European Flood Awareness System

EFAS *Bulletin*

April – May 2020

Issue 2020(3)

NEWS

New vacancy

The Joint Research Centre of the European Commission has published a vacancy for a position (Post-doc or 3 years' experience after University degree) on flood impact assessment. The main aim of the vacancy is to create a unique, independent record of flood impact and losses at European and global level by merging satellite-based flood monitoring information with modelled data and other sources of information (e.g. media, national databases).
Find out more about the job description and how to apply here (Code: 2020-IPR-E1-FGIV-014769 - ISPRA). Application deadline: 10 July 2020.

New features

Webinars

Two new webinars have been published on the EFAS website. These webinars aired on 26 May 2020. The 'Multi-Partner Feedback Process' webinar provides information on the new EFAS feedback collection tool. The 'Updates to the ERIC Flash Flood Criteria' webinar provides information on recent updates to the EFAS flash flood indicator (ERIC).

Report on Europe's parched spring

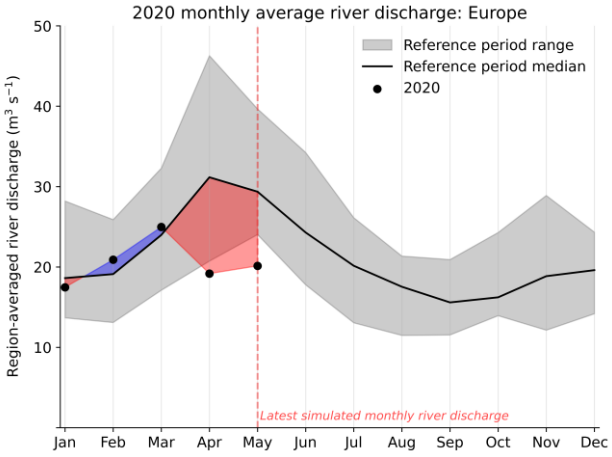

Figure 1: Monthly average river discharge across Europe. The range between minimum and maximum discharge during the 1991–2016 reference period is shown in the shaded grey area, the median of 1991–2016 as a solid black line and from January to May 2020 as black dots. Coloured shaded areas denote deviations from the median, with blue indicating higher discharge and red indicating lower discharge than the median. Data source: Copernicus EMS model-derived river discharge. Credit: Copernicus Emergency Management Service/ECMWF.

A summary report on the remarkably dry conditions experienced in Europe during spring 2020 has now been published on the Copernicus Climate Change Service (C3S) website. This report uses C3S data, together with information on wildfires and river discharge from the Copernicus Atmosphere Monitoring Service (CAMS) and Copernicus Emergency Management Service (Copernicus EMS), and precipitation data from the World Meteorological Organization's regional monitoring network for Europe (WMO RA VI RCC) to build a picture of the exceptionally dry European spring of 2020.
Copernicus EMS EFAS model-derived data were used in this report show record low levels of river discharge for April and May since model-derived data records began in 1991.

New flood assessment report

A detailed assessment report on the flood events in northern Spain in December 2019 has now been published on the EFAS website. This report focuses on three river basins during this event. The report provides understanding of the EFAS forecasts in terms of accuracy, timely availability, and effective communication of the forecasts. The report evaluates the accuracy of the EFAS forecasts, while commenting on the hydrological forecasting skill and model performance over the region of northern Spain for this event.

RESULTS

Summary of EFAS Flood and Flash Flood Notifications

The 86 formal and 24 informal EFAS flood notifications issued in April-May 2020 are summarised in Table 1. The locations of all notifications are shown in Figure 31 and Figure 33 in the appendix.

321 Flash flood notification were issued in April - May 2020. They are summarised in Table 2. The locations of all notifications are shown in Figure 32 and Figure 34 in the appendix.

Meteorological situation

by EFAS Meteorological Data Collection Centre

April

The meteorological situation in April 2020 was characterised by higher than normal monthly mean surface

pressure in the northwest and centre of the EFAS domain and below normal in the northeast, southeast and southwest of the EFAS domain. Many regions had below normal monthly precipitation totals, whereas monthly totals were above normal in some other regions. The monthly mean air temperature was below the long-term mean in the eastern regions of the EFAS domain whereas there were positive anomalies in the western parts.

At the beginning of April 2020, a low-pressure system was located over northern Scandinavia with a weak secondary system over the Norwegian Sea. The Azores high was shifted northward, located south of Iceland and extended to central Europe. Furthermore, a weak high-pressure system was situated over the southern central Mediterranean region and low-pressure systems over the western Iberian Peninsula and the eastern Mediterranean region. The second one moved to the Aegean Sea and disappeared there but brought intense precipitation to this region. The low-pressure system from the Iberian Peninsula moved in the next about twelve days eastward over the Mediterranean Sea towards the south-eastern part of EFAS domain and merged on its way with another low-pressure system from northern Africa associated with several intense precipitation events along its track. The low-pressure system over northern Scandinavia moved to the Arctic Ocean and the secondary system strengthened and moved across central Scandinavia also to the Arctic Ocean, brought significant precipitation amounts and, partly, strong winds along its way. The high-pressure system moved to eastern Europe while strengthening. A low-pressure system developed over the Atlantic Ocean and moved via Iceland and north Scandinavia to the Arctic Ocean. Its strong winds influenced especially Great Britain and Ireland, Iceland and parts of Scandinavia. The Azores high established itself at its normal position. Then a low-pressure system, formed near Newfoundland, moved via the Atlantic Ocean, including the cut-off of a weak secondary system, towards Scandinavia, where it intensified and caused strong winds. It moved further towards Russia and disappeared there some days later. The secondary system moved southward to the region between the Azores and Iberian Peninsula, merged with another low-pressure system from the Atlantic Ocean and moved to the Bay of Biscay and dissipated there. A zone of high-pressure established in the meantime from the North Sea to the Balkans with several cores, while an upper-level trough caused intense rainfall around the Adriatic Sea. The northern core in the high-pressure zone developed to a separate high-pressure system over Scandinavia, while a low-pressure system formed over northwest Africa and moved to the western Mediterranean region and a low-pressure system from the Atlantic Ocean to the same region, associated with heavy precipitation events. The first one disappeared soon while the second one could be tracked to the central Mediterranean region. During the same days, a low-pressure system developed over southern Russia and moved to the Arctic with notable precipitation amount along its track. By the end of the month, one low-pressure system developed east of the Baltic Sea and another one over the Atlantic Ocean. Both moved eastward and brought large-scale precipitation.

In April 2020, the highest precipitation totals were observed around the Iberian Peninsula and in western Norway, but also around the Aegean Sea, southeast of the Black Sea and in Russia (Figure 17). On the other hand, no or nearly no precipitation fell in a region from central and eastern Europe to the Black Sea, northward of the Caspian Sea and the southeast of the EFAS domain. Monthly precipitation totals above the long-term means were observed at the Iberian Peninsula, northwest Africa, western Norway and in Russia (Figure 18). Negative precipitation anomalies were reported from the majority of the EFAS domain. The monthly mean air temperature ranged from -12.1°C to 26.1°C with the highest values in the southern parts and lowest in the northern and mountainous parts of the EFAS domain (Figure 21).

Air temperature anomalies ranged from -4.5°C to 12.3°C (Figure 22). Monthly mean air temperature below the long-term means were noted in Portugal, Iceland and the region from northern Scandinavia towards northeast Africa, while abnormally high temperatures were reported in central and western Europe, northwest Africa as well as in the southeast and the northeast of the EFAS domain.

May

The meteorological situation in May 2020 was characterised by abnormally high monthly mean surface pressure over Great Britain and Ireland and the North Sea and abnormally low in the Norwegian Sea and the eastern parts of the EFAS domain. Many regions had below normal monthly precipitation totals, whereas the monthly totals were above normal particularly in some regions in the east of the EFAS domain. The monthly mean air temperatures were below the long-

term means in central, eastern and northern Europe while positive anomalies occurred in the other parts of the EFAS domain.

At the beginning of May 2020, a low-pressure system was located over Great Britain and Ireland with weak secondary cores westward over the Atlantic Ocean. The Azores high-pressure system was shifted southward and the African and south-eastern parts of the EFAS-domain were also influenced by high-pressure systems. The main core of the above-mentioned low-pressure system moved to Scandinavia and disappeared but brought significant amounts of large-scale precipitation to the central and northern parts of the EFAS domain. One of its secondary cores intensified over the Atlantic Ocean and was cut-off. It moved southward to the Azores forcing the high-pressure system to move to the Iberian Peninsula. Another high-pressure system extended from the Atlantic Ocean to Iceland and developed a new core there. This core merged with the high-pressure system from the Iberian Peninsula over Great Britain and Ireland. During the same period, an upper-level low-pressure system was cut-off over eastern Europe and moved eastward via the eastern Mediterranean Sea. Floods associated with rainfall caused by this system occurred in Israel. Also, during this period, a low-pressure system moved from Greenland to northern Scandinavia and the remaining trough from the low-pressure system mentioned at the beginning of May extended southward. Particularly, in the first days of the extension, it caused intense precipitation in eastern Europe. The high-pressure system from Great Britain and Ireland moved to central Europe and extended to the central Mediterranean region before it weakened, but another high-pressure system moved from Greenland to Great Britain and Ireland and built a bridge to the Azores high. More relevant in respect of high impact weather were some small low-pressure systems, which were left over from the aforementioned cut-off system at the beginning of May. One system moved via the Iberian Peninsula and brought intense precipitation to western and southern France, which led to local flooding. The low-pressure system over northern Scandinavia was still active in this region, producing several new cores there, which were getting the active ones, associated with strong winds especially over the northern Norwegian Sea. An upper-level low-pressure system moved from the Atlantic Ocean to the central Mediterranean region while weakening but caused heavy rainfall events in the central Mediterranean region. Another low-pressure system developed over the Atlantic Ocean and moved to Great Britain and Ireland causing strong winds and intense precipitation there. In the slipstream of this low-pressure system, the Azores high-pressure system intensified and moved to western Europe and Scandinavia by the end of the month. A large but weak upper-level low-pressure system brought noteworthy large-scale precipitation amounts over eastern Europe.

The highest precipitation totals in May 2020 were observed in the Alps, the Caucasus, eastern Europe and the Norwegian coast (Figure 19). On the other hand, no or nearly no precipitation fell in the regions of England, Belgium, and most of northern Africa in the EFAS domain. The low precipitation totals in Hungary were found also in an independent analysis of the Global Precipitation Climatology Centre (GPCC). Monthly precipitation totals above the long-term means were observed in eastern Europe and locally around the Mediterranean Sea (Figure 20). Negative precipitation anomalies were reported from central and northern Europe and the African region of the EFAS domain.

The monthly mean air temperatures ranged from -9°C to 31.4°C with the highest values in the southern areas and the lowest in the northern and mountainous areas of the EFAS domain (Figure 23). Air temperature anomalies ranged from -5.5°C to 11.2°C (Figure 24). Monthly mean air temperatures below the long-term means were found in central and eastern Europe as well as in Iceland. Above normal air temperatures were reported from western Europe and the African and Asian regions of the EFAS domain.

Hydrological situation

by EFAS Hydrological Data Collection Centre

April

The month of April has been characterised by a low number of stations exceeding their lowest threshold level. The Po river basin in Italy and Guadalhorce river basin in southern Spain, had the highest number of stations in this situation. The rest of the stations are found in isolation in the Danube river basin in Kosovo and Hungary, Vistula and Dnieper river basins in Ukraine, Loelva and Ataelva river basins in Norway, and Helge river basin in southern Sweden.

Stations that recorded discharge values lower than the 10% quantile, are found with a high incidence in most of the basins in central and eastern Europe: Rhine, Danube, Oder, Vistula, Dnieper and Dniester. We can also find stations showing values below 10% in stations of British Isles, and southern Sweden and Norway. In a minor extent we found the same situation in isolated stations in Ebro (Spain), Seine and Rhône (France) and Southern Bug (Ukraine) river basins.

Contrastingly, stations that recorded discharge values above the 90% quantile are mostly located in basins of northern Norway and Finland, Ebro river basin in Spain, and Danube river basin in Austria .This also occurs in isolated stations of Guadalquivir, Guadalhorce and Llobregat river basins in Spain, Nea and Farstad river basins in Norway, and Thames and Helge river basins in England and southern Sweden respectively.

May

For the month of May, it is remarkable the fact that a high number of stations exceeded their lowest threshold level in the Po river basin, Italy. Some stations located along Parma and Riglio rivers exceeded this level for more than 30 days. In Hungary, one station located in Danube basin (Tisza river) surpassed, during all the month its lowest threshold level. As can be seen in Norway, five stations across the country surpassed low thresholds too. Some other countries such as Austria, Bosnia and Herzegovina, Poland, Serbia, Sweden, Spain and Ukraine have exceedances in scattered places and for fewer days (from one to five).

There are few stations that exceeded the 90% quantile during the month of May, 11 of which are grouped in the northeast of Spain (Ebro, Ter and Llobregat basins). The others are scattered throughout Norway, the United Kingdom and Ukraine. On the other hand, many stations located in central Europe have values under the 10% quantile, mainly in the rivers that flow along the Danube, Dnieper, Elbe, Oder, Rhine and Vistula basins. We also find stations that show values below 10% in Ireland (Inny river), United Kingdom (Thames and Severn rivers), Scotland (Tweed river), Sweden, Norway, Ukraine, Belgium, Slovenia, Serbia and Spain.

Verification

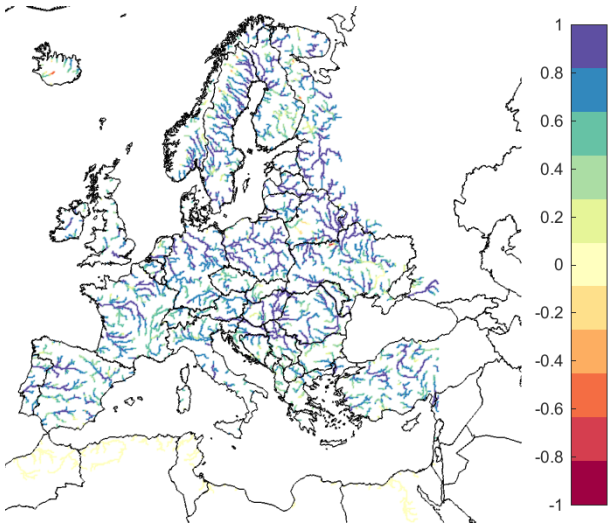

Figure 2. EFAS CRPSS at lead-time 1 day for the April-May 2020 period, for catchments >2000km2. The reference score is persistence of using previous day's forecast.

Figure 2 and Figure 3 shows the EFAS headline score, the Continuous Ranked Probability Skill Score (CRPSS) for lead times 1 and 5 days for the April to May 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.

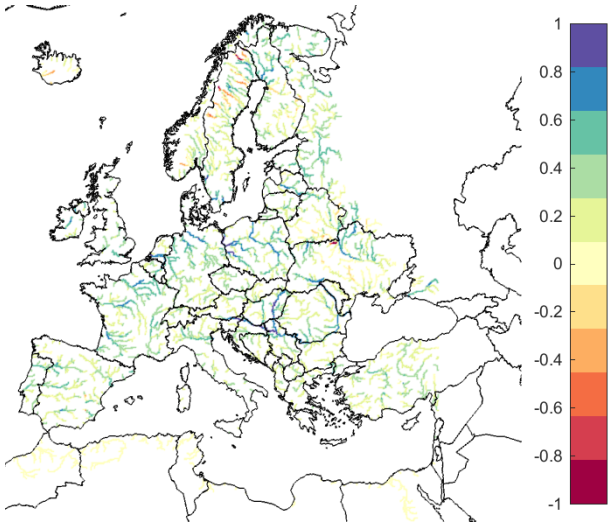

Figure 3. EFAS CRPSS at lead-time 5 days for the April-May 2020 period, for catchments >2000km2. The reference score is persistence of using previous day's forecast.

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, and better compared to the same period last year (Figure 4). The scores for 2019 are very good considering the wet autumn in large parts of Europe whereas the unusual dry summer last year affected the results and gave very positive scores. An inter-annual variability of the scores is to be expected.

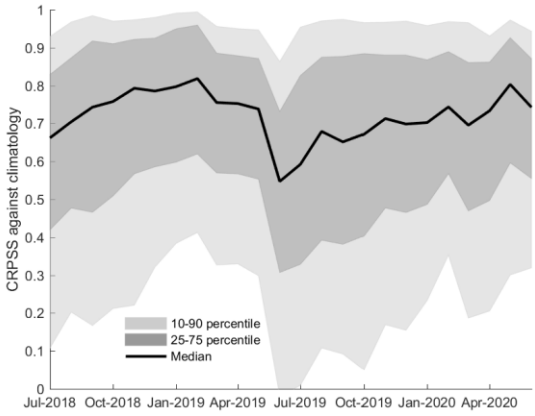

Figure 4. Monthly means of CRPSS the for lead-time 5 days for all the major river points in Europe with ECMWF ENS as forcing. Reference forecast was climatology. The skill is largest during the winter months, when there is less variation in the flow in large parts of Europe.

Publications

Baugh, C.; de Rosnay, P.; Lawrence, H.; Jurlina, T.; Drusch, M.; Zsoter, E.; Prudhomme, C. The Impact of SMOS Soil Moisture Data Assimilation within the Operational Global Flood Awareness System (GloFAS). Remote Sens. 2020, 12, 1490. https://doi.org/10.3390/rs12091490

Sutanto, S. J., H. A. J. Van Lanen, F. Wetterhall, and X. Llort, 2020: Potential of Pan-European Seasonal Hydrometeorological Drought Forecasts Obtained from a Multihazard Early Warning System. Bull. Amer. Meteor. Soc., 101, E368–E393, https://doi.org/10.1175/BAMS-D-18-0196.1

ARTICLES

Feedback on EFAS notification for 2019

by EFAS Dissemination Centre

Feedback on notifications

After the dissemination of a Formal Flood Notification, all the affected EFAS partners are requested to complete an electronic feedback survey. This feedback is used to monitor the performance of the EFAS system and to identify potential improvements to it. During 2019, the feedback collection procedure transitioned from an external service to a system embedded in EFAS-IS, thus simplifying the coupling between notifications and feedback items, and the compilation and processing of the received feedback. The new system allows partners to provide their feedback directly through a link in the Formal Flood Notification message. Additionally, it also enables reporting information about missed events. Below we present a summary of the feedback provided by EFAS partners during 2019. The statistics provided here are based on the number of responses received to each question in the feedback form, some of which are not compulsory. As a result, the percentages provided for some of the questions may be based on fewer responses.

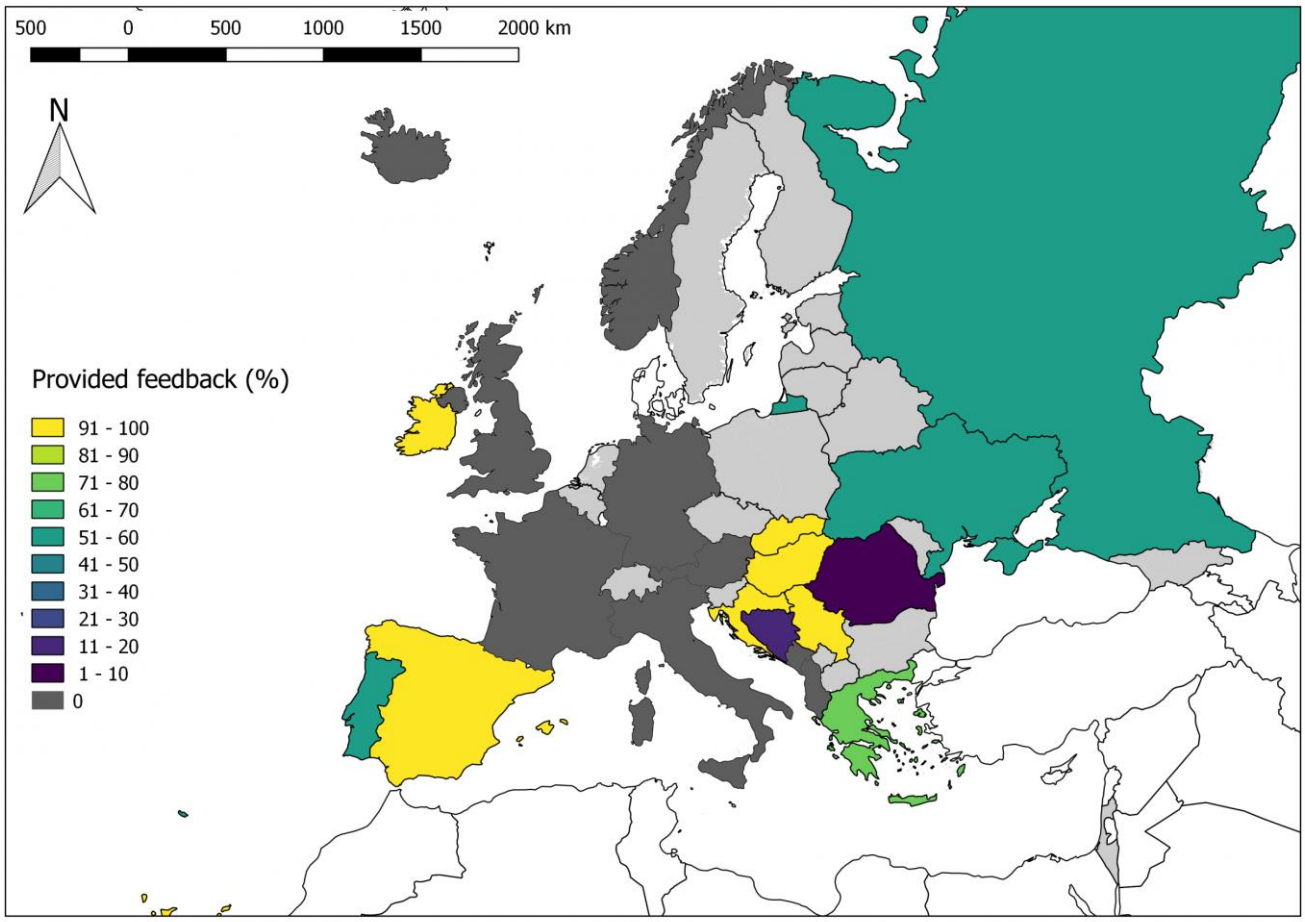

Figure 5: Summary: Percentage of EFAS Formal Flood Notifications for which feedback was provided for 2019, aggregated per country. EFAS partner countries for which no Formal Flood Notifications were issued during 2019 are shaded in grey.

Summary of received feedback during 2019

In the past, the feedback was evaluated per EFAS Specific Contract (SC) year (May to April). However, starting from 2019, feedback is evaluated based on the calendar year instead. The resulting statistics from the feedback collected during 2019 are then compared to those of previous analyses. The abbreviations SC2, SC3, and SC4 correspond to the reporting periods May 2016 - April 2017, May 2017 - April 2018, and May 2018 - April 2019, respectively.

A total of 175 Formal Flood Notifications were sent out during 2019, and 70 feedback reports were received, which accounts for 40% of the issued notifications (Figure 5 andFigure 6). This is a decrease compared to the previous analysis (SC4), in which feedback was provided for 65% of the formal flood notifications.

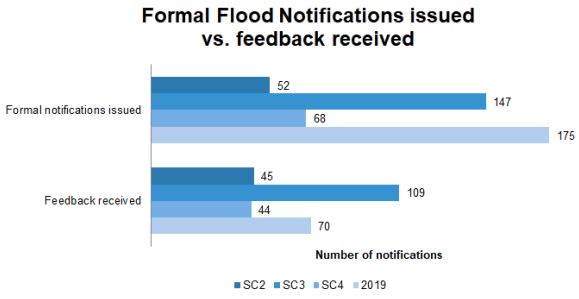

Figure 6: Issued EFAS Formal Flood Notifications compared to feedback reports received.

The provided feedback rate varies significantly among EFAS partners (Figure 6). Even if no detailed survey was performed on the reasons why partners do (not) provide feedback, it is conceivable that the change to the new feedback collection system might have influenced the amount of provided feedback.

The initial question in the feedback form is whether or not a flood event was observed in connection to an issued Formal Flood Notification. The definition of a flood event is included in the question (i.e. return period equal to or larger than 2 years) to help partners assess the event. The 2-year return period was chosen as a threshold for this question as it allows differentiating between correct rejections and flood events that happened but did not reach the 5-year return period threshold established in EFAS. In total, 42 out of 70 respondents (60%) answered that a flood event was observed after a Formal Flood Notification had been sent out (Figure 7). Note that an affirmative response to this question does not guarantee that the flood event exceeded the 5-year return period threshold. This value is an improvement respect to the previous analysis (SC4).

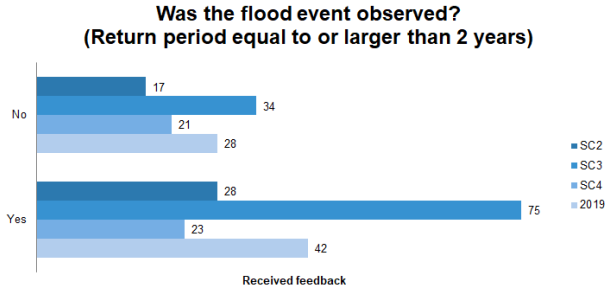

Figure 7: Partners' responses to the question "Was the flood event observed?" of the feedback survey.

Feedback from observed flood events

Most of the responders who answered that a flood event had indeed occurred in connection to a Formal Flood Notification (27 out of 42; 64%) rated the accuracy of EFAS information in terms of location as “As indicated in EFAS information” (Figure 8). This is an improvement from the previous analysis (SC4) and is related to a decrease in reported events being "In the wider region".

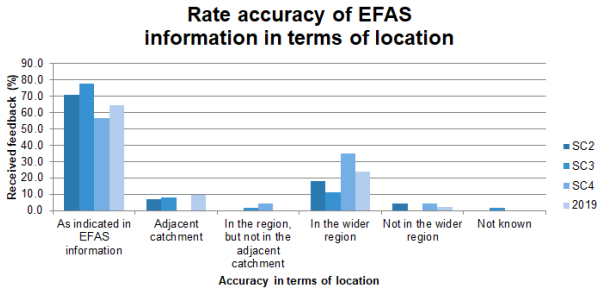

Figure 8: EFAS performance in terms of accurately predicting the location of the event.

In total, 60% of the responders who answered that the flood event had indeed occurred stated that the flood event happened on the day predicted by EFAS (Figure 9). Additionally, none of the events reported during 2019 occurred more than 2 days later than predicted and only 14% of them occurred more than 2 days earlier than predicted. This is a considerable accuracy improvement in terms of timing respect to previous years.

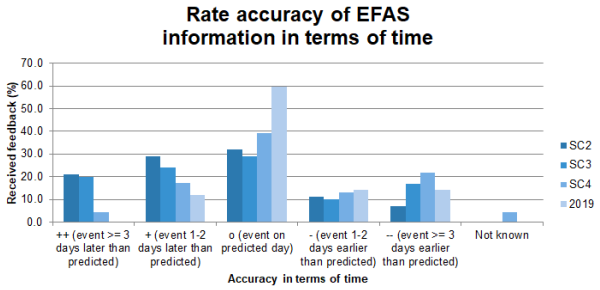

Figure 9: EFAS performance in terms of accurately predicting the time of the event.

In terms of the magnitude of the predicted event, 29% reported that the actual flood magnitude was comparable to the EFAS prediction (Figure 10). Additionally, 35% answered that the magnitude was less or much less severe than the EFAS prediction, and 17% stated that the flood was more or much more severe than the EFAS prediction. Finally, 21% of the respondents were not aware of the magnitude of the event compared to the EFAS notification. Compared to previous years, there is a decrease in the percentage of reported events with magnitudes comparable to EFAS prediction, and an increase of more severe and much less severe events respect to EFAS prediction.

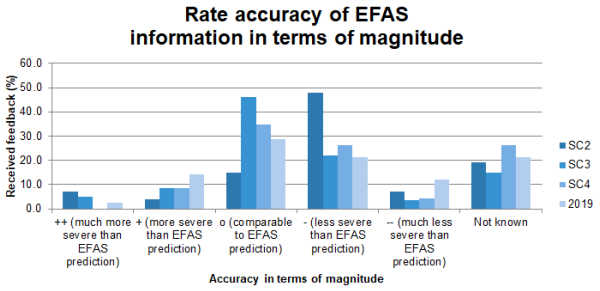

Figure 10: EFAS performance in terms of accurately predicting the magnitude of the event.

The lead time of EFAS notifications varied greatly between the different flood events, with most notifications (32%) being disseminated three days before the start of an event (Figure 11). In addition, 18% of the notifications were issued with a lead time of 2 days. This is an improvement with respect to previous years, where a significant percentage of notifications were sent with lead times of less than 2 days. Nevertheless, the percentage of notifications with unknown lead time was still significant (26%).

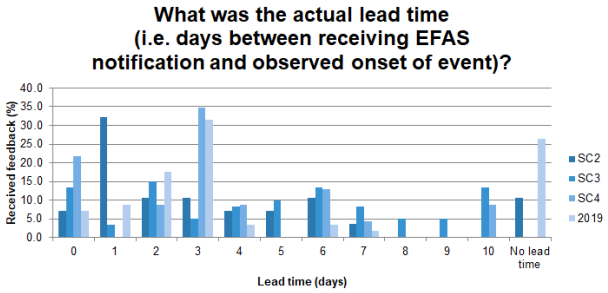

Figure 11: Partners' response to the question "What was the actual lead time (i.e. days between receiving EFAS notification and observed onset of event)?" of the feedback survey.

In total, 40% of the respondents who reported that the flood event had indeed occurred stated that the return period of the event was less than a 5-year return period event (Figure 12). Since the criterion for sending out a Formal Flood Notification requires river discharge to exceed the 5-year return period, it is remarkable that so many events were reported to be less severe than that.

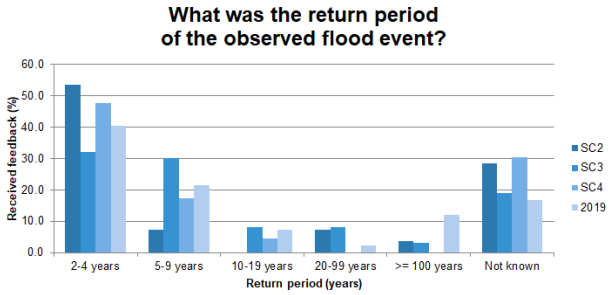

Figure 12: Partners' response to the question "What is the return period of the observed flood event?" of the feedback survey.

The time periods that partners use to calculate the return periods may vary from one partner to another. For instance, the 5-year return period in EFAS is often lower than the 5-year return period threshold that is used in Sweden by the Swedish Meteorological and Hydrological Institute. This could be due to the quality of historical forcing data, hydrological model performance and different time periods used in the return period analysis. In addition, EFAS-based return periods are calculated based on simulated discharges, whereas the EFAS partners base their thresholds on discharge observations. Calculating return periods from simulated discharge values can lead to systematic biases between observed and simulated discharge values at certain locations. A potential solution would be for partner to evaluate the Formal Flood Notifications, taking into account the differences between the simulated discharge in EFAS and their recorded observed discharge values.

The main drivers behind flood events in 2019 (highest ranked causes) were reported to be extreme rainfall (60% of the respondents) and long-lasting rainfall (40% of the respondents) (Figure 13). These causes were also the most important secondary drivers, followed by soil saturation and snow melting. Extreme rainfall is the only driver that has been reported as being relevant for a significant percentage of reported flood events throughout the different reporting periods. The percentage of reported events mainly caused by long-lasting rainfall has significantly increased in 2019 respect to previous years. Finally, soil saturation is a relevant secondary driver behind many reported events throughout the different reporting periods.

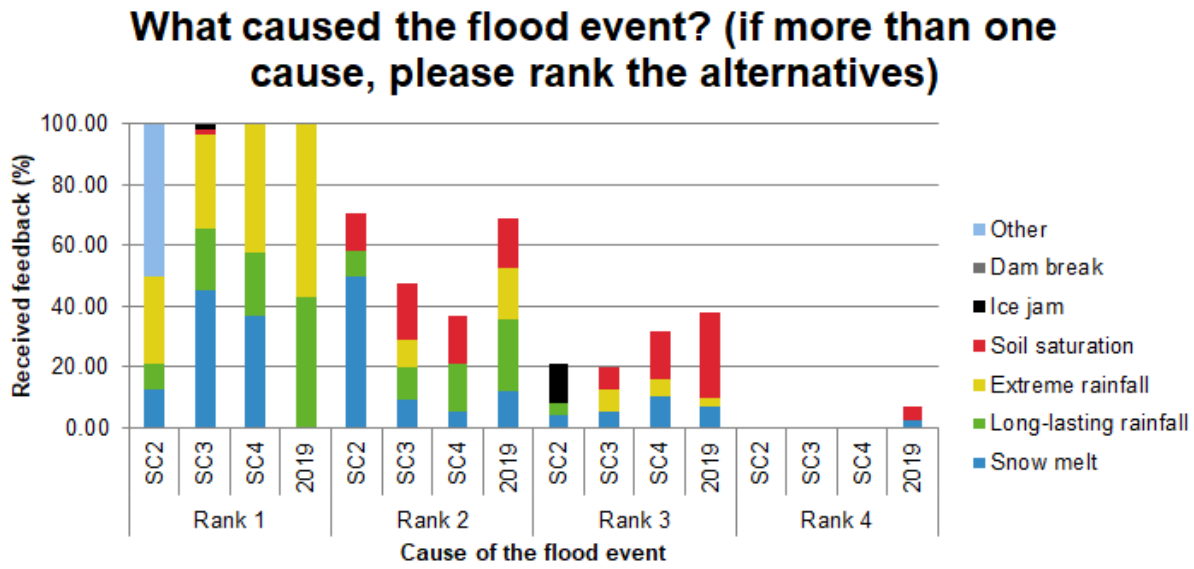

Figure 13: Partners' response to the question "What caused the flood event? If more than one cause, the alternatives are ranked from 1 to 4 (graph shows number of each cause and rank)." of the feedback survey.

Notification sent but no observed flooding event

The survey recipients were asked if they had any explanation to why a forecasted flood event did not actually take place. Possible reasons where listed, i.e. among others reservoir operation, precipitation accumulated as snow, forecasted precipitation did not occur or fell in a different area, and not enough snowpack melt. Most recipients did not respond to this question (Figure 14). Of those who did, the most common answer was "other", followed by "not enough precipitation". The reduced number of replies to this question may point to the difficulty of establishing specific causes to false alarms. This question was added during SC3 and therefore no data is available for SC2.

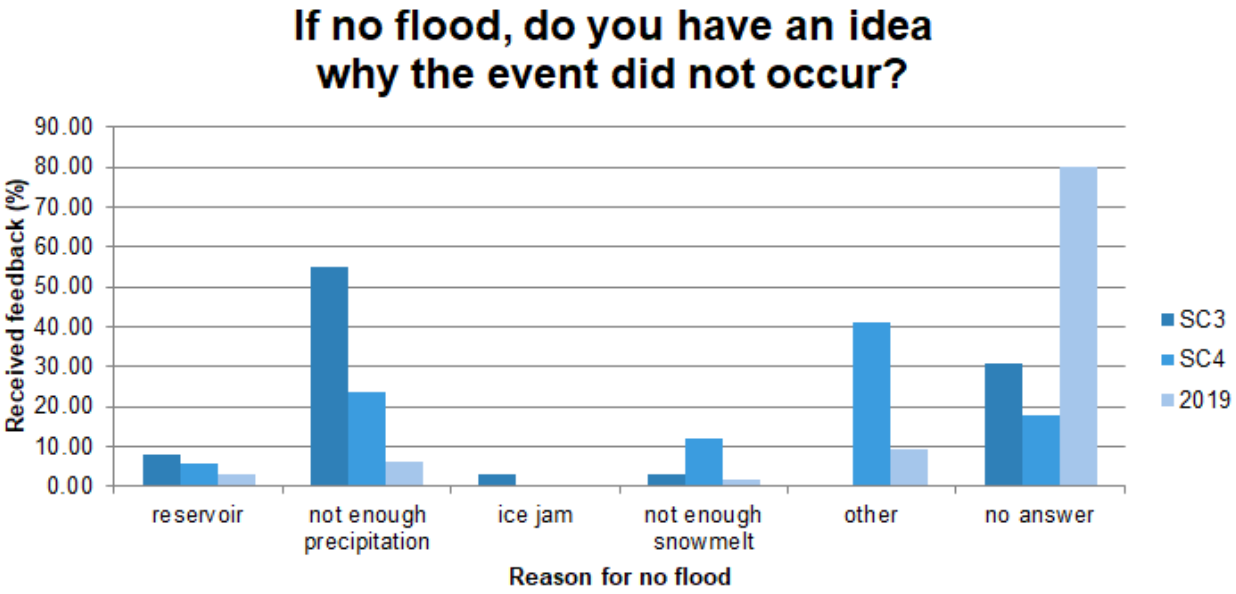

Figure 14: Partners' response to the questions "If no flood, do you have an idea why the event did not occur (reservoirs, precipitation as snow, precipitation fell in other area, forecasted precipitation did not occur, snow did not melt as fast as predicted, etc.

Conclusions
The above analysis allows drawing some key messages as follows:

- Feedback was provided for about a third of the disseminated Formal Flood Notifications. This is a decrease from previous years and might be partially explained by the changes in the feedback collection system.
- 60% of the survey recipients reported observed flooding events tied to the notifications being sent, indicating an improvement from SC4.
- The accuracy of the notifications being sent was perceived to be comparable to previous analyses in terms of location, and better than for previous analyses in terms of timing and lead time. In terms of magnitude, notifications were perceived as being slightly less accurate than for previous analyses. Overall, notifications had a good accuracy.
- The majority of the notifications' recipients stated that the return period of the observed flood events was less than 5 years, which is below the lowest EFAS threshold. In order to avoid the use of different return period thresholds between EFAS and the partners, it is suggested to define the actual discharge value to be evaluated by the partners.
- The main drivers behind flood events in 2019 were extreme rainfall and long-lasting rainfall.
- Based on the recipients' responses to why certain forecasted events did not occur, it may be deduced that establishing causes for false alarms is not always obvious.

Spain and France floods, Spring 2020

by Richard Davies, floodlist

The period April to May 2020 was marked by two significant flood events in southern Europe.

Figure 15: Rescue of man in Castellón, Spain during early April flooding. Credit: Diputació de Castelló

Province of Castellón, Valencia Region, Spain
Torrential rain caused flash flooding in coastal areas of Province of Castellón in the Valencia Region of Spain on 01 April 2020. Agencia Estatal de Meteorología (AEMET) reported some areas recorded their highest daily rainfall totals in more than 30 years. On 01 April, 48mm of rain fell in a 4-hour period in Vilafamés. La Pobla Tornesa recorded 197.6mm of rain in 24 hours to 01 April.

Figure 16: Flooded residences in Spain, April 2020. Credit: Diputació de Castelló

The worst affected areas were the towns of Almassora, Borriana, Oropesa and Vilafamés. Firefighters were called on to rescue 91 people trapped in their homes or vehicles in over 40 rescue operations, mostly in Almassora but also in Borriana and Oropesa. The provincial government also reported some flooding in Benicàssim, Villarreal, Vinaròs, Traiguera, Benicarló and Peñíscola.

Gironde and Landes Departments, France
Heavy rain from 09 May 2020 caused flash flooding in southwestern France, prompting evacuations and flood rescues in Gironde and Landes departments. Météo-France reported Retjons and Belin-Béliet, both

in Landes, recorded 136mm of rain in 36 hours to 11 May. In Tarn Department, La Vintrou recorded 261mm during the same period. In Gironde, 46 people were rescued by firefighters following rising waters. No injuries or fatalities were reported. Firefighters carried out more than 500 interventions during the severe weather, mainly for flooded homes and cellars. Almost 90 roads were flooded. In Landes, firefighters carried out 132 interventions and evacuated 12 people. One person was injured. Around 30 roads were closed in the department due to flooding. The rain caused river levels to rise, including the Midouze in Mont-de-Marsan, capital of the Landes department, which reached 6.35 metres on 12 May, beating the previous record high of 5.84m set in January 2009.

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: Flooding in Castellón, early April 2020. Credit: Diputació de Castelló.

Appendix - figures

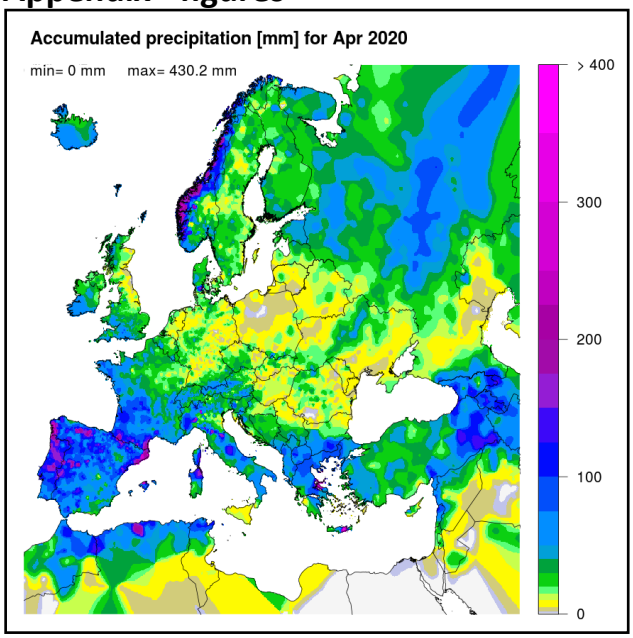

Figure 17. Accumulated precipitation [mm] for April 2020.

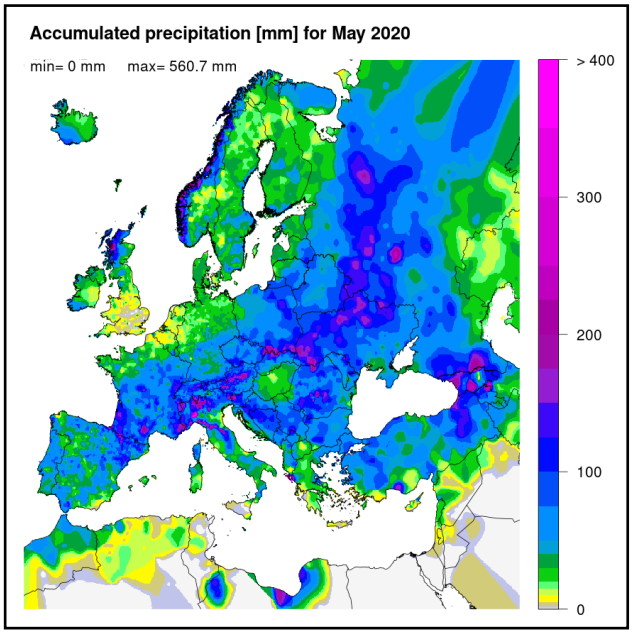

Figure 19. Accumulated precipitation [mm] for May 2020.

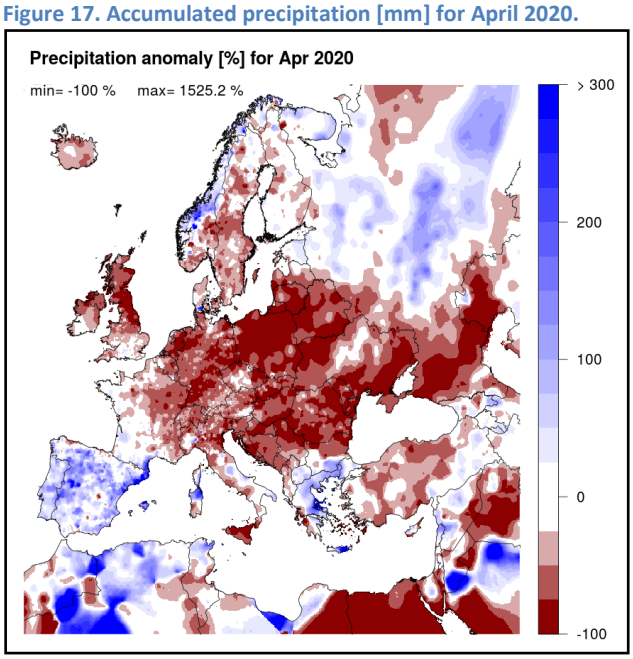

Figure 18. Precipitation anomaly [%] for April 2020, relative to a long-term average (1990-2013). Blue (red) denotes wetter (drier) conditions than normal.

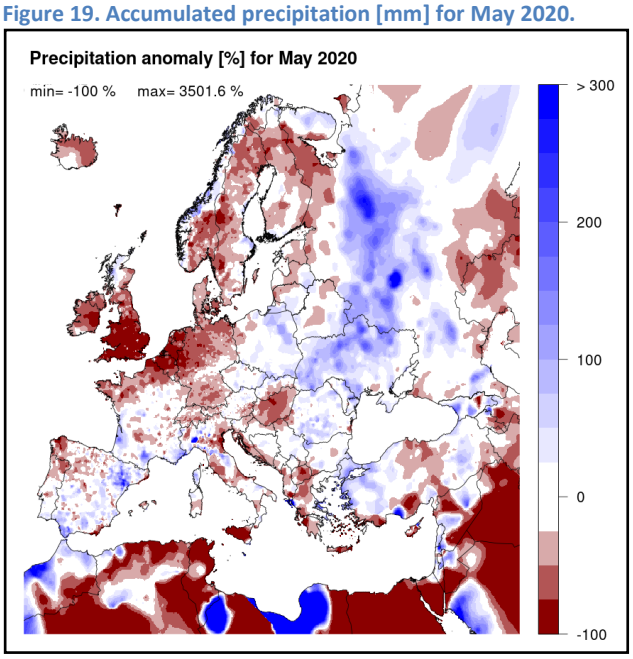

Figure 20. Precipitation anomaly [%] for May 2020, relative to a long-term average (1990-2013). Blue (red) denotes wetter (drier) conditions than normal.

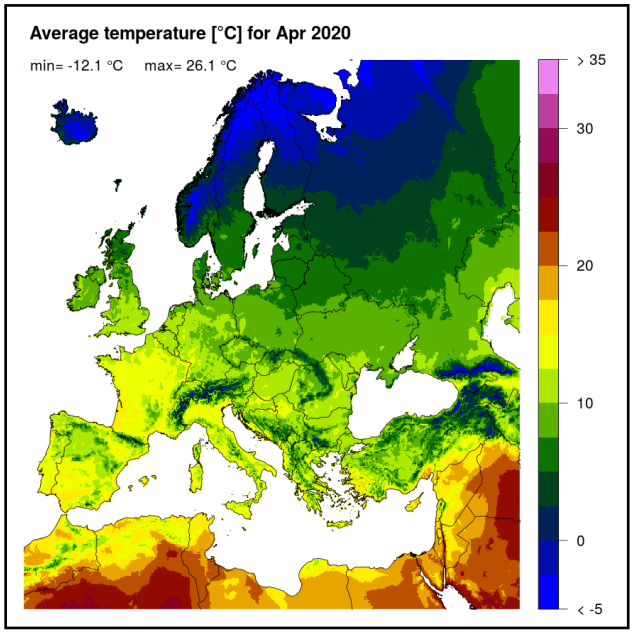

Figure 21. Mean temperature [°C] for April 2020.

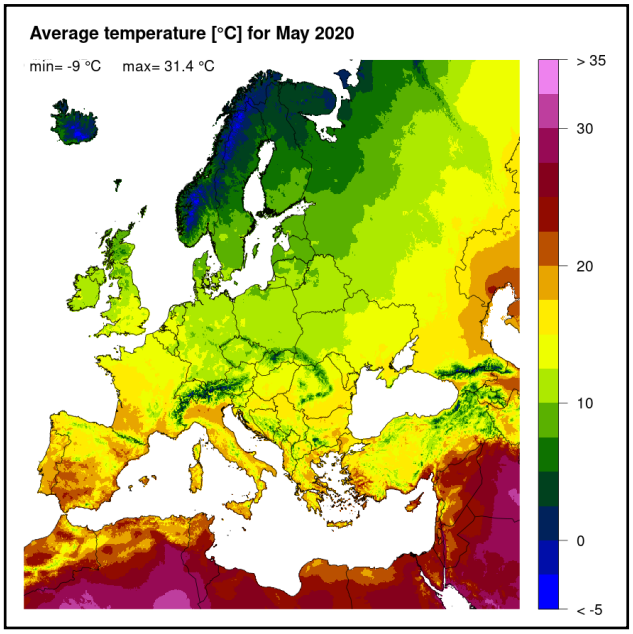

Figure 23. Mean temperature [°C] for May 2020.

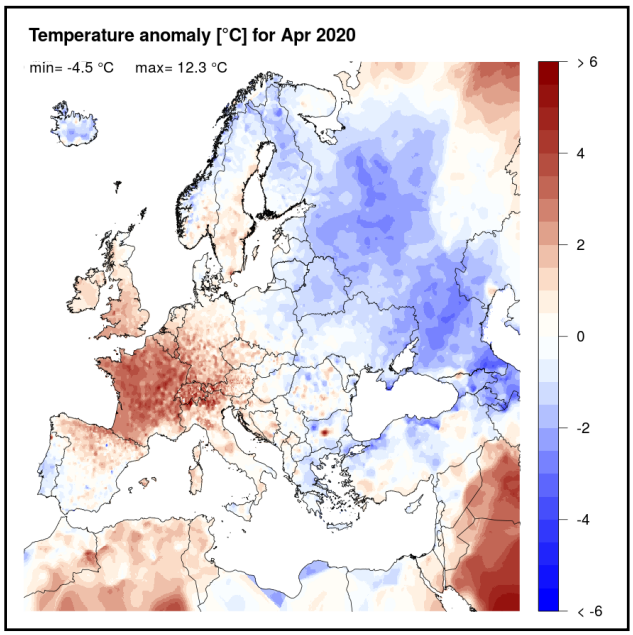

Figure 22. Temperature anomaly [°C] for April 2020, relative to a long-term average (1990-2013). Blue (red) denotes colder (warmer) temperatures than normal.

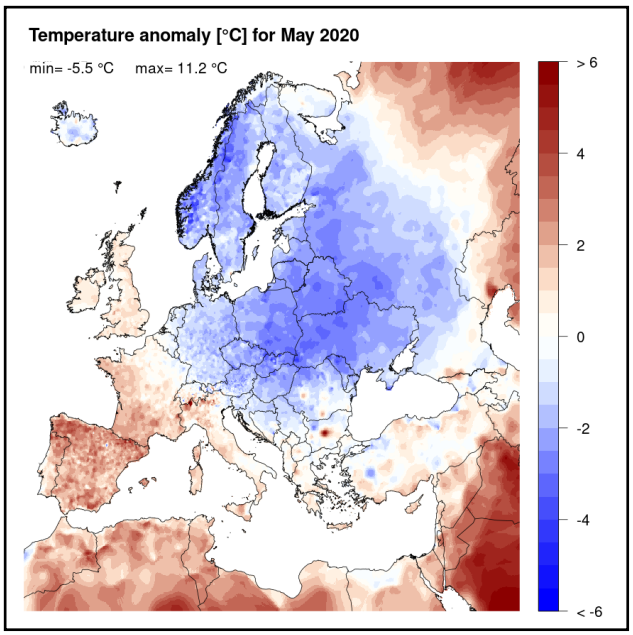

Figure 24. Temperature anomaly [°C] for May 2020, relative to a long-term average (1990-2013). Blue (red) denotes colder (warmer) temperatures than normal.

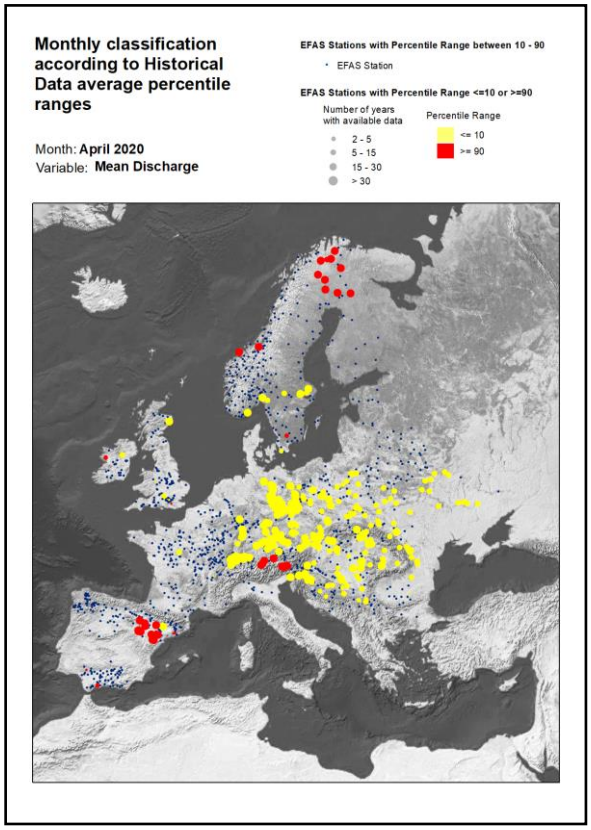

Figure 25. Monthly discharge anomalies April 2020.

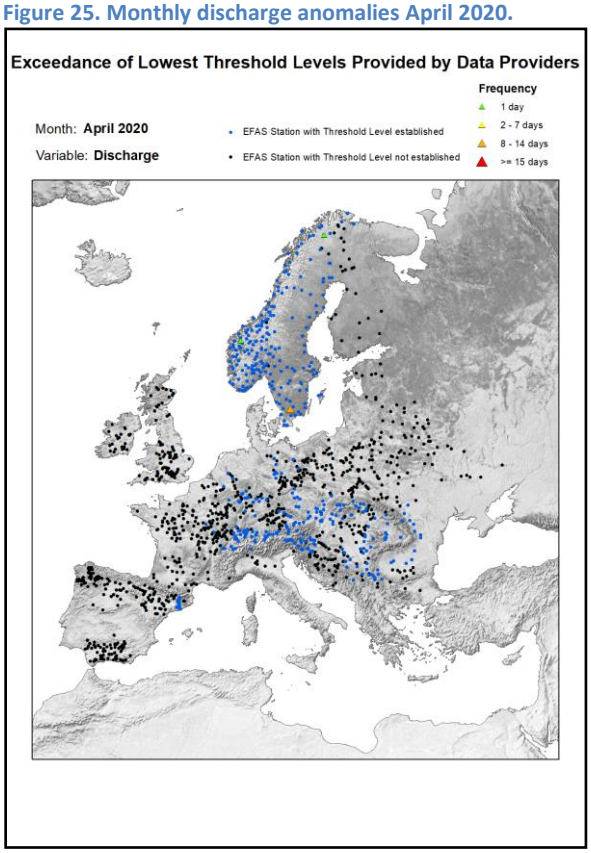

Figure 26. Lowest alert level exceedance for April 2020.

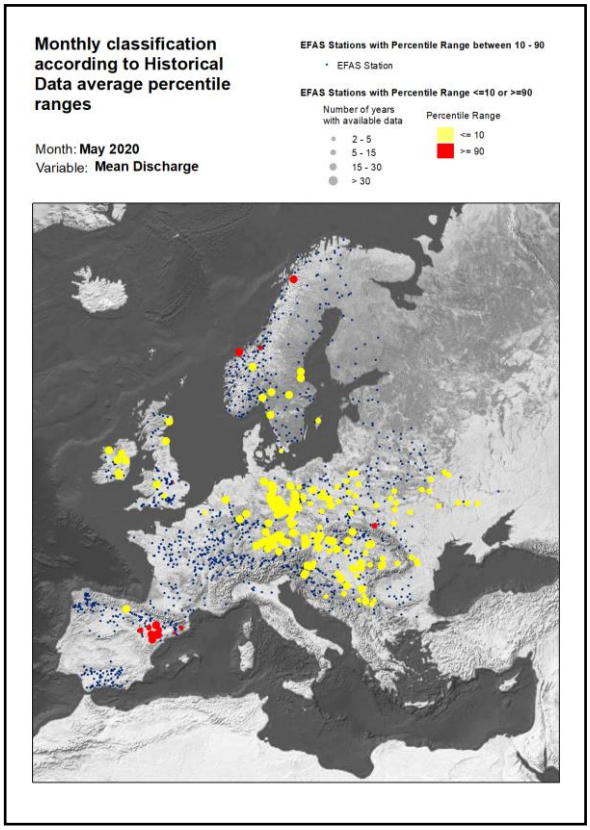

Figure 27. Monthly discharge anomalies May 2020.

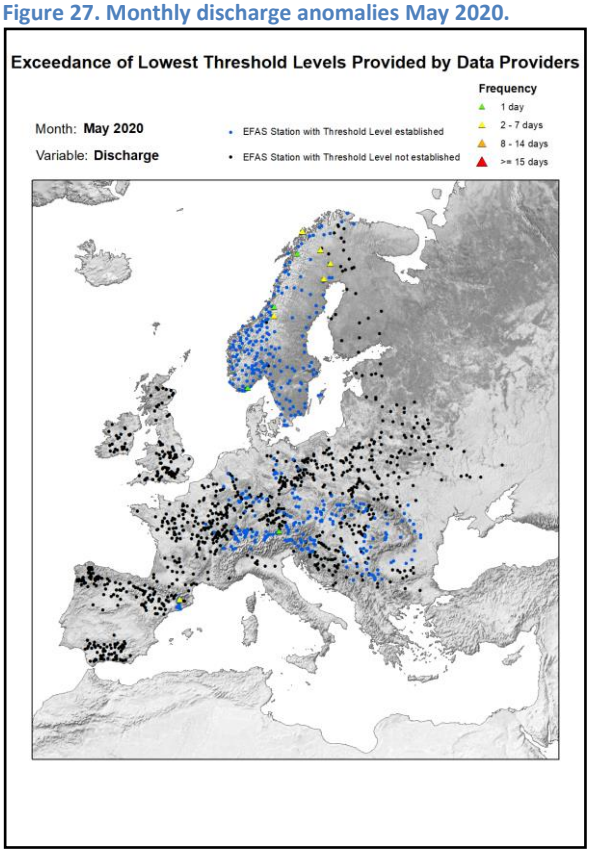

Figure 28. Lowest alert level exceedance for May 2020.

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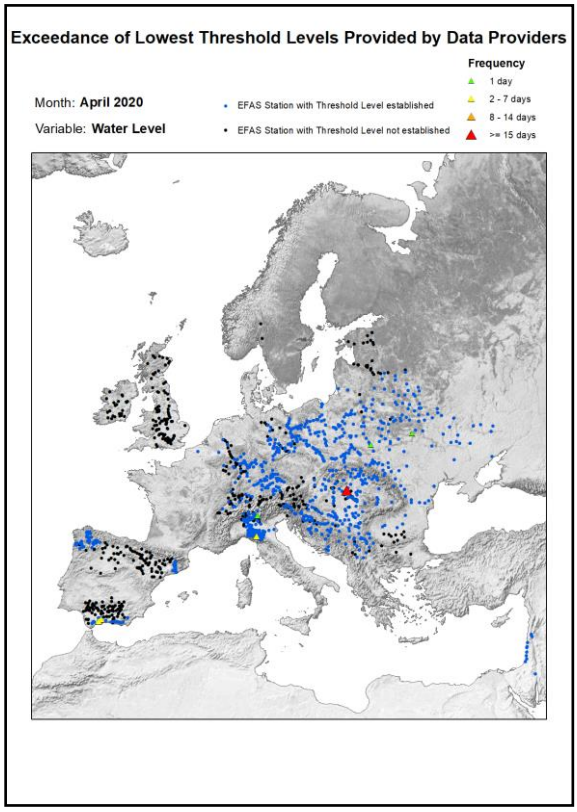

Figure 29. Lowest threshold exceedance for April 2020.

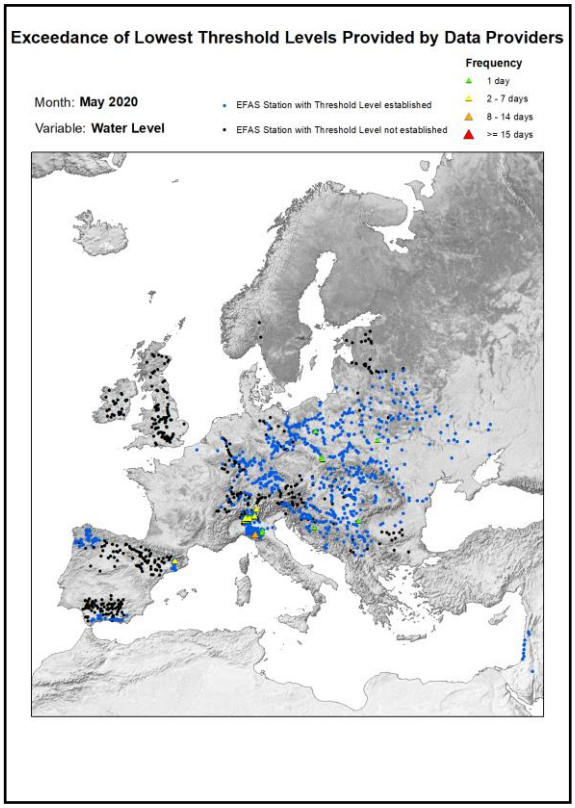

Figure 30. Lowest threshold exceedance for May 2020.

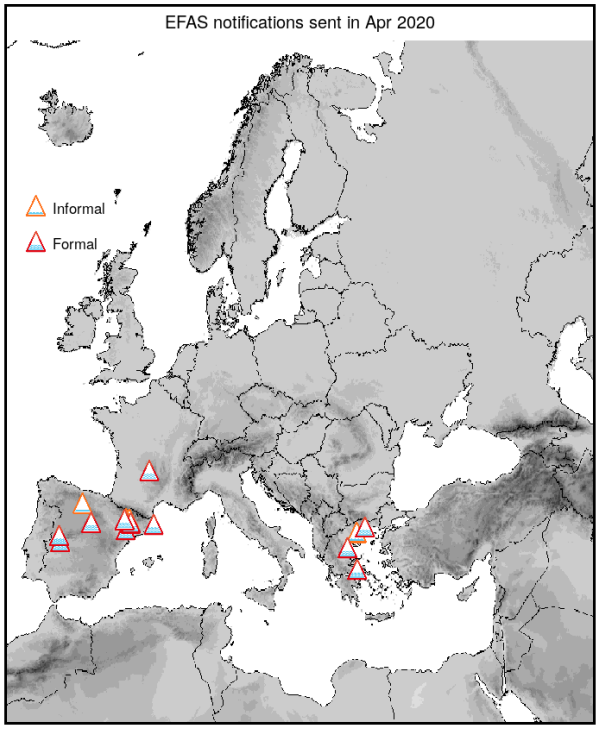

Figure 31. EFAS flood notifications sent for April.

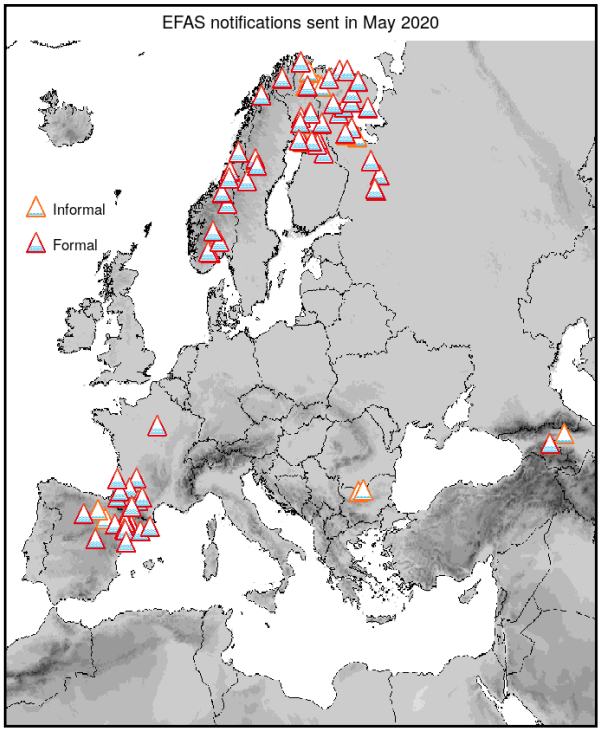

Figure 33. EFAS flood notifications sent for May 2020.

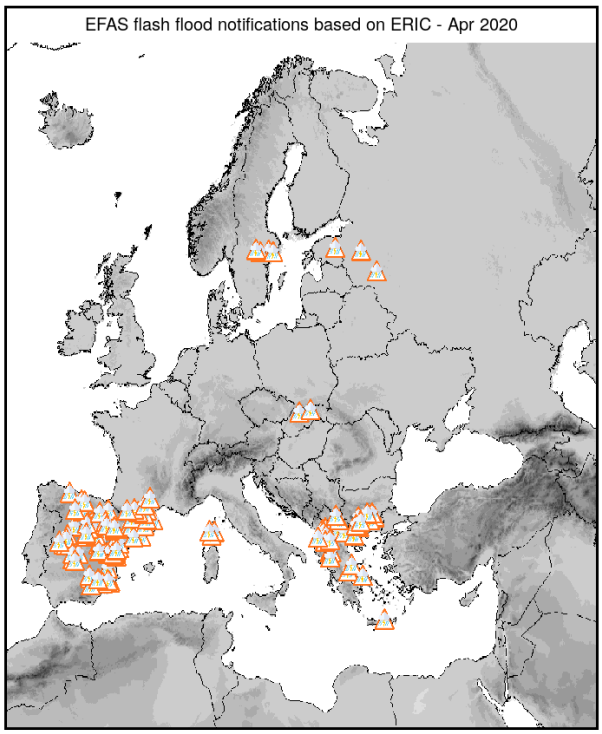

Figure 32. Flash flood notifications sent for April.

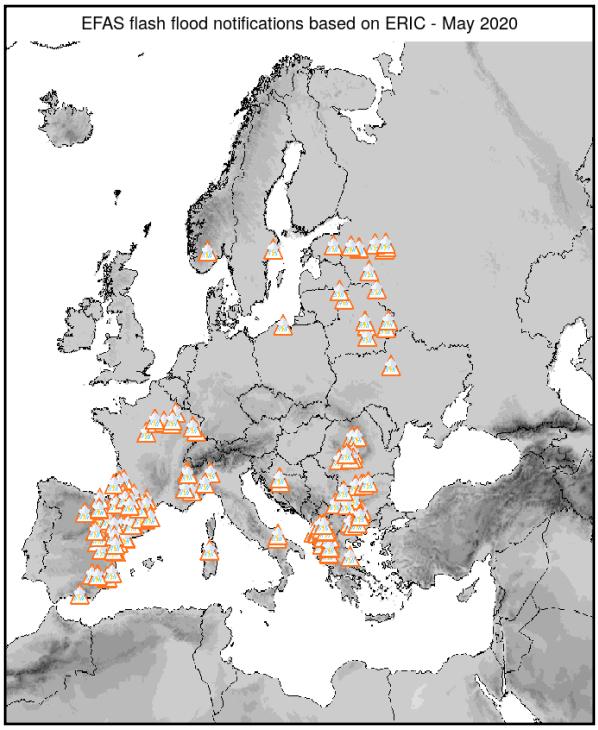

Figure 34. Flash flood notifications sent for May 2020.

Appendix - tables

Table 1. EFAS flood notifications sent in April - May 2020

Type	Forecast date	Issue date	Lead time	River	Country
Formal	31/03/2020 12UTC	01/04/2020	4	Kifisos	Greece
Formal	03/04/2020 12UTC	04/04/2020	1		Greece
Formal	03/04/2020 12UTC	04/04/2020	2	Pineios	Greece
Informal	04/04/2020 12UTC	05/04/2020	0	Strimonas	Greece
Informal	10/04/2020 12UTC	11/04/2020	5	Tietar	Spain
Formal	11/04/2020 12UTC	12/04/2020	4	Tietar	Spain
Informal	12/04/2020 00UTC	12/04/2020	1	Noguera Pallaresa	Spain
Informal	13/04/2020 00UTC	13/04/2020	0	Pisuerga	Spain
Formal	15/04/2020 12UTC	16/04/2020	2	Alagon	Spain
Formal	18/04/2020 12UTC	19/04/2020	0	Noguera Pallaresa	Spain
Formal	18/04/2020 12UTC	19/04/2020	0	Segre	Spain
Formal	20/04/2020 00UTC	20/04/2020	2	Duero	Spain
Formal	20/04/2020 00UTC	20/04/2020	1	Ter	Spain
Formal	21/04/2020 12UTC	22/04/2020	3	Gllego	Spain
Informal	24/04/2020 00UTC	24/04/2020	3	Noguera Ribagorzana	Spain
Informal	24/04/2020 12UTC	25/04/2020	1	Esera	Spain
Formal	25/04/2020 00UTC	25/04/2020	2	Duero	Spain
Formal	28/04/2020 12UTC	29/04/2020	3	Dordogne	France
Formal	30/04/2020 12UTC	01/05/2020	2	Vezere	France
Formal	30/04/2020 12UTC	01/05/2020	1	Ebro	Spain
Formal	01/05/2020 12UTC	02/05/2020	3	Onega	Russia
Informal	02/05/2020 12UTC	03/05/2020	0	Vit	Bulgaria
Informal	02/05/2020 12UTC	03/05/2020	1	Osam	Bulgaria
Formal	04/05/2020 12UTC	05/05/2020	5	Cina	Spain
Formal	04/05/2020 12UTC	05/05/2020	3	Ozero Vygozero catchment	Russia
Formal	06/05/2020 00UTC	06/05/2020	0	Khrami	Georgia
Formal	07/05/2020 00UTC	07/05/2020	3	Coastal zone	Russia
Formal	07/05/2020 12UTC	08/05/2020	2	Noguera Pallaresa	Spain
Formal	07/05/2020 12UTC	08/05/2020	3	Gave de Pau	France
Formal	07/05/2020 12UTC	08/05/2020	3	Garonne	France
Formal	07/05/2020 12UTC	08/05/2020	2	Cina	Spain
Formal	07/05/2020 12UTC	08/05/2020	2	Gllego	Spain
Formal	08/05/2020 00UTC	08/05/2020	2	Osse	France
Formal	08/05/2020 12UTC	09/05/2020	2	Garonne	France
Formal	08/05/2020 12UTC	09/05/2020	2	Midouze	France
Formal	10/05/2020 00UTC	10/05/2020	0	Coastal zone	France
Formal	10/05/2020 00UTC	10/05/2020	2	Sor	France
Formal	10/05/2020 12UTC	11/05/2020	0	Loing	France
Formal	10/05/2020 12UTC	11/05/2020	3	Gllego	Spain
Informal	10/05/2020 12UTC	11/05/2020	0	Alazani	Georgia
Formal	12/05/2020 00UTC	12/05/2020	3	Arlanza	Spain
Informal	12/05/2020 00UTC	12/05/2020	3	Najerilla	Spain
Informal	12/05/2020 00UTC	12/05/2020	1	Alhama	Spain
Formal	12/05/2020 00UTC	12/05/2020	2	Garonne	France
Formal	12/05/2020 12UTC	13/05/2020	0	Alcanadre	Spain
Informal	12/05/2020 12UTC	13/05/2020	0	Noguera Ribagorzana	Spain

Formal	12/05/2020 12UTC	13/05/2020	0	Cinca	Spain
Informal	12/05/2020 12UTC	13/05/2020	0	Coastal zone	Russia
Informal	12/05/2020 12UTC	13/05/2020	0	Esera	Spain
Formal	12/05/2020 12UTC	13/05/2020	7	Verkhne Svirskoye Vod.	Russia
Formal	13/05/2020 00UTC	13/05/2020	1	Llobregat	Spain
Formal	13/05/2020 00UTC	13/05/2020	0	Ter	Spain
Formal	13/05/2020 00UTC	13/05/2020	5	Emaj	Finland
Formal	13/05/2020 12UTC	14/05/2020	2	Ebro	Spain
Formal	14/05/2020 00UTC	14/05/2020	3	Tajo	Spain
Informal	15/05/2020 12UTC	16/05/2020	0	Kem, below Kepa	Russia
Formal	18/05/2020 12UTC	19/05/2020	2	Verkhne Svirskoye Vod.	Russia
Formal	20/05/2020 12UTC	21/05/2020	1	Emaj	Finland
Informal	21/05/2020 12UTC	22/05/2020	1	Oulankajoki	Russia
Formal	22/05/2020 00UTC	22/05/2020	2	Namsen	Norway
Informal	22/05/2020 12UTC	23/05/2020	1	Jumiskonjoki	Finland
Formal	22/05/2020 12UTC	23/05/2020	1	Coastal zone	Russia
Formal	22/05/2020 12UTC	23/05/2020	3	Iijoki	Finland
Informal	22/05/2020 12UTC	23/05/2020	1	Kuivajoki	Finland
Formal	22/05/2020 12UTC	23/05/2020	2	Voronja	Russia
Formal	23/05/2020 00UTC	23/05/2020	1	Umba	Russia
Formal	23/05/2020 00UTC	23/05/2020	2	Kola	Russia
Formal	23/05/2020 12UTC	24/05/2020	1	Coastal zone	Russia
Formal	23/05/2020 12UTC	24/05/2020	1	Simojoki	Finland
Informal	23/05/2020 12UTC	24/05/2020	0	Kemijoki, above Ounasjoki	Finland
Informal	23/05/2020 12UTC	24/05/2020	0	Paatsjoki	Finland
Formal	23/05/2020 12UTC	24/05/2020	2	Jaurakkajarvi	Finland
Formal	24/05/2020 00UTC	24/05/2020	1	Livojoki	Finland
Formal	24/05/2020 12UTC	25/05/2020	1	Coastal zone	Russia
Formal	24/05/2020 12UTC	25/05/2020	1	KOUTAJOKI	Finland
Formal	24/05/2020 12UTC	25/05/2020	2	Oulankajoki	Russia
Informal	25/05/2020 00UTC	25/05/2020	0	Khrami	Georgia
Formal	25/05/2020 12UTC	26/05/2020	1	Luiro	Finland
Formal	25/05/2020 12UTC	26/05/2020	1	Varzuga	Russia
Formal	25/05/2020 12UTC	26/05/2020	0	Meltausjoki	Finland
Informal	25/05/2020 12UTC	26/05/2020	0	Lotta	Russia
Informal	26/05/2020 00UTC	26/05/2020	0	Coastal zone	Norway
Formal	26/05/2020 12UTC	27/05/2020	0	Ponoy	Russia
Formal	26/05/2020 12UTC	27/05/2020	2	Kemijoki	Finland
Informal	27/05/2020 00UTC	27/05/2020	0	Nuorttijoki	Russia
Formal	27/05/2020 00UTC	27/05/2020	1	Ounasjoki	Finland
Formal	27/05/2020 12UTC	28/05/2020	1	Coastal zone	Russia
Formal	28/05/2020 00UTC	28/05/2020	3	Glomma	Norway
Formal	28/05/2020 00UTC	28/05/2020	5	Neiden	Norway
Formal	28/05/2020 00UTC	28/05/2020	4	Moel	Norway
Formal	28/05/2020 00UTC	28/05/2020	3	Hallingdalselva	Norway
Formal	28/05/2020 00UTC	28/05/2020	2	Tenojoki	Norway
Formal	28/05/2020 00UTC	28/05/2020	6	Snarum	Norway
Formal	28/05/2020 00UTC	28/05/2020	3	Gaula (Melhus)	Norway
Formal	28/05/2020 00UTC	28/05/2020	3	Vefsna	Norway
Formal	28/05/2020 00UTC	28/05/2020	4	Altaelva	Norway
Formal	28/05/2020 00UTC	28/05/2020	3	Indals?lven	Sweden

Formal	28/05/2020 00UTC	29/05/2020	4	Kemijoki	Finland
Formal	28/05/2020 12UTC	29/05/2020	0	Iokanga	Russia
Formal	28/05/2020 12UTC	29/05/2020	5	Byaelva	Norway
Formal	28/05/2020 12UTC	29/05/2020	3	Vojman	Sweden
Formal	28/05/2020 12UTC	29/05/2020	3	Angerman	Sweden
Formal	29/05/2020 00UTC	29/05/2020	3	Mlselv	Norway
Formal	29/05/2020 12UTC	30/05/2020	0	Paatsjoki	Finland

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

Table 2. EFAS flash flood notifications sent in April - May 2020

Type	Forecast Date	Issue Date	Lead Time	Region	Country
Flash Flood	31/03/2020 12UTC	01/04/2020	54	Haskovo	Bulgaria
Flash Flood	02/04/2020 00UTC	02/04/2020	66	Dytiki Makedonia	Greece
Flash Flood	02/04/2020 00UTC	02/04/2020	54	Ipeiros	Greece
Flash Flood	02/04/2020 12UTC	03/04/2020	54	Pelagoniski	N. Macedonia
Flash Flood	02/04/2020 12UTC	03/04/2020	54	Jugozapaden	N. Macedonia
Flash Flood	02/04/2020 12UTC	03/04/2020	60	Blagoevgrad	Bulgaria
Flash Flood	02/04/2020 12UTC	03/04/2020	60	Anatoliki Makedonia,	Greece
Flash Flood	02/04/2020 12UTC	03/04/2020	60	Kentriki Makedonia	Greece
Flash Flood	02/04/2020 12UTC	03/04/2020	60	Vardarski	N. Macedonia
Flash Flood	02/04/2020 12UTC	03/04/2020	60	Jugoistocen	N. Macedonia
Flash Flood	02/04/2020 12UTC	03/04/2020	42	Korce	Albania
Flash Flood	03/04/2020 00UTC	03/04/2020	48	Sterea Ellada	Greece
Flash Flood	03/04/2020 00UTC	03/04/2020	54	Attiki	Greece
Flash Flood	03/04/2020 00UTC	03/04/2020	54	Thessalia	Greece
Flash Flood	03/04/2020 00UTC	03/04/2020	60	Plovdiv	Bulgaria
Flash Flood	03/04/2020 00UTC	03/04/2020	60	Haskovo	Bulgaria
Flash Flood	03/04/2020 00UTC	03/04/2020	60	Kardzhali	Bulgaria
Flash Flood	03/04/2020 12UTC	04/04/2020	42	Pazardzhik	Bulgaria
Flash Flood	03/04/2020 12UTC	04/04/2020	72	Zaragoza	Spain
Flash Flood	04/04/2020 00UTC	04/04/2020	60	Avila	Spain
Flash Flood	04/04/2020 00UTC	04/04/2020	54	Caceres	Spain
Flash Flood	04/04/2020 12UTC	05/04/2020	54	Burgos	Spain
Flash Flood	04/04/2020 12UTC	05/04/2020	60	Teruel	Spain
Flash Flood	04/04/2020 12UTC	05/04/2020	60	Navarra	Spain
Flash Flood	04/04/2020 12UTC	05/04/2020	54	Soria	Spain
Flash Flood	05/04/2020 00UTC	05/04/2020	60	Castellon / Castello	Spain
Flash Flood	05/04/2020 12UTC	06/04/2020	54	Kriti	Greece
Flash Flood	09/04/2020 00UTC	09/04/2020	36	Toledo	Spain
Flash Flood	10/04/2020 00UTC	10/04/2020	30	Asturias	Spain
Flash Flood	11/04/2020 00UTC	11/04/2020	60	Cantabria	Spain
Flash Flood	11/04/2020 00UTC	11/04/2020	60	Palencia	Spain
Flash Flood	11/04/2020 12UTC	12/04/2020	54	Pyrenees-Orientales	France
Flash Flood	11/04/2020 12UTC	12/04/2020	30	Soria	Spain
Flash Flood	11/04/2020 12UTC	12/04/2020	54	Alicante / Alacant	Spain
Flash Flood	11/04/2020 12UTC	12/04/2020	48	Ciudad Real	Spain
Flash Flood	12/04/2020 00UTC	12/04/2020	54	Albacete	Spain
Flash Flood	12/04/2020 00UTC	12/04/2020	42	Valladolid	Spain

Flash Flood	12/04/2020 00UTC	12/04/2020	42	Castellon / Castello	Spain
Flash Flood	12/04/2020 00UTC	12/04/2020	42	Burgos	Spain
Flash Flood	12/04/2020 00UTC	12/04/2020	42	Teruel	Spain
Flash Flood	12/04/2020 00UTC	12/04/2020	36	Lleida	Spain
Flash Flood	12/04/2020 00UTC	12/04/2020	42	Murcia	Spain
Flash Flood	12/04/2020 00UTC	12/04/2020	42	Girona	Spain
Flash Flood	13/04/2020 00UTC	13/04/2020	42	Dytiki Makedonia	Greece
Flash Flood	13/04/2020 00UTC	13/04/2020	48	Poloski	N. Macedonia
Flash Flood	13/04/2020 00UTC	13/04/2020	30	Huesca	Spain
Flash Flood	13/04/2020 00UTC	13/04/2020	48	Pelagoniski	N. Macedonia
Flash Flood	13/04/2020 00UTC	13/04/2020	42	Ipeiros	Greece
Flash Flood	13/04/2020 00UTC	13/04/2020	48	Jugozapaden	N. Macedonia
Flash Flood	13/04/2020 00UTC	13/04/2020	48	Diber	Albania
Flash Flood	13/04/2020 00UTC	13/04/2020	42	Korce	Albania
Flash Flood	13/04/2020 12UTC	14/04/2020	54	Caceres	Spain
Flash Flood	13/04/2020 12UTC	14/04/2020	54	Avila	Spain
Flash Flood	14/04/2020 00UTC	14/04/2020	36	Valencia / Valencia	Spain
Flash Flood	14/04/2020 00UTC	14/04/2020	42	Zaragoza	Spain
Flash Flood	14/04/2020 00UTC	14/04/2020	36	Murcia	Spain
Flash Flood	14/04/2020 00UTC	14/04/2020	36	Albacete	Spain
Flash Flood	14/04/2020 00UTC	14/04/2020	36	Alicante / Alacant	Spain
Flash Flood	14/04/2020 00UTC	14/04/2020	42	Guadalajara	Spain
Flash Flood	14/04/2020 00UTC	14/04/2020	42	Cuenca	Spain
Flash Flood	14/04/2020 00UTC	14/04/2020	36	Toledo	Spain
Flash Flood	14/04/2020 00UTC	14/04/2020	42	Navarra	Spain
Flash Flood	14/04/2020 00UTC	14/04/2020	42	Castellon / Castello	Spain
Flash Flood	14/04/2020 12UTC	15/04/2020	30	Ciudad Real	Spain
Flash Flood	15/04/2020 00UTC	15/04/2020	18	Madrid	Spain
Flash Flood	15/04/2020 00UTC	15/04/2020	18	Soria	Spain
Flash Flood	15/04/2020 12UTC	16/04/2020	24	Tver'	Russia
Flash Flood	15/04/2020 12UTC	16/04/2020	36	Novgorod	Russia
Flash Flood	17/04/2020 00UTC	17/04/2020	78	Zaragoza	Spain
Flash Flood	17/04/2020 00UTC	17/04/2020	60	Soria	Spain
Flash Flood	17/04/2020 00UTC	17/04/2020	78	Alicante / Alacant	Spain
Flash Flood	17/04/2020 00UTC	17/04/2020	78	Teruel	Spain
Flash Flood	17/04/2020 00UTC	17/04/2020	60	Albacete	Spain
Flash Flood	17/04/2020 00UTC	17/04/2020	78	Lleida	Spain
Flash Flood	17/04/2020 00UTC	17/04/2020	72	Guadalajara	Spain
Flash Flood	17/04/2020 00UTC	17/04/2020	60	La Rioja	Spain
Flash Flood	17/04/2020 12UTC	18/04/2020	54	Soria	Spain
Flash Flood	18/04/2020 00UTC	18/04/2020	42	Barcelona	Spain
Flash Flood	18/04/2020 00UTC	18/04/2020	48	Girona	Spain
Flash Flood	18/04/2020 12UTC	19/04/2020	66	Haute-Corse	France
Flash Flood	18/04/2020 12UTC	19/04/2020	66	Corse-du-Sud	France
Flash Flood	19/04/2020 00UTC	19/04/2020	54	Ipeiros	Greece
Flash Flood	19/04/2020 00UTC	19/04/2020	60	Blagoevgrad	Bulgaria
Flash Flood	19/04/2020 00UTC	19/04/2020	54	Dytiki Makedonia	Greece
Flash Flood	19/04/2020 00UTC	19/04/2020	54	Diber	Albania
Flash Flood	19/04/2020 00UTC	19/04/2020	54	Jugozapaden	N. Macedonia
Flash Flood	19/04/2020 00UTC	19/04/2020	54	Poloski	N. Macedonia
Flash Flood	19/04/2020 00UTC	19/04/2020	54	Korce	Albania

Flash Flood	19/04/2020 00UTC	19/04/2020	54	Pelagoniski	N. Macedonia
Flash Flood	19/04/2020 12UTC	20/04/2020	66	Tarragona	Spain
Flash Flood	19/04/2020 12UTC	20/04/2020	60	Severoistocen	N. Macedonia
Flash Flood	19/04/2020 12UTC	20/04/2020	66	Teruel	Spain
Flash Flood	19/04/2020 12UTC	20/04/2020	66	Tarragona	Spain
Flash Flood	19/04/2020 12UTC	20/04/2020	60	Pyrenees-Orientales	France
Flash Flood	19/04/2020 12UTC	20/04/2020	66	Castellon / Castello	Spain
Flash Flood	19/04/2020 12UTC	20/04/2020	66	Aude	France
Flash Flood	19/04/2020 12UTC	20/04/2020	66	Cuenca	Spain
Flash Flood	20/04/2020 00UTC	20/04/2020	48	Pcinjska oblast	Serbia
Flash Flood	20/04/2020 12UTC	21/04/2020	24	Pazardzhik	Bulgaria
Flash Flood	22/04/2020 00UTC	22/04/2020	24	Dytiki Makedonia	Greece
Flash Flood	22/04/2020 00UTC	22/04/2020	30	Diber	Albania
Flash Flood	22/04/2020 00UTC	22/04/2020	24	Korce	Albania
Flash Flood	22/04/2020 00UTC	22/04/2020	30	Pelagoniski	N. Macedonia
Flash Flood	22/04/2020 00UTC	22/04/2020	24	Jugozapaden	N. Macedonia
Flash Flood	22/04/2020 00UTC	22/04/2020	24	Ipeiros	Greece
Flash Flood	23/04/2020 12UTC	24/04/2020	60	Toledo	Spain
Flash Flood	23/04/2020 12UTC	24/04/2020	48	Murcia	Spain
Flash Flood	23/04/2020 12UTC	24/04/2020	60	Avila	Spain
Flash Flood	23/04/2020 12UTC	24/04/2020	60	Salamanca	Spain
Flash Flood	23/04/2020 12UTC	24/04/2020	54	Lleida	Spain
Flash Flood	24/04/2020 00UTC	24/04/2020	42	La Rioja	Spain
Flash Flood	24/04/2020 00UTC	24/04/2020	42	Alicante / Alacant	Spain
Flash Flood	24/04/2020 00UTC	24/04/2020	60	Guadalajara	Spain
Flash Flood	24/04/2020 12UTC	25/04/2020	42	Jaen	Spain
Flash Flood	24/04/2020 12UTC	25/04/2020	30	Ciudad Real	Spain
Flash Flood	24/04/2020 12UTC	25/04/2020	48	Albacete	Spain
Flash Flood	24/04/2020 12UTC	25/04/2020	42	Granada	Spain
Flash Flood	24/04/2020 12UTC	25/04/2020	48	Cuenca	Spain
Flash Flood	24/04/2020 12UTC	25/04/2020	54	Teruel	Spain
Flash Flood	24/04/2020 12UTC	25/04/2020	60	Segovia	Spain
Flash Flood	24/04/2020 12UTC	25/04/2020	54	Burgos	Spain
Flash Flood	24/04/2020 12UTC	25/04/2020	54	Soria	Spain
Flash Flood	24/04/2020 12UTC	25/04/2020	30	Caceres	Spain
Flash Flood	24/04/2020 12UTC	25/04/2020	60	Zaragoza	Spain
Flash Flood	24/04/2020 12UTC	25/04/2020	60	Navarra	Spain
Flash Flood	24/04/2020 12UTC	25/04/2020	60	Cantabria	Spain
Flash Flood	24/04/2020 12UTC	25/04/2020	30	Pyrenees-Orientales	France
Flash Flood	24/04/2020 12UTC	25/04/2020	54	Castellon / Castello	Spain
Flash Flood	25/04/2020 12UTC	26/04/2020	30	Zaragoza	Spain
Flash Flood	25/04/2020 12UTC	26/04/2020	60	Navarra	Spain
Flash Flood	25/04/2020 12UTC	26/04/2020	54	Aude	France
Flash Flood	25/04/2020 12UTC	26/04/2020	24	Ariege	France
Flash Flood	25/04/2020 12UTC	26/04/2020	54	Tarn	France
Flash Flood	25/04/2020 12UTC	26/04/2020	30	Leon	Spain
Flash Flood	25/04/2020 12UTC	26/04/2020	36	Madrid	Spain
Flash Flood	25/04/2020 12UTC	26/04/2020	18	Haute-Garonne	France
Flash Flood	25/04/2020 12UTC	26/04/2020	42	Araba/Alava	Spain
Flash Flood	26/04/2020 00UTC	26/04/2020	60	Sodermanlands lan	Sweden
Flash Flood	26/04/2020 00UTC	26/04/2020	24	Albacete	Spain

Flash Flood	26/04/2020 00UTC	26/04/2020	54	Vastmanlands lan	Sweden
Flash Flood	26/04/2020 00UTC	26/04/2020	48	Orebro lan	Sweden
Flash Flood	26/04/2020 00UTC	26/04/2020	66	Stockholms lan	Sweden
Flash Flood	26/04/2020 12UTC	27/04/2020	42	Hautes-Pyrenees	France
Flash Flood	27/04/2020 00UTC	27/04/2020	18	Zaragoza	Spain
Flash Flood	27/04/2020 00UTC	27/04/2020	24	Aveyron	France
Flash Flood	27/04/2020 00UTC	27/04/2020	36	Corse-du-Sud	France
Flash Flood	27/04/2020 00UTC	27/04/2020	18	Teruel	Spain
Flash Flood	27/04/2020 12UTC	28/04/2020	42	Louna-Eesti	Estonia
Flash Flood	28/04/2020 00UTC	28/04/2020	48	Tirane	Albania
Flash Flood	28/04/2020 12UTC	29/04/2020	36	Zilinsky kraj	Slovakia
Flash Flood	29/04/2020 00UTC	29/04/2020	24	Presovsky kraj	Slovakia
Flash Flood	30/04/2020 12UTC	01/05/2020	48	Jugozapaden	N. Macedonia
Flash Flood	30/04/2020 12UTC	01/05/2020	72	Plovdiv	Bulgaria
Flash Flood	30/04/2020 12UTC	01/05/2020	48	Diber	Albania
Flash Flood	30/04/2020 12UTC	01/05/2020	48	Poloski	N. Macedonia
Flash Flood	30/04/2020 12UTC	01/05/2020	54	Pelagoniski	N. Macedonia
Flash Flood	30/04/2020 12UTC	01/05/2020	54	Ipeiros	Greece
Flash Flood	30/04/2020 12UTC	01/05/2020	48	Elbasan	Albania
Flash Flood	30/04/2020 12UTC	01/05/2020	48	Korce	Albania
Flash Flood	30/04/2020 12UTC	01/05/2020	36	Stockholms lan	Sweden
Flash Flood	30/04/2020 12UTC	01/05/2020	54	Dytiki Makedonia	Greece
Flash Flood	30/04/2020 12UTC	01/05/2020	66	Smolyan	Bulgaria
Flash Flood	30/04/2020 12UTC	01/05/2020	66	Pazardzhik	Bulgaria
Flash Flood	01/05/2020 00UTC	01/05/2020	54	Jablanicka oblast	Serbia
Flash Flood	01/05/2020 00UTC	01/05/2020	36	Durres	Albania
Flash Flood	01/05/2020 00UTC	01/05/2020	60	Pirotska oblast	Serbia
Flash Flood	01/05/2020 00UTC	01/05/2020	36	Tirane	Albania
Flash Flood	01/05/2020 12UTC	02/05/2020	48	Savoie	France
Flash Flood	01/05/2020 12UTC	02/05/2020	60	Sibiu	Romania
Flash Flood	01/05/2020 12UTC	02/05/2020	66	Harghita	Romania
Flash Flood	01/05/2020 12UTC	02/05/2020	66	Mures	Romania
Flash Flood	02/05/2020 00UTC	02/05/2020	36	Sofia (stolitsa)	Bulgaria
Flash Flood	02/05/2020 00UTC	02/05/2020	18	Berat	Albania
Flash Flood	02/05/2020 00UTC	02/05/2020	60	Brasov	Romania
Flash Flood	02/05/2020 00UTC	02/05/2020	54	Sofia	Bulgaria
Flash Flood	02/05/2020 00UTC	02/05/2020	54	Valcea	Romania
Flash Flood	02/05/2020 12UTC	03/05/2020	48	Teleorman	Romania
Flash Flood	02/05/2020 12UTC	03/05/2020	48	Olt	Romania
Flash Flood	02/05/2020 12UTC	03/05/2020	48	Pleven	Bulgaria
Flash Flood	03/05/2020 00UTC	03/05/2020	24	Korce	Albania
Flash Flood	03/05/2020 00UTC	03/05/2020	30	Dytiki Makedonia	Greece
Flash Flood	03/05/2020 00UTC	03/05/2020	24	Jugozapaden	N. Macedonia
Flash Flood	03/05/2020 00UTC	03/05/2020	24	Pelagoniski	N. Macedonia
Flash Flood	03/05/2020 00UTC	03/05/2020	36	Giurgiu	Romania
Flash Flood	03/05/2020 00UTC	03/05/2020	24	Diber	Albania
Flash Flood	04/05/2020 12UTC	05/05/2020	48	Poloski	N. Macedonia
Flash Flood	04/05/2020 12UTC	05/05/2020	54	Jugozapaden	N. Macedonia
Flash Flood	04/05/2020 12UTC	05/05/2020	54	Pelagoniski	N. Macedonia
Flash Flood	04/05/2020 12UTC	05/05/2020	60	Mahilyow	Belarus
Flash Flood	04/05/2020 12UTC	05/05/2020	48	Diber	Albania

Flash Flood	05/05/2020 00UTC	05/05/2020	54	Minsk	Belarus
Flash Flood	05/05/2020 00UTC	05/05/2020	30	Latgale	Latvia
Flash Flood	05/05/2020 00UTC	05/05/2020	54	Homyel'	Belarus
Flash Flood	05/05/2020 00UTC	05/05/2020	30	Vitsyebsk	Belarus
Flash Flood	05/05/2020 00UTC	05/05/2020	60	Smolensk	Russia
Flash Flood	05/05/2020 00UTC	05/05/2020	60	Tver'	Russia
Flash Flood	05/05/2020 00UTC	05/05/2020	48	Korce	Albania
Flash Flood	05/05/2020 00UTC	05/05/2020	42	Dytiki Makedonia	Greece
Flash Flood	05/05/2020 00UTC	05/05/2020	48	Ipeiros	Greece
Flash Flood	05/05/2020 12UTC	06/05/2020	48	Pskov	Russia
Flash Flood	06/05/2020 12UTC	07/05/2020	24	Tver'	Russia
Flash Flood	08/05/2020 12UTC	09/05/2020	54	Lleida	Spain
Flash Flood	08/05/2020 12UTC	09/05/2020	54	Tarragona	Spain
Flash Flood	08/05/2020 12UTC	09/05/2020	48	Cuenca	Spain
Flash Flood	08/05/2020 12UTC	09/05/2020	60	Pyrenees-Orientales	France
Flash Flood	08/05/2020 12UTC	09/05/2020	54	Zaragoza	Spain
Flash Flood	08/05/2020 12UTC	09/05/2020	60	Gironde	France
Flash Flood	08/05/2020 12UTC	09/05/2020	48	Huesca	Spain
Flash Flood	08/05/2020 12UTC	09/05/2020	48	Araba/Alava	Spain
Flash Flood	08/05/2020 12UTC	09/05/2020	54	La Rioja	Spain
Flash Flood	08/05/2020 12UTC	09/05/2020	60	Landes	France
Flash Flood	09/05/2020 00UTC	09/05/2020	36	Castellon / Castello	Spain
Flash Flood	09/05/2020 00UTC	09/05/2020	42	Soria	Spain
Flash Flood	09/05/2020 00UTC	09/05/2020	42	Bizkaia	Spain
Flash Flood	09/05/2020 00UTC	09/05/2020	36	Teruel	Spain
Flash Flood	09/05/2020 00UTC	09/05/2020	54	Haute-Garonne	France
Flash Flood	09/05/2020 00UTC	09/05/2020	54	Ariege	France
Flash Flood	09/05/2020 00UTC	09/05/2020	54	Gers	France
Flash Flood	09/05/2020 00UTC	09/05/2020	60	Tarn-et-Garonne	France
Flash Flood	09/05/2020 00UTC	09/05/2020	54	Pyrenees-Atlantiques	France
Flash Flood	09/05/2020 12UTC	10/05/2020	72	Novgorod	Russia
Flash Flood	09/05/2020 12UTC	10/05/2020	48	Loir-et-Cher	France
Flash Flood	09/05/2020 12UTC	10/05/2020	48	Seine-et-Marne	France
Flash Flood	09/05/2020 12UTC	10/05/2020	48	Aube	France
Flash Flood	09/05/2020 12UTC	10/05/2020	48	Essonne	France
Flash Flood	09/05/2020 12UTC	10/05/2020	48	Marne	France
Flash Flood	09/05/2020 12UTC	10/05/2020	48	Haut-Rhin	France
Flash Flood	09/05/2020 12UTC	10/05/2020	48	Vosges	France
Flash Flood	09/05/2020 12UTC	10/05/2020	36	Piemonte	Italy
Flash Flood	09/05/2020 12UTC	10/05/2020	66	Louna-Eesti	Estonia
Flash Flood	09/05/2020 12UTC	10/05/2020	48	Alpes-de-Haute-Provence	France
Flash Flood	09/05/2020 12UTC	10/05/2020	48	Aude	France
Flash Flood	09/05/2020 12UTC	10/05/2020	48	Tarn	France
Flash Flood	09/05/2020 12UTC	10/05/2020	42	Landes	France
Flash Flood	09/05/2020 12UTC	10/05/2020	72	Pskov	Russia
Flash Flood	10/05/2020 00UTC	10/05/2020	48	Pomorskie	Poland
Flash Flood	10/05/2020 12UTC	11/05/2020	30	Girona	Spain
Flash Flood	10/05/2020 12UTC	11/05/2020	24	Marne	France
Flash Flood	10/05/2020 12UTC	11/05/2020	60	Novgorod	Russia
Flash Flood	10/05/2020 12UTC	11/05/2020	24	Aube	France
Flash Flood	11/05/2020 00UTC	11/05/2020	48	Tver'	Russia

Flash Flood	11/05/2020 12UTC	12/05/2020	36	Soria	Spain
Flash Flood	11/05/2020 12UTC	12/05/2020	36	Cuenca	Spain
Flash Flood	11/05/2020 12UTC	12/05/2020	36	Valencia / Valencia	Spain
Flash Flood	11/05/2020 12UTC	12/05/2020	36	Teruel	Spain
Flash Flood	11/05/2020 12UTC	12/05/2020	42	Tarragona	Spain
Flash Flood	11/05/2020 12UTC	12/05/2020	36	La Rioja	Spain
Flash Flood	11/05/2020 12UTC	12/05/2020	36	Navarra	Spain
Flash Flood	11/05/2020 12UTC	12/05/2020	36	Zaragoza	Spain
Flash Flood	11/05/2020 12UTC	12/05/2020	36	Guadalajara	Spain
Flash Flood	12/05/2020 12UTC	13/05/2020	42	Albacete	Spain
Flash Flood	12/05/2020 12UTC	13/05/2020	48	Alicante / Alacant	Spain
Flash Flood	12/05/2020 12UTC	13/05/2020	66	Burgos	Spain
Flash Flood	12/05/2020 12UTC	13/05/2020	48	Castellon / Castello	Spain
Flash Flood	12/05/2020 12UTC	13/05/2020	48	Murcia	Spain
Flash Flood	12/05/2020 12UTC	13/05/2020	18	Araba/Alava	Spain
Flash Flood	12/05/2020 12UTC	13/05/2020	54	Huesca	Spain
Flash Flood	13/05/2020 12UTC	14/05/2020	30	Pyrenees-Orientales	France
Flash Flood	13/05/2020 12UTC	14/05/2020	48	Ariege	France
Flash Flood	13/05/2020 12UTC	14/05/2020	48	Pyrenees-Atlantiques	France
Flash Flood	13/05/2020 12UTC	14/05/2020	48	Hautes-Pyrenees	France
Flash Flood	13/05/2020 12UTC	14/05/2020	36	Gers	France
Flash Flood	13/05/2020 12UTC	14/05/2020	30	Lleida	Spain
Flash Flood	13/05/2020 12UTC	14/05/2020	30	Girona	Spain
Flash Flood	13/05/2020 12UTC	14/05/2020	48	Haute-Garonne	France
Flash Flood	14/05/2020 00UTC	14/05/2020	30	Lombardia	Italy
Flash Flood	14/05/2020 00UTC	14/05/2020	24	Piemonte	Italy
Flash Flood	15/05/2020 00UTC	15/05/2020	42	Castellon / Castello	Spain
Flash Flood	15/05/2020 00UTC	15/05/2020	42	Albacete	Spain
Flash Flood	15/05/2020 00UTC	15/05/2020	36	Alicante / Alacant	Spain
Flash Flood	15/05/2020 12UTC	16/05/2020	30	Savoie	France
Flash Flood	16/05/2020 00UTC	16/05/2020	18	Albacete	Spain
Flash Flood	16/05/2020 00UTC	16/05/2020	18	Castellon / Castello	Spain
Flash Flood	16/05/2020 12UTC	17/05/2020	30	Granada	Spain
Flash Flood	17/05/2020 12UTC	18/05/2020	48	Sardegna	Italy
Flash Flood	18/05/2020 12UTC	19/05/2020	60	Arges	Romania
Flash Flood	19/05/2020 00UTC	19/05/2020	60	Pelagoniski	N. Macedonia
Flash Flood	19/05/2020 00UTC	19/05/2020	42	Federacija Bosna i Herce-	Bosnia And Her-
Flash Flood	19/05/2020 00UTC	19/05/2020	54	Basilicata	Italy
Flash Flood	19/05/2020 00UTC	19/05/2020	60	Diber	Albania
Flash Flood	19/05/2020 00UTC	19/05/2020	60	Korce	Albania
Flash Flood	19/05/2020 00UTC	19/05/2020	54	Poloski	N. Macedonia
Flash Flood	19/05/2020 00UTC	19/05/2020	54	Jugozapaden	N. Macedonia
Flash Flood	19/05/2020 00UTC	19/05/2020	60	Dytiki Makedonia	Greece
Flash Flood	19/05/2020 12UTC	20/05/2020	54	Blagoevgrad	Bulgaria
Flash Flood	19/05/2020 12UTC	20/05/2020	36	Sibiu	Romania
Flash Flood	19/05/2020 12UTC	20/05/2020	48	Ipeiros	Greece
Flash Flood	19/05/2020 12UTC	20/05/2020	36	Hunedoara	Romania
Flash Flood	19/05/2020 12UTC	20/05/2020	24	Repuplika Srpska	Bosnia And Her-
Flash Flood	19/05/2020 12UTC	20/05/2020	54	Kentriki Makedonia	Greece
Flash Flood	19/05/2020 12UTC	20/05/2020	36	Valcea	Romania
Flash Flood	19/05/2020 12UTC	20/05/2020	54	Anatoliki Makedonia,	Greece

Flash Flood	20/05/2020 00UTC	20/05/2020	30	Elbasan	Albania
Flash Flood	20/05/2020 00UTC	20/05/2020	36	Tirane	Albania
Flash Flood	20/05/2020 12UTC	21/05/2020	24	Montana	Bulgaria
Flash Flood	22/05/2020 00UTC	22/05/2020	24	Telemark	Norway
Flash Flood	23/05/2020 12UTC	24/05/2020	54	Ipeiros	Greece
Flash Flood	23/05/2020 12UTC	24/05/2020	48	Zaragoza	Spain
Flash Flood	24/05/2020 00UTC	24/05/2020	60	Jugozapaden	N. Macedonia
Flash Flood	24/05/2020 00UTC	24/05/2020	60	Poloski	N. Macedonia
Flash Flood	24/05/2020 00UTC	24/05/2020	60	Pelagoniski	N. Macedonia
Flash Flood	24/05/2020 00UTC	24/05/2020	60	Diber	Albania
Flash Flood	24/05/2020 12UTC	25/05/2020	54	Korce	Albania
Flash Flood	24/05/2020 12UTC	25/05/2020	54	Dytiki Makedonia	Greece
Flash Flood	24/05/2020 12UTC	25/05/2020	24	Teruel	Spain
Flash Flood	25/05/2020 00UTC	25/05/2020	18	Teruel	Spain
Flash Flood	25/05/2020 00UTC	25/05/2020	36	Guadalajara	Spain
Flash Flood	26/05/2020 00UTC	26/05/2020	30	Thessalia	Greece
Flash Flood	27/05/2020 12UTC	28/05/2020	30	Dytiki Makedonia	Greece
Flash Flood	27/05/2020 12UTC	28/05/2020	54	Ipeiros	Greece
Flash Flood	28/05/2020 00UTC	28/05/2020	18	Kiev City	Ukraine
Flash Flood	28/05/2020 12UTC	29/05/2020	24	Dytiki Makedonia	Greece
Flash Flood	28/05/2020 12UTC	29/05/2020	36	Jugozapaden	N. Macedonia
Flash Flood	29/05/2020 00UTC	29/05/2020	48	Homyel'	Belarus
Flash Flood	29/05/2020 00UTC	29/05/2020	54	Mahilyow	Belarus
Flash Flood	29/05/2020 12UTC	30/05/2020	36	Puglia	Italy
Flash Flood	29/05/2020 12UTC	30/05/2020	48	Diber	Albania
Flash Flood	29/05/2020 12UTC	30/05/2020	54	Jugozapaden	N. Macedonia
Flash Flood	30/05/2020 00UTC	30/05/2020	42	Pazardzhik	Bulgaria
Flash Flood	30/05/2020 00UTC	30/05/2020	54	Smolyan	Bulgaria
Flash Flood	30/05/2020 00UTC	30/05/2020	42	Poloski	N. Macedonia

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

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

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

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

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