/02/2022	54	Dresden	Germany
Flash Flood	15/02/2022 12UTC	16/02/2022	42	Mecklenburg-Vorpommern	Germany
Flash Flood	15/02/2022 12UTC	16/02/2022	48	Kaliningrad	Russia
Flash Flood	15/02/2022 12UTC	16/02/2022	48	Mazowiecki regionalny	Poland
Flash Flood	15/02/2022 12UTC	16/02/2022	48	Olomoucky kraj	Czech Republic
Flash Flood	15/02/2022 12UTC	16/02/2022	48	Telsiu apskritis	Lithuania
Flash Flood	15/02/2022 12UTC	16/02/2022	42	Schleswig-Holstein	Germany
Flash Flood	16/02/2022 00UTC	16/02/2022	42	Alytaus apskritis	Lithuania
Flash Flood	16/02/2022 00UTC	16/02/2022	42	Vilniaus apskritis	Lithuania
Flash Flood	16/02/2022 00UTC	16/02/2022	30	Skane lan	Sweden
Flash Flood	16/02/2022 00UTC	16/02/2022	30	Kurzeme	Latvia
Flash Flood	16/02/2022 00UTC	16/02/2022	30	Podlaskie	Poland
Flash Flood	16/02/2022 00UTC	16/02/2022	36	Stredocesky kraj	Czech Republic
Flash Flood	16/02/2022 00UTC	16/02/2022	36	Pardubicky kraj	Czech Republic

Flash Flood	16/02/2022 00UTC	16/02/2022	30	Brandenburg	Germany
Flash Flood	16/02/2022 00UTC	16/02/2022	36	Slaskie	Poland
Flash Flood	16/02/2022 00UTC	16/02/2022	30	Sachsen-Anhalt	Germany
Flash Flood	16/02/2022 12UTC	17/02/2022	24	Laane-Eesti	Estonia
Flash Flood	16/02/2022 12UTC	17/02/2022	30	Minsk	Belarus
Flash Flood	16/02/2022 12UTC	17/02/2022	24	Kronobergs lan	Sweden
Flash Flood	17/02/2022 12UTC	18/02/2022	30	Fyn	Denmark
Flash Flood	18/02/2022 12UTC	19/02/2022	48	Federacija Bosna i Hercegovina	Bosnia And Herzegovina
Flash Flood	18/02/2022 12UTC	19/02/2022	48	Derbyshire and Nottinghamshire	United Kingdom
Flash Flood	18/02/2022 12UTC	19/02/2022	48	South Yorkshire	United Kingdom
Flash Flood	18/02/2022 12UTC	19/02/2022	30	Hrodna	Belarus
Flash Flood	19/02/2022 00UTC	19/02/2022	48	Unterfranken	Germany
Flash Flood	19/02/2022 00UTC	19/02/2022	42	North Yorkshire	United Kingdom
Flash Flood	19/02/2022 00UTC	19/02/2022	42	Cumbria	United Kingdom
Flash Flood	19/02/2022 00UTC	19/02/2022	42	West Yorkshire	United Kingdom
Flash Flood	19/02/2022 00UTC	19/02/2022	42	East Yorkshire and Northern Lincolnshire	United Kingdom
Flash Flood	19/02/2022 00UTC	19/02/2022	42	West Wales and The Valleys	United Kingdom
Flash Flood	19/02/2022 00UTC	19/02/2022	42	East Wales	United Kingdom
Flash Flood	19/02/2022 00UTC	19/02/2022	48	Giessen	Germany
Flash Flood	19/02/2022 00UTC	19/02/2022	48	Darmstadt	Germany
Flash Flood	19/02/2022 00UTC	19/02/2022	48	Arnsberg	Germany
Flash Flood	19/02/2022 00UTC	19/02/2022	48	Braunschweig	Germany
Flash Flood	19/02/2022 00UTC	19/02/2022	48	Gelderland	Netherlands
Flash Flood	19/02/2022 00UTC	19/02/2022	42	Shropshire and Staffordshire	United Kingdom
Flash Flood	19/02/2022 12UTC	20/02/2022	48	Mecklenburg-Vorpommern	Germany
Flash Flood	19/02/2022 12UTC	20/02/2022	48	Schleswig-Holstein	Germany
Flash Flood	19/02/2022 12UTC	20/02/2022	42	Vastra Gotalands lan	Sweden
Flash Flood	19/02/2022 12UTC	20/02/2022	42	Lubuskie	Poland
Flash Flood	19/02/2022 12UTC	20/02/2022	36	Thuringen	Germany
Flash Flood	19/02/2022 12UTC	20/02/2022	48	Kralovehradecky kraj	Czech Republic
Flash Flood	19/02/2022 12UTC	20/02/2022	42	Hallands lan	Sweden
Flash Flood	19/02/2022 12UTC	20/02/2022	36	Koblenz	Germany
Flash Flood	19/02/2022 12UTC	20/02/2022	36	Kassel	Germany
Flash Flood	19/02/2022 12UTC	20/02/2022	42	Hannover	Germany
Flash Flood	19/02/2022 12UTC	20/02/2022	48	Detmold	Germany
Flash Flood	19/02/2022 12UTC	20/02/2022	42	Jonkopings lan	Sweden
Flash Flood	19/02/2022 12UTC	20/02/2022	48	Fyn	Denmark
Flash Flood	19/02/2022 12UTC	20/02/2022	42	Oberfranken	Germany
Flash Flood	20/02/2022 00UTC	20/02/2022	36	Stockholms lan	Sweden
Flash Flood	20/02/2022 00UTC	20/02/2022	24	Vestjylland	Denmark
Flash Flood	20/02/2022 00UTC	20/02/2022	36	Ostjylland	Denmark
Flash Flood	20/02/2022 00UTC	20/02/2022	48	Arad	Romania
Flash Flood	20/02/2022 00UTC	20/02/2022	30	Skane lan	Sweden
Flash Flood	20/02/2022 00UTC	20/02/2022	48	Crna Gora	Montenegro
Flash Flood	20/02/2022 00UTC	20/02/2022	48	Bihor	Romania

Flash Flood	20/02/2022 12UTC	21/02/2022	24	Slaskie	Poland
Flash Flood	20/02/2022 12UTC	21/02/2022	24	Pardubicky kraj	Czech Republic
Flash Flood	20/02/2022 12UTC	21/02/2022	24	Liberecky kraj	Czech Republic
Flash Flood	21/02/2022 00UTC	21/02/2022	48	Kyustendil	Bulgaria
Flash Flood	21/02/2022 00UTC	21/02/2022	48	Sofia	Bulgaria
Flash Flood	21/02/2022 00UTC	21/02/2022	48	Pazardzhik	Bulgaria
Flash Flood	21/02/2022 12UTC	22/02/2022	48	Highlands and Islands	United Kingdom
Flash Flood	22/02/2022 12UTC	23/02/2022	36	Kriti	Greece
Flash Flood	22/02/2022 12UTC	23/02/2022	48	Vastra Gotalands lan	Sweden
Flash Flood	23/02/2022 00UTC	23/02/2022	48	Jonkopings lan	Sweden
Flash Flood	23/02/2022 00UTC	23/02/2022	48	Hallands lan	Sweden
Flash Flood	23/02/2022 12UTC	24/02/2022	24	Kriti	Greece
Flash Flood	25/02/2022 00UTC	25/02/2022	48	Molise	Italy
Flash Flood	25/02/2022 00UTC	25/02/2022	48	Puglia	Italy
Flash Flood	25/02/2022 12UTC	26/02/2022	48	Kentriki Makedonia	Greece
Flash Flood	26/02/2022 00UTC	26/02/2022	30	Sterea Ellada	Greece
Flash Flood	26/02/2022 12UTC	27/02/2022	36	Burgas	Bulgaria
Flash Flood	26/02/2022 12UTC	27/02/2022	18	Dytiki Ellada	Greece
Flash Flood	27/02/2022 00UTC	27/02/2022	48	Crimea	Ukraine
Flash Flood	27/02/2022 00UTC	27/02/2022	6	Thessalia	Greece
Flash Flood	01/03/2022 00 UTC	01/03/2022	24	Sea of Azov	Ukraine
Flash Flood	02/03/2022 00 UTC	02/03/2022	48	Ebro	Spain
Flash Flood	02/03/2022 00 UTC	02/03/2022	48	Nervion	Spain
Flash Flood	01/03/2022 12 UTC	02/03/2022	30	Coastal zone	Greece
Flash Flood	03/03/2022 00 UTC	03/03/2022	36	Ebro	Spain
Flash Flood	04/03/2022 12 UTC	05/03/2022	42	Greece (South)	Greece
Flash Flood	04/03/2022 12 UTC	05/03/2022	48	Greece (North)	Greece
Flash Flood	04/03/2022 12 UTC	05/03/2022	36	Italy (Adriatic Sea/Ionian Sea)	Italy
Flash Flood	05/03/2022 12 UTC	06/03/2022	24	Greece (South)	Greece
Flash Flood	12/03/2022 00 UTC	12/03/2022	24	Aude	France
Flash Flood	11/03/2022 12 UTC	12/03/2022	36	Garonne	France
Flash Flood	13/03/2022 00 UTC	13/03/2022	42	Ebro	Spain
Flash Flood	12/03/2022 12 UTC	13/03/2022	30	France (Mediterranean Sea Coast)	France
Flash Flood	13/03/2022 12 UTC	14/03/2022	30	Tajo	Spain
Flash Flood	14/03/2022 12 UTC	15/03/2022	48	Danube	Romania
Flash Flood	16/03/2022 00 UTC	16/03/2022	42	Spain (South-East Coast)	Spain
Flash Flood	16/03/2022 00 UTC	16/03/2022	48	Ebro	Spain
Flash Flood	15/03/2022 12 UTC	16/03/2022	48	Norway	Norway
Flash Flood	15/03/2022 12 UTC	16/03/2022	48	Segura	Spain
Flash Flood	17/03/2022 00 UTC	17/03/2022	24	Ebro	Spain
Flash Flood	20/03/2022 00 UTC	20/03/2022	48	Ebro	Spain
Flash Flood	20/03/2022 00 UTC	20/03/2022	48	Ebro	Spain
Flash Flood	19/03/2022 12 UTC	20/03/2022	48	Tajo	Spain
Flash Flood	21/03/2022 00 UTC	21/03/2022	30	Coastal Catchment Western Mediterranean Sea	Spain
Flash Flood	21/03/2022 00 UTC	21/03/2022	36	Ebro	Spain

Flash Flood	20/03/2022 12 UTC	21/03/2022	42	Spain (South-East Coast)	Spain
Flash Flood	20/03/2022 12 UTC	21/03/2022	24	Segura	Spain
Flash Flood	22/03/2022 00 UTC	22/03/2022	42	J	Spain
Flash Flood	21/03/2022 12 UTC	22/03/2022	48	Segura	Spain
Flash Flood	23/03/2022 00 UTC	23/03/2022	30	Guadiana	Spain
Flash Flood	23/03/2022 00 UTC	23/03/2022	48	Duero	Spain
Flash Flood	23/03/2022 00 UTC	23/03/2022	42	Spain (South-East Coast)	Spain
Flash Flood	22/03/2022 12 UTC	23/03/2022	24	Spain (South-East Coast)	Spain
Flash Flood	24/03/2022 00 UTC	24/03/2022	42	Segura	Spain
Flash Flood	24/03/2022 00 UTC	24/03/2022	24	Spain (South-East Coast)	Spain
Flash Flood	23/03/2022 12 UTC	24/03/2022	24	Spain (South-East Coast)	Spain
Flash Flood	23/03/2022 12 UTC	24/03/2022	36	Tajo	Spain
Flash Flood	23/03/2022 12 UTC	24/03/2022	36	Guadalquivir	Spain
Flash Flood	25/03/2022 00 UTC	25/03/2022	24	Guadalquivir	Spain
Flash Flood	25/03/2022 12 UTC	26/03/2022	42	Spain (South-East Coast)	Spain
Flash Flood	25/03/2022 12 UTC	26/03/2022	24	Spain (South-East Coast)	Spain
Flash Flood	25/03/2022 12 UTC	26/03/2022	24	Segura	Spain
Flash Flood	25/03/2022 12 UTC	26/03/2022	24	J	Spain
Flash Flood	27/03/2022 12 UTC	28/03/2022	48	Tajo	Spain
Flash Flood	29/03/2022 00 UTC	29/03/2022	48	Segura	Spain
Flash Flood	29/03/2022 00 UTC	29/03/2022	48	Segura	Spain
Flash Flood	28/03/2022 12 UTC	29/03/2022	48	Duero	Spain
Flash Flood	30/03/2022 00 UTC	30/03/2022	42	Adriatic Coast	Croatia
Flash Flood	30/03/2022 00 UTC	30/03/2022	48	Danube	Slovakia
Flash Flood	30/03/2022 00 UTC	30/03/2022	48	Crni Drim / Drin,Drini i Zi	Kosovo
Flash Flood	30/03/2022 00 UTC	30/03/2022	48	Danube	Romania
Flash Flood	30/03/2022 00 UTC	30/03/2022	48	Crni Drim / Drin,Drini i Zi	Albania
Flash Flood	30/03/2022 00 UTC	30/03/2022	42	Adriatic Coast	Bosnia and Herzegovina
Flash Flood	30/03/2022 00 UTC	30/03/2022	42	Adriatic Coast	Bosnia and Herzegovina
Flash Flood	29/03/2022 12 UTC	30/03/2022	48	Moraca/Bojana	Montenegro
Flash Flood	29/03/2022 12 UTC	30/03/2022	36	Spain (South-East Coast)	Spain
Flash Flood	29/03/2022 12 UTC	30/03/2022	36	J	Spain

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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