
European Flood Awareness System

EFAS *Bulletin*

October – November 2020

Issue 2020(6)



NEWS

New features

EFAS v4.0 launch - Seasonal forecasts and reforecasts on CDS

Three new data sets have now been made available through the [Copernicus Climate Data Store](#) to all users. This release is in addition to the launch of EFAS v4.0, which occurred on 14 October 2020. [EFAS reforecasts](#), [seasonal forecasts](#), and [seasonal reforecasts](#) are now live on CDS. These datasets join the existing forecasts, historical runs, and reforecast datasets already available on CDS. Reforecasts temporal resolution is 20 years of sub-daily reforecasts initialised twice weekly (Mondays and Thursdays). The seasonal forecasts will be updated with the latest forecasts on the 10th of each month, starting with the November 2020 forecast. The seasonal reforecasts are a static dataset covering the period 1991-2020. All data were produced with the EFAS v4.0 and were forced with ECMWF SEAS5 seasonal forecasts.

EFAS seasonal forecasts as presented on EFAS web site

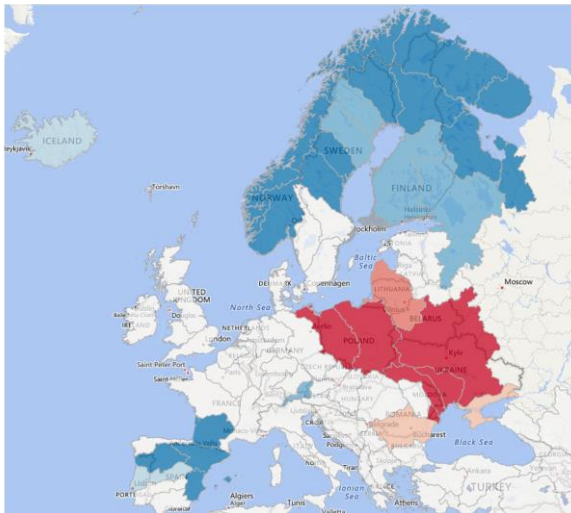


Figure 1: EFAS seasonal forecasts as presented on EFAS-IS web-site.

The publication of EFAS data in CDS was a collaboration between the two Copernicus services C3S and CEMS-Floods. Links to the all EFAS data can be found on the [Data Download page](#). Note that the documentation of the data is kept on the CDS as well as on the [EFAS wiki pages](#). Further Information on the launch of EFAS v4.0 can be found [here](#).

New webinars on EFAS v4.0 updates and features

New [webinars](#) have been published on the EFAS web-site. These webinars are associated with the new EFAS version 4.0 and provide detailed descriptions and demos of updated processes and features.

New Partners

New EFAS Third Parties

We gladly welcome the Department of Agriculture, Environment and Rural Affairs, Northern Ireland (UK) as new EFAS partner.

RESULTS

Summary of EFAS Flood and Flash Flood Notifications

The 27 formal and 30 informal EFAS flood notifications issued in October-November 2020 are summarised in Table 1. The locations of all notifications are shown in Figure 25 and Figure 27 in the appendix.

573 Flash flood notification were issued in October - November 2020. They are summarised in Table 2. The locations of all notifications are shown in Figure 26 and Figure 28 in the appendix.

Meteorological situation

by EFAS Meteorological Data Collection Centre

October

October 2020 was characterised by lower than normal mean sea surface pressure in central and southeast Europe and higher than normal surface pressure around Spitsbergen and towards the eastern regions of the EFAS domain. Monthly precipitation totals were below the long-term means in the east and south of the EFAS domain including the Mediterranean Region, Iceland, and the western slope of the Scandinavian Mountains, while being around or above normal elsewhere. Monthly mean air temperatures were below the long-term means in the western parts and above in the eastern parts of the EFAS domain.

At the beginning of October 2020, a weak low-pressure system was located over southeast Europe associated with high rain amounts in the northern Carpathian Mountains and another near Iceland. A high-pressure system was situated over Russia and the Azores High was shifted slightly westward from its usual position.

The corresponding trough of the Icelandic Low extended towards the Pyrenees and the low-pressure system moved to Great Britain and Ireland. Such weather conditions are prone to high precipitation totals in the lee of mountains. So, it was no surprise that high rainfall totals occurred at the Cantabrian Mountains, Pyrenees, Alps, Massif Central, and northern Apennines. Later, as the trough moved eastward, it also rained in the Dinarides and Grampian Mountains. This low-pressure system together with its trough moved northward. A low-pressure system from the Atlantic Ocean was incorporated, causing again notable rain amounts over Great Britain and Ireland and around the North Sea. An upper-level low-pressure system associated with severe weather was cut-off over southeast Europe. In the next days, a steep trough extended from Scandinavia to northern Africa associated with a cold air outbreak. A low-pressure system developed over the Ligurian Sea and moved via the Dinarides and Hungarian Plain to Poland, associated with high precipitation totals. An intense low-pressure system developed over northern Scandinavia and moved via the North Russian Lowlands eastward. In the next days, two low-pressure systems merged over the Atlantic Ocean, to the west of Great Britain and Ireland with an upper-level trough extending towards the Azores. As the trough moved eastward, it caused severe weather at the Iberian Peninsula and strong wind in Great Britain and Ireland. Simultaneously, a low-pressure system developed southeast of Greenland and moved with a strong intensification to Great Britain and Ireland, where it rapidly weakened. Nevertheless, it caused heavy seas in the northern Atlantic and strong winds across Great Britain and Ireland, whereas precipitation amounts were comparatively low. Additionally, a small low-pressure system developed at the frontal zone over the Western Alps, moved south-eastward to the Peloponnese and brought intense precipitation along its track and high snow amounts in the southern Alps. In the last days of October, ex-hurricane “Epsilon” moved to the north Atlantic to the south of Iceland with strong winds and caused also large-scale precipitation in western and central Europe. A previous cut-off upper-level low-pressure system over the Baltics had no significant impacts. Several low-pressure systems developed at the southern edge of the trough from ex-hurricane “Epsilon”, forming a band with strong winds from the Azores to Scandinavia and causing advection of warm subtropical air to central Europe.

In October 2020, the highest precipitation totals were observed around the central Mediterranean region and western Europe (Figure 11). No or almost no precipitation fell in the south of the EFAS domain and around the Caspian Sea. Monthly precipitation totals below the long-term means occurred in the south and east of the EFAS domain, but also at the southern Iberian Peninsula towards the Provence, around the Aegean Sea, Iceland and the western slope of the Scandinavian Mountains (Figure 12). Monthly totals above the long-term means were reported from many regions in central and western Europe and northward of the Baltic Sea.

The monthly mean air temperature ranged from -6.9°C to 31°C with the highest values in the southern parts of the EFAS domain. The lowest temperature values were reported in the northern and mountainous parts (Figure 15). Air temperature anomalies ranged from -6.4°C to 7.7°C (Figure 16). Monthly mean air temperatures below the long-term means occurred in west and southwest Europe and northwest Africa. Positive monthly mean temperature anomalies were reported in other parts of the EFAS domain.

November

November 2020 was characterised by higher than normal mean sea surface pressure in the majority of the EFAS domain. As a result, monthly precipitation totals were below the long-term means nearly everywhere in the EFAS domain except in Scandinavia and some parts of the Mediterranean region. Monthly mean air temperatures were below the long-term means in Anatolia, around the Caspian Sea, the Balkans, Iceland, and above elsewhere in the EFAS domain.

In the beginning of November 2020, the Azores High extended towards the Iberian Peninsula and connected with another high-pressure system over Western Russia. A small low-pressure system was located over the northwest of the Black Sea, moved northward and later towards Mesopotamia. Other low-pressure systems were situated westward and northward of Great Britain and Ireland, connected by an upper-level trough. They brought intense precipitation and especially strong winds to northwest Europe and later, as they moved towards the northeast, to Scandinavia. Even as it moved to the northeast, the trough steepened at the southwestern edge and led to a cut-off of an upper-

level low-pressure system westward of the Iberian Peninsula associated with heavy rain. A high-pressure system moved northward around this upper-level system via Great Britain and Ireland and central Europe towards eastern Europe. A weak upper-level low-pressure system caused heavy rains around the Aegean Sea. By mid-November a low-pressure system moved from the Atlantic Ocean via Great Britain and Ireland, over the Norwegian Sea and towards northern Scandinavia, while a high-pressure system formed over Russia. This situation caused freezing rain in many locations in western Russia as well as strong winds. In the following days, a low-pressure system developed over the central Mediterranean region, while another one was located near Iceland with a high-pressure system in between. One low-pressure system moved from Iceland to Scandinavia, while another brought intense rain to the central Mediterranean region. Later, an upper-level trough developed over the Atlantic Ocean, extended towards the south and cut-off west of the Iberian Peninsula. Simultaneously, a large high-pressure system was located over eastern Europe and a small low-pressure system over Scandinavia. This low-pressure system moved in the next days towards eastern Europe replacing the high-pressure system. The upper-level system moved to the central Mediterranean region associated with heavy rain, for example in Sardinia. Another cut-off occurred again westward of the Iberian Peninsula. By the end of November, a low-pressure system developed over central Europe as secondary system from a low-pressure system at the Norwegian Sea.

In November 2020, the highest precipitation totals were observed around the Mediterranean Sea, the Iberian Peninsula, southeast of the Black Sea, in Great Britain and Ireland, as well as at the western slope of the Scandinavian Mountains (Figure 13). No or almost no precipitation fell in the south of the EFAS domain, around the Caspian Sea, Anatolia, the Balkans, southward the Alps, and eastern central Europe. Monthly precipitation totals below the long-term means occurred in the majority of the EFAS domain (Figure 14). Monthly totals above the long-term means were reported from some regions around the Mediterranean Sea, southeast of the Black Sea, and in Scandinavia.

The monthly mean air temperature ranged from -13.9°C to 24.2°C with the highest values in the southern parts of the EFAS domain. The lowest temperature values were reported in the northern and mountainous parts (Figure 17). Air temperature anomalies ranged from -4°C to 7.7°C (Figure 18). Monthly mean air temperatures below the long-term means occurred at the Balkans, in Anatolia, around the Caspian Sea, in north-east Africa, and in Iceland. Positive monthly mean temperature anomalies were reported in the other parts of the EFAS domain with the largest anomalies in northern Scandinavia and Russia.

Hydrological situation

by EFAS Hydrological Data Collection Centre

October

In October, the highest concentration of stations (nearly 50%) that exceeded their lowest threshold level is again located in Italy, in the Po river basin, as it happened in the previous month. In central Europe the stations with their threshold level exceeded are located mainly in the east side of the Oder river basin, all stations in Poland, and in the Danube basin (Austria, Slovenia, and Hungary). Other concentrations of stations can be seen across Norway in the north and central regions, and three stations in Iceland.

According to stations registering values above the 90% quantile, these are mostly located in central Europe, mainly in the Danube basin through Austria, Czechia, Bosnia and Herzegovina, and Hungary. Other stations can be seen to a lesser degree in the Rhine basin (on the Main river in Germany) and on the Oder river through Czechia and Poland. To a minor extent, values exceeding the 90% quantile can be found in stations in the French Bourgogne region (Loire and Seine basins) and in the Rhône valley. Other stations also exceeding the 90% quantile occurred in the south of France (Adour, Garone, and Hérault basins) and in the north-east of Spain, in the Ebro basin. These values were also registered in isolated stations in the Iberian Peninsula (Doure, Minho and Velez basins), in Ireland (Shannon basin), England (Thames and Yare basins), northern Norway (Haselva and Malselv basins), one station in Sweden (Naatamo basin), and Ukraine (Dnieper basin).

Lastly, regarding values under quantile 10%, the majority of stations that meet this condition are located in Germany (Rhine, Danube, and Elbe basins), the eastern

Danube basin (Romania, Hungary, Serbia, and Ukraine), the south of Sweden, and the Oder basin in Poland. We can also find stations showing values below 10% on the Thames river basin (south of England), the south of Spain, and the Dnieper basin in Ukraine. Other isolated stations also showing values below the 10% quantile are in the Lagen river (Norway), the Maritsa river (Bulgaria), and the Minho river (Spain).

November

During the month of November, the area with the highest concentration of stations that exceed their lowest threshold (a total of 26 stations) is Norway, mainly in the south of the country. In central Europe there are several stations located along the Oder River in Poland, exceeding their threshold levels. The situation in the Danube river basin is also notable with scattered stations in Austria, Slovenia, Hungary, Croatia, Czechia, and Romania. In the Po river basin, there are still 5 stations with water level above its first threshold. This region experienced a high concentration of stations with the same situation during September and October. In Spain there are 14 stations with overshoots, mainly in the eastern region (Jucar river basin). Finally, in Iceland and Israel there is a single station with values above its threshold.

Regarding stations registering values above the 90% quantile, these are mostly located in the Scandinavian basins - where the largest concentration of stations is in the southern basins (Glomma and Drammen). Another high density of stations can be found in the Danube and Oder basins. To a minor extent, values exceeding the 90% quantile may also be seen in the south of England in the Thames basin, and in an isolated station on the Stour river. To a minor extent, other isolated stations also exceeding the 90% quantile occurred in several Spanish (Ebro, Guadalquivir and Douro river basins) and Irish basins (Moy and Suck rivers). Remote stations in Ukraine (Dnieper and Dniester basins), Scotland (Lochy river), the southeast of France (Agly river), and Switzerland (Hinterrhein river) also exceeded the 90% quantile.

Finally, stations registering values below the 10% quantile were mainly located in Germany (Rhine, Danube, and Elbe basins), Ukraine (Dnieper, Dniester, and Danube basins) and the southeast of Sweden. A lower concentration of stations can be found in the southern Danube basin (Serbia and Bulgaria), and isolated stations also showing values below the 10% quantile were

located in the Cabrera river (Spain), Lagen river (Norway), Thames river (England), Maritsa river (Bulgaria), Harmas-Koros river (Hungary), and Oder river in Poland.

Verification

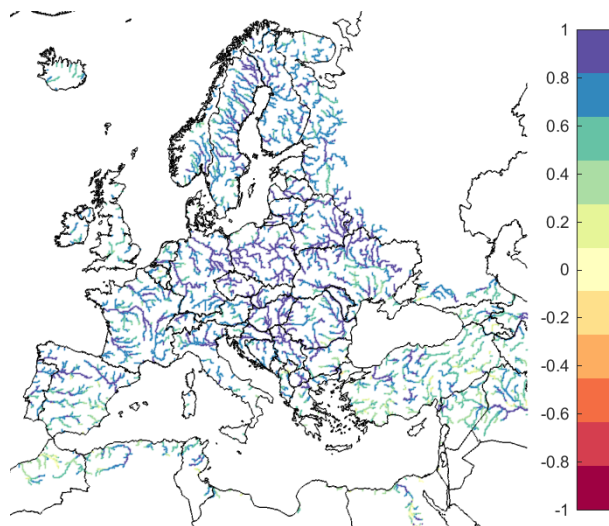


Figure 2. EFAS CRPSS at lead-time 1 day for the October-November 2020 period, for all catchments. The reference score is persistence of using previous day's forecast.

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 the August to September period across the EFAS domain for catchments larger than 2000km². 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.

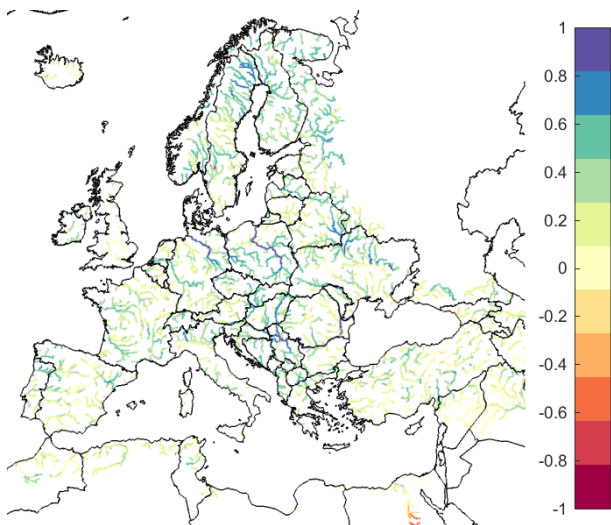


Figure 3. EFAS CRPSS at lead-time 5 days for the October-November 2020 period, for catchments >2000km². The reference score is persistence of using previous day's forecast.

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 better compared 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. The thin blue line denotes the implementation of EFAS 4.0. With the release of EFAS v4.0, general skill scores are now also available on EFAS-IS.

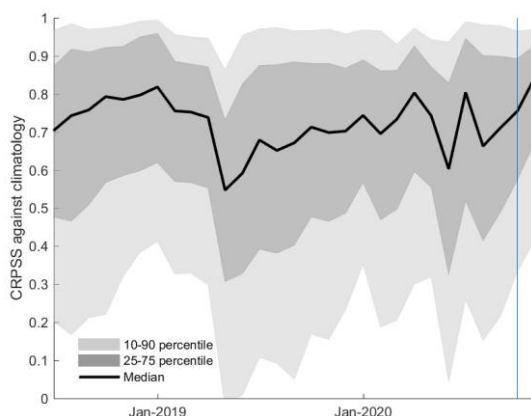


Figure 4. Monthly means of CRPSS the for lead-time 5 days for all the major river points in Europe with ECMWF ENS as forcing. Reference forecast was climatology. The skill is largest during

the winter months, when there is less variation in the flow in large parts of Europe.

ARTICLES

Risk and Recovery Mapping Service for Floods

by CEMS Risk and Recovery Mapping

Risk & Recovery Mapping (RRM) is the part of the On-demand Mapping component of Copernicus Emergency Management Service (CEMS) that supports disaster management activities not related to immediate response. This applies in particular to activities dealing with prevention, preparedness, disaster risk reduction and recovery phases. The service covers natural and man-made disasters (e.g. flood, fire, earthquake, storm, industrial accidents) anywhere in the world and is free of charge for users.

RRM is designed to allow users to request a range of products, based on their needs. In particular, the RRM service supports Member States with risk and recovery products in the context of the Union Civil Protection Mechanism and the Sendai Framework for Disaster Risk Reduction. By providing locally relevant information, the RRM products are relevant at city and regional level and can support processes such as cost-benefit analysis of major investment projects for disaster prevention and climate change adaptation and help effective investments under the European Structural and Investment Funds. In relation to floods, the RRM service can support activities of flood risk management to fulfil the requirements of the Floods Directive.

The performed analyses are based on satellite imagery and in-situ data, with the possibility to integrate information offered by the users. The main output of the analyses is the geospatial data, which can be then inserted in the geospatial information systems of the users to further develop on them. Apart from the vector and raster datasets, the deliverables include symbology layers, ready to print overview maps, metadata and an informative report including all the specifications on the imagery and data used, the methodologies applied and results.

In relation to pre-disaster activities, RRM service can provide information on the exposure, vulnerability and risk of people and assets. It can also offer detailed post-

disaster assessment and assist in the development of recovery plans.

The service can be activated through two modalities:

- **FLEX mode:** which accommodates tailor-made studies to support specific needs from the users. The FLEX mode covers a wide variety of situations for pre-disaster, post-disaster, and reference mapping. The activations are developed under specific contracts after a tendering process. The products delivery is flexible, usually 1-2 months, depending on the specificities of the activation.

An example of a past FLEX activation in relation to floods is the *EMSN056: Historic flood delineation and analyses for Elbe/Vltava catchment*. The analysis covered one of the largest floods in Central Europe in the past two centuries that occurred in the summer of 2013, affecting especially Southern and Eastern Germany and some areas in Czech Republic, Austria and Switzerland. The purpose was to improve the understanding of the flood event dynamics. The analysis included the delimitation of the flood extent during more than one month for every available source not analysed before and the chronological comparison of results to provide information on the evolution of the event. A wide number of images, including SAR and optical, were processed to maximise the spatial and temporal coverage of results. More information is available in our portal <https://emergency.copernicus.eu/mapping/list-of-components/EMSN056>.

Another example is activation *EMSN054: Assessment of flood risk and economic impact, Drin river basin, Balkans* that provided relevant information for risk preparedness (hazard, historical floods and economic risk assessment) and sustainable development (economic assets mapping, economic risk assessment) in the Drin catchment area covering a transboundary area including Albania, Kosovo, the Former Yugoslavian Republic of Macedonia and Montenegro.

- **Standard (STD) mode:** a set of predefined standard products are offered to cover typical user needs. The products have a predefined methodology and scale, and results are offered in a period ranging from 5 to 15 days.

In relation to floods, the more relevant products are:

Flood Delineation (P04)

Flood delineation product is the spatial characterization of the flood event, both in terms of delineation and water level. Derived from the best available SAR (VHR and HR) and optical imagery (HR), it describes the flood extent as close as possible to the crisis, having a pre-event hydrological information as reference. Linking results with Digital Elevation Model (DEM), allows for the estimation of the flood water levels at its peak. Reference hydrography from the Reference dataset is required to distinguish the normal water extent from the floodwater inundated area.

- Input data: Image data VHR-SAR, HR-SAR, HR-Optical and Digital Elevation Model (DEM)
- Scale: 1:25.000
- AOI: 500 Km² max
- Production time: 5 – 10 days



Figure 5: Flood Delineation

Modelled Flood Extent for Major Events (P05)

Provides modelled, simulated flood extent, information about the flood based on estimate discharges and water levels using statistical methods or modelling of the hydrologic cycle (runoff models).

- Input data: Digital Elevation Model (DEM) < 10m, precipitation data, discharge data, land use, flood delineation (to calibrate the model)
- Scale: 1:25.000
- AOI: 500 Km² max
- Production time: 5 – 10 days



Figure 6: Modelled Flood Extent for Major Events

Temporal Analyses of Occurred Flood Events (P06)

Provides temporal analyses of flood events within a defined area of interest. P06 is based on hydrological modelling and calibrated by time series of flood extents (P04 or similar) for the occurred flood event. As a result, P06 offers the maximum flood extent, maximum flood depth and maximum flood retention (time during which the location was covered with water).

- Input data: Digital Elevation Model (DEM) < 10m, precipitation data, discharge data, land use, flood delineation (to calibrate the model)
- Scale: 1:25.000
- AOI: 500 Km² max
- Production time: 2 - 5 days

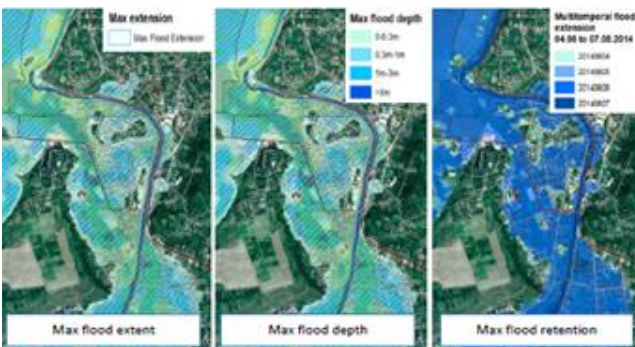


Figure 7: Temporal Analyses of Occurred Flood Events

Impact Assessment/Exposure Analyses on Assets and Population (P14)

Allows two types of analysis:

- impact assessment on assets and population for events where a disaster extent is available; and
- exposure analysis on assets and population in the case of a predicted/modelled event.

The main outputs of this product are general statistical information about assets and population exposed during or affected by an event, presented in tabular form, coupled with intermediate results of spatial statistics per asset type.

- Input data: reference dataset, disaster extent or predicted event extent
- Scale: input data driven, 1:10.000-1:25.000
- AOI: 500 Km² max
- Production time: 3 days

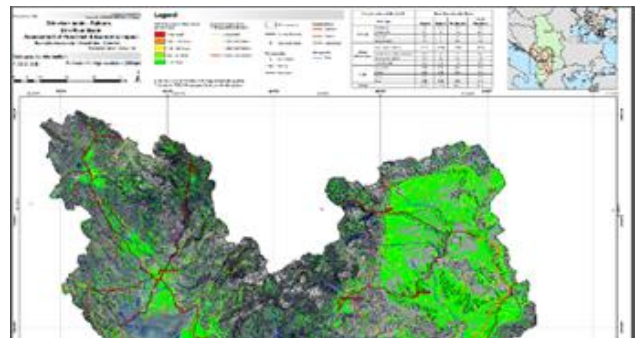


Figure 8: Impact Assessment/Exposure Analyses on Assets and Population

Detailed Impact Assessment/Exposure Analysis on Selected Aspect (P15)

As for P14, both impact assessment and exposure analysis can be provided. In this case, the analyses focus on selected thematic aspects (i.e. agriculture production and crop, forest stand information, economic values). The main outputs are detailed statistical information on a selected asset exposed/affected during an event, presented in tabular form and as descriptive part in the report using tables and graphs. Additionally, the intermediate result of spatial statistics is delivered.

- Input data: disaster extent or predicted event extent, data provided by user on selected aspect, land use (optional)
- Scale: input data driven, 1:10.000-1:25.000
- AOI: 500 Km² max
- Production time: 3 days

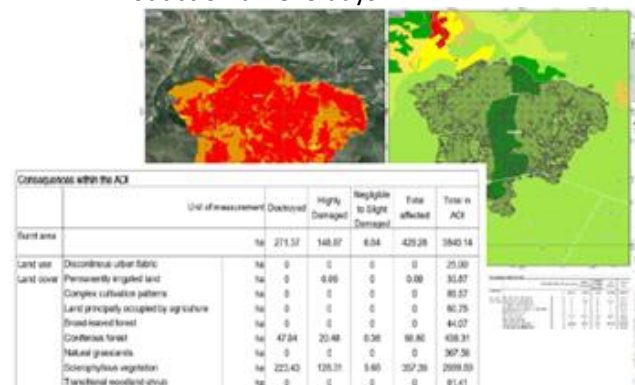


Figure 9: Detailed Impact Assessment/Exposure Analysis on Selected Aspect

Activations [EMS068: Germany, Brandenburg flood mapping](#) and [EMS069: Germany, Herne city flood preparedness](#) are examples of pre- and post-disaster studies, respectively, related to floods under Standard mode.

For further information check the RRM portal <https://emergency.copernicus.eu/mapping> or contact JRC-EMS-RISKRECOVERYMAPPING@ec.europa.eu.

15th EFAS Annual Meeting

by EFAS Dissemination Centre

At least 152 people participated at the 15th EFAS Annual Meeting (AM) which took place on October 22, 2020. Due to the Covid-19 pandemic the scheduled physical meeting was instead transferred to the online Webex platform. The meeting was organized by the Joint Research Centre (JRC) and the EFAS Dissemination Centre (DISS) with the support of all EFAS operational centers.



Figure 10: Participants of 15th EFAS Annual Meeting (online)

Achievements during the last year

EFAS DISS presented the six new partners that have joined EFAS since the last annual meeting and two webinars that were held. High number of issued notifications and analysis of provided feedback was mentioned. Overall, floods were comparable to the EFAS predictions from last year, yet less severe than the 2020 EFAS predictions. The Annual Survey was not carried during this virtual meeting; however, the partners will be requested to provide feedback on EFAS for the entire year 2020 and will receive a questionnaire in January 2021.

The EFAS Hydrological Data Collection Centre (HDCC) presented their [Annual report 2019](#), in which 1149 discharge stations are analysed. Discharge values in 2019 did not differ much from 2018, although it was clearly lower compared to the historical period 1991-2016. Threshold levels (available in 1092 stations) were exceeded in 51% of the stations, mostly in summer and late autumn. Currently 1824 stations from 44 partners are providing water level or discharge data. New developments will involve post-processing, real-time and fixed reporting points layers.

The EFAS Meteorological Data Collection Centre (MDCC) described their station network and collected variables. The data processing system was improved since the last AM and Data licence for non-EUMETNET members is now available. 6-hourly grids of precipitation and average temperature have been prepared for integration into the Lisflood model. As future development, MDCC plans to avoid duplicated stations in grids, to improve the performance of grid creation that will be used in future EFAS higher spatial resolution and to include new data providers and more parameters and stations from existing data providers.

The EFAS Computational Centre (COMP) highlighted the novelties since last year, including the release of EFAS v4.0 in October 2020, new Reporting point layer, new sub-seasonal products, improvements in the ERICHA and ERIC layers, more detailed documentation on Wiki and more data accessible through the Climate Data Centre.

What's new in EFAS v4.0?

EFAS COMP explained the improvements in the Lisflood model and its 6-hourly calibration. The comparison of model performance between EFAS v3.0 and EFAS v4.0 showed that the Kling-Gupta Efficiency (KGE) for the new calibration increased in most of the stations and in most of the catchments. The number of points for post-processing have increased and a new evaluation layer has been launched. In addition, the model performance and forecast skill can help users to evaluate the model results.

New products and Services

An enhanced reporting point layer was also shown to the participants. This layer displays fixed and dynamic reporting points with a 6-hourly time step and besides hydrographs of return periods also discharge hydrographs. Sub-seasonal and seasonal outlooks were

presented as well. These layers provide an outlook of hydrological condition for larger regions for the next 6 and 8 weeks with updates twice a week and monthly respectively. Many of the EFAS results are now available in the Climate Data Store (CDS). These include EFAS forecasts with a 30-day delay, EFAS v4.0 reforecasts, historical EFAS water balance, sub-seasonal and seasonal forecasts and all the previous EFAS versions.

Besides feedback on EFAS Formal Flood Notifications and feedback on missed events, a new feedback form enables the provision of quick feedback on Flash-flood notifications. All provided feedbacks are visualised in the EFAS-IS.

Case study analysis

A joint DISS and HYDRO presentation covered a detailed analysis of floods in Northern Spain in December 2019, when the Ebro, Douro and Minho-Limia basins were hit by three storms on December 16-22, 2020. Besides the hydrological assessment and evaluation of the EFAS performance, a reconstruction of the events for each basin was also made based on Twitter tags/Hashtags (#) containing specific words. It was concluded that the quality of the provided EFAS forecasts was fairly high and the events were detected by EFAS with a lead-time of 3 to 9 days. For some rivers, there seem to be some challenges in the model, particularly in the description of human impacts e.g. reservoirs. Incorporating the operational usage of these reservoirs could potentially increase the accuracy of the EFAS forecasts.

What's next for EFAS?

Peter Salamon (JRC) reported on upcoming plans. These included:

- EFAS Pre-tasking of the acquisition of satellite images based on EFAS forecasts;
- Increase of spatial resolution to app. 1 arcmin;
- New global monitoring product using the satellite Sentinel-1.

Peter Salamon also informed the partners about the end of all existing EFAS Framework contracts next year and expected public procurements of the services.

Flash floods

Calum Baugh (COMP) presented recent developments of the Flash flood layer and discussed changes, problems and possible solutions. Calum Baugh also talked about flash flood forecasts in the EFAS system, about

changes, the evaluation in EFAS v4.0, and about challenges and solutions. ERIC products needed to be re-evaluated after the new LISFLOOD calibration. Further evaluation showed that flash flood threshold criterion remains unchanged. The biggest challenges are missed events in the summer, the prevalence of false alarms in winter and persistence criteria for flash floods notifications. Some of potential solutions were finally discussed.

Open data and new EFAS partner agreement – presentation, discussion and voting

Peter Salamon (JRC) led the presentation and voting procedure on the new EFAS Condition of Access (CoA). Its final version was drafted after the discussions on last EFAS Annual Meetings and e-mail communication during the 2020 summer. Each partner had one vote and the Conditions of Access might be updated by a qualified majority, i.e. two thirds of present and voting. The new CoA were adopted with 40 out of 41 EFAS partners voting in favour of it. New [EFAS Condition of Access](#) is published on the EFAS webpage.

Summary

The meeting was full of information and organizers appreciated a lot that partners provided feedback and had many questions that could move EFAS forward. Meeting materials, such as presentations and minutes, can be found on the web [here](#). The EFAS annual meeting concluded with a hope that next year we will be able to meet again face to face.

France and Italy Floods, October 2020

by Richard Davies, [floodlist](#)

Storm Alex brought heavy rain and strong winds across parts of Europe from 01 October 2020. South-eastern France and northern Italy experienced the worst of the storm's consequences, where torrential rain caused flooding and landslides resulting in fatalities and widespread damage to homes and infrastructure.

France

In France, areas of Alpes-Maritimes Department were the hardest hit by the floods, in particular the communes of Saint-Martin-Vésubie and Breil-sur-Roya.



Figure 3: Before (top) and after (bottom) flooding in Breil-sur-Roya, October 2020. Images provided by Institut National de l'Information Géographique et Forestière (IGN).

As of 04 October, hundreds of firefighters had carried out over 400 interventions. Military personnel and helicopters were also deployed to assist with rescue efforts. [Department officials](#) said over 2,000 homes suffered damage.

equivalent of more than three months of rain and a record daily amount.

Several people were reported missing at the time and authorities have had difficulty verifying exact numbers. In November 2020, weeks after the event, [media in France reported](#) 7 fatalities as a result of the storm in Alpes-Maritimes Department, with 9 people still thought to be missing.

[Météo France](#) reported 500.2mm of rain in 24 hours to 03 October at Saint-Martin-Vésubie, which is the



Figure 4: Before (top) and after (bottom) flooding in Saint-Martin-Vésubie, October 2020. Images provided by Institut National de l'Information Géographique et Forestière (IGN).

Italy

Italy's Fire Department – Vigili del Fuoco – carried out over 2,500 interventions in Piedmont, Liguria and Lombardy regions in the north of the country.

Emergency teams used helicopters to rescue dozens of people from the flooding. Dozens of people were eventually rescued after being trapped in vehicles along the Col de Tende mountain pass in the Alps, close to the border with France.

Fatalities were reported in the Aosta Valley Region, where a firefighter died during a rescue operation. Another fatality was reported after a man was swept away by flood waters in Vercelli province in Piedmont on 02 October. A third fatality was reported after a

body was found in Col de Tende area in the Province of Cuneo, also Piedmont Region.

[ARPA Piemonte](#) said rainfall totals from 01 to 04 October 2020 were more than 50% of the average annual precipitation for some stations.

Sambughetto in the Province of Verbano-Cusio-Ossola recorded 630 mm of rain in 24 hours to 03 October 2020. Limone Piemonte in the Province of Cuneo recorded 580 mm of rain during the same period.

Several rivers in the region exceeded danger levels, including the Sesia at Borgosesia and Palestro, the Po at Valenza, the Tanaro at Garessio and Farigliano, and the Toce at Candoglia.

EFAS Training for Israel

by EFAS Dissemination Centre

On 19 November 2020 the EFAS Dissemination Centre and the Hydrology Data Collection Centre provided training for the Israel - Israel Hydrological Service (IHS) EFAS Partner and the Israel Fire & Rescue Authority (IFRA), which is an EFAS Third Party partner.



Figure 5: Participants of the EFAS training for Israel

The training aimed to provide:

- Introduction to the EFAS service and existing products, including a presentation on the new products and the 6-hourly calibration
- Training on how to use the EFAS-IS and extract hydro-meteorological information for forecasted extreme events
- Demonstration on how to provide feedback for received notifications
- Reference on existing hydrological and meteorological data around the country and how these can be shared.

Due to the Covid-19 pandemic situation, this one-day training was provided on-line. The training was held by Ilias Pechlivanidis and Michaela Mikulickova from the EFAS Dissemination Centre and Mercedes García Padilla and David Blanco de Córdoba Muñoz from the EFAS Hydrological Data Collection Centre. Besides participants from both Israeli partners, also a delegate from the Israeli Meteorological Service (IMS), who is in charge of R&D remote sensing and nowcasting, attended the workshop.

Some of the participants had previous experience in using the EFAS-IS, whilst for others the training was the first introduction to the service and its products. The meeting started with overviews of activities at IHS and IFRA. The ongoing effort of IHS is concentrated on:

1. Providing flood impact maps.
2. World-wide review of flood centres and their models/tools.
3. Improving hydrological models and tools.
4. Using precipitation ensembles in the hydrological model scheme.
5. Improving nowcasting using artificial intelligence to detect rainfall thresholds.

IFRA showed the decision support tools for severe weather events. IFRA runs a fully gridded hydrological model and based on its results creates insights and alerts. Overall, there is a high interest on impact forecasting. IFRA is targeting a proactive approach, identifying the hazard in advance in space and time in order to take improved actions.

A case study in the Lachish river showed that EFAS v4.0 forecasts for 2020/11/04 had very good performance in relevance to observations. However, for the same event in the region of the Ayalon river, near the city of Tel Aviv, the model (both Lisflood and the national model) did not perform well.

The EFAS Dissemination Centre introduced EFAS (consisting of the EFAS general information, information about LISFLOOD model, probabilistic forecasting, meteorological inputs, EFAS thresholds, EFAS notifications, and flash floods) followed by a discussion on the performance of the different EFAS products.

Moreover, the EFAS Hydrological Data Collection Centre presented the operations and workflows with regard to data transfer, data harmonization, data quality control and validation, collaborations in EFAS products such as reports and bulletins, incident management and partner communications. During the afternoon session, the EFAS Dissemination Centre presented the new EFAS products (rapid impact assessment and rapid flood mapping, sub-seasonal and seasonal outlooks, and 6-hourly calibration), and guided the partners on how to give feedback to the flood notifications sent.

The hands-on session on the EFAS-IS gave everyone the opportunity to explore all layers of the EFAS Interface. At the end of a very intensive day conclusions were summarized. Israeli partners are more familiar with the EFAS now and can explore it according to the needs of their services.

Acknowledgements

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

- DG GROW - 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: Before (top) and After (bottom) flooding in Saint-Martin-Vésuibe, October 2020. Image provided by Institut National de l'Information Géographique et Forestière (IGN). <https://alex.ign.fr/>

Appendix – figures

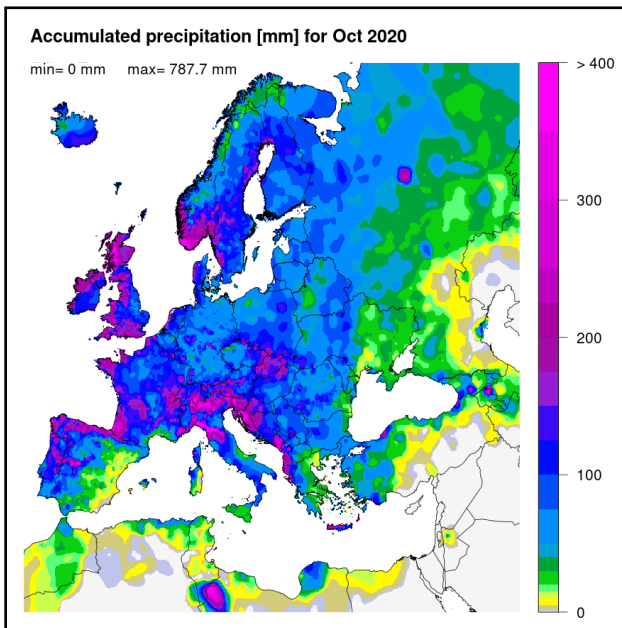


Figure 11. Accumulated precipitation [mm] for October 2020.

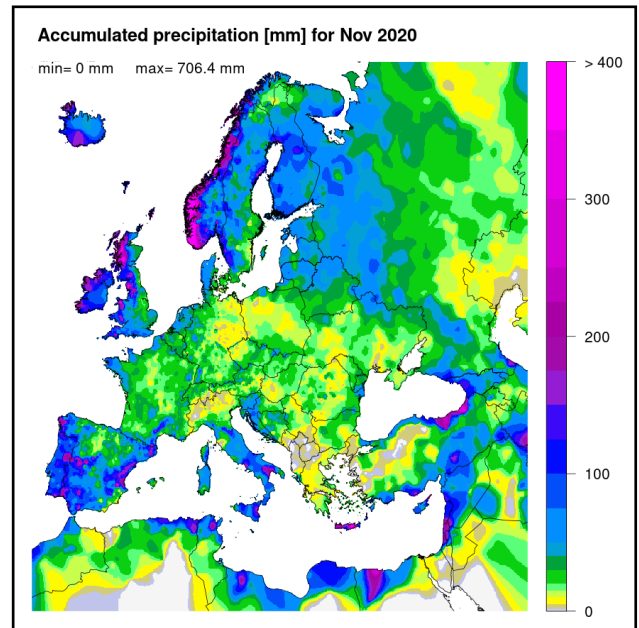


Figure 13. Accumulated precipitation [mm] for November 2020.

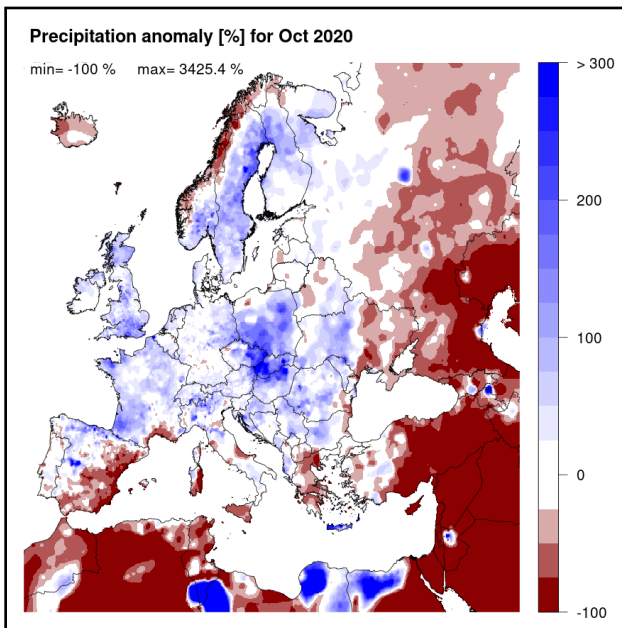


Figure 12. Precipitation anomaly [%] for October 2020, relative to a long-term average (1990-2013). Blue (red) denotes wetter (drier) conditions than normal.

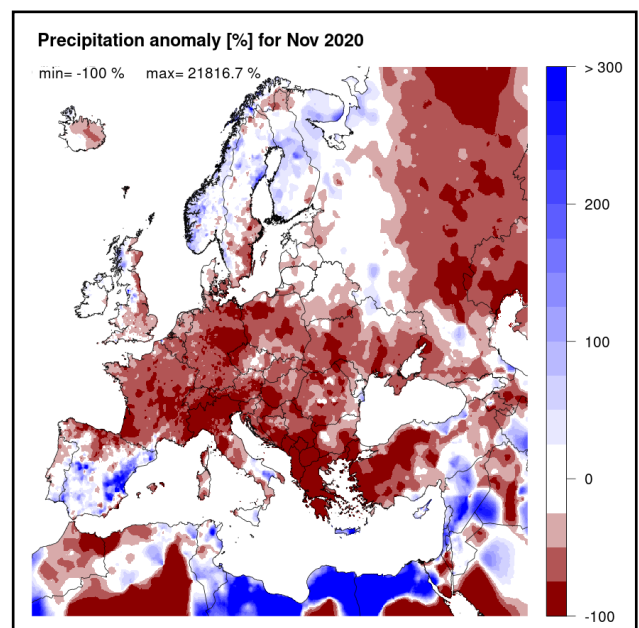


Figure 14. Precipitation anomaly [%] for November 2020, relative to a long-term average (1990-2013). Blue (red) denotes wetter (drier) conditions than normal.

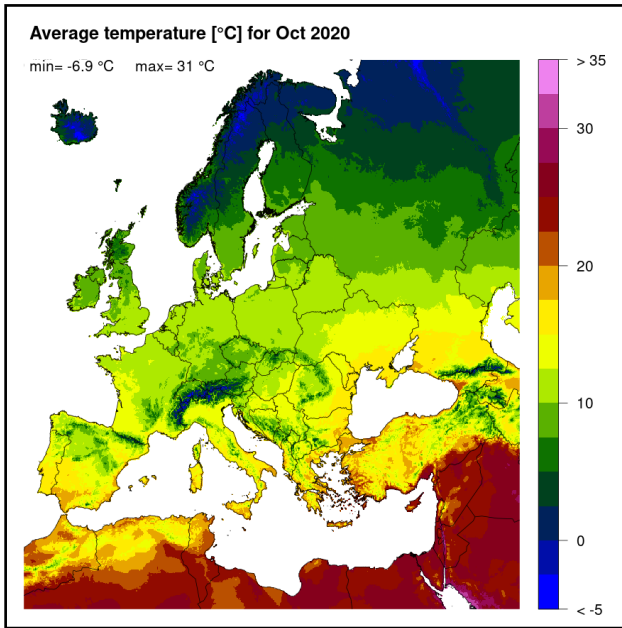


Figure 15. Mean temperature [$^{\circ}\text{C}$] for October 2020.

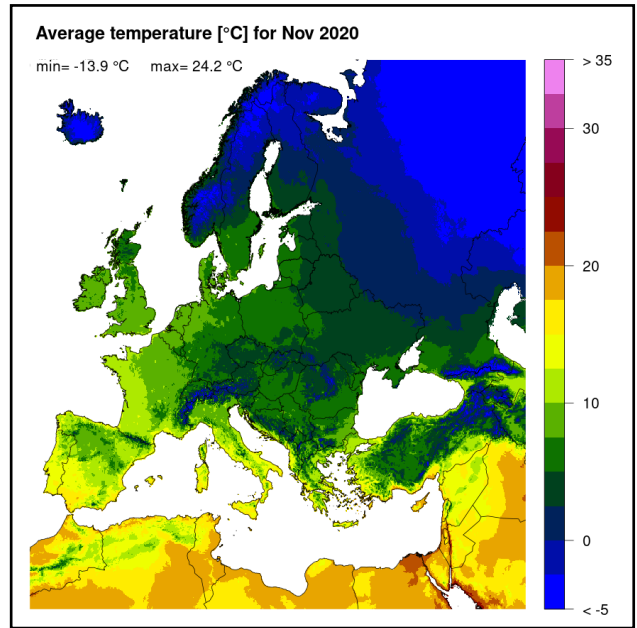


Figure 17. Mean temperature [$^{\circ}\text{C}$] for November 2020.

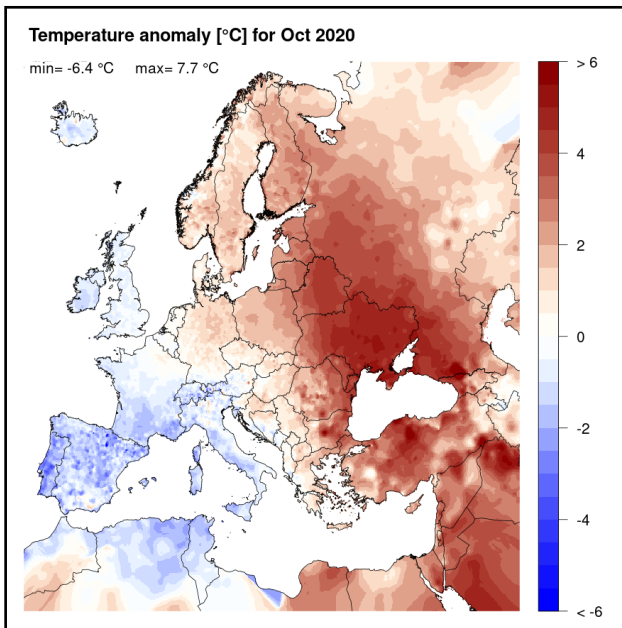


Figure 16. Temperature anomaly [$^{\circ}\text{C}$] for October 2020, relative to a long-term average (1990-2013). Blue (red) denotes colder (warmer) temperatures than normal.

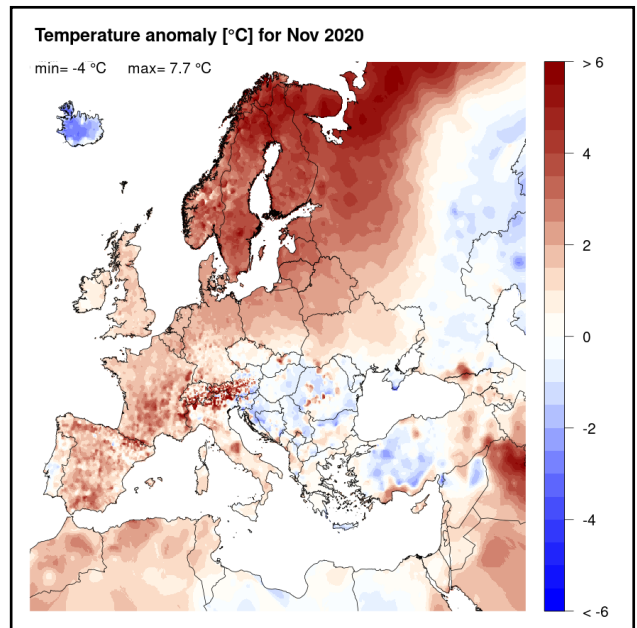


Figure 18. Temperature anomaly [$^{\circ}\text{C}$] for November 2020, relative to a long-term average (1990-2013). Blue (red) denotes colder (warmer) temperatures than normal.

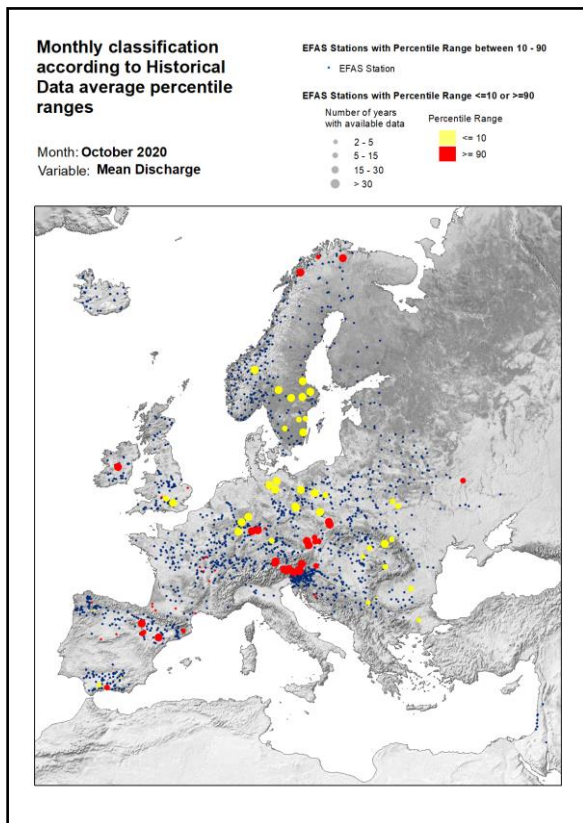


Figure 19. Monthly discharge anomalies October 2020.

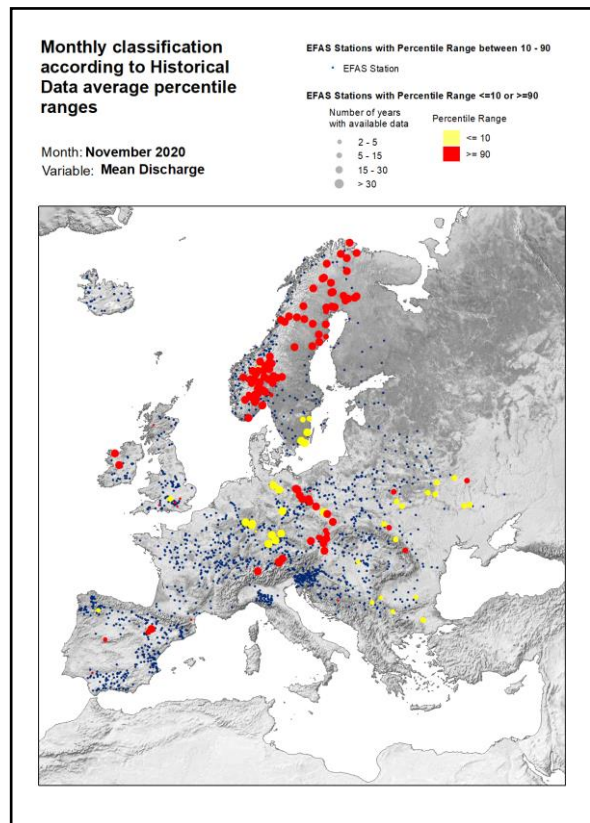


Figure 21. Monthly discharge anomalies November 2020.

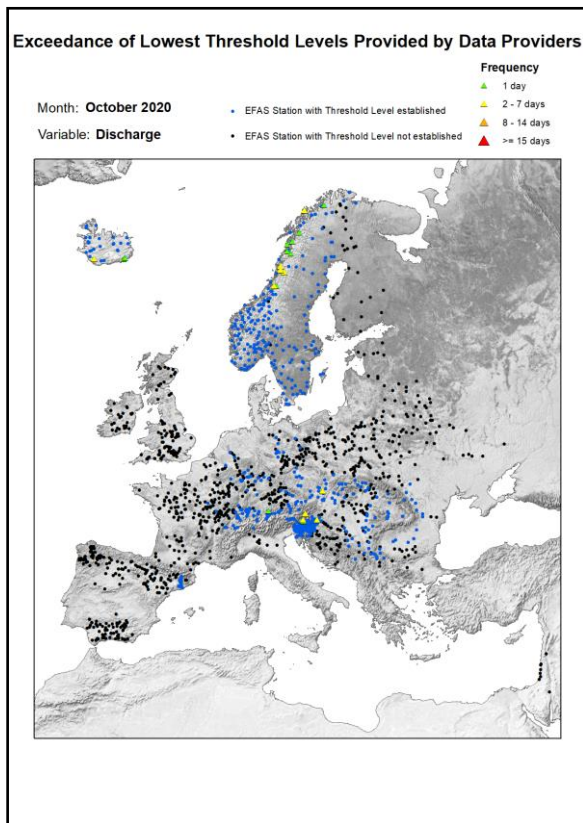


Figure 20. Lowest alert level exceedance for October 2020.

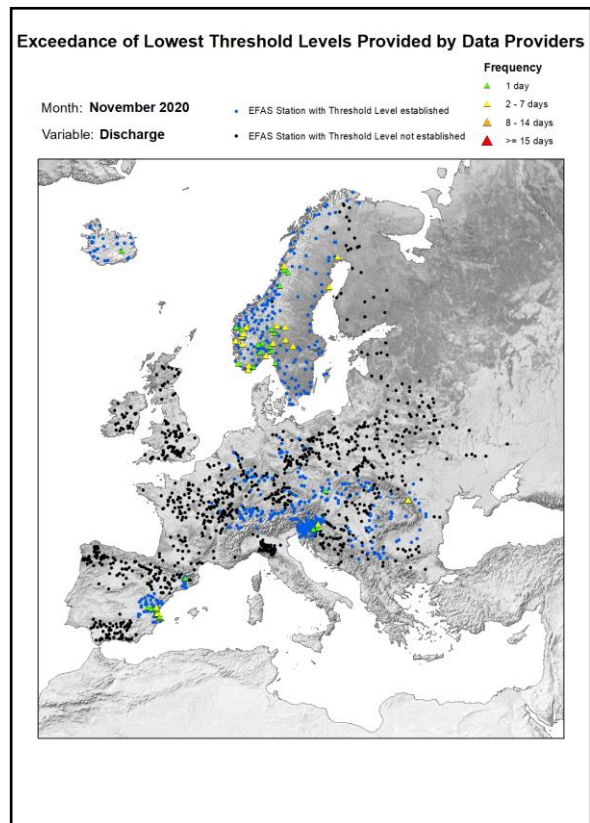


Figure 22. Lowest alert level exceedance for November 2020.

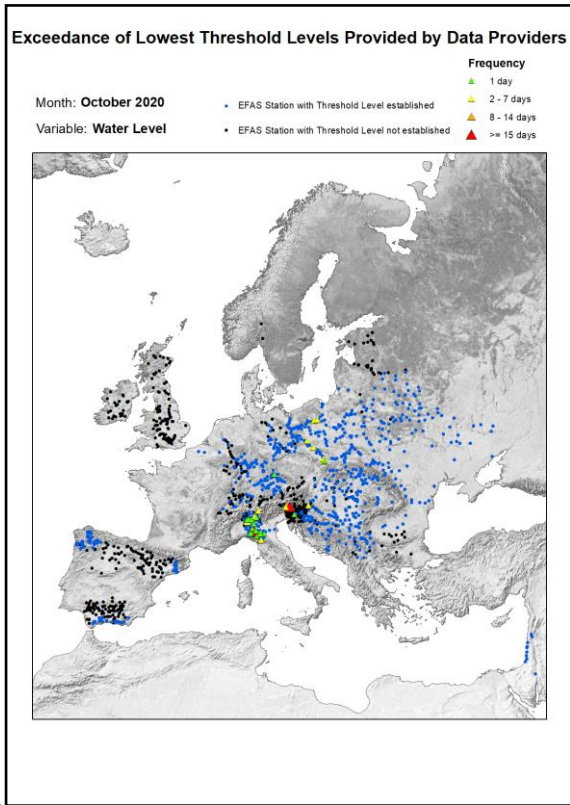


Figure 23. Lowest threshold exceedance for October 2020.

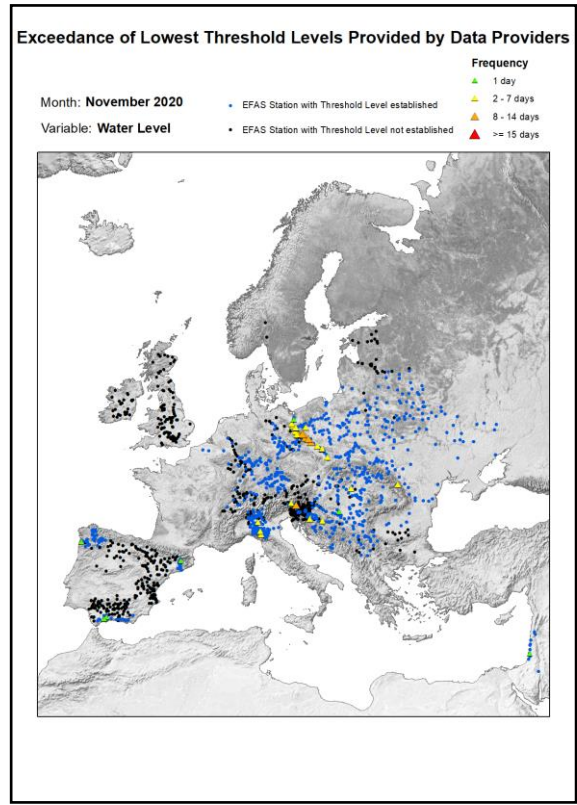


Figure 24. Lowest threshold exceedance for November 2020.

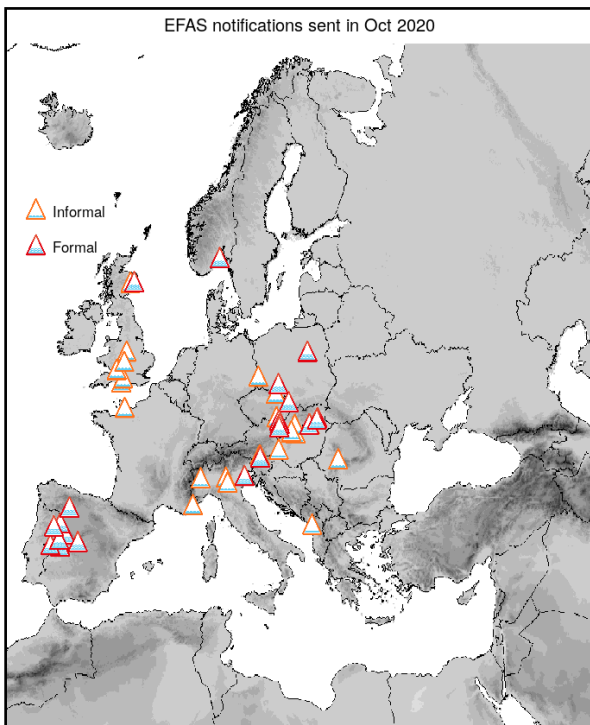


Figure 25. EFAS flood notifications sent for October 2020.

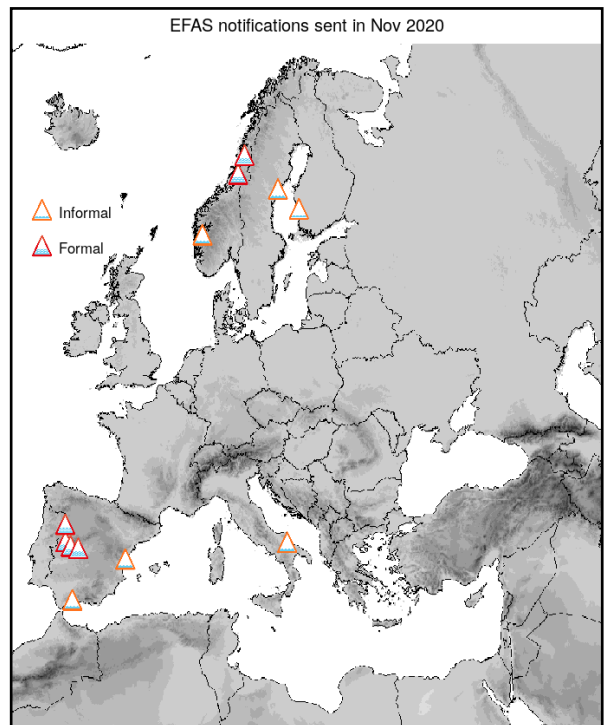


Figure 27. EFAS flood notifications sent for November 2020.

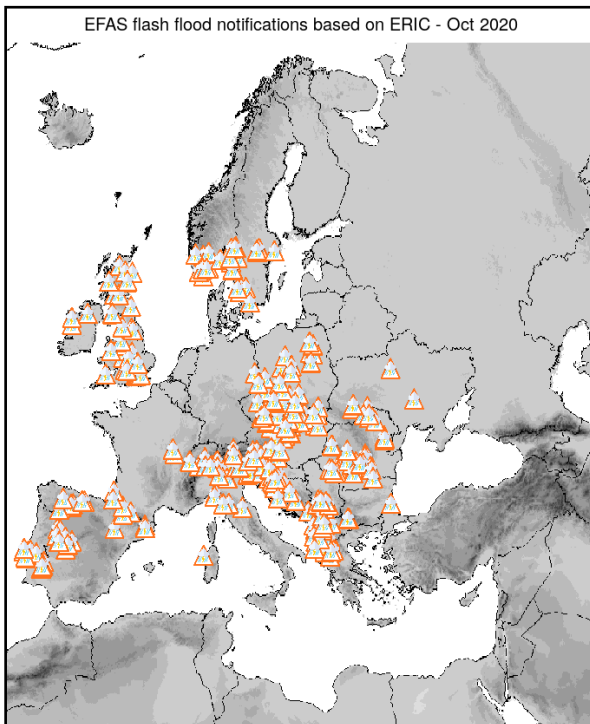


Figure 26. Flash flood notifications sent for October 2020.

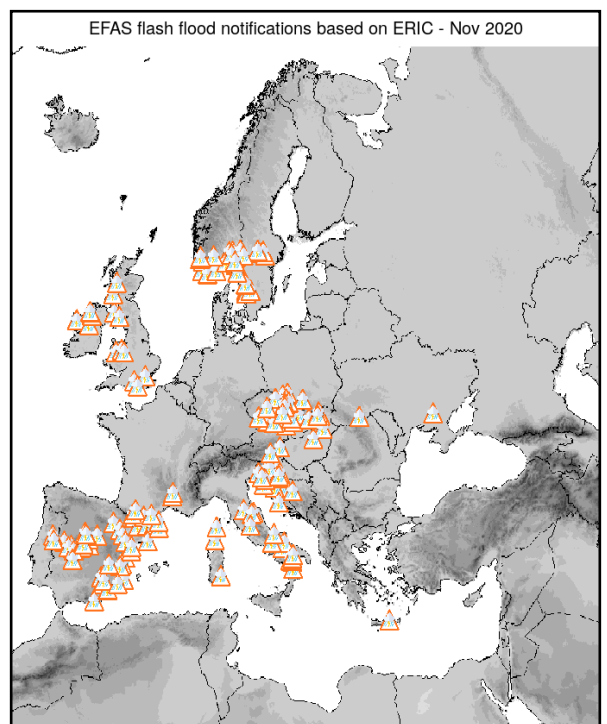


Figure 28. Flash flood notifications sent for November 2020.

Appendix - tables

Table 1: EFAS flood notifications sent in October - November 2020

Type	Forecast date	Issue date	Lead time	River	Country
Formal	30/09/2020 12UTC	01/10/2020	3	Coastal zone	United Kingdom
Formal	30/09/2020 12UTC	01/10/2020	3	Piave	Italy
Informal	30/09/2020 12UTC	01/10/2020	1	Mincio	Italy
Informal	01/10/2020 00UTC	01/10/2020	1	Coastal zone	France
Informal	01/10/2020 12UTC	02/10/2020	2	Trent	United Kingdom
Informal	01/10/2020 12UTC	02/10/2020	3	Gurk	Austria
Informal	01/10/2020 12UTC	02/10/2020	2	Dee	United Kingdom
Informal	02/10/2020 00UTC	02/10/2020	1	Dora Baltea	Italy
Informal	02/10/2020 12UTC	03/10/2020	0	Stour	United Kingdom
Informal	02/10/2020 12UTC	03/10/2020	1	Avon of Bristol	United Kingdom
Informal	02/10/2020 12UTC	03/10/2020	0	Avon (Hampshire)	United Kingdom
Informal	03/10/2020 00UTC	03/10/2020	1	Drin-Buna	Albania
Informal	03/10/2020 12UTC	04/10/2020	2	Vire	France
Informal	03/10/2020 12UTC	04/10/2020	0	Avon	United Kingdom
Formal	04/10/2020 12UTC	05/10/2020	2	Lgen	Norway
Informal	07/10/2020 12UTC	08/10/2020	1	Strei	Romania
Informal	09/10/2020 12UTC	10/10/2020	1	Mincio	Italy
Formal	09/10/2020 12UTC	10/10/2020	2	Gurk	Austria
Informal	10/10/2020 12UTC	11/10/2020	2	Raba	Hungary
Informal	10/10/2020 12UTC	11/10/2020	2	Nitra	Slovakia
Formal	11/10/2020 00UTC	11/10/2020	3	Hornad	Slovakia
Formal	11/10/2020 00UTC	11/10/2020	2	Slana	Slovakia
Formal	11/10/2020 12UTC	12/10/2020	2	Narew, above Bug	Poland
Informal	11/10/2020 12UTC	12/10/2020	2	Hron	Sierra Leone
Formal	11/10/2020 12UTC	12/10/2020	2	Opava	Czechia
Informal	11/10/2020 12UTC	12/10/2020	2	Slana	Hungary
Formal	12/10/2020 00UTC	12/10/2020	2	Hornad	Hungary
Informal	12/10/2020 00UTC	12/10/2020	1	Hron	Slovakia
Informal	12/10/2020 12UTC	13/10/2020	1	Svratka	Czechia
Informal	12/10/2020 12UTC	13/10/2020	2	Lusatian Neisse	Germany
Informal	12/10/2020 12UTC	13/10/2020	1	Nysa K?odzka	Poland
Formal	13/10/2020 00UTC	13/10/2020	2	Morava	Slovakia
Formal	13/10/2020 00UTC	13/10/2020	2	Thaya	Czechia
Formal	13/10/2020 00UTC	13/10/2020	3	March	Austria
Formal	13/10/2020 12UTC	14/10/2020	3	Oder	Poland
Formal	14/10/2020 00UTC	14/10/2020	7	Tietar	Spain
Informal	16/10/2020 00UTC	16/10/2020	12	NITRA	Slovakia
Formal	16/10/2020 12UTC	17/10/2020	90	Duero	Spain
Formal	19/10/2020 00UTC	19/10/2020	36	Agueda	Portugal
Formal	19/10/2020 00UTC	19/10/2020	42	Esla	Spain
Formal	19/10/2020 00UTC	19/10/2020	60	Tajo	Spain
Formal	19/10/2020 00UTC	19/10/2020	30	Alagon	Spain
Formal	19/10/2020 00UTC	19/10/2020	48	Tormes	Spain
Formal	29/10/2020 12UTC	30/10/2020	138	Alberche	Spain

Formal	01/11/2020 12UTC	02/11/2020	78	Tajo	Spain
Informal	01/11/2020 12UTC	02/11/2020	24	Mellan Moälven och Nätraån	Sweden
Formal	02/11/2020 00UTC	02/11/2020	84	Tormes	Spain
Informal	03/11/2020 00UTC	03/11/2020	42	Guadalhorce	Spain
Formal	03/11/2020 12UTC	04/11/2020	66	Namsen	Norway
Formal	05/11/2020 00UTC	05/11/2020	42	Vefsna	Norway
Informal	06/11/2020 00UTC	06/11/2020	30	Tormes	Spain
Informal	18/11/2020 00UTC	18/11/2020	24	Vosso	Norway
Informal	19/11/2020 12UTC	20/11/2020	30	OFANTO	Italy
Informal	20/11/2020 12UTC	21/11/2020	36	Merikarvianjoki	Finland
Formal	23/11/2020 00UTC	23/11/2020	72	Tietar	Spain
Formal	24/11/2020 12UTC	25/11/2020	60	Alberche	Spain
Informal	26/11/2020 12UTC	27/11/2020	24	Mijares	Spain

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

Table 2: EFAS flash flood notifications sent in October - November 2020

Type	Forecast date	Issue date	Lead time	Region	Country
Flash Flood	30/09/2020 12UTC	01/10/2020	60	Lombardia	Italy
Flash Flood	30/09/2020 12UTC	01/10/2020	48	Zaragoza	Spain
Flash Flood	30/09/2020 12UTC	01/10/2020	66	Graubunden	Switzerland
Flash Flood	30/09/2020 12UTC	01/10/2020	60	Liguria	Italy
Flash Flood	30/09/2020 12UTC	01/10/2020	66	Graubunden	Switzerland
Flash Flood	30/09/2020 12UTC	01/10/2020	66	Ticino	Switzerland
Flash Flood	01/10/2020 00UTC	01/10/2020	60	Tirol	Austria
Flash Flood	01/10/2020 00UTC	01/10/2020	48	Valais	Switzerland
Flash Flood	01/10/2020 00UTC	01/10/2020	54	Provincia Autonoma di Bolzano/Bozen	Italy
Flash Flood	01/10/2020 00UTC	01/10/2020	48	Bern	Switzerland
Flash Flood	01/10/2020 00UTC	01/10/2020	48	Saone-et-Loire	France
Flash Flood	01/10/2020 00UTC	01/10/2020	54	Veneto	Italy
Flash Flood	01/10/2020 00UTC	01/10/2020	60	Provincia Autonoma di Trento	Italy
Flash Flood	01/10/2020 12UTC	02/10/2020	54	Karnten	Austria
Flash Flood	01/10/2020 12UTC	02/10/2020	60	Burgenland	Austria
Flash Flood	01/10/2020 12UTC	02/10/2020	42	Piemonte	Italy
Flash Flood	01/10/2020 12UTC	02/10/2020	30	Cote-d'Or	France
Flash Flood	01/10/2020 12UTC	02/10/2020	54	Salzburg	Austria
Flash Flood	02/10/2020 00UTC	02/10/2020	48	East Wales	United Kingdom
Flash Flood	02/10/2020 00UTC	02/10/2020	48	Merseyside	United Kingdom
Flash Flood	02/10/2020 00UTC	02/10/2020	48	Cheshire	United Kingdom
Flash Flood	02/10/2020 00UTC	02/10/2020	48	Nyugat-Dunantul	Hungary
Flash Flood	02/10/2020 00UTC	02/10/2020	42	Steiermark	Austria
Flash Flood	02/10/2020 00UTC	02/10/2020	48	Gloucestershire, Wiltshire and Bristol/Bath area	United Kingdom
Flash Flood	02/10/2020 00UTC	02/10/2020	48	Highlands and Islands	United Kingdom
Flash Flood	02/10/2020 00UTC	02/10/2020	48	Devon	United Kingdom
Flash Flood	02/10/2020 00UTC	02/10/2020	48	Herefordshire, Worcestershire and Warwickshire	United Kingdom

Flash Flood	02/10/2020 00UTC	02/10/2020	48	Shropshire and Staffordshire	United Kingdom
Flash Flood	02/10/2020 12UTC	03/10/2020	30	Outer London - South Leicestershire, Rutland and Northamptonshire	United Kingdom
Flash Flood	02/10/2020 12UTC	03/10/2020	42	West Midlands	United Kingdom
Flash Flood	02/10/2020 12UTC	03/10/2020	42	Berkshire, Buckinghamshire and Oxfordshire	United Kingdom
Flash Flood	02/10/2020 12UTC	03/10/2020	36	Surrey, East and West Sussex	United Kingdom
Flash Flood	02/10/2020 12UTC	03/10/2020	30	Outer London - West and North West	United Kingdom
Flash Flood	02/10/2020 12UTC	03/10/2020	30	Inner London - West	United Kingdom
Flash Flood	02/10/2020 12UTC	03/10/2020	24	Outer London - East and North East	United Kingdom
Flash Flood	02/10/2020 12UTC	03/10/2020	30	Inner London - East	United Kingdom
Flash Flood	02/10/2020 12UTC	03/10/2020	24	Outer London - East and North East	United Kingdom
Flash Flood	02/10/2020 12UTC	03/10/2020	36	North East	Bosnia And Herzegovina
Flash Flood	02/10/2020 12UTC	03/10/2020	36	Republika Srpska	United Kingdom
Flash Flood	03/10/2020 00UTC	03/10/2020	24	Merseyside	United Kingdom
Flash Flood	03/10/2020 00UTC	03/10/2020	42	Northumberland and Tyne and Wear	United Kingdom
Flash Flood	03/10/2020 00UTC	03/10/2020	30	Telemark	Norway
Flash Flood	03/10/2020 00UTC	03/10/2020	24	Bedfordshire and Hertfordshire	United Kingdom
Flash Flood	03/10/2020 00UTC	03/10/2020	30	North Yorkshire	United Kingdom
Flash Flood	03/10/2020 00UTC	03/10/2020	30	North Eastern Scotland	United Kingdom
Flash Flood	03/10/2020 12UTC	04/10/2020	30	Vest-Agder	Norway
Flash Flood	03/10/2020 12UTC	04/10/2020	36	Aust-Agder	Norway
Flash Flood	03/10/2020 12UTC	04/10/2020	42	Karnten	Austria
Flash Flood	04/10/2020 00UTC	04/10/2020	60	Durres	Albania
Flash Flood	04/10/2020 00UTC	04/10/2020	54	Lezhe	Albania
Flash Flood	04/10/2020 00UTC	04/10/2020	60	Pelagoniski	N Macedonia
Flash Flood	04/10/2020 00UTC	04/10/2020	60	Diber	Albania
Flash Flood	04/10/2020 00UTC	04/10/2020	66	Korce	Albania
Flash Flood	04/10/2020 12UTC	05/10/2020	54	Dytiki Makedonia	Greece
Flash Flood	04/10/2020 12UTC	05/10/2020	54	Jugozapaden	N Macedonia
Flash Flood	04/10/2020 12UTC	05/10/2020	54	Ipeiros	Greece
Flash Flood	04/10/2020 12UTC	05/10/2020	48	Poloski	N Macedonia
Flash Flood	05/10/2020 00UTC	05/10/2020	30	Tirane	Albania
Flash Flood	05/10/2020 00UTC	05/10/2020	36	Prizren	Kosovo*
Flash Flood	06/10/2020 00UTC	06/10/2020	6	Lezhe	Albania
Flash Flood	06/10/2020 00UTC	06/10/2020	66	Edinet Briceni Donduseni and Ocnita	Moldova
Flash Flood	06/10/2020 00UTC	06/10/2020	6	Durres	Albania
Flash Flood	06/10/2020 00UTC	06/10/2020	48	Diber	Albania
Flash Flood	06/10/2020 00UTC	06/10/2020	48	Elbasan	Albania
Flash Flood	06/10/2020 00UTC	06/10/2020	48	Korce	Albania
Flash Flood	06/10/2020 00UTC	06/10/2020	72	Leova Hincesti Basarabeasca and Cimislia	Moldova

Flash Flood	06/10/2020 00UTC	06/10/2020	66	Khmel'nyts'kyy	Ukraine
Flash Flood	06/10/2020 00UTC	06/10/2020	72	Vaslui	Romania
Flash Flood	06/10/2020 12UTC	07/10/2020	24	Sisacko-moslavacka zupan- ija	Croatia
Flash Flood	06/10/2020 12UTC	07/10/2020	36	Fier	Albania
Flash Flood	06/10/2020 12UTC	07/10/2020	48	Ivano-Frankivs'k	Ukraine
Flash Flood	06/10/2020 12UTC	07/10/2020	48	Chernivtsi	Ukraine
Flash Flood	06/10/2020 12UTC	07/10/2020	48	Botosani	Romania
Flash Flood	06/10/2020 12UTC	07/10/2020	42	Dambovita	Romania
Flash Flood	06/10/2020 12UTC	07/10/2020	36	Tirane	Albania
Flash Flood	06/10/2020 12UTC	07/10/2020	36	Poloski	N Macedonia
Flash Flood	06/10/2020 12UTC	07/10/2020	60	Cahul/Cantemir and Ga- gauzia	Moldova
Flash Flood	06/10/2020 12UTC	07/10/2020	42	North Yorkshire	United Kingdom
Flash Flood	06/10/2020 12UTC	07/10/2020	36	Dytiki Makedonia	Greece
Flash Flood	06/10/2020 12UTC	07/10/2020	6	Ipeiros	Greece
Flash Flood	06/10/2020 12UTC	07/10/2020	36	Jugozapaden	N Macedonia
Flash Flood	06/10/2020 12UTC	07/10/2020	36	Pelagoniski	N Macedonia
Flash Flood	06/10/2020 12UTC	07/10/2020	48	Ternopil'	Ukraine
Flash Flood	07/10/2020 00UTC	07/10/2020	42	Falesti Glodeni Riscani Balti and Singerei	Moldova
Flash Flood	07/10/2020 00UTC	07/10/2020	36	Covasna	Romania
Flash Flood	07/10/2020 00UTC	07/10/2020	36	Brasov	Romania
Flash Flood	07/10/2020 00UTC	07/10/2020	36	Arges	Romania
Flash Flood	07/10/2020 00UTC	07/10/2020	30	Prahova	Romania
Flash Flood	07/10/2020 00UTC	07/10/2020	42	Caras-Severin	Romania
Flash Flood	07/10/2020 12UTC	08/10/2020	30	Hunedoara	Romania
Flash Flood	07/10/2020 12UTC	08/10/2020	24	Sibiu	Romania
Flash Flood	08/10/2020 12UTC	09/10/2020	60	Girona	Spain
Flash Flood	09/10/2020 00UTC	09/10/2020	48	Barcelona	Spain
Flash Flood	09/10/2020 12UTC	10/10/2020	60	Karnten	Austria
Flash Flood	09/10/2020 12UTC	10/10/2020	60	Friuli-Venezia Giulia	Italy
Flash Flood	09/10/2020 12UTC	10/10/2020	60	Veneto	Italy
Flash Flood	09/10/2020 12UTC	10/10/2020	48	Lombardia	Italy
Flash Flood	10/10/2020 12UTC	11/10/2020	54	Durres	Albania
Flash Flood	10/10/2020 12UTC	11/10/2020	54	Tirane	Albania
Flash Flood	10/10/2020 12UTC	11/10/2020	54	Fier	Albania
Flash Flood	10/10/2020 12UTC	11/10/2020	54	Diber	Albania
Flash Flood	10/10/2020 12UTC	11/10/2020	54	Elbasan	Albania
Flash Flood	10/10/2020 12UTC	11/10/2020	60	Dytiki Makedonia	Greece
Flash Flood	10/10/2020 12UTC	11/10/2020	42	Bratislavsky kraj	Slovakia
Flash Flood	10/10/2020 12UTC	11/10/2020	42	Trnavsky kraj	Slovakia
Flash Flood	10/10/2020 12UTC	11/10/2020	54	Jugozapaden	N Macedonia
Flash Flood	10/10/2020 12UTC	11/10/2020	60	Raska oblast	Serbia
Flash Flood	10/10/2020 12UTC	11/10/2020	60	Pelagoniski	N Macedonia
Flash Flood	10/10/2020 12UTC	11/10/2020	60	Poloski	N Macedonia
Flash Flood	10/10/2020 12UTC	11/10/2020	60	Skopski	N Macedonia
Flash Flood	10/10/2020 12UTC	11/10/2020	54	Korce	Albania
Flash Flood	10/10/2020 12UTC	11/10/2020	36	Steiermark	Austria
Flash Flood	10/10/2020 12UTC	11/10/2020	60	Moravicka oblast	Serbia
Flash Flood	10/10/2020 12UTC	11/10/2020	54	Lezhe	Albania

Flash Flood	11/10/2020 00UTC	11/10/2020	42	Jihomoravsky kraj	Czech Republic
Flash Flood	11/10/2020 00UTC	11/10/2020	48	Gjirokaster	Albania
Flash Flood	11/10/2020 00UTC	11/10/2020	48	Kukes	Albania
Flash Flood	11/10/2020 00UTC	11/10/2020	30	Burgenland	Austria
Flash Flood	11/10/2020 00UTC	11/10/2020	48	Ipeiros	Greece
Flash Flood	11/10/2020 00UTC	11/10/2020	30	Nyugat-Dunantul	Hungary
Flash Flood	11/10/2020 00UTC	11/10/2020	60	Gorj	Romania
Flash Flood	11/10/2020 00UTC	11/10/2020	60	Hunedoara	Romania
Flash Flood	11/10/2020 00UTC	11/10/2020	60	Arges	Romania
Flash Flood	11/10/2020 00UTC	11/10/2020	30	Niederosterreich	Austria
Flash Flood	11/10/2020 00UTC	11/10/2020	42	Trenciansky kraj	Slovakia
Flash Flood	11/10/2020 12UTC	12/10/2020	48	Brasov	Romania
Flash Flood	11/10/2020 12UTC	12/10/2020	48	Dambovita	Romania
Flash Flood	11/10/2020 12UTC	12/10/2020	48	Prahova	Romania
Flash Flood	11/10/2020 12UTC	12/10/2020	42	Zilinsky kraj	Slovakia
Flash Flood	11/10/2020 12UTC	12/10/2020	54	Kosicky kraj	Slovakia
Flash Flood	11/10/2020 12UTC	12/10/2020	54	Eszak-Magyarország	Hungary
Flash Flood	11/10/2020 12UTC	12/10/2020	30	Moravskoslezsky kraj	Czech Republic
Flash Flood	11/10/2020 12UTC	12/10/2020	48	Mazowiecki regionalny	Poland
Flash Flood	11/10/2020 12UTC	12/10/2020	60	Warszawski stoleczny	Poland
Flash Flood	11/10/2020 12UTC	12/10/2020	42	Slaskie	Czech Republic
Flash Flood	11/10/2020 12UTC	12/10/2020	60	Opolskie	Poland
Flash Flood	11/10/2020 12UTC	12/10/2020	48	Mehedinti	Romania
Flash Flood	11/10/2020 12UTC	12/10/2020	60	Podlaskie	Poland
Flash Flood	11/10/2020 12UTC	12/10/2020	42	Banskobystricky kraj	Slovakia
Flash Flood	12/10/2020 00UTC	12/10/2020	36	Caras-Severin	Romania
Flash Flood	12/10/2020 00UTC	12/10/2020	60	Brandenburg	Germany
Flash Flood	12/10/2020 00UTC	12/10/2020	54	Pardubicky kraj	Czech Republic
Flash Flood	12/10/2020 00UTC	12/10/2020	54	Lubuskie	Poland
Flash Flood	12/10/2020 00UTC	12/10/2020	60	Dresden	Germany
Flash Flood	12/10/2020 00UTC	12/10/2020	54	Dolnoslaskie	Poland
Flash Flood	12/10/2020 00UTC	12/10/2020	54	Wielkopolskie	Poland
Flash Flood	12/10/2020 00UTC	12/10/2020	54	Kujawsko-pomorskie	Poland
Flash Flood	12/10/2020 00UTC	12/10/2020	36	Slaskie	Poland
Flash Flood	12/10/2020 00UTC	12/10/2020	42	Opolskie	Poland
Flash Flood	12/10/2020 00UTC	12/10/2020	54	Kralovehradecky kraj	Czech Republic
Flash Flood	12/10/2020 00UTC	12/10/2020	54	Liberecky kraj	Czech Republic
Flash Flood	12/10/2020 00UTC	12/10/2020	54	Kraj Vysocina	Czech Republic
Flash Flood	12/10/2020 00UTC	12/10/2020	54	Jihocesky kraj	Czech Republic
Flash Flood	12/10/2020 00UTC	12/10/2020	36	Moravskoslezsky kraj	Czech Republic
Flash Flood	12/10/2020 00UTC	12/10/2020	36	Mazowiecki regionalny	Poland
Flash Flood	12/10/2020 00UTC	12/10/2020	36	Sibiu	Romania
Flash Flood	12/10/2020 00UTC	12/10/2020	36	Valcea	Romania
Flash Flood	12/10/2020 00UTC	12/10/2020	60	Hlavni mesto Praha	Czech Republic
Flash Flood	12/10/2020 00UTC	12/10/2020	54	Stredocesky kraj	Czech Republic
Flash Flood	11/10/2020 12UTC	13/10/2020	60	Zlinsky kraj	Czech Republic
Flash Flood	12/10/2020 12UTC	13/10/2020	42	Olomoucky kraj	Czech Republic
Flash Flood	12/10/2020 12UTC	13/10/2020	36	Nitriansky kraj	Slovakia
Flash Flood	12/10/2020 12UTC	13/10/2020	36	Warszawski stoleczny	Poland
Flash Flood	12/10/2020 12UTC	13/10/2020	36	Wielkopolskie	Poland
Flash Flood	12/10/2020 12UTC	13/10/2020	36	Lodzkie	Poland

Flash Flood	12/10/2020 12UTC	13/10/2020	42	Podlaskie	Poland
Flash Flood	13/10/2020 12UTC	14/10/2020	24	Kraj Vysocina	Czech Republic
Flash Flood	13/10/2020 12UTC	14/10/2020	60	Shkoder	Albania
Flash Flood	13/10/2020 12UTC	14/10/2020	60	Lezhe	Albania
Flash Flood	13/10/2020 12UTC	14/10/2020	42	Umbria	Italy
Flash Flood	13/10/2020 12UTC	14/10/2020	24	Olomoucky kraj	Czech Republic
Flash Flood	13/10/2020 12UTC	14/10/2020	30	Sardegna	Italy
Flash Flood	13/10/2020 12UTC	14/10/2020	60	Fier	Albania
Flash Flood	13/10/2020 12UTC	14/10/2020	60	Lombardia	Italy
Flash Flood	13/10/2020 12UTC	14/10/2020	60	Poloski	N Macedonia
Flash Flood	13/10/2020 12UTC	14/10/2020	60	Kosovska Mitrovica	Kosovo*
Flash Flood	13/10/2020 12UTC	14/10/2020	54	Crna Gora	Montenegro
Flash Flood	14/10/2020 00UTC	14/10/2020	54	Pelagoniski	N Macedonia
Flash Flood	14/10/2020 00UTC	14/10/2020	54	Ipeiros	Greece
Flash Flood	14/10/2020 00UTC	14/10/2020	48	Kukes	Albania
Flash Flood	14/10/2020 00UTC	14/10/2020	48	Durres	Albania
Flash Flood	14/10/2020 00UTC	14/10/2020	48	Korce	Albania
Flash Flood	14/10/2020 00UTC	14/10/2020	48	Jugozapaden	N Macedonia
Flash Flood	14/10/2020 00UTC	14/10/2020	42	Toscana	Italy
Flash Flood	14/10/2020 00UTC	14/10/2020	48	Zlatiborska oblast	Serbia
Flash Flood	14/10/2020 00UTC	14/10/2020	48	Moravicka oblast	Serbia
Flash Flood	14/10/2020 00UTC	14/10/2020	48	Raska oblast	Serbia
Flash Flood	14/10/2020 00UTC	14/10/2020	54	Dytiki Makedonia	Greece
Flash Flood	14/10/2020 00UTC	14/10/2020	48	Diber	Albania
Flash Flood	14/10/2020 00UTC	14/10/2020	54	Gjirokaster	Albania
Flash Flood	14/10/2020 12UTC	15/10/2020	54	Jihomoravsky kraj	Czech Republic
Flash Flood	14/10/2020 12UTC	15/10/2020	48	Kosicky kraj	Slovakia
Flash Flood	14/10/2020 12UTC	15/10/2020	60	Jihocesky kraj	Czech Republic
Flash Flood	14/10/2020 12UTC	15/10/2020	36	Nyugat-Dunantul	Hungary
Flash Flood	14/10/2020 12UTC	15/10/2020	30	Federacija Bosna i Hercegovina	Bosnia And Herzegovina
Flash Flood	14/10/2020 12UTC	15/10/2020	30	Karlovacka zupanija	Croatia
Flash Flood	14/10/2020 12UTC	15/10/2020	48	Eszak-Magyarorszag	Hungary
Flash Flood	14/10/2020 12UTC	15/10/2020	36	Osrednjeslovenska	Slovenia
Flash Flood	14/10/2020 12UTC	15/10/2020	36	Pecki	Kosovo*
Flash Flood	14/10/2020 12UTC	15/10/2020	30	Licko-senjska zupanija	Croatia
Flash Flood	14/10/2020 12UTC	15/10/2020	42	Karnten	Austria
Flash Flood	14/10/2020 12UTC	15/10/2020	60	Kraj Vysocina	Czech Republic
Flash Flood	14/10/2020 12UTC	15/10/2020	36	Burgenland	Austria
Flash Flood	14/10/2020 12UTC	15/10/2020	60	Olomoucky kraj	Czech Republic
Flash Flood	14/10/2020 12UTC	15/10/2020	30	Sisacko-moslavacka zupanija	Croatia
Flash Flood	14/10/2020 12UTC	15/10/2020	54	Trenciansky kraj	Slovakia
Flash Flood	14/10/2020 12UTC	15/10/2020	30	Pomurska	Slovenia
Flash Flood	14/10/2020 12UTC	15/10/2020	36	Rasinska oblast	Serbia
Flash Flood	14/10/2020 12UTC	15/10/2020	36	Toplicka oblast	Serbia
Flash Flood	14/10/2020 12UTC	15/10/2020	36	Niederosterreich	Austria
Flash Flood	14/10/2020 12UTC	15/10/2020	36	Steiermark	Austria
Flash Flood	15/10/2020 00UTC	15/10/2020	24	Kukes	Albania
Flash Flood	15/10/2020 00UTC	15/10/2020	30	Ipeiros	Greece
Flash Flood	15/10/2020 00UTC	15/10/2020	30	Dytiki Makedonia	Greece

Flash Flood	15/10/2020 00UTC	15/10/2020	30	Kyustendil	Bulgaria
Flash Flood	15/10/2020 00UTC	15/10/2020	24	Elbasan	Albania
Flash Flood	15/10/2020 00UTC	15/10/2020	24	Vlore	Albania
Flash Flood	15/10/2020 00UTC	15/10/2020	24	Diber	Albania
Flash Flood	15/10/2020 00UTC	15/10/2020	54	Bihor	Romania
Flash Flood	15/10/2020 00UTC	15/10/2020	54	Moravskoslezsky kraj	Czech Republic
Flash Flood	15/10/2020 00UTC	15/10/2020	54	Opolskie	Poland
Flash Flood	15/10/2020 00UTC	15/10/2020	48	Blagoevgrad	Bulgaria
Flash Flood	15/10/2020 00UTC	15/10/2020	24	Diber	Albania
Flash Flood	15/10/2020 00UTC	15/10/2020	24	Kukes	Albania
Flash Flood	15/10/2020 00UTC	15/10/2020	42	Zilinsky kraj	Slovakia
Flash Flood	15/10/2020 00UTC	15/10/2020	24	Nitriansky kraj	Slovakia
Flash Flood	15/10/2020 00UTC	15/10/2020	24	Trnavsky kraj	Slovakia
Flash Flood	15/10/2020 12UTC	16/10/2020	60	Botosani	Romania
Flash Flood	15/10/2020 12UTC	16/10/2020	42	Slaskie	Poland
Flash Flood	15/10/2020 12UTC	16/10/2020	36	Zlinsky kraj	Czech Republic
Flash Flood	15/10/2020 12UTC	16/10/2020	48	Kirovohrad	Ukraine
Flash Flood	15/10/2020 12UTC	16/10/2020	30	Banskobystricky kraj	Slovakia
Flash Flood	16/10/2020 12UTC	17/10/2020	24	Kiev City	Ukraine
Flash Flood	17/10/2020 00UTC	17/10/2020	36	Eszak-Magyarország	Hungary
Flash Flood	17/10/2020 12UTC	18/10/2020	60	West	Ireland
Flash Flood	17/10/2020 12UTC	18/10/2020	60	Southern Scotland	United Kingdom
Flash Flood	17/10/2020 12UTC	18/10/2020	60	West Central Scotland	United Kingdom
Flash Flood	18/10/2020 12UTC	19/10/2020	60	Caceres	Spain
Flash Flood	18/10/2020 12UTC	19/10/2020	60	Caceres	Spain
Flash Flood	18/10/2020 12UTC	19/10/2020	60	Caceres	Spain
Flash Flood	18/10/2020 12UTC	19/10/2020	54	Leziria do Tejo	Portugal
Flash Flood	18/10/2020 12UTC	19/10/2020	54	Oeste	Portugal
Flash Flood	18/10/2020 12UTC	19/10/2020	60	Area Metropolitana de Lisboa	Portugal
Flash Flood	18/10/2020 12UTC	19/10/2020	60	Area Metropolitana de Lisboa	Portugal
Flash Flood	18/10/2020 12UTC	19/10/2020	60	Leon	Spain
Flash Flood	18/10/2020 12UTC	19/10/2020	60	Leon	Spain
Flash Flood	18/10/2020 12UTC	19/10/2020	60	Leon	Spain
Flash Flood	18/10/2020 12UTC	19/10/2020	60	Leon	Spain
Flash Flood	18/10/2020 12UTC	19/10/2020	66	Palencia	Spain
Flash Flood	18/10/2020 12UTC	19/10/2020	60	Leon	Spain
Flash Flood	18/10/2020 12UTC	19/10/2020	60	Ostfold	Norway
Flash Flood	18/10/2020 12UTC	19/10/2020	54	Rogaland	Norway
Flash Flood	18/10/2020 12UTC	19/10/2020	60	Varmlands lan	Sweden
Flash Flood	18/10/2020 12UTC	19/10/2020	60	Vastra Gotalands lan	Sweden
Flash Flood	18/10/2020 12UTC	19/10/2020	54	Oeste	Portugal
Flash Flood	18/10/2020 12UTC	19/10/2020	60	Area Metropolitana de Lisboa	Portugal
Flash Flood	18/10/2020 12UTC	19/10/2020	60	Area Metropolitana de Lisboa	Portugal
Flash Flood	18/10/2020 12UTC	19/10/2020	60	Area Metropolitana de Lisboa	Portugal
Flash Flood	18/10/2020 12UTC	19/10/2020	60	Oeste	Portugal
Flash Flood	18/10/2020 12UTC	19/10/2020	60	Alentejo Central	Portugal

Flash Flood	18/10/2020 12UTC	19/10/2020	60	Alentejo Central	Portugal
Flash Flood	18/10/2020 12UTC	19/10/2020	60	Alentejo Central	Portugal
Flash Flood	18/10/2020 12UTC	19/10/2020	60	Alentejo Central	Portugal
Flash Flood	18/10/2020 12UTC	19/10/2020	60	Alentejo Central	Portugal
Flash Flood	18/10/2020 12UTC	19/10/2020	60	Baixo Alentejo	Portugal
Flash Flood	18/10/2020 12UTC	19/10/2020	60	Oeste	Portugal
Flash Flood	18/10/2020 12UTC	19/10/2020	66	Avila	Spain
Flash Flood	18/10/2020 12UTC	19/10/2020	60	Caceres	Spain
Flash Flood	18/10/2020 12UTC	19/10/2020	60	Caceres	Spain
Flash Flood	18/10/2020 12UTC	19/10/2020	54	Leziria do Tejo	Portugal
Flash Flood	18/10/2020 12UTC	19/10/2020	60	Area Metropolitana de Lisboa	Portugal
Flash Flood	18/10/2020 12UTC	19/10/2020	60	Area Metropolitana de Lisboa	Portugal
Flash Flood	18/10/2020 12UTC	19/10/2020	60	Area Metropolitana de Lisboa	Portugal
Flash Flood	18/10/2020 12UTC	19/10/2020	60	Salamanca	Spain
Flash Flood	18/10/2020 12UTC	19/10/2020	60	Salamanca	Spain
Flash Flood	18/10/2020 12UTC	19/10/2020	60	Salamanca	Spain
Flash Flood	18/10/2020 12UTC	19/10/2020	60	Salamanca	Spain
Flash Flood	19/10/2020 00UTC	19/10/2020	48	Alentejo Central	Portugal
Flash Flood	19/10/2020 00UTC	19/10/2020	48	Baixo Alentejo	Portugal
Flash Flood	19/10/2020 00UTC	19/10/2020	42	Alto Alentejo	Portugal
Flash Flood	19/10/2020 00UTC	19/10/2020	36	Vest-Agder	Norway
Flash Flood	19/10/2020 00UTC	19/10/2020	60	Huesca	Spain
Flash Flood	19/10/2020 00UTC	19/10/2020	60	Hautes-Pyrenees	France
Flash Flood	19/10/2020 00UTC	19/10/2020	60	Haute-Garonne	France
Flash Flood	19/10/2020 00UTC	19/10/2020	48	Badajoz	Spain
Flash Flood	19/10/2020 00UTC	19/10/2020	48	Badajoz	Spain
Flash Flood	19/10/2020 00UTC	19/10/2020	48	Leon	Spain
Flash Flood	19/10/2020 00UTC	19/10/2020	48	Avila	Spain
Flash Flood	19/10/2020 00UTC	19/10/2020	48	Caceres	Spain
Flash Flood	19/10/2020 00UTC	19/10/2020	48	Salamanca	Spain
Flash Flood	19/10/2020 00UTC	19/10/2020	42	Area Metropolitana de Lisboa	Portugal
Flash Flood	19/10/2020 12UTC	20/10/2020	36	Cantabria	Spain
Flash Flood	19/10/2020 12UTC	20/10/2020	30	Oeste	Portugal
Flash Flood	19/10/2020 12UTC	20/10/2020	36	Zamora	Spain
Flash Flood	19/10/2020 12UTC	20/10/2020	36	Palencia	Spain
Flash Flood	20/10/2020 00UTC	20/10/2020	30	Pyrenees-Atlantiques	France
Flash Flood	20/10/2020 00UTC	20/10/2020	60	Telemark	Norway
Flash Flood	20/10/2020 00UTC	20/10/2020	24	Alentejo Central	Portugal
Flash Flood	20/10/2020 00UTC	20/10/2020	48	Aust-Agder	Norway
Flash Flood	20/10/2020 00UTC	20/10/2020	60	Orebro lan	Sweden
Flash Flood	20/10/2020 12UTC	21/10/2020	36	Vastra Gotalands lan	Sweden
Flash Flood	20/10/2020 12UTC	21/10/2020	54	Ostfold	Norway
Flash Flood	20/10/2020 12UTC	21/10/2020	42	Varmlands lan	Sweden
Flash Flood	21/10/2020 00UTC	21/10/2020	30	Highlands and Islands	United Kingdom
Flash Flood	21/10/2020 00UTC	21/10/2020	24	Hallands lan	Sweden
Flash Flood	21/10/2020 00UTC	21/10/2020	30	Jonkopings lan	Sweden
Flash Flood	21/10/2020 00UTC	21/10/2020	42	Vastmanlands lan	Sweden

Flash Flood	21/10/2020 12UTC	22/10/2020	18	North Eastern Scotland	United Kingdom
Flash Flood	22/10/2020 00UTC	22/10/2020	48	Vaud	Switzerland
Flash Flood	22/10/2020 00UTC	22/10/2020	60	Mazowiecki regionalny	Poland
Flash Flood	22/10/2020 00UTC	22/10/2020	48	Haute-Savoie	France
Flash Flood	22/10/2020 00UTC	22/10/2020	60	Niederosterreich	Austria
Flash Flood	22/10/2020 12UTC	23/10/2020	54	Kosický kraj	Slovakia
Flash Flood	22/10/2020 12UTC	23/10/2020	42	Lombardia	Italy
Flash Flood	22/10/2020 12UTC	23/10/2020	54	Posavska	Slovenia
Flash Flood	22/10/2020 12UTC	23/10/2020	54	Zasavska	Slovenia
Flash Flood	23/10/2020 00UTC	23/10/2020	54	Vest-Agder	Norway
Flash Flood	23/10/2020 00UTC	23/10/2020	54	Republika Srpska	Bosnia And Herzegovina
Flash Flood	23/10/2020 00UTC	23/10/2020	42	Primorsko-goranska zupanija	Croatia
Flash Flood	23/10/2020 00UTC	23/10/2020	42	Zagrebacka zupanija	Croatia
Flash Flood	23/10/2020 00UTC	23/10/2020	48	Karlovacka zupanija	Croatia
Flash Flood	23/10/2020 00UTC	23/10/2020	42	Osrednjeslovenska	Slovenia
Flash Flood	23/10/2020 00UTC	23/10/2020	42	Primorsko-notranjska	Slovenia
Flash Flood	23/10/2020 00UTC	23/10/2020	54	Telemark	Norway
Flash Flood	23/10/2020 00UTC	23/10/2020	54	Aust-Agder	Norway
Flash Flood	23/10/2020 12UTC	24/10/2020	60	Varmlands lan	Sweden
Flash Flood	23/10/2020 12UTC	24/10/2020	42	Sisacko-moslavacka zupanija	Croatia
Flash Flood	23/10/2020 12UTC	24/10/2020	60	Vastra Gotalands lan	Sweden
Flash Flood	23/10/2020 12UTC	24/10/2020	36	Licko-senjska zupanija	Croatia
Flash Flood	23/10/2020 12UTC	24/10/2020	42	Federacija Bosna i Hercegovina	Bosnia And Herzegovina
Flash Flood	24/10/2020 00UTC	24/10/2020	30	Leon	Spain
Flash Flood	24/10/2020 00UTC	24/10/2020	54	Ostfold	Norway
Flash Flood	24/10/2020 00UTC	24/10/2020	48	Hallands lan	Sweden
Flash Flood	24/10/2020 00UTC	24/10/2020	48	Jonkopings lan	Sweden
Flash Flood	24/10/2020 00UTC	24/10/2020	18	Jugovzhodna Slovenija	Slovenia
Flash Flood	24/10/2020 12UTC	25/10/2020	48	Orebro lan	Sweden
Flash Flood	24/10/2020 12UTC	25/10/2020	48	Landes	France
Flash Flood	24/10/2020 12UTC	25/10/2020	54	Vestfold	Norway
Flash Flood	24/10/2020 12UTC	25/10/2020	42	Dambovita	Romania
Flash Flood	24/10/2020 12UTC	25/10/2020	30	Akershus	Norway
Flash Flood	24/10/2020 12UTC	25/10/2020	42	Arges	Romania
Flash Flood	24/10/2020 12UTC	25/10/2020	42	Valcea	Romania
Flash Flood	24/10/2020 12UTC	25/10/2020	54	Liguria	Italy
Flash Flood	24/10/2020 12UTC	25/10/2020	60	Lombardia	Italy
Flash Flood	24/10/2020 12UTC	25/10/2020	48	Vastmanlands lan	Sweden
Flash Flood	25/10/2020 00UTC	25/10/2020	54	Karnten	Austria
Flash Flood	25/10/2020 00UTC	25/10/2020	42	Toscana	Italy
Flash Flood	25/10/2020 00UTC	25/10/2020	48	Friuli-Venezia Giulia	Italy
Flash Flood	25/10/2020 00UTC	25/10/2020	48	Veneto	Italy
Flash Flood	25/10/2020 00UTC	25/10/2020	48	Provincia Autonoma di Bolzano/Bozen	Italy
Flash Flood	25/10/2020 00UTC	25/10/2020	48	Pyrenees-Atlantiques	France
Flash Flood	25/10/2020 00UTC	25/10/2020	36	Ilfov	Romania
Flash Flood	25/10/2020 00UTC	25/10/2020	30	Giurgiu	Romania

Flash Flood	25/10/2020 00UTC	25/10/2020	48	Provincia Autonoma di Trento	Italy
Flash Flood	25/10/2020 12UTC	26/10/2020	30	Skane lan	Sweden
Flash Flood	25/10/2020 12UTC	26/10/2020	48	Niederosterreich	Austria
Flash Flood	25/10/2020 12UTC	26/10/2020	48	Steiermark	Austria
Flash Flood	25/10/2020 12UTC	26/10/2020	48	Burgenland	Austria
Flash Flood	25/10/2020 12UTC	26/10/2020	54	Licko-senjska zupanija	Croatia
Flash Flood	25/10/2020 12UTC	26/10/2020	54	Nyugat-Dunantul	Hungary
Flash Flood	26/10/2020 00UTC	26/10/2020	42	Federacija Bosna i Hercegovina	Bosnia And Herzegovina
Flash Flood	26/10/2020 00UTC	26/10/2020	18	Ticino	Switzerland
Flash Flood	26/10/2020 00UTC	26/10/2020	24	Stockholms lan	Sweden
Flash Flood	26/10/2020 00UTC	26/10/2020	42	Karlovacka zupanija	Croatia
Flash Flood	26/10/2020 12UTC	27/10/2020	36	Karlovacka zupanija	Croatia
Flash Flood	26/10/2020 12UTC	27/10/2020	30	Licko-senjska zupanija	Croatia
Flash Flood	26/10/2020 12UTC	27/10/2020	54	Ostfold	Norway
Flash Flood	26/10/2020 12UTC	27/10/2020	36	Sisacko-moslavacka zupanija	Croatia
Flash Flood	26/10/2020 12UTC	27/10/2020	48	Varmlands lan	Sweden
Flash Flood	26/10/2020 12UTC	27/10/2020	48	Vastra Gotalands lan	Sweden
Flash Flood	27/10/2020 00UTC	27/10/2020	18	Sibensko-kninska zupanija	Croatia
Flash Flood	27/10/2020 00UTC	27/10/2020	60	Hallands lan	Sweden
Flash Flood	27/10/2020 00UTC	27/10/2020	78	Cumbria	United Kingdom
Flash Flood	27/10/2020 00UTC	27/10/2020	60	West Wales and The Valleys	United Kingdom
Flash Flood	27/10/2020 00UTC	27/10/2020	72	West	Ireland
Flash Flood	27/10/2020 12UTC	28/10/2020	42	Burgas	Bulgaria
Flash Flood	28/10/2020 00UTC	28/10/2020	60	Niederosterreich	Austria
Flash Flood	28/10/2020 00UTC	28/10/2020	60	Jihocesky kraj	Czech Republic
Flash Flood	28/10/2020 12UTC	29/10/2020	60	Trenciansky kraj	Slovakia
Flash Flood	28/10/2020 12UTC	29/10/2020	60	Jihomoravsky kraj	Czech Republic
Flash Flood	28/10/2020 12UTC	29/10/2020	60	Olomoucky kraj	Czech Republic
Flash Flood	28/10/2020 12UTC	29/10/2020	42	Alba	Romania
Flash Flood	28/10/2020 12UTC	29/10/2020	36	Bihor	Romania
Flash Flood	29/10/2020 00UTC	29/10/2020	48	Opolskie	Poland
Flash Flood	29/10/2020 00UTC	29/10/2020	60	Eastern Scotland	United Kingdom
Flash Flood	29/10/2020 00UTC	29/10/2020	60	Southern Scotland	United Kingdom
Flash Flood	29/10/2020 00UTC	29/10/2020	48	Pardubicky kraj	Czech Republic
Flash Flood	29/10/2020 00UTC	29/10/2020	54	Moravskoslezsky kraj	Czech Republic
Flash Flood	29/10/2020 00UTC	29/10/2020	54	Dolnoslaskie	Poland
Flash Flood	29/10/2020 00UTC	29/10/2020	60	Slaskie	Poland
Flash Flood	29/10/2020 00UTC	29/10/2020	54	Zilinsky kraj	Slovakia
Flash Flood	29/10/2020 00UTC	29/10/2020	54	Zlinsky kraj	Czech Republic
Flash Flood	29/10/2020 00UTC	29/10/2020	54	Kosicky kraj	Slovakia
Flash Flood	29/10/2020 00UTC	29/10/2020	54	Presovsky kraj	Slovakia
Flash Flood	29/10/2020 12UTC	30/10/2020	48	Northern Ireland	United Kingdom
Flash Flood	29/10/2020 12UTC	30/10/2020	48	Highlands and Islands	United Kingdom
Flash Flood	29/10/2020 12UTC	30/10/2020	48	Caras-Severin	Romania
Flash Flood	29/10/2020 12UTC	30/10/2020	42	Bratislavsky kraj	Slovakia

Flash Flood	30/10/2020 00UTC	30/10/2020	24	Kraj Vysocina	Czech Republic
Flash Flood	30/10/2020 00UTC	30/10/2020	54	Raska oblast	Serbia
Flash Flood	30/10/2020 00UTC	30/10/2020	36	North Eastern Scotland	United Kingdom
Flash Flood	30/10/2020 00UTC	30/10/2020	30	Kralovehradecky kraj	Czech Republic
Flash Flood	31/10/2020 12UTC	01/11/2020	36	East Wales	United Kingdom
Flash Flood	31/10/2020 12UTC	01/11/2020	36	West Wales and The Valleys	United Kingdom
Flash Flood	31/10/2020 12UTC	01/11/2020	36	Shropshire and Staffordshire	United Kingdom
Flash Flood	01/11/2020 00UTC	01/11/2020	18	Jihocesky kraj	Czech Republic
Flash Flood	01/11/2020 00UTC	01/11/2020	36	Ostfold	Norway
Flash Flood	01/11/2020 00UTC	01/11/2020	42	Vastra Gotalands lan	Sweden
Flash Flood	01/11/2020 00UTC	01/11/2020	42	Jonkopings lan	Sweden
Flash Flood	01/11/2020 00UTC	01/11/2020	36	Aust-Agder	Norway
Flash Flood	01/11/2020 00UTC	01/11/2020	42	Hallands lan	Sweden
Flash Flood	01/11/2020 00UTC	01/11/2020	30	Vest-Agder	Norway
Flash Flood	01/11/2020 00UTC	01/11/2020	36	Rogaland	Norway
Flash Flood	01/11/2020 00UTC	01/11/2020	36	Akershus	Norway
Flash Flood	01/11/2020 00UTC	01/11/2020	36	Orebro lan	Sweden
Flash Flood	01/11/2020 00UTC	01/11/2020	42	Varmlands lan	Sweden
Flash Flood	02/11/2020 00UTC	02/11/2020	24	Vastmanlands lan	Sweden
Flash Flood	02/11/2020 00UTC	02/11/2020	48	Chernivtsi	Ukraine
Flash Flood	02/11/2020 00UTC	02/11/2020	60	Jihomoravsky kraj	Czech Republic
Flash Flood	02/11/2020 12UTC	03/11/2020	54	Madrid	Spain
Flash Flood	02/11/2020 12UTC	03/11/2020	60	Zilinsky kraj	Slovakia
Flash Flood	02/11/2020 12UTC	03/11/2020	60	Burgenland	Austria
Flash Flood	02/11/2020 12UTC	03/11/2020	60	Trenciansky kraj	Slovakia
Flash Flood	02/11/2020 12UTC	03/11/2020	60	Segovia	Spain
Flash Flood	02/11/2020 12UTC	03/11/2020	60	Trnavsky kraj	Slovakia
Flash Flood	02/11/2020 12UTC	03/11/2020	54	Guadalajara	Spain
Flash Flood	02/11/2020 12UTC	03/11/2020	42	Stredocesky kraj	Czech Republic
Flash Flood	02/11/2020 12UTC	03/11/2020	42	Dolnoslaskie	Poland
Flash Flood	02/11/2020 12UTC	03/11/2020	36	Jihocesky kraj	Czech Republic
Flash Flood	02/11/2020 12UTC	03/11/2020	42	Olomoucky kraj	Czech Republic
Flash Flood	02/11/2020 12UTC	03/11/2020	60	Zlinsky kraj	Czech Republic
Flash Flood	02/11/2020 12UTC	03/11/2020	48	Kraj Vysocina	Czech Republic
Flash Flood	02/11/2020 12UTC	03/11/2020	48	Niederosterreich	Austria
Flash Flood	02/11/2020 12UTC	03/11/2020	42	Opolskie	Poland
Flash Flood	02/11/2020 12UTC	03/11/2020	42	Kralovehradecky kraj	Czech Republic
Flash Flood	03/11/2020 00UTC	03/11/2020	42	Slaskie	Poland
Flash Flood	03/11/2020 00UTC	03/11/2020	30	Moravskoslezsky kraj	Czech Republic
Flash Flood	03/11/2020 00UTC	03/11/2020	30	Vastra Gotalands lan	Sweden
Flash Flood	03/11/2020 00UTC	03/11/2020	54	Banskobystricky kraj	Slovakia
Flash Flood	03/11/2020 00UTC	03/11/2020	54	Kosicky kraj	Slovakia
Flash Flood	03/11/2020 00UTC	03/11/2020	30	Olomoucky kraj	Czech Republic
Flash Flood	03/11/2020 00UTC	03/11/2020	54	Castellon / Castello	Spain
Flash Flood	03/11/2020 12UTC	04/11/2020	54	Murcia	Spain
Flash Flood	03/11/2020 12UTC	04/11/2020	42	Eszak-Magyarorszag	Hungary
Flash Flood	03/11/2020 12UTC	04/11/2020	54	Toledo	Spain
Flash Flood	03/11/2020 12UTC	04/11/2020	48	Valencia / Valencia	Spain
Flash Flood	03/11/2020 12UTC	04/11/2020	54	Caceres	Spain

Flash Flood	04/11/2020 00UTC	04/11/2020	24	Presovsky kraj	Slovakia
Flash Flood	04/11/2020 00UTC	04/11/2020	30	Eszak-Alfold	Hungary
Flash Flood	04/11/2020 00UTC	04/11/2020	36	Alicante / Alacant	Spain
Flash Flood	04/11/2020 00UTC	04/11/2020	42	Albacete	Spain
Flash Flood	05/11/2020 12UTC	06/11/2020	48	Ariege	France
Flash Flood	05/11/2020 12UTC	06/11/2020	48	Navarra	Spain
Flash Flood	05/11/2020 12UTC	06/11/2020	48	Zaragoza	Spain
Flash Flood	05/11/2020 12UTC	06/11/2020	48	Huesca	Spain
Flash Flood	05/11/2020 12UTC	06/11/2020	48	Lleida	Spain
Flash Flood	05/11/2020 12UTC	06/11/2020	48	Haute-Garonne	France
Flash Flood	05/11/2020 12UTC	06/11/2020	48	Hautes-Pyrenees	France
Flash Flood	05/11/2020 12UTC	06/11/2020	48	Pyrenees-Orientales	France
Flash Flood	06/11/2020 00UTC	06/11/2020	36	Madrid	Spain
Flash Flood	06/11/2020 00UTC	06/11/2020	36	Girona	Spain
Flash Flood	06/11/2020 00UTC	06/11/2020	24	Beiras e Serra da Estrela	Portugal
Flash Flood	06/11/2020 00UTC	06/11/2020	30	Caceres	Spain
Flash Flood	06/11/2020 00UTC	06/11/2020	36	Toledo	Spain
Flash Flood	06/11/2020 00UTC	06/11/2020	42	Barcelona	Spain
Flash Flood	06/11/2020 12UTC	07/11/2020	24	Segovia	Spain
Flash Flood	06/11/2020 12UTC	07/11/2020	24	Avila	Spain
Flash Flood	07/11/2020 12UTC	08/11/2020	24	Gard	France
Flash Flood	07/11/2020 12UTC	08/11/2020	24	Ardeche	France
Flash Flood	07/11/2020 12UTC	08/11/2020	42	Caceres	Spain
Flash Flood	08/11/2020 00UTC	08/11/2020	54	Kriti	Greece
Flash Flood	10/11/2020 00UTC	10/11/2020	48	Southern Scotland	United Kingdom
Flash Flood	10/11/2020 12UTC	11/11/2020	30	West	Ireland
Flash Flood	11/11/2020 00UTC	11/11/2020	24	Highlands and Islands	United Kingdom
				Hampshire and Isle of	
Flash Flood	14/11/2020 00UTC	14/11/2020	30	Wight	United Kingdom
Flash Flood	14/11/2020 00UTC	14/11/2020	30	Vest-Agder	Norway
				Federacija Bosna i Herce-	Bosnia And Her-
Flash Flood	14/11/2020 12UTC	15/11/2020	60	govina	zegovina
Flash Flood	14/11/2020 12UTC	15/11/2020	36	Telemark	Norway
Flash Flood	14/11/2020 12UTC	15/11/2020	54	Licko-senjska zupanija	Croatia
Flash Flood	14/11/2020 12UTC	15/11/2020	42	Akershus	Norway
Flash Flood	14/11/2020 12UTC	15/11/2020	36	Vestfold	Norway
Flash Flood	14/11/2020 12UTC	15/11/2020	36	Aust-Agder	Norway
Flash Flood	14/11/2020 12UTC	15/11/2020	42	Buskerud	Norway
Flash Flood	14/11/2020 12UTC	15/11/2020	30	Varmlands lan	Sweden
Flash Flood	14/11/2020 12UTC	15/11/2020	24	Inner London - East	United Kingdom
Flash Flood	14/11/2020 12UTC	15/11/2020	54	Karlovacka zupanija	Croatia
				Surrey, East and West Sus-	
Flash Flood	14/11/2020 12UTC	15/11/2020	24	sex	United Kingdom
Flash Flood	14/11/2020 12UTC	15/11/2020	54	Jugovzhodna Slovenija	Slovenia
Flash Flood	14/11/2020 12UTC	15/11/2020	54	Posavska	Slovenia
				Sisacko-moslavacka zupan-	
Flash Flood	14/11/2020 12UTC	15/11/2020	60	ija	Croatia
Flash Flood	15/11/2020 00UTC	15/11/2020	30	Ostfold	Norway
Flash Flood	15/11/2020 00UTC	16/11/2020	42	Primorsko-notranjska	Slovenia
					Bosnia And Her-
Flash Flood	15/11/2020 12UTC	16/11/2020	48	Republika Srpska	zegovina

Flash Flood	15/11/2020 12UTC	16/11/2020	42	Grad Zagreb	Croatia
Flash Flood	15/11/2020 12UTC	16/11/2020	30	Umbria	Italy
Flash Flood	15/11/2020 12UTC	16/11/2020	30	Osrednjeslovenska	Slovenia
Flash Flood	15/11/2020 12UTC	16/11/2020	48	Highlands and Islands	United Kingdom
Flash Flood	15/11/2020 12UTC	16/11/2020	30	Istarska zupanija	Croatia
Flash Flood	15/11/2020 12UTC	16/11/2020	36	Zagrebacka zupanija	Croatia
Flash Flood	15/11/2020 12UTC	16/11/2020	30	Friuli-Venezia Giulia	Italy
Flash Flood	15/11/2020 12UTC	16/11/2020	30	Marche	Italy
				Primorsko-goranska zupan-	
Flash Flood	15/11/2020 12UTC	16/11/2020	30	ija	Croatia
Flash Flood	15/11/2020 12UTC	16/11/2020	36	Sibensko-kninska zupanija	Croatia
Flash Flood	15/11/2020 12UTC	16/11/2020	42	Zasavska	Slovenia
Flash Flood	15/11/2020 12UTC	16/11/2020	30	Toscana	Italy
Flash Flood	16/11/2020 00UTC	16/11/2020	18	Steiermark	Austria
Flash Flood	16/11/2020 00UTC	16/11/2020	18	Obalno-kraska	Slovenia
Flash Flood	17/11/2020 12UTC	18/11/2020	54	Olomoucky kraj	Czech Republic
Flash Flood	17/11/2020 12UTC	18/11/2020	60	Jihomoravsky kraj	Czech Republic
Flash Flood	18/11/2020 00UTC	18/11/2020	24	Rogaland	Norway
Flash Flood	18/11/2020 00UTC	18/11/2020	30	Ostfold	Norway
Flash Flood	18/11/2020 00UTC	18/11/2020	30	Vastra Gotalands lan	Sweden
Flash Flood	18/11/2020 00UTC	18/11/2020	30	Varmlands lan	Sweden
Flash Flood	18/11/2020 00UTC	18/11/2020	36	Jonkopings lan	Sweden
Flash Flood	19/11/2020 00UTC	19/11/2020	60	Basilicata	Italy
Flash Flood	19/11/2020 00UTC	19/11/2020	24	Kosicky kraj	Slovakia
Flash Flood	19/11/2020 00UTC	19/11/2020	60	Calabria	Italy
Flash Flood	19/11/2020 12UTC	20/11/2020	42	Puglia	Italy
Flash Flood	20/11/2020 00UTC	20/11/2020	30	Rogaland	Norway
Flash Flood	20/11/2020 00UTC	20/11/2020	12	Lazio	Italy
Flash Flood	20/11/2020 00UTC	20/11/2020	36	Telemark	Norway
Flash Flood	20/11/2020 00UTC	20/11/2020	36	Ostfold	Norway
Flash Flood	20/11/2020 00UTC	20/11/2020	36	Varmlands lan	Sweden
Flash Flood	20/11/2020 00UTC	20/11/2020	36	Vastra Gotalands lan	Sweden
Flash Flood	20/11/2020 00UTC	20/11/2020	24	Campania	Italy
Flash Flood	20/11/2020 00UTC	20/11/2020	24	Molise	Italy
Flash Flood	20/11/2020 12UTC	21/11/2020	30	Hallands lan	Sweden
Flash Flood	20/11/2020 12UTC	21/11/2020	30	Jonkopings lan	Sweden
Flash Flood	21/11/2020 00UTC	21/11/2020	18	Vastmanlands lan	Sweden
Flash Flood	21/11/2020 00UTC	21/11/2020	18	Orebro lan	Sweden
Flash Flood	21/11/2020 12UTC	22/11/2020	24	Basilicata	Italy
Flash Flood	21/11/2020 12UTC	22/11/2020	24	Calabria	Italy
Flash Flood	22/11/2020 00UTC	22/11/2020	60	West	Ireland
Flash Flood	22/11/2020 00UTC	22/11/2020	66	Southern Scotland	United Kingdom
Flash Flood	22/11/2020 12UTC	23/11/2020	54	Border	Ireland
Flash Flood	23/11/2020 00UTC	23/11/2020	36	Vastra Gotalands lan	Sweden
Flash Flood	23/11/2020 00UTC	23/11/2020	36	Hallands lan	Sweden
Flash Flood	23/11/2020 00UTC	23/11/2020	36	Jonkopings lan	Sweden
Flash Flood	23/11/2020 00UTC	23/11/2020	48	Rogaland	Norway
Flash Flood	23/11/2020 12UTC	24/11/2020	30	Northern Ireland	United Kingdom
Flash Flood	23/11/2020 12UTC	24/11/2020	24	Border	Ireland
Flash Flood	23/11/2020 12UTC	24/11/2020	66	Caceres	Spain
Flash Flood	23/11/2020 12UTC	24/11/2020	78	Avila	Spain

Flash Flood	23/11/2020 12UTC	24/11/2020	72	Toledo	Spain
Flash Flood	24/11/2020 12UTC	25/11/2020	48	Badajoz	Spain
Flash Flood	24/11/2020 12UTC	25/11/2020	54	Segovia	Spain
Flash Flood	24/11/2020 12UTC	25/11/2020	54	Madrid	Spain
Flash Flood	25/11/2020 00UTC	25/11/2020	30	Vastra Gotalands lan	Sweden
Flash Flood	25/11/2020 00UTC	25/11/2020	12	Beiras e Serra da Estrela	Portugal
Flash Flood	25/11/2020 12UTC	26/11/2020	48	Almeria	Spain
Flash Flood	25/11/2020 12UTC	26/11/2020	78	Girona	Spain
Flash Flood	25/11/2020 12UTC	26/11/2020	78	Barcelona	Spain
Flash Flood	25/11/2020 12UTC	26/11/2020	66	Teruel	Spain
Flash Flood	25/11/2020 12UTC	26/11/2020	78	Pyrenees-Orientales	France
Flash Flood	25/11/2020 12UTC	26/11/2020	66	Valencia / Valencia	Spain
Flash Flood	25/11/2020 12UTC	26/11/2020	60	Albacete	Spain
Flash Flood	25/11/2020 12UTC	26/11/2020	60	Alicante / Alacant	
Flash Flood	25/11/2020 12UTC	26/11/2020	54	Murcia	Spain
Flash Flood	25/11/2020 12UTC	26/11/2020	66	Zaragoza	Spain
Flash Flood	25/11/2020 12UTC	26/11/2020	60	Castellon / Castello	Spain
Flash Flood	25/11/2020 12UTC	26/11/2020	66	Tarragona	Spain
Flash Flood	26/11/2020 00UTC	26/11/2020	54	Cuenca	Spain
Flash Flood	26/11/2020 12UTC	27/11/2020	60	Corse-du-Sud	France
Flash Flood	26/11/2020 12UTC	27/11/2020	60	Haute-Corse	France
Flash Flood	26/11/2020 12UTC	27/11/2020	60	Aude	France
Flash Flood	27/11/2020 00UTC	27/11/2020	36	Sardegna	Italy
Flash Flood	27/11/2020 12UTC	28/11/2020	60	Basilicata	Italy
Flash Flood	28/11/2020 12UTC	29/11/2020	66	Vastra Gotalands lan	Sweden
Flash Flood	28/11/2020 12UTC	29/11/2020	54	Kherson	Ukraine
Flash Flood	28/11/2020 12UTC	29/11/2020	66	Varmlands lan	Sweden
Flash Flood	28/11/2020 12UTC	29/11/2020	18	Puglia	Italy
Flash Flood	29/11/2020 00UTC	29/11/2020	54	Ostfold	Norway

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.

Contact details:

European Centre for Medium-Range Weather Forecasts (ECMWF)
Shinfield Park, Reading,
RG2 9AX, UK

Tel: +44-118-9499-303

Fax: +44-118-9869-450

Email: comp@efas.eu

www.efas.eu

www.ecmwf.int