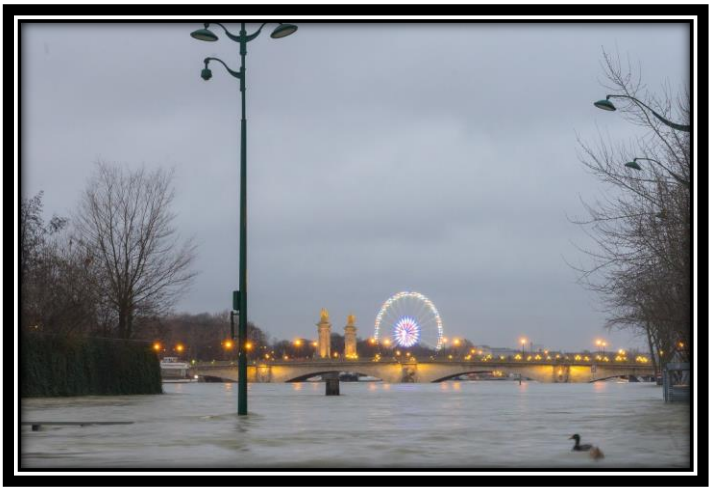
European Flood Awareness System

EFAS *Bulletin*

December 2017 – January 2018

Issue 2018(1)



NEWS

New features

The eastwards extension of EFAS is now coming nearer its release, and as a teaser, the precipitation and temperature maps (Figure 10-Figure 17) will now be shown on the new domain from this issue onwards.

ECMWF has released a new version of the seasonal forecasting system (SEAS5) and EFAS will start using that forecast as input for the seasonal hydrological outlook from March onwards. The main improvements in the meteorological forecast are higher resolution in the atmosphere and ocean, more hindcast members and an earlier release date (5th of each month).

Upcoming events

The registration for the 13th EFAS annual meeting in Norrköping, Sweden, 13-14 March 2018 is now closed. The focus of the meeting will be partner networking and sharing experiences. Please make sure that you book a hotel room at Elite Grand Hotel in Norrköping (reservation.grandhotel@elite.se), as early as possible since the reservation for pre-booked rooms is closed and availability therefore is no longer guaranteed. For more information, please visit the EFAS web portal or contact the EFAS Dissemination Centre via info@efas.eu. We look forward to seeing you all at the meeting!

Meetings

Sava River Basin workshop, 04-05 Oct, Zagreb, Croatia

A training workshop on Governance and Technology for Flood Risk Reduction: Linking early warning to emergency management in the Sava River Basin, was held 04-05 October in Zagreb, Croatia. The workshop served two main purposes: presenting the current state of ongoing relevant projects for the Sava basin (Sava FEWS and I-REACT), and a communication exercise among representatives of hydrometeorological services and civil protection on a simulated flood event.

Regarding the first, large advancements on the establishment and implementation of the Flood Forecasting and Warning System in the Sava Basin (FEWS Sava) have been achieved. It is foreseen to test the EFAS forecast as inclusion of an external forecast in the FEWS Sava system. The communication exercise revealed some shortcomings in the procedures of some countries - an opportunity for improvement.

UCPM-EWS meeting, 11 December, Ispra, Italy

The Union Civil Protection Mechanism (UCPM)'s Early Warning Systems (EWS) expert working group held a meeting on 11 December in Ispra, Italy. An efficient emergency decision-making process cannot exist without an efficient and people-centred EWS. A EWS is within national responsibility; however, a relevant European dimension already exists and will be further expanded according to Participating States' recommendations.

The objective of the annual EWS expert group meeting is to discuss the latest development of the European and Global detection and alert systems and possible improvements. It is to identify potential steps forward and to share information, best practices and lessons learnt on measure taken at national level, including the one on the "last mile" of a EWS (i.e. education, raising awareness).

The early warning systems used within the UCPM (EFAS, EFFIS, EDO and GDACS) were presented, alongside with recent developments in the ARISTOTLE, NEAMWAVE17 and FOKUS projects. A multi-hazard approach, increasing synergies among the existing systems and a consolidation of the European Natural Hazard Partnership were emphasized as the critical points for the future.

RESULTS

Summary of EFAS Flood and Flash Flood Notifications

The 43 formal and 17 informal EFAS flood notifications issued in December-January 2017 are summarised in Table 1. The locations of all notifications are shown in Figure 22 and Figure 24 in the appendix.

108 Flash flood notifications, summarised in Table 2, were issued from December to January 2017. The locations are shown in Figure 23 and Figure 25 in the appendix.

Meteorological situation

by EFAS Meteorological Data Collection Centre

December 2017

A low-pressure system caused heavy floods in Albania at the end of November and beginning of December, which led to one fatality, approximately 4,000 evacuations and thousands of damaged buildings. In total, an area of more than 15,000 hectares was flooded. A strong high-pressure system located over the North Atlantic strengthened and moved eastwards. During this process, low-pressure dominated the weather conditions in Scandinavia and Iceland.

The low-pressure area expanded to the south and slowly displaced the high-pressure systems over Europe. Consequently, extreme rainfall and snowmelt affected Italy in the northeastern regions of Emilia-Romagna, Liguria and Tuscany on 11 December. The River Enza in the town of Lentigione was bursting its banks resulting in around thousands of evacuations. On 12 December, this river reached a level of 12.44 m, which was higher than the previous record of 11.63 m in February 2016. By the end of the month, a new high-pressure system formed over the North Atlantic, moved eastwards and strengthened. As a contrast, low-pressure systems still influenced Scandinavia and expanded to northern and central Europe.

The precipitation anomalies displayed drier conditions in most parts of Spain, Sardinia, Sicilia, parts of southern and northeastern Italy, as well as in the Czech Republic and Scotland (Figure 10 - Figure 11). The high precipitation amounts with a maximum of 860.5 mm in regions in northeastern Italy and Albania are related to the flood event in the beginning of the month. The average recorded temperatures ranged from -16.6°C in mountainous areas, Iceland, Scandinavia and Northeastern Europe to 15.0°C in maritime characterized climate zones and the Mediterranean region (Figure 14). The Balkans, most parts of northern, central and eastern Europe, as well as southern Norway and Sweden were significantly warmer than normal whereas Portugal, Iceland and the Mediterranean region recorded temperatures below normal (Figure 17).

January 2018

Strong low-pressure systems brought heavy winds and storm surges to parts of northern Europe 2 - 4 January. The storm Eleanor reached wind speeds and maximum gusts of almost 40 m/s at Mace Head in western Ireland, which caused enormous flooding along the coast. A record high water level of 4.659 m was recorded of the Corrib in Galway City on 2 January. Simultaneously, wind speeds at Great Dun Fell in Cumbria, UK, reached 45 m/s and caused 60 flood warnings across England. Storm Eleanor also led to flooding in Isère in the Auvergne-Rhône-Alpes region, France. In Germany (named Burglind) the storm caused bank overflow of the river Rhine. The low-pressure front moved eastwards, and after this, strong high-pressure systems influenced the weather in Europe.

In mid-January, a high-pressure system over Scandinavia strengthened and extended to the southeast. This system was replaced by a new, very strong low-pressure area forming over Iceland causing flash floods in parts of southwestern England, Wales and Ireland on 21 January. Several regions received more than 30 mm of rain in 24 hours. Heavy precipitation in France together with snowmelt led to high water levels of the river Seine in Paris starting on 23 January. The floods resulting in around 1,000 evacuations (see article late in this bulletin). The storm Georgina caused flooding with recorded gusts up to 65 m/s in parts of Scotland on 24 January. After this, mostly high-pressure systems dominated Europe until the end of the month.

The precipitation anomalies displayed wetter conditions in central Europe, Ireland, Rumania and parts of northern Spain (Figure 12 and Figure 13). However, northern Norway, Portugal, Corse, Sardinia, Italy as well as some parts of southern Poland and Slovakia were drier than normal. Most precipitation amounts, with up to 839.8 mm were measured in the coastal regions of northern Europe and mountainous regions, were related to the storm Eleanor. The average temperatures ranged from -20.8°C in mountainous regions, Iceland, Scandinavia and northeastern Europe to 14.5°C in the Mediterranean area (Figure 16). Overall, the temperature anomalies indicated warmer conditions in Europe, excluded, Portugal, Scotland, Iceland as well as northern Norway and Sweden (Figure 17).

Hydrological situation

By EFAS Hydrological Data Collection Centre

Over the past two months, the highest concentration of stations which surpassed the minimum discharge and stage warning levels were in the Dnieper river basin (Belarus and north-western Ukraine), in the Po river (northern Italy), in the Danube basin along the Sava and Tisza rivers as well as the central and western areas of the same basin and in the Rhine river Basin (central area and southern Germany and Switzerland). (Figure 19 and Figure 21) Other stations, which have also surpassed their minimum warning levels, are the ones located in Minho river basin in northwestern Spain, northern and western Sweden, southwestern Norway, the Seine river Basin and the northern Rhône river basin area.

As expected, most of the stations located in the basins mentioned above, also appear in the assessment of the stations for which the mean discharge and/or stage values surpassed their 90% historic quantile (Figure 18 and Figure 20). The 90% quantile has also been surpassed by stations throughout Norway and Sweden, southeastern of the Danube river basin (Romania and Bulgary), the Laugave river basin (Latvia), as well as stations of the Elbe river basin in Germany and several stations across Spanish river basins and stations in southern UK.

The stations that presented stage and discharge values that remained below the 10% quantile were found in Spain, mainly in the Ebro and Guadalquivir river basins. This occurred less frequently in a small number of stations of the Po river basin in Italy, the Danube river basin in Austria, Germany, Romania, Bulgaria and Ukraine as well as the Welland and Thames river basins in the UK.

Verification

Figure 1 - Figure 3 shows the EFAS headline score, the Continuous Ranked Probability Skill Score (CRPSS) for lead times 3, 5 and 10 days for the December to January period across the EFAS domain for catchments larger than 2000km^2. The reference score is the persistence forecast. 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 red on the maps) indicates the skill is worse than persistence.

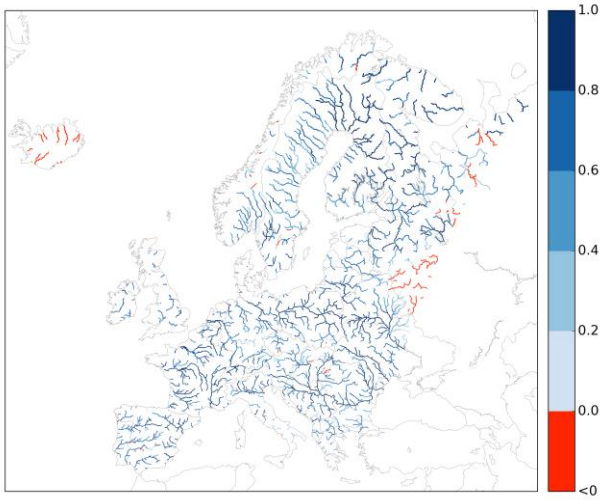


Figure 1. EFAS CRPSS at lead-time 3 days the December-January 2017 period, for catchments >2000km2. The reference score is persistence.

These maps indicate that across much of Europe for forecasts are more skilful than persistence at all lead times. Regions shown in blue are those where EFAS forecasts are more skilful than persistence, with darker shading indicating better performance.

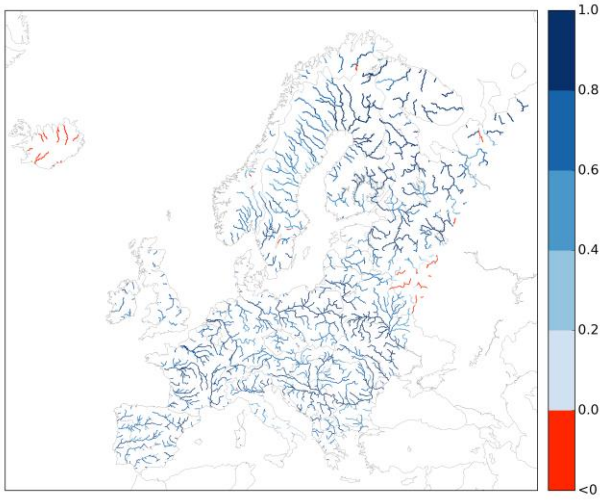


Figure 2. EFAS CRPSS at lead-time 5 days the December-January 2017 period, for catchments >2000km2. The reference score is persistence.

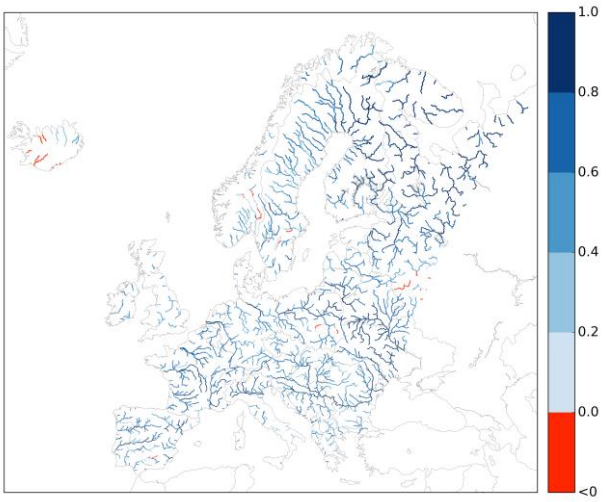


Figure 3. EFAS CRPSS at lead-time 10 days the December-January 2017 period, for catchments >2000km2. The reference score is persistence.

Publications

Beck, H. E., Vergopolan, N., Pan, M., Levizzani, V., van Dijk, A. I. J. M., Weedon, G. P., Brocca, L., Pappenberger, F., Huffman, G. J., and Wood, E. F.: Global-scale evaluation of 22 precipitation datasets using gauge observations and hydrological modeling, Hydrol. Earth Syst. Sci., 21, 6201-6217, https://doi.org/10.5194/hess-21-6201-2017, 201

FEATURES

A summary of EFAS notifications in 2017 and comparison with previous years

by Erik Sprokkereef, RWS, EFAS Dissemination Center

The notifications sent in 2017 were concentrated towards the end of the year (Figure 4). November and December were the most active months with 55 and 73 notifications, which is about 40% of the total number of notifications of 2017. December also saw the most formal notifications issued, while March-May were very quiet in terms of flood notifications. In total 64 formal, 61 informal and 208 flash flood notifications were issued in 2017.

2017 was an average year for formal and informal notifications as in comparison with the total number of EFAS notifications issued per year for the past 5 years (Figure 5). After the spectacular increase in 2016, the number of flash flood notifications returned to a level comparable to 2015.

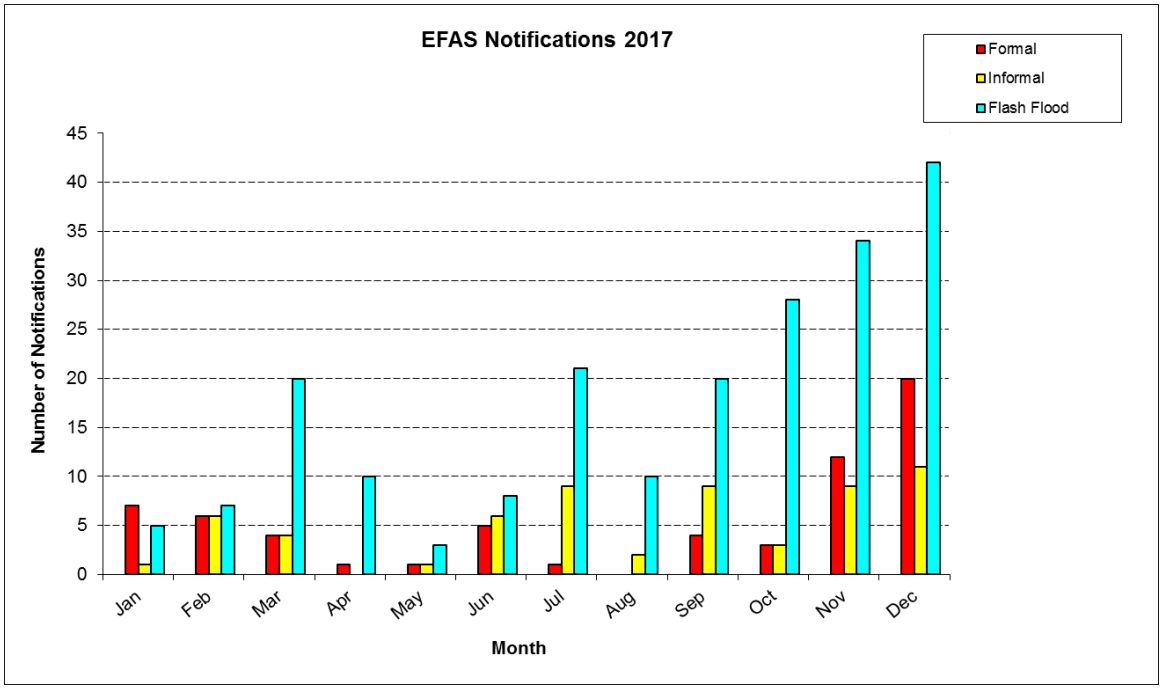


Figure 4. Number of EFAS formal (red), informal (orange) and flash flood (blue) notifications issued in 2017

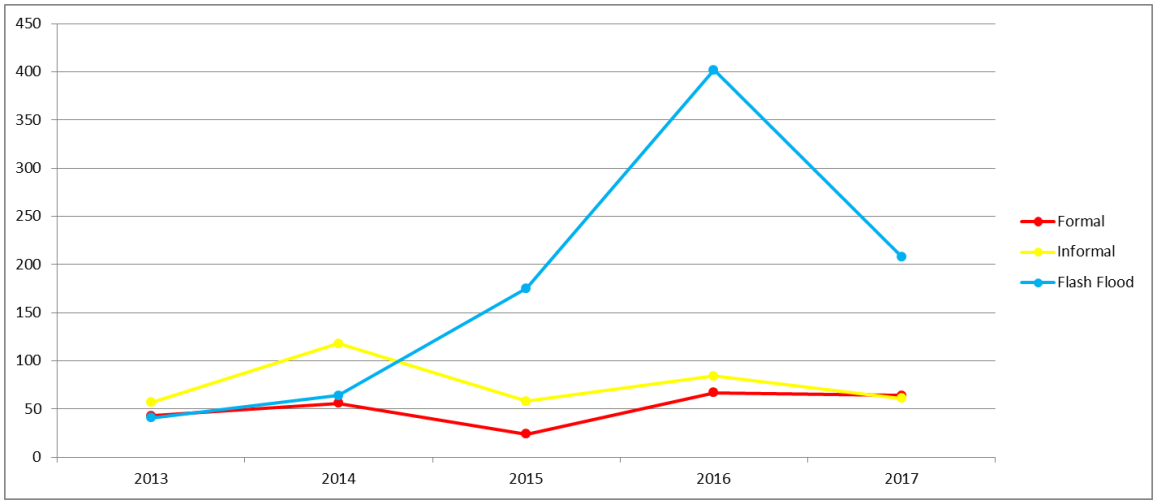


Figure 5. Total number of EFAS formal (red), informal (orange) and flash flood (blue) notifications issued per year from 2013-2017

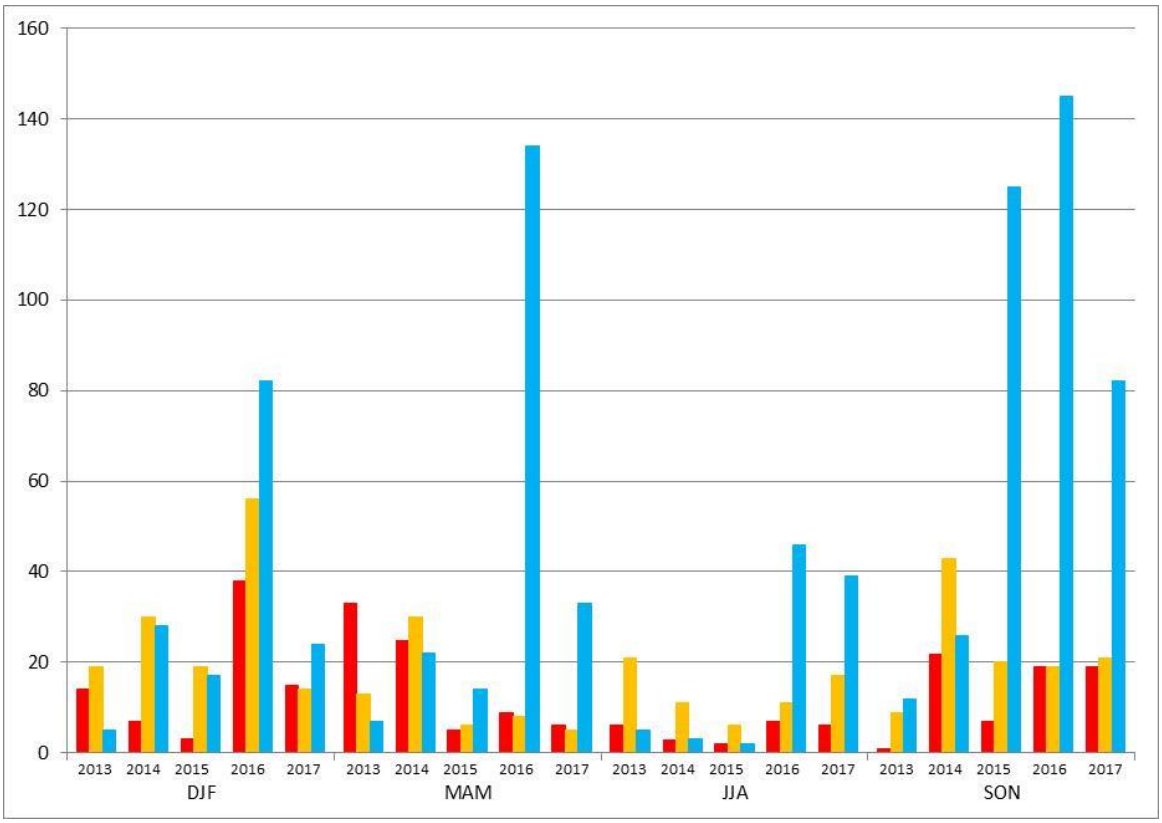


Figure 6. Number of EFAS (red), informal (orange) and flash flood (blue) notifications issued per season over the past 5 years 2013-2017.

Figure 6 breaks down the number of notifications over the past 5 years into seasons (December-January-February [DJF], March-April-May [MAM], June-July-August [JJA] and September-October-November [SON]). The most active seasons in terms of river flooding over the past 5 years are the winter (DJF) of 2016, the spring (MAM) of 2014 and the autumn (SON) of 2016.

In 2017 in total 30 countries received 333 notifications (64 formal, 61 informal and 208 flash flood notifications). Spain received the highest number of notifications (8 formal, 3 informal and 22 flash flood

notifications). The most formal notifications were sent to Greece (11), followed by France (9) and Spain (8), the most informal notifications to Hungary and Italy (9) and the most flash flood notifications to Spain (22), followed by Germany (16), Poland, Romania and Slovakia (14).

Based on the number of notifications issued from 2013-2017, the most formal flood notifications are issued in winter and spring (about 15 per year on average), informal notifications in winter (28 per year on average) and flash flood notifications in autumn (78 per year on average). The season with the fewest formal notifications is the summer (about 5 per year on average).

Case study: Floods in Paris and Île-de-France, France, January 2018

by Richard Davies, FloodList

The overflowing Seine river in Paris and Île-de-France region caused around 1,000 people to evacuate their homes during late January 2018. Météo-France reported that the country had seen exceptional rainfall during January 2018, with some areas recording 4 to 5 times more rain than normal.
A storm brought further heavy rain between 20 and 21 January. This, combined with snowmelt in some areas caused river levels to increase.

In the department of Doubs the Loue River, a tributary of the Doubs, burst its banks flooding parts of the town of Ornans. The river reached 2.58 metres, the second highest level recorded after the 1953 high of 3.2m. Upstream, melting snow and heavy rain had caused the Doubs river to overflow in St-Ursanne in Jura, Switzerland.

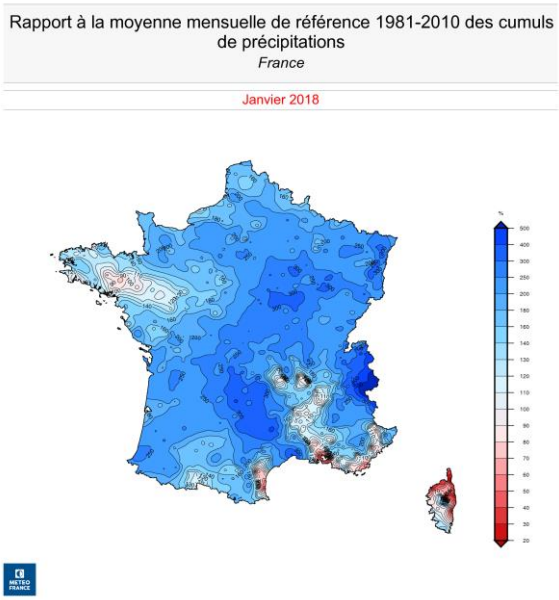


Figure 7. Accumulative rainfall in France during January 2018. *Credit: Météo-France*

Issued alerts and notifications

By 24 January, Météo-France had issued flood alerts for at least 20 departments of the country, including the Paris region.

In what seemed like a possible repeat of the flooding of summer 2016, the rising river Seine in Paris and the Île-de-France region caught the attention of the world's media. Thousands of homes were flooded and four people died in flood-related incidents during the floods of May to June 2016. The Association Française de l'assurance (AFA) estimated the cost of the 2016 floods to be as high as €1.4 billion.

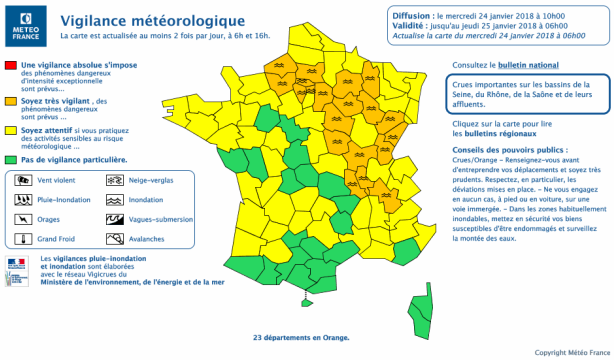


Figure 8. Flood warnings in France as of 24 January 2018. Credit: Météo-France

EFAS predicted the event well in advance with lead times ranging from 4-8 days (Table 1). 13 flood notifications and a large number of flash flood notifications were sent for the event.

The development of the event

As of midday 24 January 2018, the Seine at Austerlitz Bridge in Paris stood at 5.22 metres. In a bulletin of 24 January, Vigicrues said that a maximum level of up to 6.2 metres was possible during the weekend 26 to 28 January. At the peak of the 2016 floods, the Seine at Austerlitz Bridge reached 6.10 metres. Paris authorities suspended river traffic, closed several roads along the river and central stations of city's RER C train line. A lower level of the Louvre Museum was closed.

Levels of the river crept higher over the next few days affecting an area stretching from east of Paris along the Marne river, a tributary of the Seine, through Paris and northwards along the Seine. Police in Paris said on 27 January that around 1,000 people had evacuated their homes including 358 in Val de Marne, 214 in Essonne, 154 in Seine et Marne and 105 in Yvelines. Some patients were evacuated from medical establishments, including 94 in Villeneuve-Saint-Georges and 78 in Meulan Les Mureaux.

By early Monday, 29 January 2018 levels of the Seine peaked at around 5.85 to 5.88 metres (with a slight discrepancy between ultrasound (5.85m) and other measurements).

Figure 9. Levels of the Seine River at Austerlitz Bridge during late January 2018. Credit: Vigicrues France.

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: Paris flooding in late January. Photo credit: Julien Colin https://www.flickr.com/photos/jolun64/, under CC BY-NC 2.0

Appendix - figures

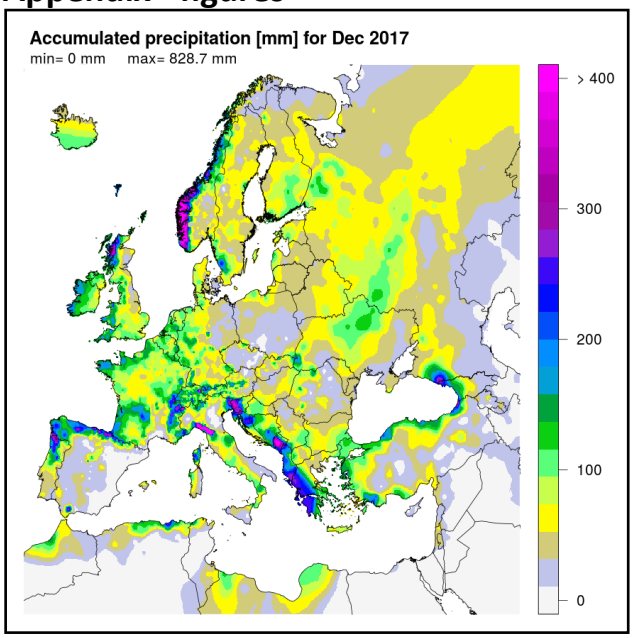


Figure 10. Accumulated precipitation [mm] for Dec. 2017.

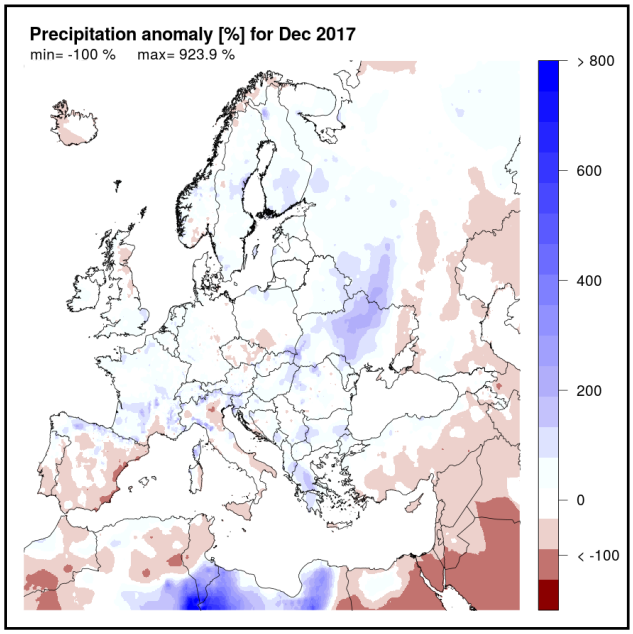


Figure 11. Precipitation anomaly [%] for December 2017, relative to a long-term average (1990-2013). Blue (red) denotes wetter (drier) conditions than normal.

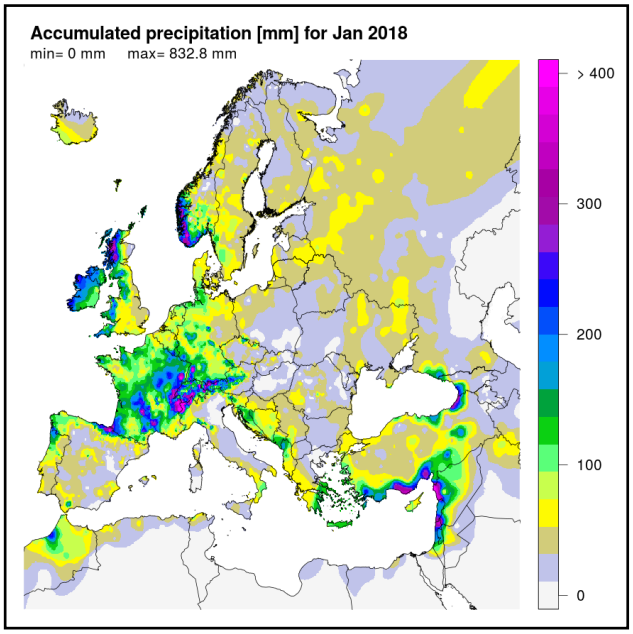


Figure 12. Accumulated precipitation [mm] for January 2017.

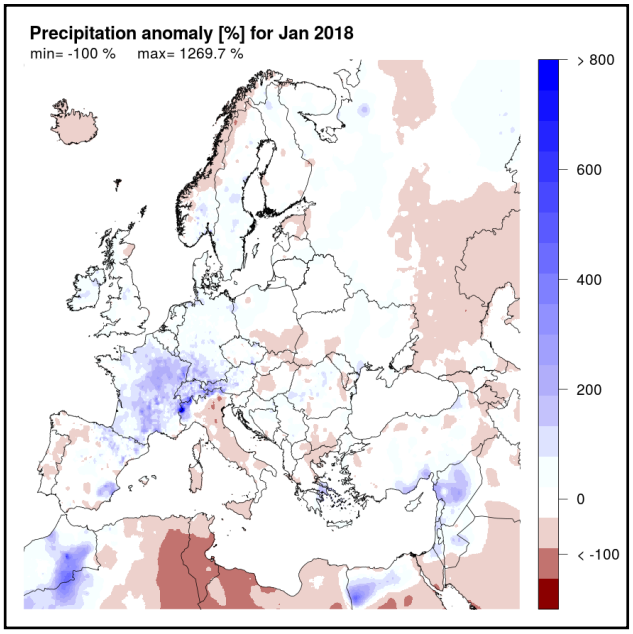


Figure 13. Precipitation anomaly [%] for January 2017, relative to a long-term average (1990-2013). Blue (red) denotes wetter (drier) conditions than normal.

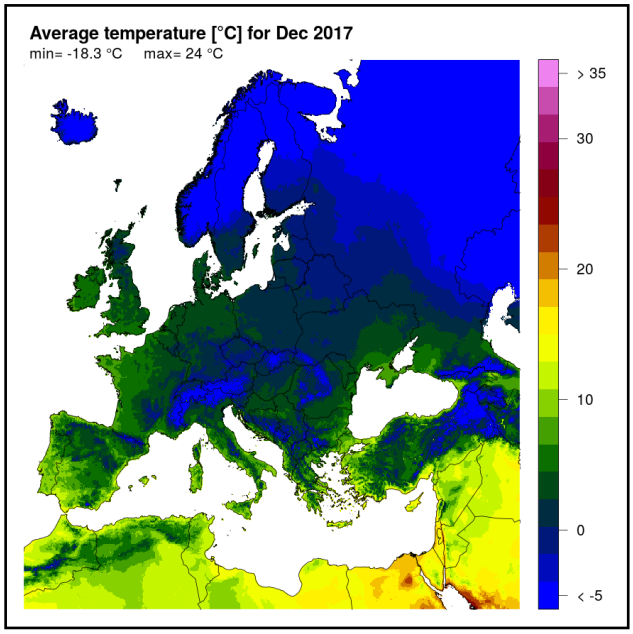


Figure 14. Mean temperature [°C] for December 2017.

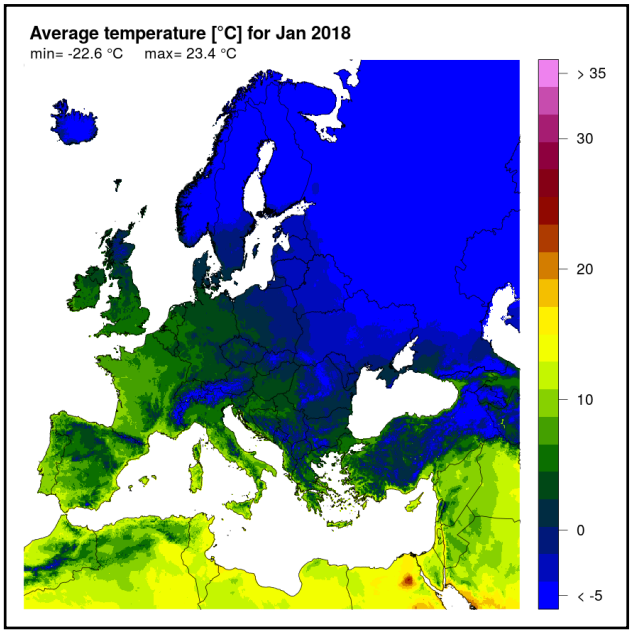


Figure 16. Mean temperature [°C] for January 2017.

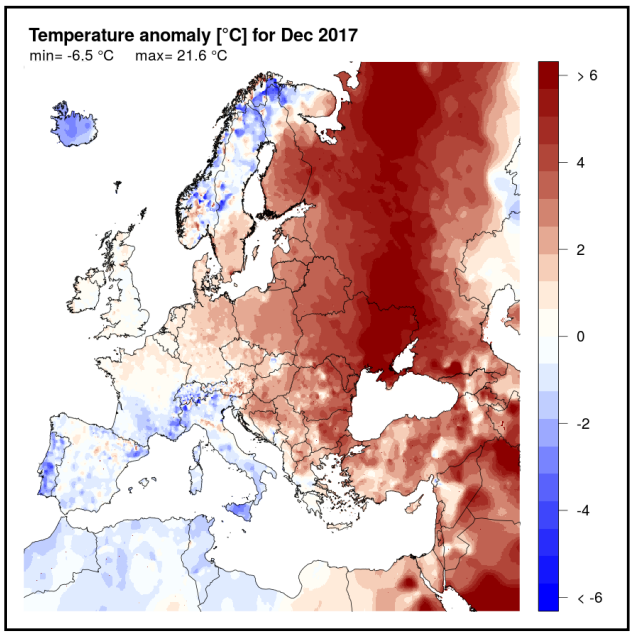


Figure 15. Temperature anomaly [°C] for December 2017, relative to a long-term average (1990-2013). Blue (red) denotes colder (warmer) temperatures than normal.

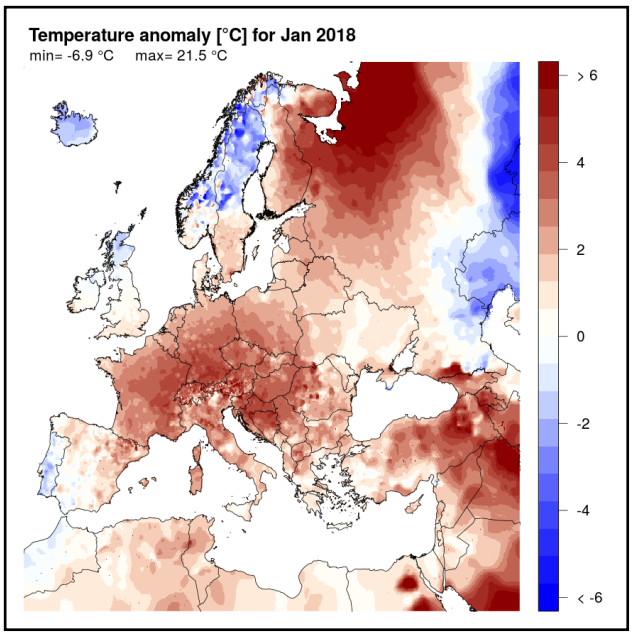


Figure 17. Temperature anomaly [°C] for January 2017, relative to a long-term average (1990-2013). Blue (red) denotes colder (warmer) temperatures than normal.

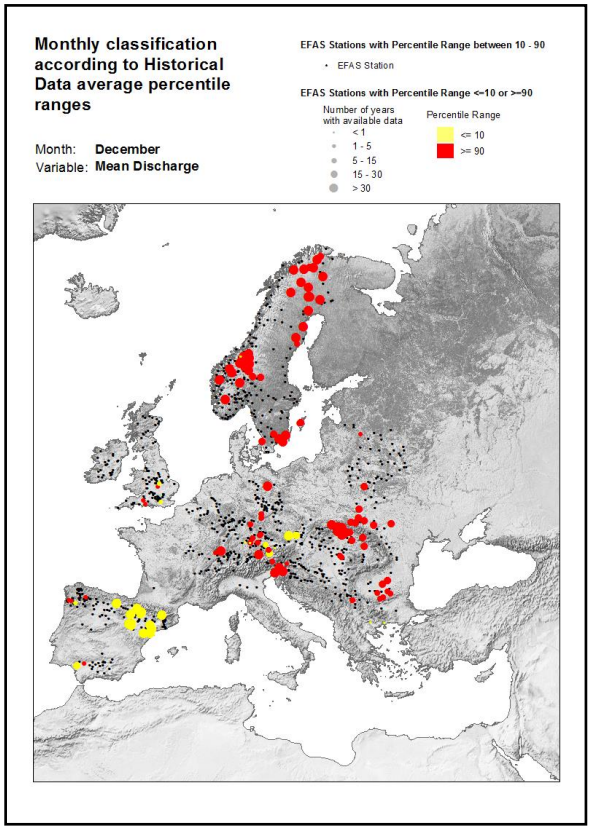


Figure 18. Monthly discharge anomalies December 2017.

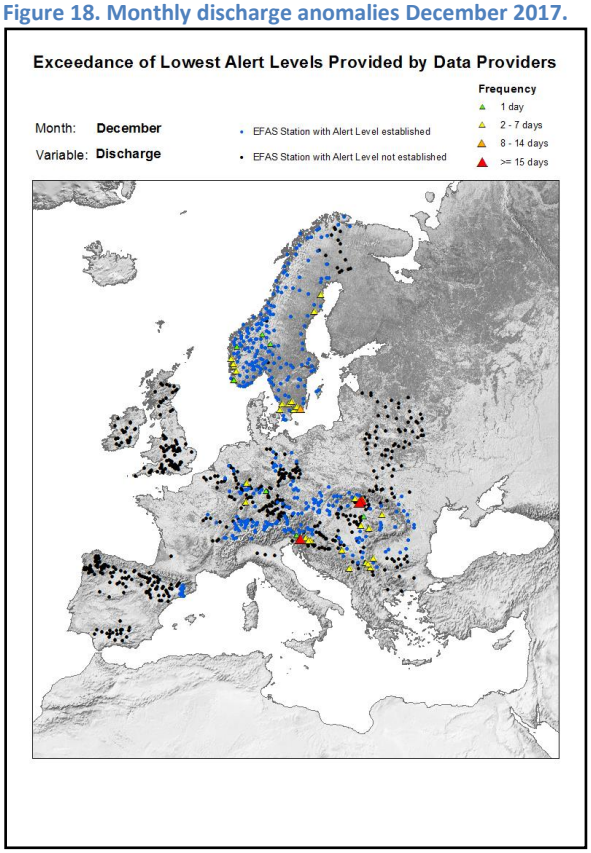


Figure 19. Lowest alert level exceedance for December 2017.

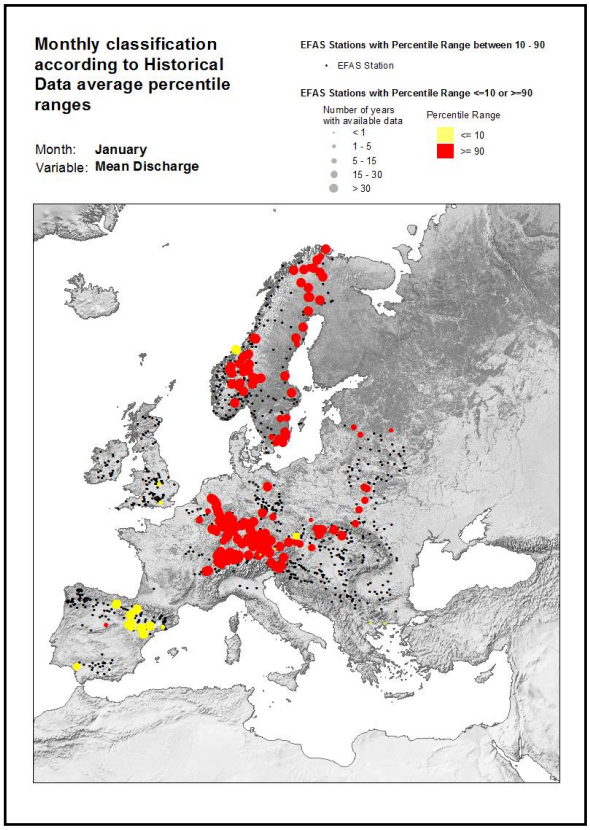


Figure 20. Monthly discharge anomalies January 2017.

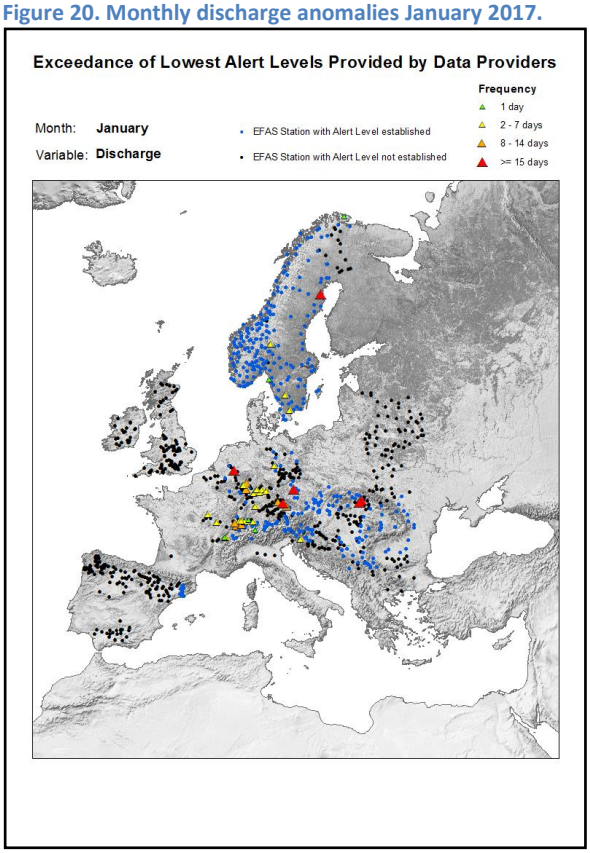


Figure 21. Lowest alert level exceedance for January 2017.

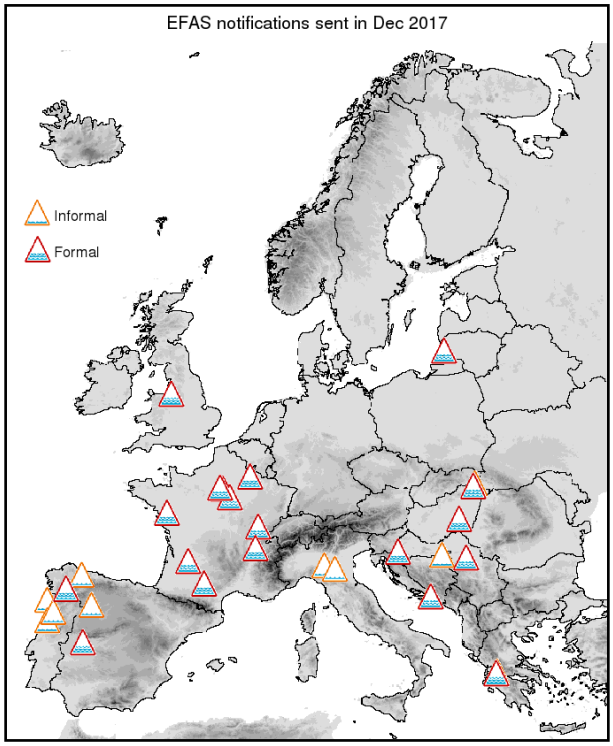


Figure 22. EFAS flood notifications sent for December 2017.

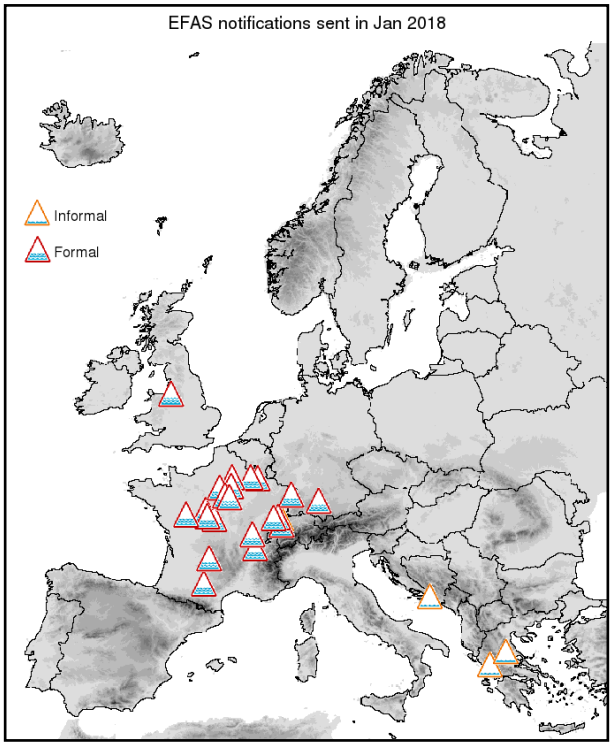


Figure 24. EFAS flood notifications sent for January 2017.

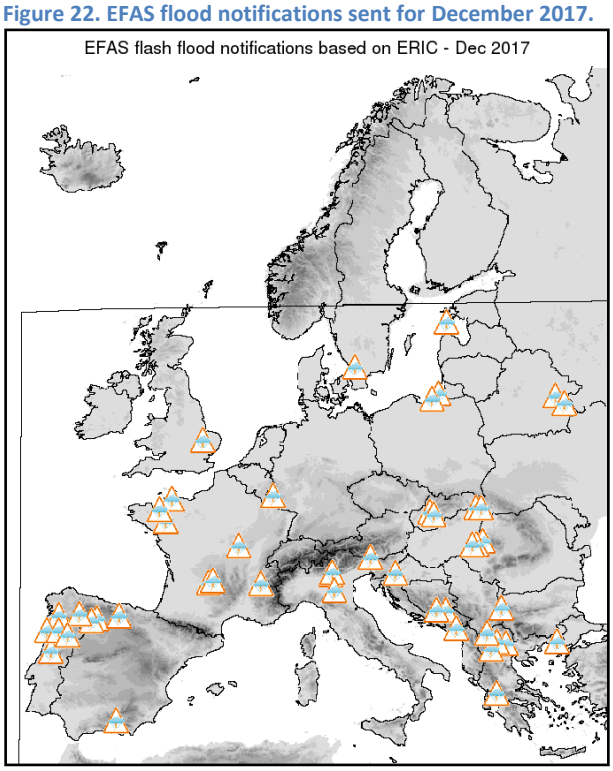


Figure 23. Flash flood notifications sent for December 2017.

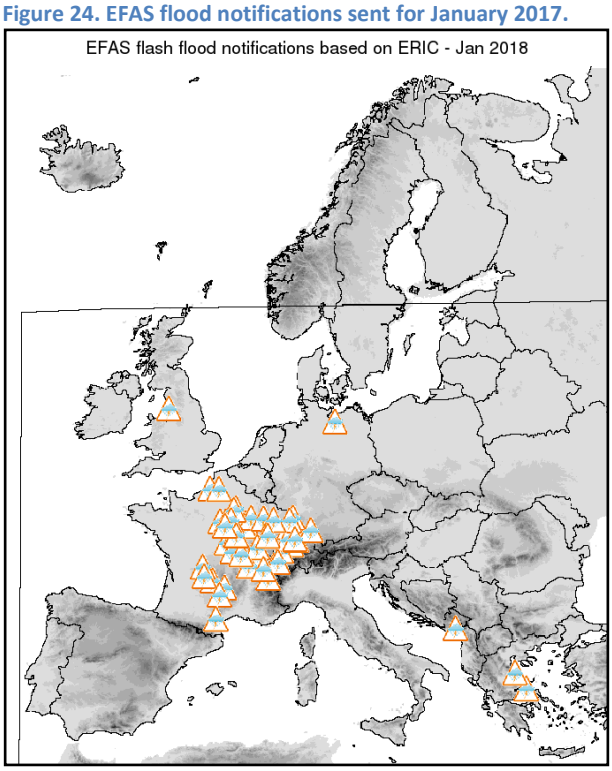


Figure 25. Flash flood notifications sent for January 2017.

Appendix - tables

Table 1. EFAS flood notifications sent in December - January 2017.

Type	Forecast date	Issue date	Lead time*	River	Country
Formal	04/12/2017 12 UTC	05/12/2017	5	Akheloos	Greece
Formal	06/12/2017 00 UTC	06/12/2017	2	Minija	Lithuania
Formal	06/12/2017 00 UTC	06/12/2017	6	Lower Neretva	Croatia
Formal	08/12/2017 12 UTC	09/12/2017	3	Rhone, above Saone	France
Formal	08/12/2017 12 UTC	09/12/2017	2	Tietar	Spain
Formal	08/12/2017 12 UTC	09/12/2017	2	Sil	Spain
Informal	08/12/2017 12 UTC	09/12/2017	2	Vouga	Portugal
Informal	08/12/2017 12 UTC	09/12/2017	2	Duoro, below Tormes	Portugal
Formal	09/12/2017 00 UTC	09/12/2017	0	Akheloos	Greece
Informal	09/12/2017 00 UTC	09/12/2017	1	Navia	Spain
Informal	09/12/2017 00 UTC	09/12/2017	1	Portugal - costal zone	Portugal
Formal	10/12/2017 00 UTC	10/12/2017	3	Kupa	Croatia
Informal	10/12/2017 00 UTC	10/12/2017	1	Esla, below Orbigo	Spain
Informal	10/12/2017 12 UTC	11/12/2017	2	Po, section Adda - Oglio	Italy
Informal	10/12/2017 12 UTC	11/12/2017	1	Secchia	Italy
Formal	11/12/2017 12 UTC	12/12/2017	5	Bodrog	Slovakia
Informal	13/12/2017 12 UTC	14/12/2017	2	Lower Neretva	Croatia
Formal	14/12/2017 00 UTC	14/12/2017	4	Lower Koros section	Hungary
Formal	14/12/2017 00 UTC	14/12/2017	2	Seine	France
Formal	14/12/2017 00 UTC	14/12/2017	2	Loire, below Maine	France
Informal	16/12/2017 00 UTC	16/12/2017	1	Bodrog	Slovakia
Formal	18/12/2017 00 UTC	18/12/2017	3	Sava, below Drina	Serbia
Informal	18/12/2017 00 UTC	18/12/2017	1	Sava, above Drina	Croatia
Informal	25/12/2017 12 UTC	26/12/2017	2	Akheloos	Greece
Formal	28/12/2017 00 UTC	28/12/2017	3	Rhone, above Saone	France
Formal	28/12/2017 12 UTC	29/12/2017	7	Aisne	France
Formal	28/12/2017 12 UTC	29/12/2017	7	Marne	France
Formal	28/12/2017 12 UTC	29/12/2017	6	Yonne	France
Formal	29/12/2017 00 UTC	29/12/2017	6	Seine	France
Formal	29/12/2017 00 UTC	29/12/2017	6	Dordogne, above Isle	France
Formal	31/12/2017 00 UTC	31/12/2017	3	Mersey	United Kingdom
Formal	31/12/2017 00 UTC	31/12/2017	5	Saone, below Doubs	France
Formal	31/12/2017 12 UTC	31/12/2017	3	Tarn, above Aveyron	France
Informal	01/01/2018 00 UTC	01/01/2018	3	Doubs	Switzerland
Formal	03/01/2018 00 UTC	03/01/2018	4	Loire, section Vienne - Maine	France
Formal	04/01/2018 00 UTC	04/01/2018	2	Cher	France
Formal	04/01/2018 00 UTC	04/01/2018	1	Doubs	France
Informal	04/01/2018 12 UTC	05/01/2018	0	Doubs	Switzerland
Formal	11/01/2018 12 UTC	12/01/2018	0	Dordogne, above Isle	France
Informal	11/01/2018 12 UTC	12/01/2018	2	Pinios	Greece
Formal	13/01/2018 12 UTC	14/01/2018	2	Mersey	United Kingdom
Formal	14/01/2018 00 UTC	14/01/2018	0	Seine	France
Formal	14/01/2018 00 UTC	14/01/2018	4	Seine, section Loing - Marne	France
Formal	14/01/2018 00 UTC	14/01/2018	4	Yonne	France
Formal	14/01/2018 12 UTC	15/01/2018	8	Marne	France
Formal	17/01/2018 00 UTC	17/01/2018	4	Tarn, above Aveyron	France

Formal	17/01/2018 12 UTC	18/01/2018	4	Rhone, above Saone	France
Formal	17/01/2018 12 UTC	18/01/2018	4	Saone, below Doubs	France
Formal	17/01/2018 12 UTC	18/01/2018	7	Aisne	France
Formal	18/01/2018 00 UTC	18/01/2018	2	Loire, section Allier - Cher	France
Formal	18/01/2018 00 UTC	18/01/2018	0	Cher	France
Formal	19/01/2018 12 UTC	20/01/2018	3	Rhine, section Ill - Neckar	France
Formal	20/01/2018 00 UTC	20/01/2018	2	Doubs	France
Formal	20/01/2018 00 UTC	20/01/2018	3	Danube, above Lech	Germany
Informal	20/01/2018 00 UTC	20/01/2018	2	Doubs	Switzerland
Formal	21/01/2018 00 UTC	21/01/2018	2	Aisne	France
Formal	21/01/2018 12 UTC	22/01/2018	3	Maas	France
Formal	23/01/2018 12 UTC	24/01/2018	0	Aare	Switzerland
Informal	31/01/2018 00 UTC	31/01/2018	4	Arachthos	Greece
Informal	31/01/2018 00 UTC	31/01/2018	3	Lower Neretva	Croatia

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

Table 2. EFAS flash flood notifications sent in December - January 2017.

Type	Forecast date	Issue date	Lead time*	Region	Country
Flash flood	01/12/2017 00 UTC	01/12/2017	30	Ditiki Ellada	Greece
Flash flood	01/12/2017 00 UTC	01/12/2017	24	Skopski	Macedonia
Flash flood	01/12/2017 00 UTC	01/12/2017	24	Pelagoniski	Macedonia
Flash flood	01/12/2017 00 UTC	01/12/2017	24	Pirot	Serbia
Flash flood	01/12/2017 12 UTC	02/12/2017	24	Jugoistochen	Macedonia
Flash flood	01/12/2017 12 UTC	02/12/2017	12	Vardarski	Macedonia
Flash flood	04/12/2017 00 UTC	04/12/2017	72	Kaliningradskaya	Russia
Flash flood	08/12/2017 00 UTC	08/12/2017	72	Duoro	Portugal
Flash flood	08/12/2017 00 UTC	08/12/2017	78	Tamega	Portugal
Flash flood	08/12/2017 00 UTC	08/12/2017	72	Cantal	France
Flash flood	08/12/2017 00 UTC	08/12/2017	78	Correze	France
Flash flood	08/12/2017 00 UTC	08/12/2017	102	Emilia-Romagna	Italy
Flash flood	08/12/2017 12 UTC	09/12/2017	60	Leon	Spain
Flash flood	08/12/2017 12 UTC	09/12/2017	60	Grande Porto	Portugal
Flash flood	09/12/2017 00 UTC	09/12/2017	60	Rheinland-Pfalz	Germany
Flash flood	09/12/2017 12 UTC	10/12/2017	36	Ourense	Spain
Flash flood	09/12/2017 12 UTC	10/12/2017	42	Cantabria	Spain
Flash flood	10/12/2017 00 UTC	10/12/2017	54	Lombardia	Italy
Flash flood	10/12/2017 00 UTC	10/12/2017	48	Trento	Italy
Flash flood	10/12/2017 00 UTC	10/12/2017	36	Ille-et-Vilaine	France
Flash flood	10/12/2017 00 UTC	10/12/2017	36	Cotes-d'Armor	France
Flash flood	10/12/2017 00 UTC	10/12/2017	12	Nievre	France
Flash flood	10/12/2017 00 UTC	10/12/2017	24	Leon	Spain
Flash flood	10/12/2017 00 UTC	10/12/2017	24	Leon	Spain
Flash flood	10/12/2017 00 UTC	10/12/2017	24	Dao-Lafoes	Portugal
Flash flood	10/12/2017 00 UTC	10/12/2017	36	Granada	Spain
Flash flood	10/12/2017 12 UTC	11/12/2017	42	Karnten	Austria
Flash flood	10/12/2017 12 UTC	11/12/2017	30	Karlovacka zupanija	Croatia
Flash flood	11/12/2017 00 UTC	11/12/2017	12	Manche	France

Flash flood	11/12/2017 12 UTC	12/12/2017	36	Laane-Eesti	Estonia
Flash flood	12/12/2017 12 UTC	13/12/2017	90	Zakarpats'ka Oblast'	Ukraine
Flash flood	14/12/2017 00 UTC	14/12/2017	60	Montenegro	Montenegro
Flash flood	14/12/2017 12 UTC	15/12/2017	48	Bihor	Romania
Flash flood	14/12/2017 12 UTC	15/12/2017	42	Arad	Romania
Flash flood	14/12/2017 12 UTC	15/12/2017	42	Del Alfold	Hungary
Flash flood	14/12/2017 12 UTC	15/12/2017	42	Bosnia and Herzegovina	Bosnia and Herz.
Flash flood	14/12/2017 12 UTC	15/12/2017	42	Republika Srpska	Bosnia and Herz.
Flash flood	15/12/2017 00 UTC	15/12/2017	36	Kosicky kraj	Slovakia
Flash flood	23/12/2017 12 UTC	24/12/2017	48	Hallands län	Sweden
Flash flood	24/12/2017 12 UTC	25/12/2017	18	Kaliningradskaya oblast'	Russia
Flash flood	26/12/2017 00 UTC	26/12/2017	30	East of England	United Kingdom
Flash flood	26/12/2017 00 UTC	26/12/2017	66	Banskobystricky kraj	Slovakia
Flash flood	26/12/2017 12 UTC	27/12/2017	48	Trenciansky kraj	Slovakia
Flash flood	27/12/2017 12 UTC	28/12/2017	36	Anatoliki Makedonia	Greece
Flash flood	28/12/2017 12 UTC	29/12/2017	48	Homyel'skaya voblasts'	Belarus
Flash flood	29/12/2017 12 UTC	30/12/2017	30	Isere	France
Flash flood	29/12/2017 12 UTC	30/12/2017	24	Mahilyowskaya voblasts'	Belarus
Flash flood	01/01/2018 12 UTC	02/01/2018	84	Haute-Savoie	France
Flash flood	01/01/2018 12 UTC	02/01/2018	78	Saone-et-Loire	France
Flash flood	01/01/2018 12 UTC	02/01/2018	84	Yonne	France
Flash flood	01/01/2018 12 UTC	02/01/2018	84	Loiret	France
Flash flood	01/01/2018 12 UTC	02/01/2018	90	Haute-Saone	France
Flash flood	02/01/2018 00 UTC	02/01/2018	72	Savoie	France
Flash flood	02/01/2018 00 UTC	02/01/2018	72	Cote-d'Or	France
Flash flood	02/01/2018 00 UTC	02/01/2018	78	Seine-et-Marne	France
Flash flood	02/01/2018 00 UTC	02/01/2018	42	North West England	United Kingdom
Flash flood	02/01/2018 12 UTC	03/01/2018	66	Baden-Wurttemberg	Germany
Flash flood	03/01/2018 00 UTC	03/01/2018	36	Aisne	France
Flash flood	03/01/2018 00 UTC	03/01/2018	30	Rhone	France
Flash flood	03/01/2018 00 UTC	03/01/2018	54	Baden-Wurttemberg	Germany
Flash flood	03/01/2018 00 UTC	03/01/2018	24	Mecklenburg-Vorpomm.	Germany
Flash flood	03/01/2018 12 UTC	04/01/2018	42	Meurthe-et-Moselle	France
Flash flood	03/01/2018 12 UTC	04/01/2018	30	Vaud	Switzerland
Flash flood	04/01/2018 00 UTC	04/01/2018	24	Bas-Rhin	France
Flash flood	04/01/2018 12 UTC	05/01/2018	12	Haut-Saone	France
Flash flood	05/01/2018 00 UTC	05/01/2018	72	Aude	France
Flash flood	10/01/2018 12 UTC	11/01/2018	78	THessalia	Greece
Flash flood	11/01/2018 12 UTC	12/01/2018	60	Sterea Ellada	Greece
Flash flood	14/01/2018 12 UTC	15/01/2018	66	Loiret	France
Flash flood	17/01/2018 12 UTC	18/01/2018	120	Haute-Savoie	France
Flash flood	18/01/2018 00 UTC	18/01/2018	102	Seine-et-Marne	France
Flash flood	19/01/2018 00 UTC	19/01/2018	60	Aveyron	France
Flash flood	19/01/2018 12 UTC	20/01/2018	30	Nievre	France
Flash flood	19/01/2018 12 UTC	20/01/2018	30	Correze	France
Flash flood	19/01/2018 12 UTC	20/01/2018	72	Somme	France
Flash flood	19/01/2018 12 UTC	20/01/2018	78	Baden-Wurttemberg	Germany
Flash flood	20/01/2018 00 UTC	20/01/2018	72	Baden-Wurttemberg	Germany
Flash flood	20/01/2018 00 UTC	20/01/2018	60	Cantal	France
Flash flood	20/01/2018 00 UTC	20/01/2018	30	Seine-Maritime Region	France
Flash flood	20/01/2018 00 UTC	20/01/2018	36	Seine-Maritime Region	France

Flash flood	20/01/2018 00 UTC	20/01/2018	12	Yonne	France
Flash flood	20/01/2018 00 UTC	20/01/2018	66	Haute-Saone	France
Flash flood	20/01/2018 00 UTC	20/01/2018	66	Meurthe-et-Moselle	France
Flash flood	20/01/2018 00 UTC	20/01/2018	18	Haute-Vienne	France
Flash flood	20/01/2018 00 UTC	20/01/2018	60	Aargau	Switzerland
Flash flood	20/01/2018 00 UTC	20/01/2018	60	Basel-Stadt	Switzerland
Flash flood	20/01/2018 00 UTC	20/01/2018	60	Freiburg	Switzerland
Flash flood	21/01/2018 00 UTC	21/01/2018	42	Aube	France
Flash flood	21/01/2018 00 UTC	21/01/2018	36	Marne	France
Flash flood	21/01/2018 00 UTC	21/01/2018	42	Meuse	France
Flash flood	21/01/2018 00 UTC	21/01/2018	48	Vaud	Switzerland
Flash flood	21/01/2018 00 UTC	21/01/2018	48	Solothurn	Switzerland
Flash flood	22/01/2018 12 UTC	23/01/2018	72	Aube	France
Flash flood	22/01/2018 12 UTC	23/01/2018	72	Yonne	France
Flash flood	22/01/2018 12 UTC	23/01/2018	72	Loiret	France
Flash flood	23/01/2018 12 UTC	24/01/2018	66	Saone-et-Loire	France
Flash flood	23/01/2018 12 UTC	24/01/2018	66	Saone-et-Loire	France
Flash flood	23/01/2018 12 UTC	24/01/2018	60	Aube	France
Flash flood	23/01/2018 12 UTC	24/01/2018	60	Aube Yonne	France
Flash flood	23/01/2018 12 UTC	24/01/2018	54	Nievre	France
Flash flood	26/01/2018 00 UTC	26/01/2018	24	Saone-et-Loire	France
Flash flood	29/01/2018 00 UTC	29/01/2018	72	Yonne	France
Flash flood	29/01/2018 12 UTC	30/01/2018	60	Aube	France
Flash flood	29/01/2018 12 UTC	30/01/2018	60	Aisne	France
Flash flood	30/01/2018 00 UTC	30/01/2018	42	Loiret	France
Flash flood	30/01/2018 00 UTC	30/01/2018	42	Seine-et-Marne	France
Flash flood	30/01/2018 12 UTC	31/01/2018	90	Montenegro	Montenegro
Flash flood	31/01/2018 00 UTC	31/01/2018	18	Essonne	France

* 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 ENTR 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 ELIMCO) 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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