





European Flood Awareness System

EFAS Bulletin

December 2023 – January 2024 Issue 2024(1)















NEWS

EFAS News

Register for 3rd CEMS Global Flood Forecasting and Monitoring Annual Meeting



Figure 1: 3rd CEMS Global Flood Forecasting and Monitoring Meeting

The CEMS GloFAS and GFM teams invite you to join the 3rd CEMS Global Flood Forecasting and Monitoring Annual Meeting on **05-06 March 2024.** Please use this link to register for the event: https://ecmwf.zoom.us/webinar/register/WN-68lgAd-potk--1604TF0kOw#/registration . Registrations close on March 4th.

The 2-days meeting will be held **fully online** and it will consist of **two blocks** from **1pm to 4.30 pm UTC** to enable participation from around the world. The format of the meeting will be highly interactive, including ignite and keynote talks from GloFAS and GFM users, a poster session, and an open space for lively conversations. Participants will have the opportunity to connect with people from the GloFAS and GFM communities to discuss expand their network.

If you are interested in providing an IGNITE presentation (5 minutes, or more) /poster about a use case where you used/or are planning to use GloFAS or please send GFM, us a message https://www.globalfloods.eu/contact-us/ by February 21st 13:00 UTC. We will collect all incoming expressions of interest and contact the presenters between February 19th and February 26th. Please note that the deadline for slides/posters submission is February 28th. Presenters will be contacted to verify their willingness to join a voluntary rehearsal session in the week of February 26th - March 1st.

New CDS soon to be launched - expect some disruptions

We are pleased to announce that the Climate Data Store (CDS) is being modernised to better manage the growing workload, surging computing demand and better serve its current and future users. This modernisation affects all layers of the infrastructure: the front-end web interface, the back-end software engine and the underlying cloud infrastructure hosting the service and core data repositories. The new modernised CDS is expected to be launched in Spring 2024.



Figure 2: Climate Data Store Homepage

While the modernisation process has up to now been transparent to users, it has reached the stage when data is being migrated onto the new infrastructure and this, unfortunately, is impacting services.

This migration period will take several weeks to complete, during which users should be expecting some disruption and degradation of service on the CDS such as:

- longer queues
- requests being cancelled
- temporary closure of queues
- requests failing with unusual error messages
- catalogue temporarily offline

Relevant information (e.g. activation of new single sign-on ECMWF account) will be shared with CDS users nearer the time of the launch.

Users of the CDS Toolbox should however take note that the CDS Toolbox will be discontinued and will not be migrated to the new CDS infrastructure. New tool packages will be made available (post new CDS

launch) to provide software tools for weather and climate workflows that simplify data access, analysis, visualisation, and much more.

We understand the inconvenience the disruptions are causing during this time. The CDS team is working hard at keeping disruption to a minimum.

We will keep our users informed with the latest details on this announcement page. We, therefore, recommend users to "Watch" this page: https://confluence.ecmwf.int/x/oYnlFg to receive email notifications of updates on this announcement.

We thank our users for their patience during this significant modernisation of the CDS which will enable exciting scientific developments and an overall better service to all users.

RESULTS

Summary of EFAS Flood and Flash Flood Notifications

The 33 formal and 22 informal EFAS flood notifications issued in December – January 2024 are summarised in Table 1. The locations of all notifications are shown in Figure 22 and Figure 24 in the appendix.

388 flash flood notifications were issued in December – January 2024. They are summarised in Table 2. The locations of all notifications are shown in Figure 23 and Figure 25 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

December

During the month of December, there were 415 stations with exceedances, a hundred more than the previous month. Most of them are located in Germany (97 stations). In Slovenia there are 52 stations with exceedances and in Italy there are 41 stations.

In addition, there are 34 stations in Poland, 26 in Croatia, 22 in Hungary and 20 in Spain. The following countries have recorded less than 20 stations with exceedances this month: Switzerland, Czech Republic, Ireland, Austria, Slovakia, Serbia, Ukraine, Norway, Bosnia and Herzegovina, Belgium, Sweden, Romania, Lithuania, France, and Iceland.

As for the river basins, the main river basin with values above the thresholds this month is the Danube River, with 184 stations in eleven different countries with Slovenia standing out. The Rhine River, focused in Germany and Switzerland, is the next river basin with the highest number of stations (53), followed by the Po River basin with 39 stations showing exceedances in Italy. A total of 48 different river basins have exceedances in December.

In terms of stations that recorded values of mean discharge above the 90% quantile, 331 exceeded this threshold this month. In December, Germany was the country with the most stations in this situation: 102. Poland, with 44 stations, and Austria with 28, are the countries with the next highest number of stations in this situation. The German stations are distributed in four different river basins, highlighting the Danube River and the Rhine River with 44 stations each exceeding this quantile. In Poland there are two basins affected (Oder and Vistula) while in Austria the Danube river and the Rhine river basins are affected. In Slovakia, 27 stations have values above this quantile. In Switzerland, 25 stations exceed this cliff. Other stations exceed the 90% quantile value in up to 21 countries.

By river basin, the aforementioned Danube River stands out with 146 stations above the 90% quantile. The Rhine River basin is the second with the highest number of stations over this cliff, showing 69 stations in this situation and followed by the Oder river basin with 28. A total of 27 different river basins have exceedances over the 90% quantile in December.

Finally, and according to the number of stations recording mean values below the 10% quantile, in December there were 33 stations with average values below this cliff at five different countries.

This month, Spain is the country with most of the stations (20), followed by Norway with 8 stations and Romania with 3 stations. Sweden and Bulgaria show one station each in this situation.

In terms of river basin, this month the Guadalquivir River is the one with the highest number of cases, with 11 stations with an average discharge below the 10% quantile. The Llobregat River and the Danube River have 4 stations each, one more than the Ebro river basin. In total, as many as 15 different basins have values below this limit in Europe.

January

During the month of January, there were 311 stations with exceedances, one hundred less than the previous month. Most of them are located in Germany (73 stations). In Poland there are 47 stations with exceedances and in Italy there are 24 stations.

In addition, there are 20 stations in Spain, 16 in Belgium, 15 in Sweden and 14 in Ireland and Croatia. The following countries have recorded 11 stations or less with exceedances this month (from highest to lowest): Hungary, Luxembourg, Serbia, Czech Republic, Ukraine, Slovakia, Slovenia, Norway, Romania, Iceland, Bosnia and Herzegovina, France, Estonia, Israel, Austria, Netherlands, and Lithuania.

As for the river basins, the main river basin with values above the thresholds this month is again the Danube River, with 76 stations in 11 different countries with Germany standing out. The Rhine River, focused in Germany and Luxembourg, is the next river basin with the highest number of stations (48), followed by the Oder River basin with 30 stations showing exceedances in Poland and Germany. A total of 56 different river basins have exceedances in January.

In terms of stations that recorded values of mean discharge above the 90% quantile, 312 exceeded this threshold this month. In January, Spain was the country with the most stations in this situation with 44. Poland (2039), and Germany (38) are the countries with the next highest number of stations in this situation. The Spanish stations are distributed in six

different river basins, highlighting the Guadiana River with 33 stations exceeding this quantile. In Poland there are two basins affected (Oder and Vistula) while in Germany the Danube River and the Elbe river basins are the most affected. In Austria, 29 stations have values above this quantile. In Slovakia 21 stations exceed this cliff. Other stations exceed the 90% quantile value in up to 22 countries.

By river basin, the Danube River stands out with 118 stations above the 90% quantile. The Guadiana River basin is the second with the highest number of stations over this cliff, showing 33 stations in this situation and followed by the Oder river basin with 25. A total of 52 different river basins have at less one station with mean values over the 90% quantile in January.

Finally, and according to the number of stations recording mean values below the 10% quantile, in January there were 45 stations with average values below this cliff at nine different countries.

This month, Spain is the country with most of the stations (29), followed by Romania with five stations and Norway with 3 stations. Sweden and Italy show two stations each in this situation. Other countries show one station in this situation: Ukraine, Bulgaria, Iceland and Poland

In terms of river basin, this month the Guadalquivir River is again the one with the highest number of cases, with nine stations with an average discharge below the 10% quantile. The Ebro River with eight stations and the Danube River with four stations surpass the Jucar River basin, with three stations. In total, as many as 20 different basins have values below this limit in Europe.

Verification

The verification is now based on the current operational system, EFAS version 5, which was released on 20 September 2023. Since EFAS version 5, the maps (Figure 3 and Figure 4) use climatology as the reference forecast as in Figure 5.

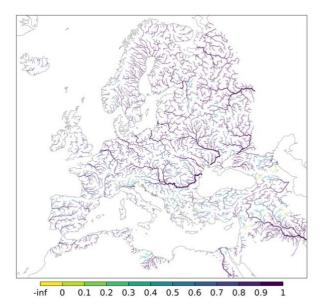


Figure 3: EFAS CRPSS at lead-time 1 day for December – January 2024, for catchments >1000km². The reference forecast is climatology.

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 December - January 2024 across the EFAS domain for catchments larger than 1000km². 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 yellow on the maps) indicates the skill is worse than the reference. Climatology is used as the reference forecast.

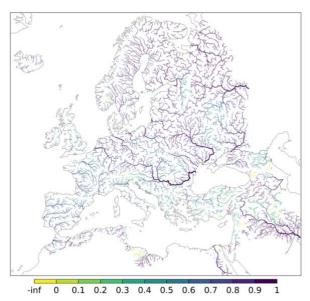


Figure 4: EFAS CRPSS at lead-time 5 days for December-January 2024 for catchments >1000km². The reference forecast is climatology.

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

The skill of the forecast was high over the period, and similar to the same period last year (Figure 5). An interannual variability of the scores is to be expected. The long-term trend is neutral over the period since the domain was extended.

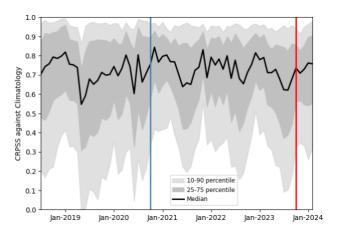


Figure 5: Monthly means of CRPSS for the lead-time 5 days for all the major river points in Europe with ECMWF ENS as forcing. Reference forecast was climatology. The skill is largest during the winter months, when there is less variation in the flow in large parts of Europe. The blue and red lines indicate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

ARTICLES

Flooding in Germany – December 2023 by Richard Davies, floodlist

Prolonged heavy rainfall across parts of Germany in late December 2023 caused rivers to rise in several states, in particular Lower Saxony, Saxony-Anhalt, Thuringia and North Rhine-Westphalia. Rivers remained high in many areas into early January 2024.



Figure 6: During a flight with an Air Force helicopter on 31 December 2023, Chancellor Scholz was able to get an idea of the extent of the flooding in the area between Celle and Verden in Lower Saxony, Germany. Credit: German Federal Government / Bergmann

Thousands of emergency personnel made up of police, firefighters, civil protection, military and volunteers, were deployed to pump floodwater and erect temporary flood barriers. Lower Saxony requested help from the German armed forces and 6 military helicopters were put on standby.

Evacuation orders were issued for residents in the town of Windehausen in Thuringia, and in Lilienthal, Lower Saxony. The overflowing Meiße river prompted the evacuation of the Serengeti Park zoo in Hodenhagen, also in Lower Saxony.

On 31 December Chancellor Olaf Scholz visited the town of Verden in Lower Saxony, to see the damage caused by the flooding Aller river. The Aller River at Eitze near Verden measured 6.59 metres on 29 December, above the highest warning level (4 of 4) of 6.51 metres.

The swollen Weser River caused flooding in the small town of Rinteln, where some residents were evacuated on 27 December. Areas of Nienburg district were also flooded from the overflowing Weser river. At Drakenburg in Nienburg district the Weser reached a record level of 8.43 metres on 28 December, above the previous high of 8.34 metres set in 1981.

In North Rhine-Westphalia, the village of Schenkenschanz in the district of Kleve was completely surrounded by flood water. Teams from the Technisches Hilfswerk (THW), the federal civil protection organisation of Germany, set up a ferry service for the village's 100 residents.

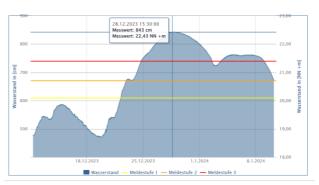


Figure 7:Levels of the Weser River at Drakenburg, Lower Saxony, Germany. Credit: Niedersächsischer Landesbetrieb für Wasserwirtschaft, Küsten- und Naturschutz

Communities in the Mansfeld-Südharz District in Saxony-Anhalt were told to prepare to evacuate due to rising levels of the Helme River. Bridges and railway lines were closed. The district declared a state of disaster on 30 December 2023 and later requested help from the German armed forces. Chancellor Scholz visited affected areas of Mansfeld-Südharz district on 04 January 2024.



Figure 8:Residents in the district fighting the Helme floods in Mansfeld-Südharz District, stabilizing dikes and pumping out water. Credit: German Federal Government/Steins

The Helme River at Bennungen in Mansfeld-Südharz District exceeded the 2 metres highest warning level (4 of 4) on 25 December and remained above level 4 warning well into January 2024.

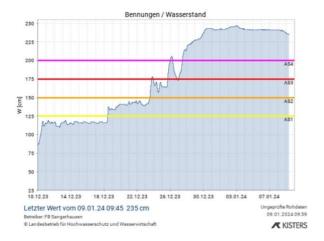


Figure 9: Levels of the Helme River at Bennungen, Saxony-Anhalt, Germany. Credit: Landesportal Sachsen-Anhalt

Copernicus EMS Rapid Mapping was activated to provide maps of flooded areas and damages. EMS analysed areas along the Hase, Hunte, Weser, Leine-Rhume, Innerste, Fuhse and Oker-Schunter rivers. As of 09 January 2024, EMS reported almost 35,000 hectares flooded, with 459.9 hectares flooded in built-up areas. A total of 17,720 people were potentially affected and 468.8 km of roads damaged.



Figure 10:Copernicus EMS map of flooding along the Hase River in Germany in December 2023 to January 2024. Credit: Copernicus EMS

Germany requested assistance via the EU Civil Protection Mechanism that quickly mobilised emergency support. France also requested assistance at the same time following further <u>flooding in the Pasde-Calais department</u>.

"As the new year starts, EU solidarity does not waver. Once again, the EU Civil Protection Mechanism's swift and decisive assistance to the flood-stricken regions of Germany and France stands as a testament to the

strength of unity. I thank Austria, Czechia, France, Hungary, the Netherlands, Slovenia, Slovakia, and Sweden for quickly showing their support." <u>said Commissioner for Crises Management Janez Lenarcic</u>.

Storms and Floods in UK and France - January 2024

by Richard Davies, floodlist

Storms and heavy rain impacted areas of northern Europe in the first days of January 2024 with significant flooding reported in England, UK, and Northern France.



Figure 11: Floods in the Pas de Calais Department, France in early January 2023. Photo: Sapeurs Pompiers du Pas de Calais SDIS 62

United Kingdom

Storm Henk brought heavy rainfall of more than 40 mm in 24 hours to wide areas of England and Wales during the first days of January 2024. By 04 January, 273 flood warnings and 294 flood alerts were in place across England.

Hundreds of people were evacuated from a caravan park in Great Billing, Northampton, following the rise of the Nene River. Northamptonshire Fire and Rescue Service (NFRS) said crews carried out a systematic search of 1,750 homes in the park. Levels of the river at the measuring gauge at Nene Valley jumped to 1.63 metres on 03 January 2024, just 1 cm below the record high seen on 24 December 2020.

At the same time the Severn River rose to dangerously high levels for the fourth time this winter. Areas of the city of Worcester were flooded and some homes evacuated. The Severn River at Barbourne in Worcester reached 5.54 metres on 03 January. Property flooding is expected at 4.70 metres. The record high here is 5.79 metres, recorded on 26 February 2020.



Figure 12; Flooding in Northampton UK following Storm Henk in January 2024. Photo: Northamptonshire Fire and Rescue Service

Flood waters from the Severn and Avon rivers surrounded the town of Tewkesbury in Gloucestershire. Gloucester City Council advised residents of Alney Island to evacuate on 04 January 2023.

The rising Thames River flooded areas of Surrey and Berkshire on 08 January. Evacuations were carried out in Wraysbury in Berkshire and Addlestone and Chertsey in Surrey. The River Thames downstream at Chertsey Lock measured 4.49 metres on 09 January. Property flooding is possible above 4.34 metres. The record level here is 4.59 metres recorded on 11 February 2014

As of 09 January, the Environment Agency reported 2,200 properties damaged by floods across England. More than 102,000 properties were protected during Storm Henk and the ensuing floods, the Agency said.

Northern France

Wide areas of the <u>Pas-de-Calais department</u> in the north of France were flooded in early January 2024. Many of the areas impacted saw severe flooding in the first 2 weeks of November 2023 when almost 1,500 people were evacuated and firefighters carried out over 2,300 interventions. Over 280 municipalities were recognized as under a state of natural disaster.

Rivers including the Aa, Lys, Hem and Canche were again placed on alert following heavy rain in late December 2023. The Lys River at Merville reached a record 3.03 metres on 05 January. Likewise, the Lys River at Delettes, jumped to a record 2.13 metres. The

Aa River at Elnes, reached 2.51 metres on 03 January. The Aa at Elnes had previously reached a record high of 2.59 metres during the flooding in November 2023.

The government of Pas-de-Calais department said around 189 municipalities were affected by the January flooding. As of late January, 153 of those municipalities were recognized as under a state of natural disaster.



Figure 13: Floods in the Pas de Calais Department, France in early January 2023. Photo: Sapeurs Pompiers du Pas de Calais SDIS 62

Around 700 firefighters working alongside police assisted with flood rescues, recovery, and protection. As of 04 January, they had carried out almost 600 interventions. A firefighter was injured during an intervention in Aire-sur-la-Lys.

Flooding damaged 2,084 homes across the department, with over 750 people evacuated from affected areas including Thérouanne, Delettes, Quernes, Lumbres, Auchy-lès-Hesdin, Aire-sur-la-Lys, Arques and Blendecques.

The <u>department announced</u> a series of emergency works on rivers and watercourses in mid-January, including repairing banks and dykes and clearing river beds. As of early February, 179 operations had been completed, 37 were in progress and 218 were scheduled.

Further flood warnings were issued in the department after heavy rain in early February 2024.

EFAS Training for the Slovak Water Management Enterprise

by Martin Halaj, CEMS-Flood Analytics and Dissemination Centre (CEMS DISS)

The training was requested by the Slovak Water Management Enterprise (further as SVP). The enterprise became a new third party partner in autumn 2023. SVP is the manager of water courses and river catchments in Slovakia and it is divided into several branches, each one representing the main river basins. The branches are located in different regions of Slovakia and because of this fact, training was conducted separately to allow all officers to participate. All trainings were provided in person, in the form of a one-day meeting. CEMS DISS organized the activities: duty officers (further as DOs) led the training and the hands-on session. Participants from SVP were mainly DOs and team managers.



Figure 14: Marcel Zvolenský (CEMS DISS) at the SVP operational room (19th Oct 2023, Piešťany)

Training sessions were held on the following dates and locations:

- Training for Hornád and Bodrog basin regional branch: 3rd October 2023 in Košice
- Training for Váh basin regional branch: 18th October 2023 in Ružomberok and 19th October 2023 in Piešťany
- Training for Dunaj basin regional branch: 25th October 2023 in Bratislava
- Final training for SVP: 30th November 2023 in Ružiná

Training for the Hron basin regional branch took place during the summer 2022. This regional branch of the SVP had already become an EFAS 3rd party partner in 2022. The reason was the implementation of flood control measures in the regional capital city Banská Bystrica.

Trainings for regional branches

All trainings for regional branches were provided in the form of a general introduction to the use of the European Flood Awareness System (EFAS). The main points of the training were:

- organisational structure,
- partner network,
- main tasks of EFAS meteorological and hydrological models,
- definition of critical thresholds,
- EFAS flood and flash flood notifications,
- EFAS-IS user interface,
- satellite monitoring of flood events Global Flood Monitoring and pre-tasking of CEMS Rapid Mapping.

The CEMS DISS team gave more detailed information on the background of CEMS-Floods for monitoring and forecasting and its history. Then they continued with an introduction to the background and operation of the forecasts. This included a background on the meteorological forecasting systems used (i.e. deterministic and probabilistic) and also on the criteria for issuing notifications, including the persistency and consistency in the forecasts. An important information about different computing of threshold levels for EFAS-IS was presented: EFAS threshold values are different from the national threshold values. Then the focus was on the different types of flooding that EFAS assesses (fluvial and flash flooding) and the different types of issued notifications (Formal and Informal Flood Notifications, and Flash Flood Notifications). EFAS forecasts are analysed twice a day by DISS DOs. The training included the description of the ERCC overview, a summary of active notifications and ongoing reported flooding.

Final training

The meeting of SHMÚ and SVP representatives near Ružiná was held to improve cooperation, exchange information and data and introduce new developments. The meeting also included the final training of SVP staff on the use of the EFAS-IS.

DISS considered products of satellite mapping useful for the river basin managers, therefore products such as the Global Flood Monitoring (GFM) and Rapid mapping service were described in a separate session. SVP was informed about the Authorised user and about the workflow on how to request satellite imagery based on EFAS forecast or on ongoing floods.

In the hands-on, interactive session, the EFAS-IS layers were described. Beside the basic layers, also Seasonal and Sub-seasonal outlook, Rapid Flood mapping and Rapid Impact Assessment layers were presented. The model performance and forecasting skill were also mentioned. All participants were trained step-by-step using their own laptops. The participants were assisted by four other DISS DOs present at the meeting. SVP stated that EFAS products can help them fulfil their tasks and CEMS DISS will be available to provide further support in the future.

How to request training

All EFAS partners who wish to receive a training are welcome to contact the CEMS-Flood Analytics and Dissemination centre, either using the contact form on EFAS homepage or sending an email to info@efas.eu. The training for partners who also are data providers will envisage the participation of the CEMS Hydrological Data Collection Centre and of the CEMS Meteorological Collection Centre. (When submitting a request, please be aware that partners who have not received a training before will be prioritised).

Improvements introduced after the EFAS Partner Survey 2022

By Nina Bosshard, CEMS-Flood Analytics and Dissemination Centre (CEMS DISS)

The EFAS team highly appreciates all feedback we receive from the partners, since we constantly strive to improve the service as a whole and make it as useful as possible. Below is a list of some of the actions taken mainly after the EFAS annual survey for 2022 (conducted in January 2023), but also considering input and feedback sent to us via the feedback form, during partner trainings or at the EFAS annual meetings.

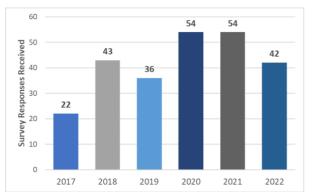


Figure 15: EFAS Annual Surveys: number of responses from 2017 - 2022

- *Improve* EFAS performance in catchments: The recent major operational upgrade of EFAS, v5.0, was released on September 20th, 2023. EFAS v5.0 introduces several major changes to the system, first of all a significantly higher spatial resolution. EFAS v5.0 has a 1 arcmin / 0.0167 degrees resolution (~1.4km), as opposed to the 5-km resolution of all the previous EFAS versions. This, together with many other updates, for example a completely new suite of higher resolved (1 arcmin) static input maps and a calibration using more smaller stations and complemented by a parameter regionalization ungauged catchments, significantly improved the overall performance in small basins. Currently, the criteria for issuing notifications are revisited and will be updated to likely include even smaller catchments (updates are expected in the upcoming months of 2024). In addition, the EFAS Flash floods product ERIC is now computed from simulated LISFLOOD surface runoff output (previously computed using a regression to translate precipitation and soil moisture into surface runoff).
- The EFAS map viewer interface has adequate content and functionalities, but it can be improved: Through an interactive booth at the Annual Meeting 2023, possible solutions were outlined together with the partners. The corresponding poster can be found via this link or at the bottom of the page of the Annual Meeting 2023. Implementation of collected ideas is currently ongoing and will be advertised once ready.
- The ability to access and download EFAS
 hydrological data should be better
 highlighted: Through a dedicated workshop at
 the Annual Meeting 2023, different ways of
 accessing data were presented and the 70
 onsite and 30 online participants could ask
 questions.
- Lack of clarity about pre-tasking protocols: A workshop at the Annual Meeting 2023 was dedicated to the discussion of pre-tasking purpose, expected benefits, and protocols.

- Lack of clarity about how to provide feedback on EFAS notifications: CEMS DISS set-up a help-desk at the Annual Meeting to discuss difficulties and provide step-by-step tutorials. Furthermore, this presentation explained the importance of EFAS partners feedback on each notification. Clarifications and techincal support can be required at any time by sending a message via the feedback form.
- Improve EFAS in areas with reservoirs: Reservoirs in hydrological modelling are a challenging factor since they alter the hydrological regime and response precipitation through specific decisions of the local reservoir management authorities, i.e. storing and releasing of water at different times compared to natural flow conditions. A necessary step to make improvements in those catchments from a modelling point of view is to gain knowledge on the reservoir characteristics and management plans. CEMS HYDRO started collecting reservoir data in 2023 (technical information on data collection are available here). This will in the long run allow the JRC and CEMS COMP to test improvements to LISFLOOD OS hydrological model. The work is in at concept stage, any development need to be thoroughly tested before operational implementation. Development and testing phase is a lengthy process. The EFAS partners will be informed about the progress in the EFAS AM 2024.

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 Northampton UK following Storm Henk in January 2024. Photo: Northamptonshire Fire and Rescue Service

Appendix - figures

Reporting of the meteorological situation by the Meteorological Data Collection Centre (MDCC) is **no longer** 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 <u>Climate Bulletins</u>.

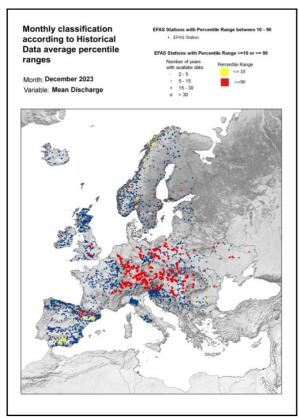


Figure 16: Monthly discharge anomalies December 2023.

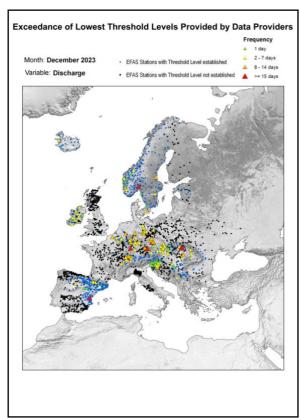


Figure 17: Lowest alert level exceedance for December 2023.

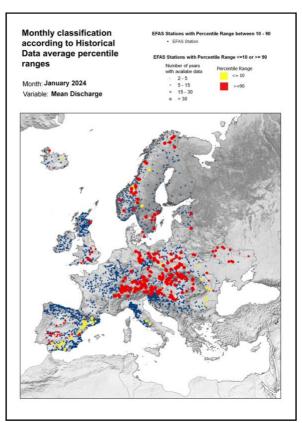


Figure 18: Monthly discharge anomalies January 2024.

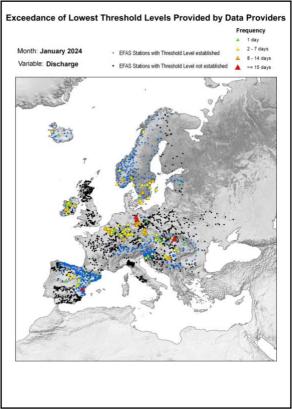
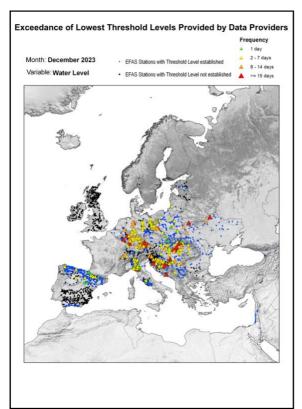


Figure 19: Lowest alert level exceedance for January 2024.





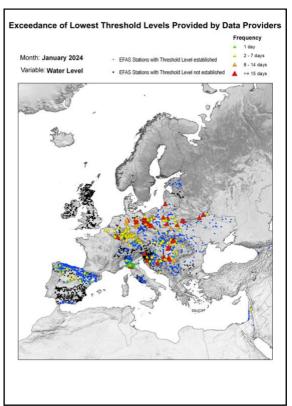


Figure 21: Lowest threshold exceedance for January 2024.

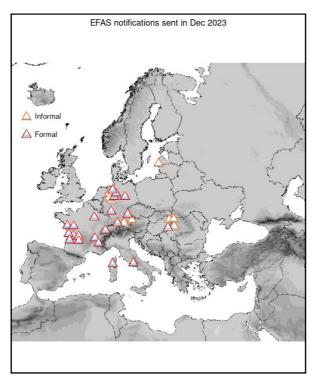


Figure 22: EFAS flood notifications sent for December 2023

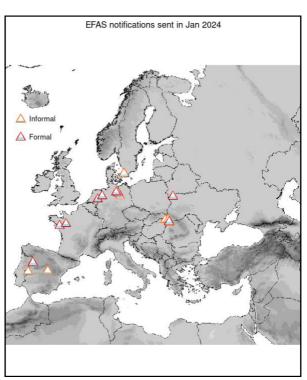


Figure 24: EFAS flood notifications sent for January 2024.

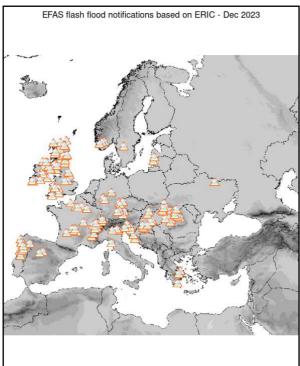


Figure 23: Flash notifications sent for December 2023

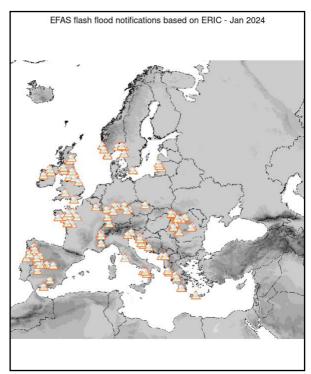


Figure 25: Flash notifications sent for January 2024.

Appendix - tables

Table 1: EFAS flood notifications sent in December – January 2024

Туре	Forecast Date	Issue Date	Lead Time	River	Country
Formal	07/12/2023 00 UTC	07/12/2023	150	Rhine	Germany
Formal	07/12/2023 00 UTC	07/12/2023	150	Rhine	Switzerland
Informal	06/12/2023 12 UTC	07/12/2023	120	Donau	Germany
Formal	07/12/2023 12 UTC	08/12/2023	30	Le Drac	France
Formal	07/12/2023 12 UTC	08/12/2023	96	Bay Of Biscay	France
Formal	07/12/2023 12 UTC	08/12/2023	66	Dordogne/ Garone	France
Formal	07/12/2023 12 UTC	08/12/2023	96	Donau	Germany
Formal	08/12/2023 12 UTC	09/12/2023	66	Charente	France
Formal	08/12/2023 12 UTC	09/12/2023	60	La Vienne	France
Formal	08/12/2023 12 UTC	09/12/2023	60	Vézère	France
Informal	08/12/2023 12 UTC	09/12/2023	66	Vils	Germany
Informal	08/12/2023 12 UTC	09/12/2023	102	Amper	Germany
Formal	09/12/2023 12 UTC	10/12/2023	60	Rhone	France
Formal	29/10/2023 12 UTC	11/12/2023	96	Le Prunelli	France
Formal	09/12/2023 00 UTC	11/12/2023	-97	Aniene	Italy
Formal	12/12/2023 00 UTC	12/12/2023	60	Crisul Repede	Hungary
Informal	12/12/2023 00 UTC	12/12/2023	60	Túr-belvíz-főcsatorna	Hungary
Informal	12/12/2023 12 UTC	13/12/2023	30	Danube	Hungary
Informal	12/12/2023 12 UTC	13/12/2023	24	Sebes-Körös	Romania
Formal	20/12/2023 00 UTC	20/12/2023	108	Weser	Germany
Formal	20/12/2023 00 UTC	20/12/2023	78	Ohre	Germany
Informal	19/12/2023 12 UTC	20/12/2023	78	Donau	Germany
Informal	20/12/2023 00 UTC	21/12/2023	66	Naab	Germany
Informal	21/12/2023 12 UTC	22/12/2023	48	Ems	Germany
Formal	21/12/2023 12 UTC	22/12/2023	60	Aller	Germany
Informal	23/12/2023 00 UTC	23/12/2023	24	Hase	Germany
Informal	22/12/2023 12 UTC	23/12/2023	30	Lippe	Germany
Informal	24/12/2023 00 UTC	24/12/2023	6	Leine	Germany
Informal	25/12/2023 12 UTC	26/12/2023	0	Durbe	Latvia
Formal	29/12/2023 00 UTC	29/12/2023	96	La Sevre Nantaise	France
Formal	29/12/2023 00 UTC	29/12/2023	102	Le Thouet	France
Formal	29/12/2023 00 UTC	29/12/2023	114	Marne	France
Formal	28/12/2023 12 UTC	29/12/2023	114	Charente	France
Informal	28/12/2023 12 UTC	29/12/2023	6	Durbe	Latvia
Formal	30/12/2023 00 UTC	30/12/2023	108	Weser	Germany
Formal	30/12/2023 00 UTC	30/12/2023	84	Naab	Germany
Formal	01/01/2024 00 UTC	01/01/2024	54	Ijssel	Netherlands
Formal	01/01/2024 00 UTC	01/01/2024	48	Ems	Germany
Informal	01/01/2024 00 UTC	01/01/2024	48	Biese	Germany
Formal	01/01/2024 00 UTC	01/01/2024	48	Sude	Germany
Formal	31/12/2023 12 UTC	01/01/2024	42	Mayenne	France
Formal	01/01/2024 12 UTC	02/01/2024	48	, Muritz-Elde	Germany
Formal	15/01/2024 00 UTC	15/01/2024	54	Vilaine	France
Informal	16/01/2024 00 UTC	16/01/2024	54	Latorica	Ukraine
Formal	17/01/2024 00 UTC	17/01/2024	48	Tisza	Hungary

Formal	17/01/2024 00 UTC	17/01/2024	48	Tisza	Ukraine
Informal	16/01/2024 12 UTC	17/01/2024	60	Túr-belvíz-főcsatorna	Hungary
Informal	16/01/2024 12 UTC	17/01/2024	48	Боржава	Ukraine
Informal	17/01/2024 12 UTC	18/01/2024	42	Tajuña	Spain
Formal	17/01/2024 12 UTC	18/01/2024	60	Duero	Spain
Informal	17/01/2024 12 UTC	18/01/2024	36	Latorica	Slovakia
Informal	18/01/2024 12 UTC	19/01/2024	30	Tajo	Spain
Informal	22/01/2024 00 UTC	22/01/2024	54	Rossjoholmsan	Sweden
Formal	23/01/2024 12 UTC	24/01/2024	54	Прип'ять	Ukraine

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

Table 2: EFAS Flash notifications sent in December – January 2024

Туре	Forecast Date	Issue Date	Lead Time	Region	Country
Flash Flood	01/12/2023 00 UTC	01/12/2023	42	Danube	Slovakia
Flash Flood	01/12/2023 00 UTC	01/12/2023	30	Adriatic Sea	Italy
Flash Flood	30/11/2023 12 UTC	01/12/2023	36	Danube	Ukraine
Flash Flood	30/11/2023 12 UTC	01/12/2023	24	Danube	Slovenia
Flash Flood	30/11/2023 12 UTC	01/12/2023	42	Danube	Slovenia
Flash Flood	30/11/2023 12 UTC	01/12/2023	48	Danube	Austria
Flash Flood	30/11/2023 12 UTC	01/12/2023	42	Adriatic Sea	Italy
Flash Flood	30/11/2023 12 UTC	01/12/2023	42	Adige	Italy
Flash Flood	30/11/2023 12 UTC	01/12/2023	36	Po	Italy
Flash Flood	30/11/2023 12 UTC	01/12/2023	48	Coastal	Italy
Flash Flood	02/12/2023 00 UTC	02/12/2023	18	Vistula	Poland
Flash Flood	03/12/2023 12 UTC	04/12/2023	36	Trent	United Kingdom
Flash Flood	03/12/2023 12 UTC	04/12/2023	24	Trent	United Kingdom
Flash Flood	05/12/2023 00 UTC	05/12/2023	48	Barrow	Ireland
Flash Flood	06/12/2023 00 UTC	06/12/2023	42	Douro/Duero	Spain
Flash Flood	06/12/2023 00 UTC	06/12/2023	42	Douro/Duero	Spain
Flash Flood	06/12/2023 00 UTC	06/12/2023	42	Mino/Minho	Spain
Flash Flood	06/12/2023 00 UTC	06/12/2023	36	Lima/Limia	Portugal
Flash Flood	06/12/2023 00 UTC	06/12/2023	42	Douro/Duero	Portugal
Flash Flood	06/12/2023 00 UTC	06/12/2023	18	Coastal	Ireland
Flash Flood	06/12/2023 00 UTC	06/12/2023	36	Barrow	Ireland
Flash Flood	06/12/2023 00 UTC	06/12/2023	42	Coastal	United Kingdom
Flash Flood	06/12/2023 00 UTC	06/12/2023	42	Coastal	United Kingdom
Flash Flood	06/12/2023 00 UTC	06/12/2023	42	Coastal	United Kingdom
Flash Flood	06/12/2023 00 UTC	06/12/2023	42	Coastal	United Kingdom
Flash Flood	06/12/2023 00 UTC	06/12/2023	42	Coastal	United Kingdom
Flash Flood	06/12/2023 00 UTC	06/12/2023	48	Tay	United Kingdom
Flash Flood	06/12/2023 00 UTC	06/12/2023	48	Coastal	United Kingdom
Flash Flood	06/12/2023 00 UTC	06/12/2023	48	Coastal	United Kingdom
Flash Flood	06/12/2023 00 UTC	06/12/2023	48	North Atlantic	United Kingdom
Flash Flood	05/12/2023 12 UTC	06/12/2023	48	Coastal	Spain
Flash Flood	05/12/2023 12 UTC	06/12/2023	48	Coastal	Spain
Flash Flood	05/12/2023 12 UTC	06/12/2023	48	Lima/Limia	Spain
Flash Flood	07/12/2023 00 UTC	07/12/2023	18	Mondego	Portugal
Flash Flood	07/12/2023 00 UTC	07/12/2023	18	Douro/Duero	Portugal

Flash Flood	06/12/2023 12 UTC	07/12/2023	30	Douro/Duero	Portugal
Flash Flood	06/12/2023 12 UTC	07/12/2023	36	Dordogne/ Garone	France
Flash Flood	06/12/2023 12 UTC	07/12/2023	30	Coastal	United Kingdom
Flash Flood	06/12/2023 12 UTC	07/12/2023	30	Usk	United Kingdom
Flash Flood	06/12/2023 12 UTC	07/12/2023	30	Parrett	United Kingdom
Flash Flood	06/12/2023 12 UTC	07/12/2023	30	Coastal	United Kingdom
Flash Flood	06/12/2023 12 UTC	07/12/2023	30	Trent	United Kingdom
Flash Flood	08/12/2023 00 UTC	08/12/2023	42	Seine	France
Flash Flood	08/12/2023 00 UTC	08/12/2023	36	Seine	France
Flash Flood	07/12/2023 12 UTC	08/12/2023	48	Seine	France
Flash Flood	09/12/2023 00 UTC	09/12/2023	24	Danube	Germany
Flash Flood	08/12/2023 12 UTC	09/12/2023	36	Rhine	Switzerland
Flash Flood	08/12/2023 12 UTC	09/12/2023	48	Rhine	Germany
Flash Flood	08/12/2023 12 UTC	09/12/2023	48	Rhine	Germany
Flash Flood	08/12/2023 12 UTC	09/12/2023	24	Seine	France
Flash Flood	08/12/2023 12 UTC	09/12/2023	24	Seine	France
Flash Flood	10/12/2023 12 OTC	10/12/2023	42	Danube	Germany
Flash Flood	10/12/2023 00 UTC	10/12/2023	42	Rhone	France
Flash Flood	10/12/2023 00 UTC	10/12/2023	42	Rhone	France
Flash Flood	09/12/2023 12 UTC	10/12/2023	48	Rhone	Switzerland
Flash Flood	09/12/2023 12 UTC	10/12/2023	48	Rhone	France
Flash Flood	09/12/2023 12 UTC	10/12/2023	48	Rhone	France
Flash Flood	09/12/2023 12 UTC 09/12/2023 12 UTC	10/12/2023	40 42	Rhine	Switzerland
Flash Flood		10/12/2023	42 48	Danube	
Flash Flood	09/12/2023 12 UTC		46 30	Loire	Germany
	11/12/2023 00 UTC	11/12/2023			France
Flash Flood	11/12/2023 00 UTC	11/12/2023	24	Dordogne/ Garone	France
Flash Flood	11/12/2023 00 UTC	11/12/2023	18	Rhine	Switzerland
Flash Flood	11/12/2023 00 UTC	11/12/2023	18	Rhine	Switzerland
Flash Flood	11/12/2023 00 UTC	11/12/2023	24	Coastal	Ireland
Flash Flood	10/12/2023 12 UTC	11/12/2023	48	Rhine	Germany
Flash Flood	10/12/2023 12 UTC	11/12/2023	30	Loire	France
Flash Flood	10/12/2023 12 UTC	11/12/2023	30	Loire	France
Flash Flood	10/12/2023 12 UTC	11/12/2023	24	Rhine	Switzerland
Flash Flood	12/12/2023 00 UTC	12/12/2023	48	Danube	Romania
Flash Flood	12/12/2023 00 UTC	12/12/2023	48	Danube	Romania
Flash Flood	12/12/2023 00 UTC	12/12/2023	48	Danube	Romania
Flash Flood	12/12/2023 00 UTC	12/12/2023	42	Danube	Romania
Flash Flood	12/12/2023 00 UTC	12/12/2023	48	Danube	Ukraine
Flash Flood	12/12/2023 00 UTC	12/12/2023	48	Danube	Slovakia
Flash Flood	12/12/2023 00 UTC	12/12/2023	48	Danube	Hungary
Flash Flood	12/12/2023 00 UTC	12/12/2023	48	Danube	Hungary
Flash Flood	12/12/2023 00 UTC	12/12/2023	48	Danube	Hungary
Flash Flood	12/12/2023 00 UTC	12/12/2023	36	Danube	Hungary
Flash Flood	12/12/2023 00 UTC	12/12/2023	36	Danube	Hungary
Flash Flood	11/12/2023 12 UTC	12/12/2023	48	Danube	Hungary
Flash Flood	11/12/2023 12 UTC	12/12/2023	48	Danube	Hungary
Flash Flood	11/12/2023 12 UTC	12/12/2023	48	Coastal	Croatia
Flash Flood	11/12/2023 12 UTC	12/12/2023	48	Danube	Germany
Flash Flood	11/12/2023 12 UTC	12/12/2023	48	Dordogne/ Garone	France
Flash Flood	13/12/2023 00 UTC	13/12/2023	30	Danube	Romania
Flash Flood	13/12/2023 00 UTC	13/12/2023	18	Danube	Croatia

Flash Flood	13/12/2023 00 UTC	13/12/2023	18	Danube	Croatia
Flash Flood	13/12/2023 00 UTC	13/12/2023	18	Coastal	Croatia
Flash Flood	13/12/2023 00 UTC	13/12/2023	42	Dnieper	Ukraine
Flash Flood	12/12/2023 12 UTC	13/12/2023	42	Danube	Romania
Flash Flood	12/12/2023 12 UTC	13/12/2023	42	Danube	Romania
Flash Flood	15/12/2023 00 UTC	15/12/2023	42	Skien	Norway
Flash Flood	15/12/2023 00 UTC	15/12/2023	42	Otra	Norway
Flash Flood	15/12/2023 00 UTC	15/12/2023	30	Aegean Sea	Greece
Flash Flood	15/12/2023 00 UTC	15/12/2023	24	Aegean Sea	Greece
Flash Flood	15/12/2023 00 UTC	15/12/2023	42	Coastal	Norway
Flash Flood	16/12/2023 00 UTC	16/12/2023	48	Neman/Nemunas/Nyoman)	Lithuania
Flash Flood	16/12/2023 00 UTC	16/12/2023	42	Venta	Latvia
Flash Flood	16/12/2023 00 UTC	16/12/2023	30	Aegean Sea	Greece
Flash Flood	15/12/2023 12 UTC	16/12/2023	42	Gota	Sweden
Flash Flood	15/12/2023 12 UTC	16/12/2023	48	Coastal	United Kingdom
Flash Flood	15/12/2023 12 UTC	16/12/2023	42	Coastal	United Kingdom
Flash Flood	15/12/2023 12 UTC	16/12/2023	42	Coastal	United Kingdom
Flash Flood	20/12/2023 12 UTC	21/12/2023	30	Weser	Germany
Flash Flood	22/12/2023 00 UTC	22/12/2023	42	North Sea	United Kingdom
Flash Flood	21/12/2023 12 UTC	22/12/2023	48	Coastal	United Kingdom
Flash Flood	21/12/2023 12 UTC	22/12/2023	18	Danube	Romania
Flash Flood	23/12/2023 00 UTC	23/12/2023	30	Elbe	Germany
Flash Flood	23/12/2023 00 UTC	23/12/2023	48	Danube	Romania
Flash Flood	22/12/2023 12 UTC	23/12/2023	42	Elbe	Czechia
Flash Flood	22/12/2023 12 UTC	23/12/2023	42	Danube	Germany
Flash Flood	24/12/2023 00 UTC	24/12/2023	30	Danube	Slovakia
Flash Flood	23/12/2023 12 UTC	24/12/2023	42	Danube	Hungary
Flash Flood	23/12/2023 12 UTC	24/12/2023	48	Danube	Ukraine
Flash Flood	23/12/2023 12 UTC	24/12/2023	48	Danube	Romania
Flash Flood	23/12/2023 12 UTC	24/12/2023	42	Danube	Slovakia
Flash Flood	24/12/2023 12 UTC	25/12/2023	18	Danube	Romania
Flash Flood	26/12/2023 00 UTC	26/12/2023	42	Coastal	United Kingdom
Flash Flood	26/12/2023 00 UTC	26/12/2023	42	Coastal	United Kingdom
Flash Flood	26/12/2023 00 UTC	26/12/2023	30	Coastal	United Kingdom
Flash Flood	26/12/2023 00 UTC	26/12/2023	30	Foyle	United Kingdom
Flash Flood	26/12/2023 00 UTC	26/12/2023	30	Coastal	Ireland
Flash Flood	26/12/2023 00 UTC	26/12/2023	42	Coastal	United Kingdom
Flash Flood	26/12/2023 00 UTC	26/12/2023	42	Coastal	United Kingdom
Flash Flood	26/12/2023 00 UTC	26/12/2023	30	Erne	United Kingdom
Flash Flood	26/12/2023 00 UTC 26/12/2023 00 UTC		30		Ireland
Flash Flood	25/12/2023 00 UTC 25/12/2023 12 UTC	26/12/2023 26/12/2023	48	Shannon	
Flash Flood			48 48	Coastal Tweed	United Kingdom United Kingdom
	25/12/2023 12 UTC 25/12/2023 12 UTC	26/12/2023			•
Flash Flood		26/12/2023	48 40	Trent	United Kingdom
Flash Flood	25/12/2023 12 UTC	26/12/2023	48	Coastal	Isle of Man
Flash Flood	25/12/2023 12 UTC	26/12/2023	42	Bann	United Kingdom
Flash Flood	25/12/2023 12 UTC	26/12/2023	42	Coastal	Ireland
Flash Flood	25/12/2023 12 UTC	26/12/2023	48	Coastal	United Kingdom
Flash Flood	25/12/2023 12 UTC	26/12/2023	48	Coastal	United Kingdom
Flash Flood	25/12/2023 12 UTC	26/12/2023	48	Coastal	United Kingdom
Flash Flood	25/12/2023 12 UTC	26/12/2023	42	Coastal	Ireland

Flash Flood	26/12/2023 12 UTC	27/12/2023	24	Coastal	United Kingdom
Flash Flood	26/12/2023 12 UTC	27/12/2023	24	North Atlantic	United Kingdom
Flash Flood	26/12/2023 12 UTC	27/12/2023	48	Coastal	United Kingdom
Flash Flood	27/12/2023 12 UTC	28/12/2023	48	Venta	Latvia
Flash Flood	29/12/2023 00 UTC	29/12/2023	30	Coastal	Ireland
Flash Flood	29/12/2023 00 UTC	29/12/2023	48	Coastal	United Kingdom
Flash Flood	29/12/2023 00 UTC	29/12/2023	48	Coastal	United Kingdom
Flash Flood	30/12/2023 00 UTC	30/12/2023	24	Trent	United Kingdom
Flash Flood	29/12/2023 12 UTC	30/12/2023	24	Coastal	United Kingdom
Flash Flood	29/12/2023 12 UTC	30/12/2023	30	R. Towy	United Kingdom
Flash Flood	01/01/2024 00 UTC	01/01/2024	48	Rhine	Germany
Flash Flood	01/01/2024 00 UTC	01/01/2024	48	Rhine	Germany
Flash Flood	01/01/2024 00 UTC	01/01/2024	42	Maas/Meuse	Belgium
Flash Flood	01/01/2024 00 UTC	01/01/2024	42	Loire	France
Flash Flood	01/01/2024 00 UTC	01/01/2024	48	Elbe	Germany
Flash Flood	01/01/2024 00 UTC	01/01/2024	48	Danube	Germany
Flash Flood	31/12/2023 12 UTC	01/01/2024	48	Loire	France
Flash Flood	31/12/2023 12 UTC	01/01/2024	48	Coastal	France
Flash Flood	31/12/2023 12 UTC	01/01/2024	48	Coastal	France
Flash Flood	31/12/2023 12 UTC	01/01/2024	48	Rhine	Germany
Flash Flood	02/01/2024 00 UTC	02/01/2024	18	Coastal	United Kingdom
Flash Flood	02/01/2024 00 UTC	02/01/2024	36	Douro/Duero	Spain
Flash Flood	02/01/2024 00 UTC	02/01/2024	30	Elbe	Czechia
Flash Flood	01/01/2024 12 UTC	02/01/2024	36	Rhine	Germany
Flash Flood	01/01/2024 12 UTC	02/01/2024	36	Rhine	Germany
Flash Flood	01/01/2024 12 UTC	02/01/2024	30	Loire	France
Flash Flood	01/01/2024 12 UTC	02/01/2024	48	Danube	Romania
Flash Flood	01/01/2024 12 UTC	02/01/2024	42	Danube	Ukraine
Flash Flood	02/01/2024 12 UTC	03/01/2024	18	Douro/Duero	Portugal
Flash Flood	02/01/2024 12 UTC	03/01/2024	18	Douro/Duero	Spain
Flash Flood	02/01/2024 12 UTC	03/01/2024	12	Mino/Minho	Spain
Flash Flood	02/01/2024 12 UTC	03/01/2024	48	Danube	Romania
Flash Flood	04/01/2024 00 UTC	04/01/2024	18	Arun	United Kingdom
Flash Flood	04/01/2024 00 UTC	04/01/2024	42	Guadalquivir	Spain
riasii rioou	04/01/2024 00 010	04/01/2024	42	Tyrrhenian Sea, Ligurian	Spairi
Flash Flood	05/01/2024 00 UTC	05/01/2024	48	Sea	Italy
Flash Flood	04/01/2024 12 UTC	05/01/2024	48	Adriatic Sea	Italy
Flash Flood	06/01/2024 12 OTC	06/01/2024	42	Bistrica	Albania
Flash Flood	06/01/2024 00 UTC	06/01/2024	42	Akheloos	Greece
Flash Flood				Akheloos	
	06/01/2024 00 UTC	06/01/2024	42		Greece
Flash Flood	06/01/2024 00 UTC	06/01/2024	12	Coastal	Italy
Flash Flood	05/01/2024 12 UTC	06/01/2024	48	Coastal	Greece
Flash Flood	05/01/2024 12 UTC	06/01/2024	48	Tyrrhenian Sea, Ligurian Sea	Italy
Flash Flood	05/01/2024 12 UTC	06/01/2024	24	Adriatic Sea	Italy
Flash Flood	06/01/2024 12 UTC	07/01/2024	30	Ionian Sea	Greece
Flash Flood	14/01/2024 00 UTC	14/01/2024	36	Tagus/Tejo	Spain
Flash Flood	14/01/2024 00 OTC 14/01/2024 12 UTC	15/01/2024	36	Coastal	Greece
Flash Flood	16/01/2024 12 OTC	16/01/2024	48	Danube	Ukraine
Flash Flood	16/01/2024 00 UTC	16/01/2024	48 48	Danube	Romania
Flash Flood	16/01/2024 00 UTC	16/01/2024	48 48	Danube	Romania
1 10311 11000	10/01/2024 00 010	10/01/2024	40	Danube	Nomania

Flash Flood	16/01/2024 00 UTC	16/01/2024	42	Danube	Romania
Flash Flood	16/01/2024 00 UTC	16/01/2024	48	Danube	Romania
Flash Flood	16/01/2024 00 UTC	16/01/2024	48	Adriatic Sea	Croatia
Flash Flood	16/01/2024 00 UTC	16/01/2024	48	Danube	Slovenia
Flash Flood	16/01/2024 00 UTC	16/01/2024	48	Coastal	Croatia
Flash Flood	16/01/2024 00 UTC	16/01/2024	48	Coastal	Croatia
Flash Flood	16/01/2024 00 UTC	16/01/2024	42	Douro/Duero	Portugal
Flash Flood	16/01/2024 00 UTC	16/01/2024	42	Vouga	Portugal
Flash Flood	16/01/2024 00 UTC	16/01/2024	36	Tagus/Tejo	Spain
Flash Flood	16/01/2024 00 UTC	16/01/2024	36	Rhine	Germany
Flash Flood	16/01/2024 00 UTC	16/01/2024	48	Rhone	France
Flash Flood	16/01/2024 00 UTC	16/01/2024	48	Rhone	France
Flash Flood	16/01/2024 00 UTC	16/01/2024	30	Vilaine	France
Flash Flood	15/01/2024 12 UTC	16/01/2024	48	Vilaine	France
Flash Flood	15/01/2024 12 UTC	16/01/2024	48	Vilaine	France
Flash Flood	15/01/2024 12 UTC	16/01/2024	42	Loire	France
Flash Flood	15/01/2024 12 UTC	16/01/2024	48	Rhine	France
Flash Flood	15/01/2024 12 UTC	16/01/2024	48	Loire	France
Flash Flood	15/01/2024 12 UTC	16/01/2024	42	Douro/Duero	Spain
Flash Flood	15/01/2024 12 UTC	16/01/2024	42	Tagus/Tejo	Spain
Flash Flood	17/01/2024 00 UTC	17/01/2024	42	Danube	Romania
Flash Flood	17/01/2024 00 UTC	17/01/2024	48	Danube	Romania
Flash Flood	17/01/2024 00 UTC	17/01/2024	36	Drini	Montenegro
Flash Flood	17/01/2024 00 UTC	17/01/2024	36	Zrmanja	Croatia
Flash Flood	16/01/2024 12 UTC	17/01/2024	48	Danube	Romania
Flash Flood	16/01/2024 12 UTC	17/01/2024	48	Danube	Romania
Flash Flood	16/01/2024 12 UTC	17/01/2024	48 48		
				Danube Drini	Romania
Flash Flood Flash Flood	16/01/2024 12 UTC	17/01/2024	48	Adriatic Sea	Albania Croatia
	16/01/2024 12 UTC	17/01/2024	48		
Flash Flood	16/01/2024 12 UTC	17/01/2024	36	Mino/Minho	Spain
Flash Flood	16/01/2024 12 UTC	17/01/2024	30	Mino/Minho	Spain
Flash Flood	16/01/2024 12 UTC	17/01/2024	24	Orne	France
Flash Flood	16/01/2024 12 UTC	17/01/2024	48	Rhone	France
Flash Flood	16/01/2024 12 UTC	17/01/2024	36	Oder	Poland
Flash Flood	18/01/2024 00 UTC	18/01/2024	48	Tagus/Tejo	Spain
Flash Flood	18/01/2024 00 UTC	18/01/2024	36	Tagus/Tejo	Spain
Flash Flood	18/01/2024 00 UTC	18/01/2024	36	Guadiana	Spain
Flash Flood	17/01/2024 12 UTC	18/01/2024	48	Tagus/Tejo	Spain
Flash Flood	17/01/2024 12 UTC	18/01/2024	30	Tyrrhenian Sea, Ligurian Sea	Italy
Flash Flood	18/01/2024 12 UTC	19/01/2024	30	Velez	Spain
Flash Flood	20/01/2024 00 UTC	20/01/2024	48	Tay	United Kingdom
Flash Flood	20/01/2024 00 UTC	20/01/2024	48	Usk	United Kingdom
Flash Flood	20/01/2024 00 UTC	20/01/2024	48	Trent	United Kingdom
Flash Flood	20/01/2024 00 UTC	20/01/2024	42	North Atlantic	United Kingdom
Flash Flood	20/01/2024 00 UTC	20/01/2024	48	Ireland	Ireland
Flash Flood	20/01/2024 00 UTC	20/01/2024	48	Dee	United Kingdom
Flash Flood	20/01/2024 00 UTC	20/01/2024	48	Tyne	United Kingdom
Flash Flood	19/01/2024 12 UTC	20/01/2024	24	Tyrrhenian Sea, Ligurian	Italy
				Sea	•
Flash Flood	21/01/2024 00 UTC	21/01/2024	30	Coastal	Norway

Flash Flood	21/01/2024 00 UTC	21/01/2024	24	Wear	United Kingdom
Flash Flood	20/01/2024 12 UTC	21/01/2024	36	Lune	United Kingdom
Flash Flood	20/01/2024 12 UTC	21/01/2024	24	Corrib	Ireland
Flash Flood	20/01/2024 12 UTC	21/01/2024	30	Erne	United Kingdom
Flash Flood	20/01/2024 12 UTC	21/01/2024	48	Gota	Sweden
Flash Flood	20/01/2024 12 UTC	21/01/2024	48	Coastal	Sweden
Flash Flood	20/01/2024 12 UTC	21/01/2024	42	Coastal	Greece
Flash Flood	20/01/2024 12 UTC	21/01/2024	42	Lagen	Norway
Flash Flood	20/01/2024 12 UTC	21/01/2024	36	Coastal	Norway
Flash Flood	20/01/2024 12 UTC	21/01/2024	42	Glomaa	Norway
Flash Flood	22/01/2024 00 UTC	22/01/2024	24	Oder	Poland
Flash Flood	21/01/2024 12 UTC	22/01/2024	48	Coastal	United Kingdom
Flash Flood	23/01/2024 00 UTC	23/01/2024	48	Neman/Nemunas/Nyoman)	Lithuania
Flash Flood	23/01/2024 00 UTC	23/01/2024	30	Coastal	Sweden
Flash Flood	22/01/2024 12 UTC	23/01/2024	48	Baltic Sea	Latvia
Flash Flood	22/01/2024 12 UTC	23/01/2024	42	Coastal	Sweden
Flash Flood	22/01/2024 12 UTC	23/01/2024	36	Coastal	Norway
Flash Flood	23/01/2024 12 UTC	24/01/2024	42	Neman/Nemunas/Nyoman)	Lithuania
Flash Flood	24/01/2024 12 UTC	25/01/2024	42	Lygna	Norway
Flash Flood	30/01/2024 00 UTC	30/01/2024	36	Coastal	Greece
Flash Flood	30/01/2024 00 UTC	30/01/2024	36	Danube	Romania

^{*} 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 contractor, Ghenova Digital (formerly 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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