European Flood Awareness System

EFAS *Bulletin*

June – July 2017

Issue 2017(4)

NEWS

A report from user survey conducted for the web development of EFAS is now available to download from the EFAS website. If you would to leave further comments or participate in future surveys, please do not hesitate to contact us at comp@efas.eu.

New partners

We gladly welcome the Hydrometeorological Centre of Russia as new EFAS partner.

RESULTS

Summary of EFAS Flood and Flash Flood Notifications

The 6 formal and 15 informal EFAS flood notifications issued in June-July 2017 are summarised in Table 1. The locations of all notifications are shown in Figure 23 and Figure 25 in the appendix.

30 Flash flood notifications, summarised in Table 2, were issued from June to July 2017. The locations are shown in Figure 24 and Figure 26 in the appendix.

Meteorological Situation

by EFAS Meteorological Data Collection Centre

Meteorological situation for June 2017

In the beginning of June two strong low pressure systems were located over Scandinavia and the North Atlantic close to Iceland, moving slowly eastwards. One of these strong low pressure systems caused extreme rainfall during the night between 6 and 7 of June in northeastern Scotland, which led to river floods. Edinburgh recorded 65.2 mm of rain in 24 hours. On 7 June, storms and heavy rain also caused flooding in parts of northeastern Serbia resulting in 1 fatality and 42 evacuations. After these events, the low-pressure systems weakened resulting in regionally limited high pressure systems.

Between 13 and 14 June, one person died and around 160 were evacuated from the Haute-Loire department of France after a major storm. Rainfall with up to 123 mm of precipitation in one hour caused flash floods. Furthermore, rivers rose rapidly in the upper basin of the Loire, e.g. at Chadrac by almost 6 meters.

During June, a high pressure system governed the weather conditions in southern and northwestern Europe, which later on influenced southern parts of Scandinavia and other northeastern European countries. Southern and northern parts of Europe were still dominated by low pressure systems, which slowly displaced the high pressure system over Central Europe.

By the end of June, a new low pressure system was building up over northwestern Europe, strengthening and moving towards Germany. This weather situation led to heavy rain on 29-30 of June, which caused surface flooding in parts of eastern Germany, including the capital Berlin and surrounding areas of Brandenburg. In some areas more than 150 mm of rain were recorded in 24 hours. Several provinces of Poland were also affected by heavy rain, thunderstorms and strong winds.

Overall precipitation anomalies displayed drier than normal conditions in Iceland, Scandinavia, Belgium, the Balkan states, parts of eastern Europe, Italy, Portugal as well as central and southern Spain (Figure 11 and Figure 12). However, in Greece, northern Spain and southern France more rainfall than normal was recorded. The wetter conditions corresponded to the flooding during this month. The highest accumulated precipitation amounts were observed in the Alps with up to 431.1 mm. The average recorded temperatures ranged from -2.7°C in Iceland to 28°C in the Mediterranean Basin (Figure 15). Recorded temperatures in Europe were generally above the average with the exception of Russia and Finland (Figure 16). The cold spot on the Italian Peninsula is a result of a faulty measurement

Meteorological situation for July 2017

In the beginning of July a high pressure system influencing southern Europe moved slowly towards central Europe. In all other European regions low pressure systems dominated, the strongest of which were located over Scandinavia and Iceland. In mid-July, a high pressure system located close to the European Atlantic coast moved towards Central Europe. Meanwhile, low pressure systems in the rest of Europe led to high precipitation amounts. Between 16 and 18 July, a storm named “Medusa” caused flash floods in parts of the Greek peninsula of Halkidiki, a popular tourist destination. On 18 July heavy rainfall in Turkey hit the city of Istanbul and surrounding areas with up to 65 mm per hour resulting in around 150 buildings being damaged.

On the same day, thunderstorms caused torrential rain, large hailstorms and flash floods in southern England. Major flash flooding, with up to 100 mm of precipitation in 24 hours, occurred in the coastal village of Coverack in Cornwall.

Later in the month, the low pressure systems over most parts of Europe weakened with the exception of northern Europe. One of these low pressure systems located over Iceland was strengthening and led to river floods in parts of northern Germany on 26 July due to heavy rainfall. The worst flooding occurred in the mountainous Harz region with up to 117 mm of rain in 24 hours on 25 July. At least four rivers reached record highs in the adjacent state of Lower Saxony.

The accumulated precipitation sums indicated a maximum of 605 mm in the Alps regions (Figure 13). Monthly accumulated precipitation values above 50 mm were recorded in most European countries, except in parts of southern Europe (Figure 14). During this month, around 50 mm rain fell in Central Spain resulting in positive precipitation anomalies. Especially in Greece, England and Germany more rainfall than normal was measured which correlated with the flood events mentioned above. The average recorded temperatures ranged from 0.7°C to 29.8°C in southern Europe and parts of eastern European regions (Figure 17). In Scandinavia and northern Europe it was mostly colder than normal (Figure 18, the warm spot visible in Central Sweden is the result of a locational error). Temperatures were generally above the average in the rest of Europe with the exception of Portugal.

Hydrological situation

By EFAS Hydrological Data Collection Centre

During June the observed daily average discharge values for the gauging stations of the Po basin (Italy) have surpassed the 90% quantile value, these are mainly torrential streams (Baganza, Taro, Parma, Crostolo and Secchia, Figure 19). This same threshold has also been exceeded by some stations present along the catchments of the Drammen, Lakselva, Marsvik, Gjerstad, Karpelva and Glomma in Norway, by stations from Mediterranean basins in Spain (Guadiaro and Guadalhorce), in Sweden (River Högvadsån), in Ukraine (River Vistula) and by stations from England (rivers Gwash and Welland).

For the month of July, the 90% quantile value was surpassed by stations on many of the European rivers (Figure 21) for central (Danube, Rhine, Elbe, Möll), northern (Byaelva, Storelva, Masi, Halselva, Tana, Kemijoki Näätämö, Torne and Paatsjoki), Eastern (Dnieper) and southern Europe (Po, Ebro, Guadalquivir).

Out of the 813 stations for which warning levels were available, for both water level and discharge values alike, 44 exceeded the minimum warning level provided at least 1 day during the month of June (Figure 20). This mostly occurred for stations in Norway (24 stations) and for stations that are situated along the catchments of the Danube, Rhine, Po, Minho, Elbe, Ume, and Vistula. The rivers Tisza (Danube) and Secchia, Chero, Recchio, Riglio (Po) have surpassed the minimum alert level for a period of over 15 days.

In July, 34 stations exceeded the lowest warning value provided (Figure 22). This occurred for stations that are situated along the catchments of the Danube (22 stations), Rhine, Po, Dnieper, Storelva, Satelva and Kalix. The rivers Tisza, Riglio and Secchia surpassed the minimum alert level for over 15 days.

Verification

Figure 1 shows the EFAS headline score, the Continuous Ranked Probability Skill Score (CRPSS) for one lead-time, for the June to July 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.

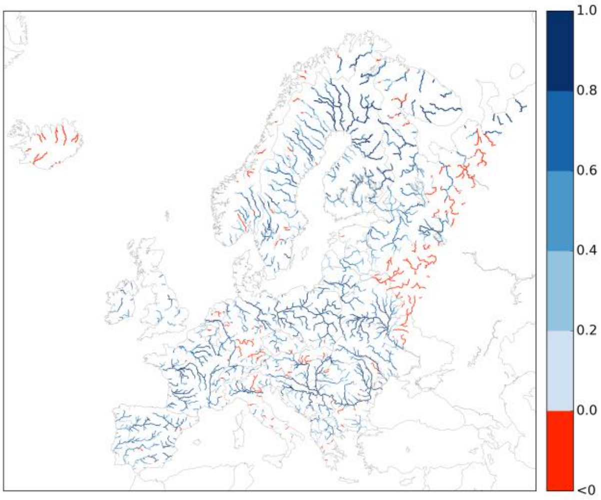

Figure 1. EFAS CRPSS at lead-time 1 day for the June-July 2017 period, for catchments >2000km2. The reference score is persistence.

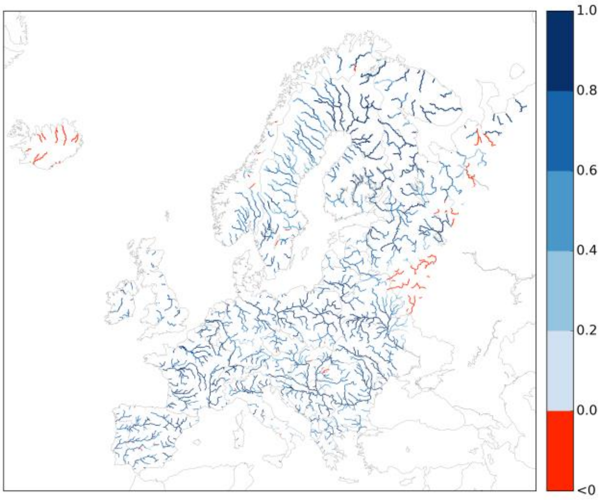

Figure 2. EFAS CRPSS at lead-time 3 days the June-July 2017 period, for catchments >2000km2. The reference score is persistence.

The map shown in Figure 2 displays the CRPSS at 3 days lead-time. The corresponding maps for 5 and 10 days lead-time are shown Figure 3 and Figure 4. 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.

It can be seen from Figure 4 that the 10-day lead-time CRPSS has higher skill for some rivers in the Eastern borders of the current EFAS domain. With the new calibration that follows the eastwards extension, this is likely to be improved.

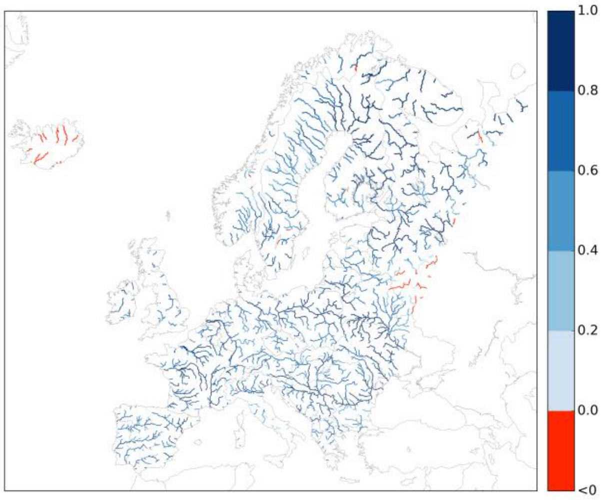

Figure 3. EFAS CRPSS at lead-time 5 days the June-July 2017 period, for catchments >2000km2. The reference score is persistence.

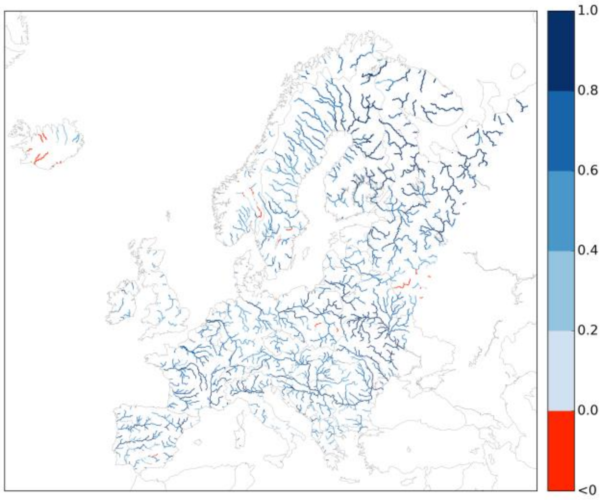

Figure 4. EFAS CRPSS at lead-time 10 days the June-July 2017 period, for catchments >2000km2. The reference score is persistence.

FEATURES

Survey from the EFAS Annual meeting 2017

by Elinor Andersson, EFAS Dissemination Centre, SMHI

The 12th EFAS Annual Meeting took place in De Bilt, the Netherlands, between 28 and 29 of March. After the meeting the participants were invited to answer the yearly survey regarding the satisfaction of the EFAS performance in general, the service and the products. 22 answers were received from the 28 countries represented at the meeting. This was an increase from last year where 16 answers were received. The answers to this year's survey are very similar to last year's (Figure 5). The overall EFAS satisfaction (3.95 out of 5) was about the same as in 2016 (4.00). The performance of EFAS last year (3.77) was rated a bit lower than the year before (3.94). However, the overall interest in EFAS (4.05 compared to 3.87) and the value of probabilistic forecasting (4.05 compared to 3.88) were rated higher than in 2016.

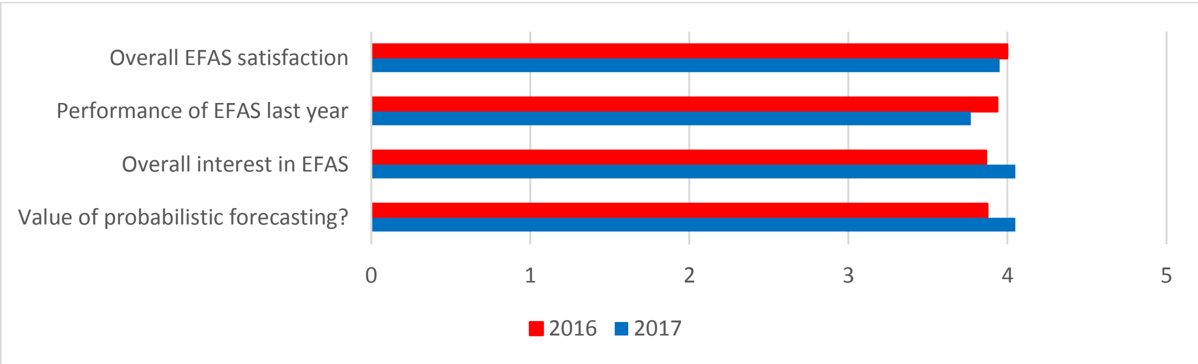

Figure 5. Average user response on the user satisfaction, performance and overall interest in EFAS as well as the value of probabilistic forecasting (1 = very low, 2 = low, 3 = medium, 4 = high, 5 = very high). Blue = Survey 2017, Red = Survey 2016.

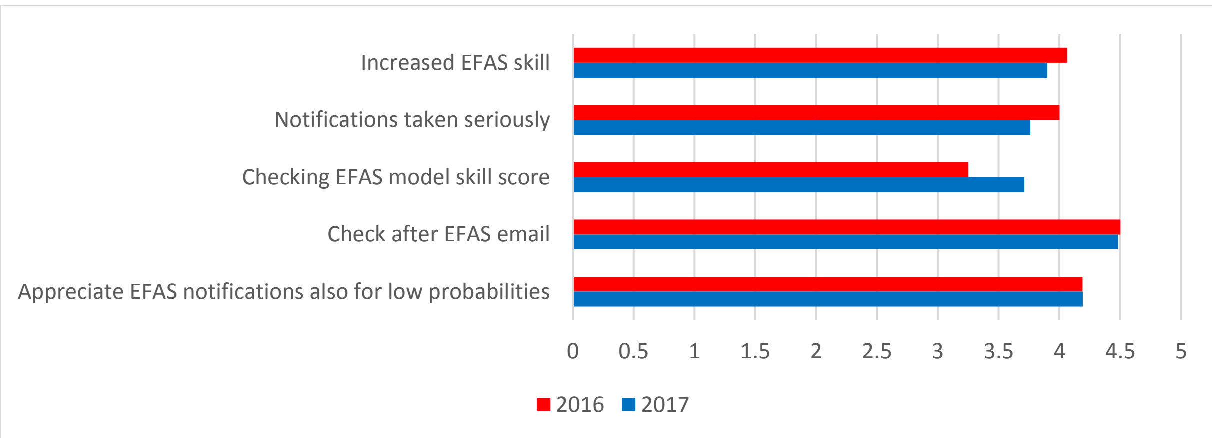

Figure 6. Average user response on skill, performance and trust (1 = very low, 2 = low, 3 = medium, 4 = high, 5 = very high). Blue = Survey 2017, Red = Survey 2016

Skill, performance and trust

The user satisfaction regarding skill, performance and trust was similar to last year's (Figure 6). A bigger portion of survey participants (3.71) stated that they checked the EFAS model skill score compared to last year (3.25). There was a slight decrease in agreement with the statements "The skill of EFAS has increased over the years" (from 4.1 to 3.9) and "In my organisation EFAS notifications are always taken seriously" (from 4 to 3.76).

EFAS services

The survey results regarding EFAS services were similar to 2016 (Figure 7). The statement “Our organisation makes use of the EFAS web services (WMS-T or SOS)” was rated slightly higher than last year’s survey (from 3.38 to 3.43). The amount of people wanting more training to be provided during the annual workshop or through webinars remained high (4.00 both years). The participants were also asked which topics they would like more training or webinars on. The most popular topic was flash floods followed by case studies and information about new products. The statements “EFAS bulletins are interesting” (from 4.00 to 3.91), “EFAS bulletins are read” (from 3.81 to 3.68) and “I connect to the EFAS website regularly” (from 3.75 to 3.64) all had a slightly lower rating than the year before.

The survey participants were also asked some new questions regarding the EFAS-IS website, the partner network and the annual meeting. The statements “The EFAS-IS website is easy to navigate” and “It is easy to understand how to choose and use layers in the EFAS web interface” both had an average rating of 3.64. Most participants found the partner network useful for sharing knowledge and best practices (3.86). A majority of survey participants were very satisfied with the organization of the EFAS annual meetings (4.43) and would like to come back next year (4.45).

EFAS products

There were some differences in user opinion regarding EFAS products this year compared to 2016 (Figure 8). Flash flood notification improvement from EPIC to ERIC was as expected rated similarly (3.59 compared to 3.57). The added value of EFAS (from 4.00 to 3.82) and the appreciation of EFAS developments (from 4.38 to 4.29) were rated lower than last year. The statement “New EFAS products stimulate new development in my organisation” was however rated slightly higher than in 2016 (from 3.75 to 3.82). The participants also appeared to be more satisfied with the amount of satellite data in EFAS compared to last year (demand rated from 4.00 to 3.7).

New for this year’s survey was statements about added value of different notifications. The added value of Formal Notifications were unsurprisingly rated the highest (4.00) followed by Flash Flood Notifications (3.90) and Informal Notifications (3.86). The participants were also asked to rate their demand for EFAS products through data service (3.95), flood impact forecasts (3.35) and coastal flood forecasts (4.19).

The participants of last year’s survey were asked to rate the importance of suggested EFAS developments, which further flash flood product development in top. This year the participants were asked about three wishes they had for EFAS (e.g. additional suggestions, comments, new development and products). The most common wish was related to further EFAS development, like real-time simulations, flood impact forecasts, adding dams and reservoirs, test of different hydrological models etc. The second most common wish was related to the EFAS homepage and the EFAS-IS webpage, like improvements of the layers and shapefiles. Third place was shared by data access-related wishes (e.g. raw data access) and communication (e.g. better/faster communication between EFAS Dissemination Centre and partners).

Even though there are some differences between 2016 and 2017, they survey results were similar to each other. If you are interested in reading a more detailed review of the survey, please contact us via e-mail at: info@efas.eu.

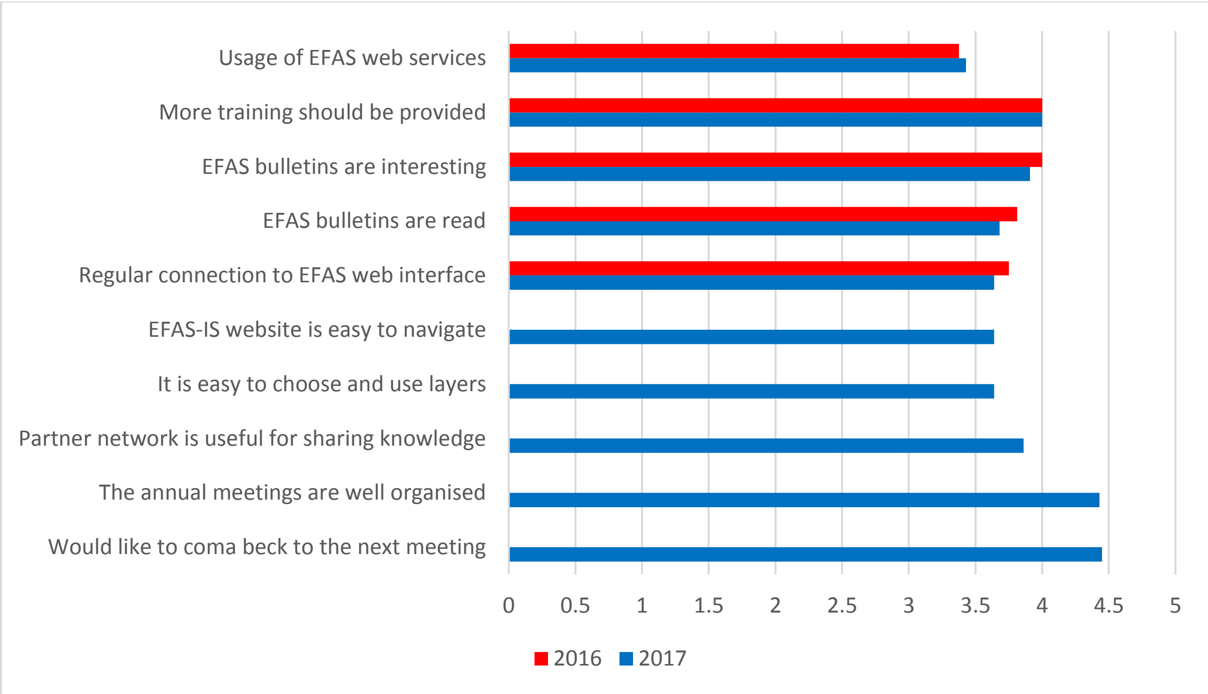

Figure 7. Average user response on the different EFAS services (1 = very low, 2 = low, 3 = medium, 4 = high, 5 = very high). Blue = Survey 2017, Red = Survey 2016.

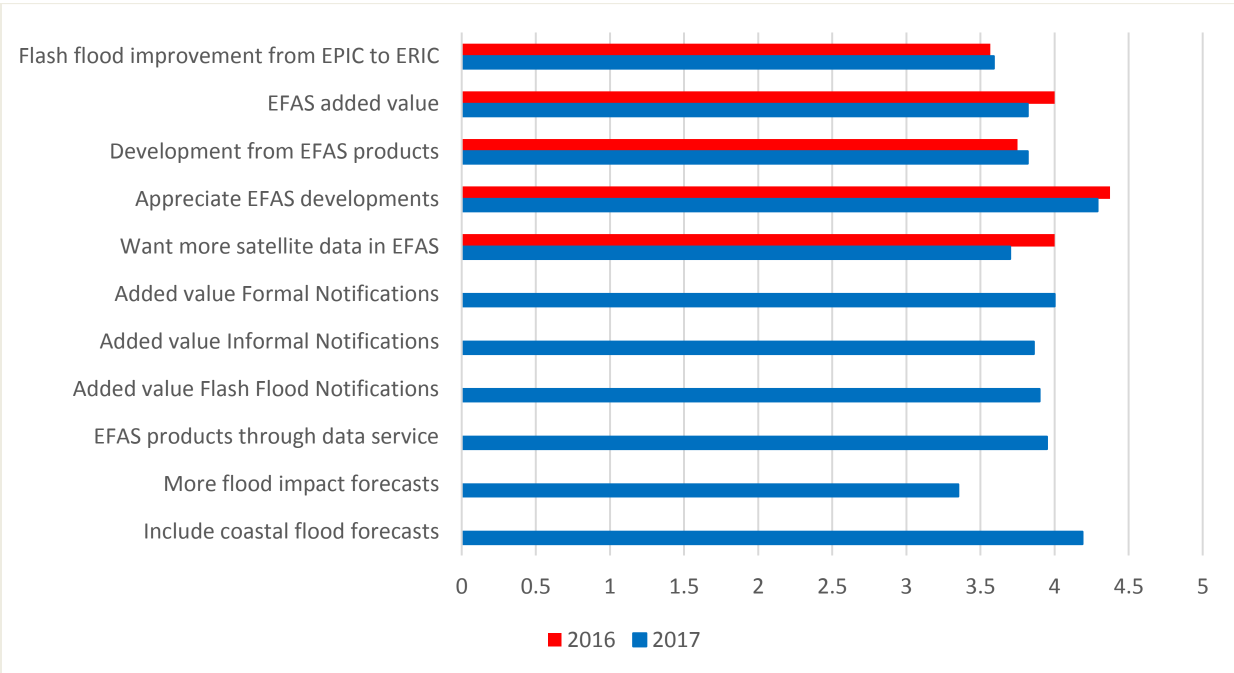

Figure 8. Average user response on EFAS products (1 = very low, 2 = low, 3 = medium, 4 = high, 5 = very high). Blue = Survey 2017, Red = Survey 2016.

Case study: Floods in Northern Germany, July 2017

by Richard Davies, FloodList

Several rivers overflowed in parts of northern Germany on Wednesday 26 July after a period of heavy rain causing flooding in many areas. The worst of the flooding occurred in the mountainous Harz region of Germany. On 25 July, 117 mm of rain was recorded in Brocken, the highest peak of the Harz mountain range. Several rivers reached record highs in the state of Lower Saxony, including the Innerste at Heinde, the Oker River at Schladen, the Grane at Margarethenklippe and the Nette at Groß Rhüden.

Goslar District

The district of Goslar in Lower Saxony was one of the hardest hit areas. Damaging floods were reported in the historic city of Goslar, Bad Harzburg and Rhüden, part of the town of Seesen. The district authorities declared a disaster situation (Katastrophenfall) around midday on Wednesday, 26 July 2017.

Figure 9. Flooding in Goslar, Germany

Maximilian Strache, a spokesman for the district, said that several rivers in the district had broken their banks, including the Radau in Bad Harzburg, the Abzucht in Goslar and the rivers Schildau and Nette in the area of Rhüden in Seesen. The Nette at Groß Rhüden reached 3.91 metres, above the previous high of 3.66m. Levels of the Laute River also increased dramatically. Parts of Goslar’s historic old town, a UNESCO World Heritage Site, were flooded (Figure 9). Around 120 people were evacuated from a home for the elderly in the city and a few other residents from areas of the old town.

Figure 10. Clean-up of historical town Goslar, July 2017

Hildesheim District

In the city of Hildesheim, residents and emergency workers filled sandbags and shored up temporary flood defences as the Innerste River threatened to overflow. At 08:00 on Wednesday levels of the Innerste reached 7.14 metres in Heinde, just south of Hildesheim, beating the previous record of 6.75m set in 2007. Around a dozen people were evacuated in Hildesheim. Local media said that authorities had prepared evacuation plans for around over 1,000 residents living close to the river should the temporary defences not hold. Fortunately, by the afternoon of 26 July levels of the Innerste had started to drop.

All photos courtesy of Frank J Beckmann. Used with permission.

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: Flood in Goslar, Germany, July 2017. Courtesy of Frank J Beckmann. Used with permission.

Appendix - figures

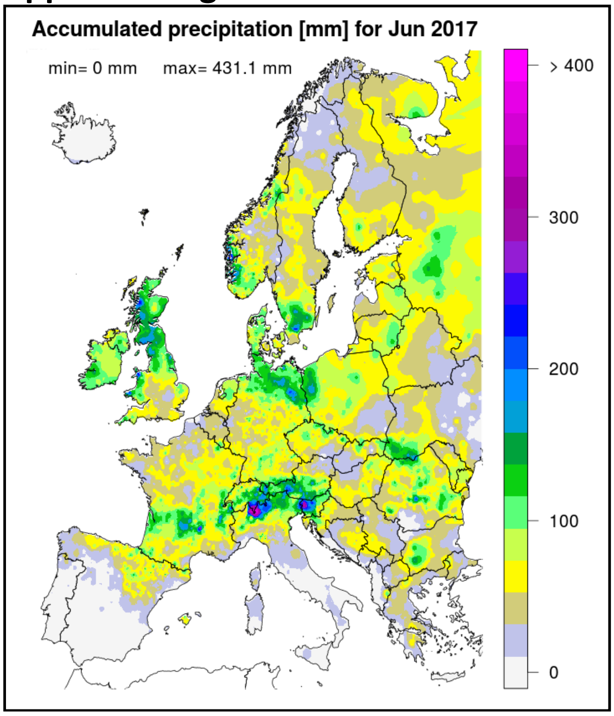

Figure 11. Accumulated precipitation [mm] for June 2017.

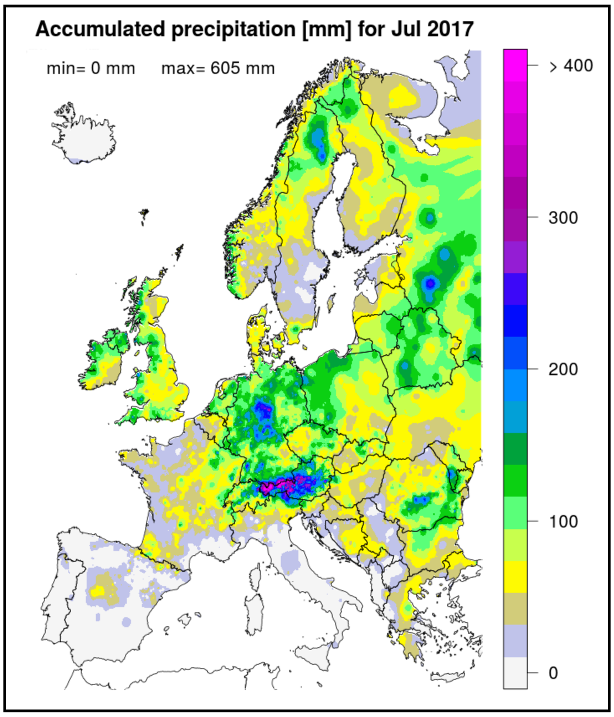

Figure 13. Accumulated precipitation [mm] for July 2017.

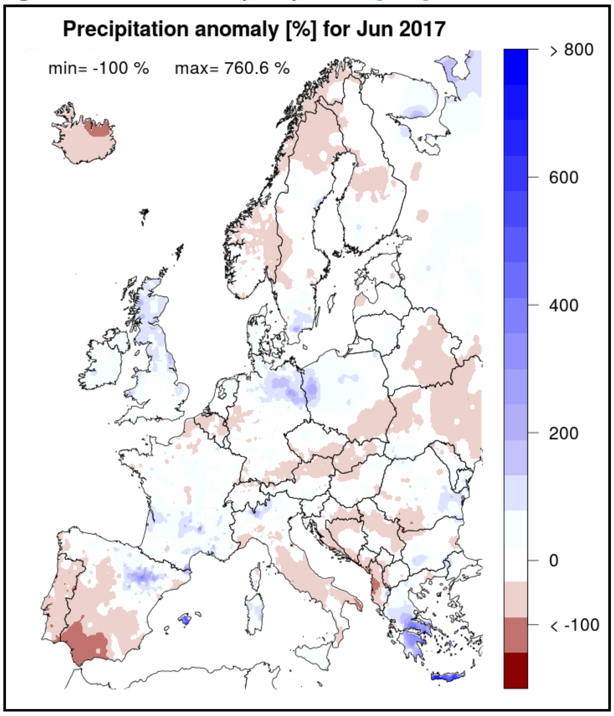

Figure 12. Precipitation anomaly [%] for June 2017, relative to a long-term average (1990-2013). Blue (red) denotes wetter (drier) conditions than normal.

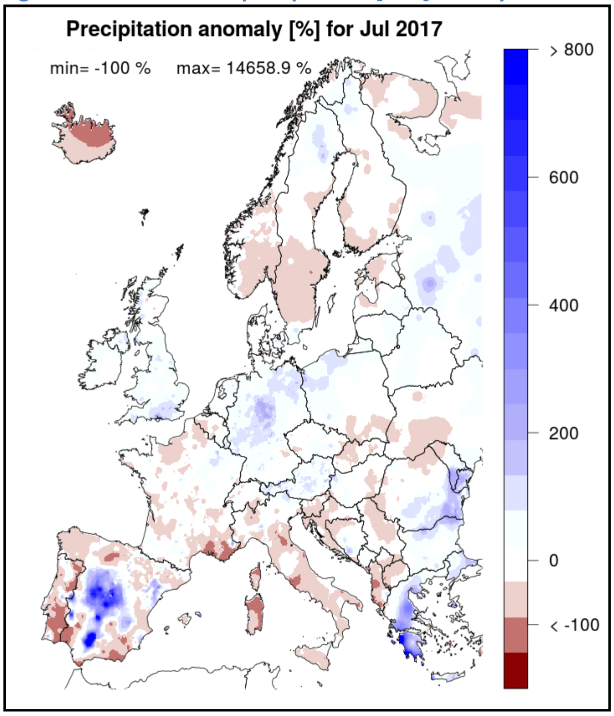

Figure 14. Precipitation anomaly [%] for July 2017, relative to a long-term average (1990-2013). Blue (red) denotes wetter (drier) conditions than normal.

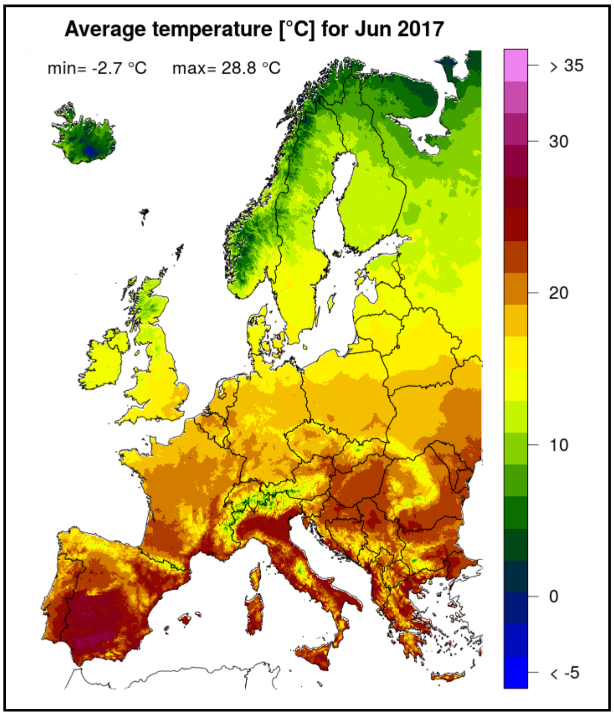

Figure 15. Mean temperature [°C] for June 2017.

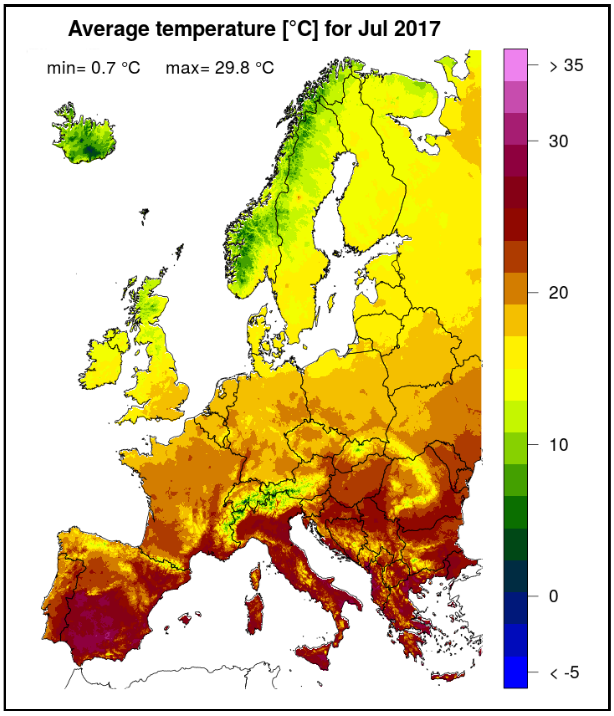

Figure 17. Mean temperature [°C] for July 2017.

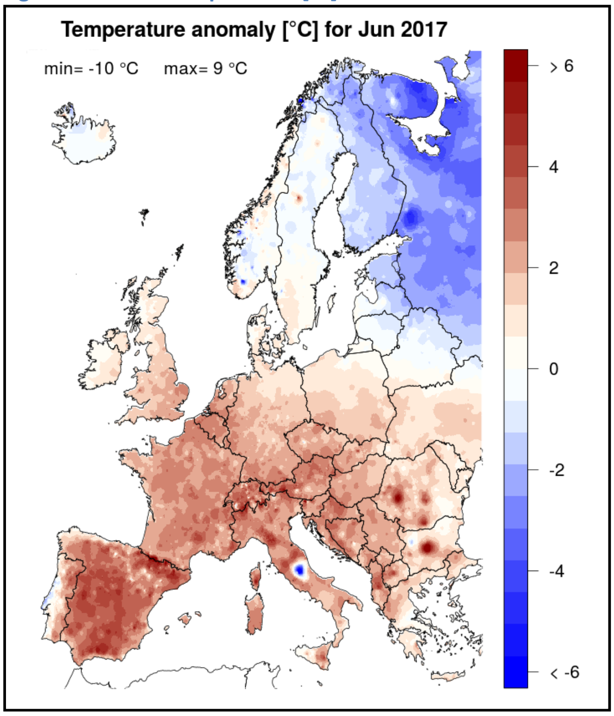

Figure 16. Temperature anomaly [°C] for June 2017, relative to a long-term average (1990-2013). Blue (red) denotes colder (warmer) temperatures than normal.

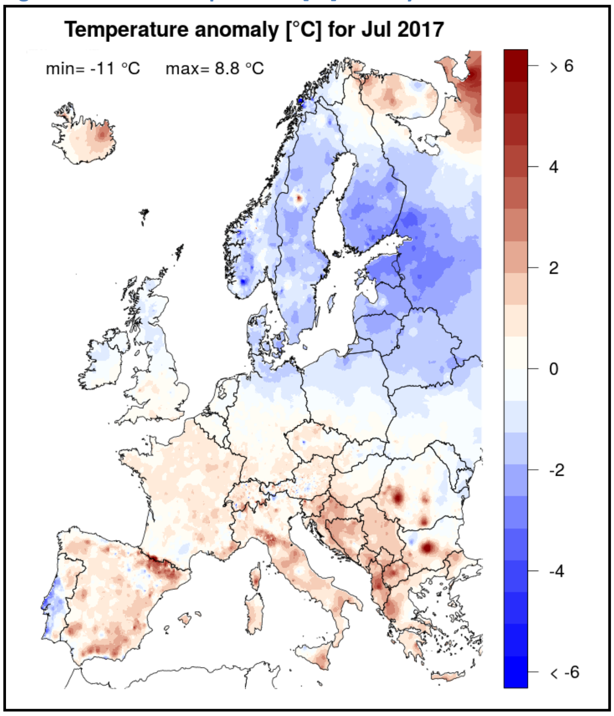

Figure 18. Temperature anomaly [°C] for July 2017, relative to a long-term average (1990-2013). Blue (red) denotes colder (warmer) temperatures than normal.

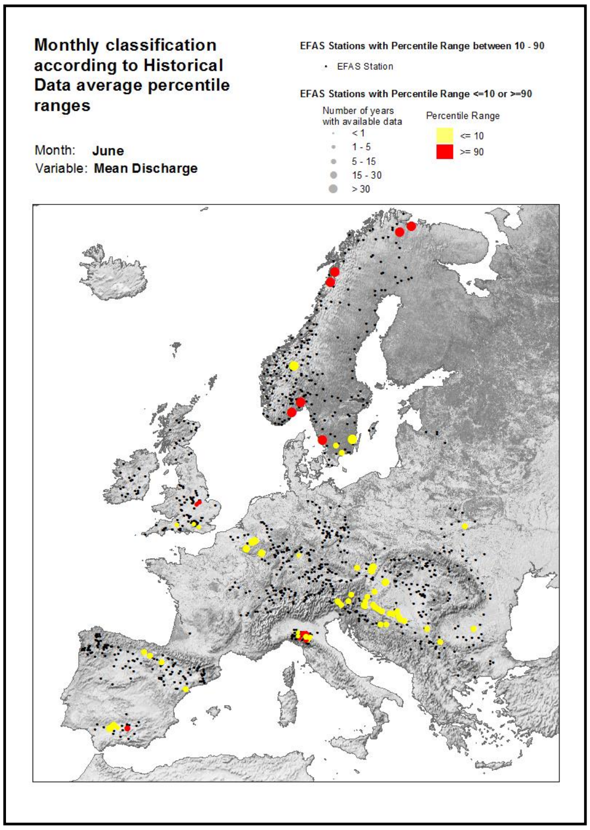

Figure 19. Monthly discharge anomalies June 2017.

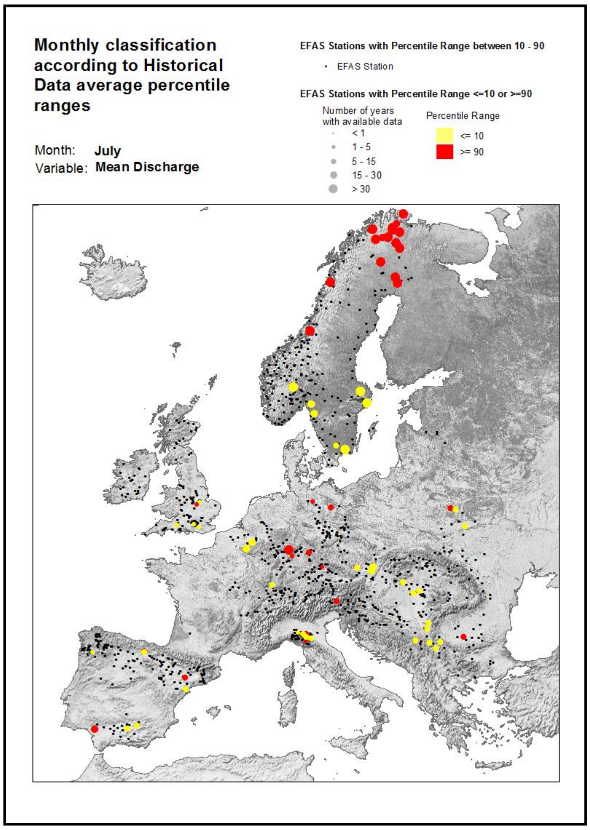

Figure 21. Monthly discharge anomalies July 2017.

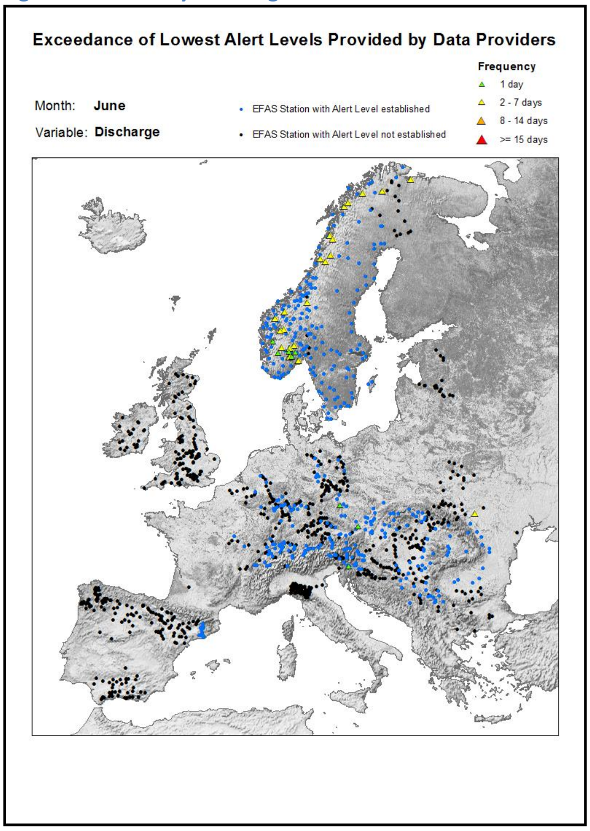

Figure 20. Alert level exceedance for June 2017.

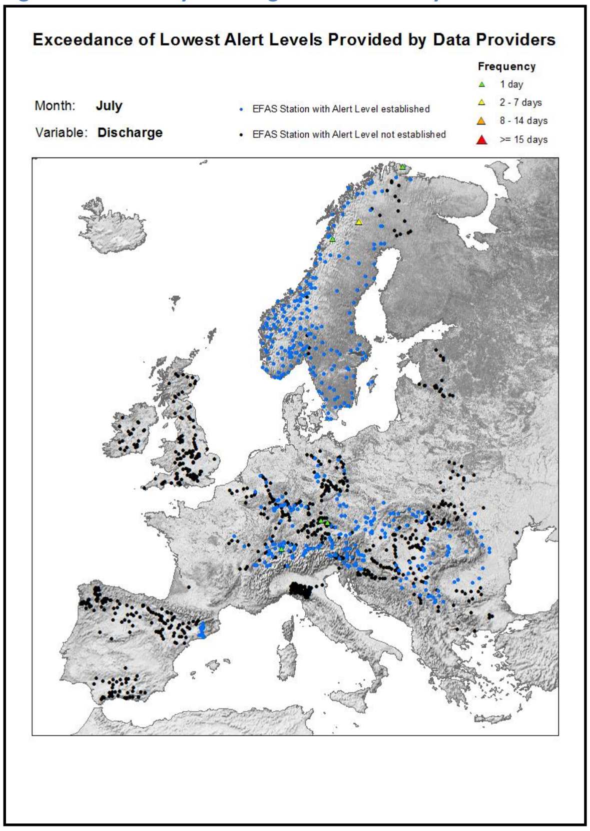

Figure 22. Alert level exceedance for July 2017.

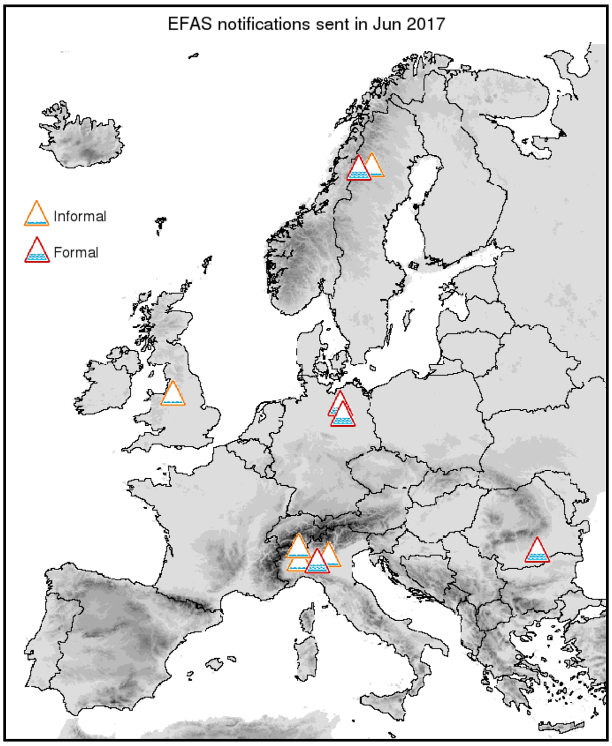

Figure 23. EFAS flood notifications sent for June 2017.

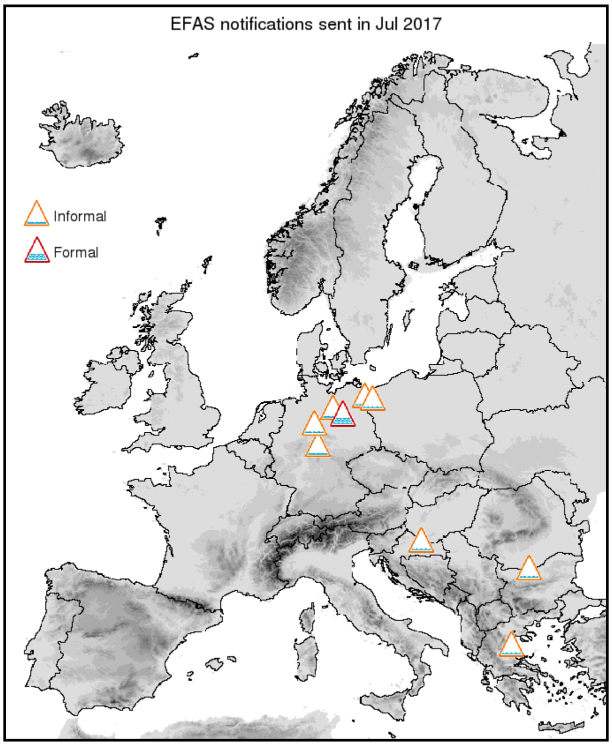

Figure 25. EFAS flood notifications sent for July 2017.

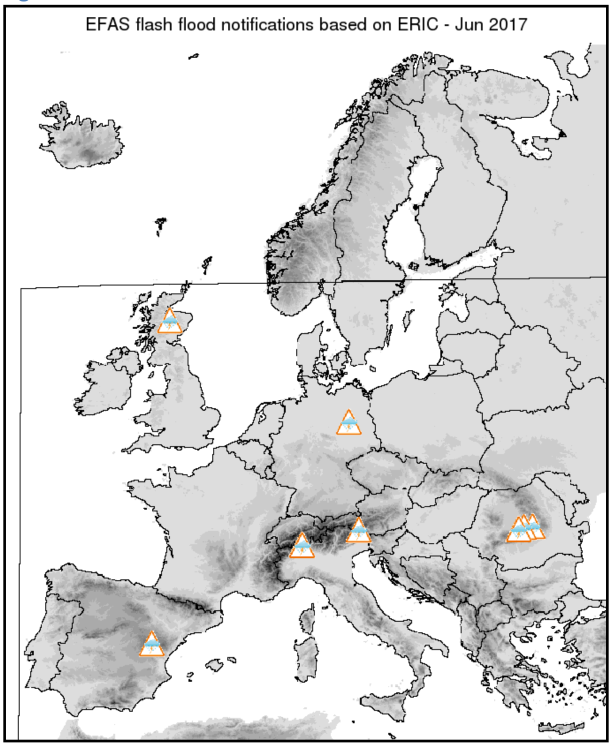

Figure 24. Flash flood notifications sent for June 2017.

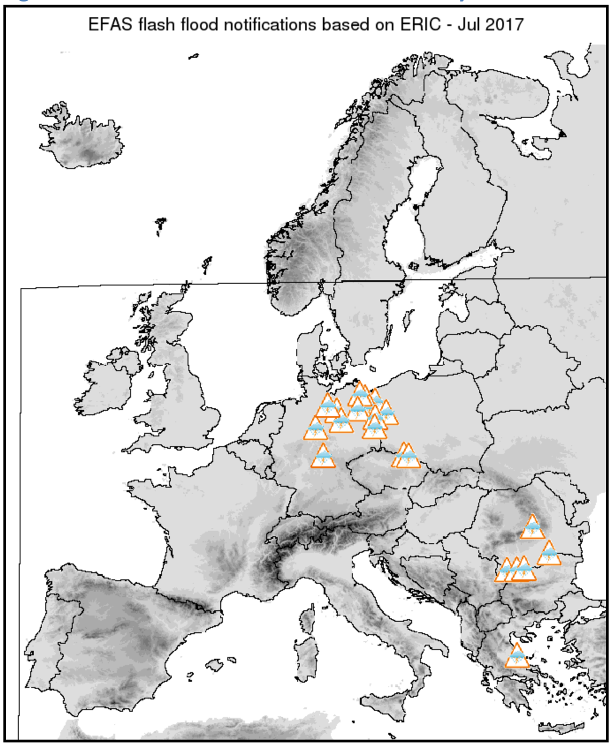

Figure 26. Flash flood notifications sent for July 2017.

Appendix - tables

Table 1. EFAS flood notifications sent in June - July 2017.

Type	Forecast date	Issue date	Lead time*	River	Country
Formal	02/06/2017 12 UTC	03/06/2017	6	Umealven, above Vindelalven	Sweden
Informal	05/06/2017 00 UTC	05/06/2017	1	Mersey	United Kingdom
Informal	07/06/2017 12 UTC	08/06/2017	5	Vindelalven	Sweden
Formal	25/06/2017 12 UTC	26/06/2017	3	Adda	Italy
Informal	26/06/2017 00 UTC	26/06/2017	2	Ticino	Italy
Informal	26/06/2017 12 UTC	27/06/2017	2	Po, sect. Dora Baltea - Tanaro	Italy
Informal	26/06/2017 12 UTC	27/06/2017	2	Po, below Oglio	Italy
Informal	28/06/2017 00 UTC	28/06/2017	0	Po, below Oglio	Italy
Formal	29/06/2017 12 UTC	30/06/2017	4	Arges	Romania
Formal	30/06/2017 00 UTC	30/06/2017	0	Elbe, below Havel	Germany
Formal	30/06/2017 00 UTC	30/06/2017	3	Havel, below Spree	Germany
Informal	03/07/2017 00 UTC	03/07/2017	0	Danube, section Olt - Yantra	Bulgaria
Informal	15/07/2017 12 UTC	16/07/2017	1	Pinios	Greece
Informal	25/07/2017 00 UTC	25/07/2017	1	Oder, below Warta	Poland
Informal	26/07/2017 00 UTC	26/07/2017	0	Elbe, below Havel	Germany
Informal	26/07/2017 00 UTC	26/07/2017	0	Uecker	Germany
Informal	26/07/2017 12 UTC	27/07/2017	1	Drava	Hungary
Formal	27/07/2017 00 UTC	27/07/2017	2	Havel, below Spree	Germany
Informal	27/07/2017 00 UTC	27/07/2017	0	Weser	Germany
Informal	27/07/2017 00 UTC	27/07/2017	0	Leine	Germany
Informal	28/07/2017 00 UTC	28/07/2017	1	Elbe, below Havel	Germany

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

Table 2. EFAS flash flood notifications sent in June - July 2017.

Type	Forecast date	Issue date	Lead time*	Region	Country
Flash flood	02/06/2017 12 UTC	03/06/2017	60	Teruel	Spain
Flash flood	06/06/2017 00 UTC	06/06/2017	30	Highlands and Islands	United Kingdom
Flash flood	07/06/2017 12 UTC	08/06/2017	24	Brasov, Sibiu	Romania
Flash flood	15/06/2017 12 UTC	16/06/2017	72	Brasov, Sibiu	Romania
Flash flood	24/06/2017 12 UTC	25/06/2017	24	Karnten	Austria
Flash flood	26/06/2017 00 UTC	26/06/2017	72	Lombardia	Italy
Flash flood	26/06/2017 12 UTC	27/06/2017	54	Piemonte	Italy
Flash flood	28/06/2017 00 UTC	28/06/2017	48	Brandenburg	Germany
Flash flood	01/07/2017 12 UTC	02/07/2017	54	Olt	Romania
Flash flood	02/07/2017 00 UTC	02/07/2017	42	Vratsa	Romania
Flash flood	02/07/2017 12 UTC	03/07/2017	30	Montana	Bulgaria
Flash flood	02/07/2017 12 UTC	03/07/2017	30	Brasov	Romania
Flash flood	03/07/2017 00 UTC	03/07/2017	24	Calasari	Romania
Flash flood	17/07/2017 00 UTC	17/07/2017	18	Thessalia	Greece
Flash flood	23/07/2017 12 UTC	24/07/2017	36	Opolskie	Poland
Flash flood	24/07/2017 00 UTC	24/07/2017	42	Brandenburg	Germany
Flash flood	24/07/2017 00 UTC	24/07/2017	24	Dolnoslaskie	Poland
Flash flood	24/07/2017 12 UTC	25/07/2017	30	Mecklenburg-Vor-	Germany
Flash flood	24/07/2017 12 UTC	25/07/2017	36	Sachsen-Anhalt	Germany

Flash flood	24/07/2017 12 UTC	25/07/2017	48	Brandenburg	Germany
Flash flood	24/07/2017 12 UTC	25/07/2017	36	Lubuskie	Poland
Flash flood	24/07/2017 12 UTC	25/07/2017	42	Mecklenburg-Vor-	Germany
Flash flood	24/07/2017 12 UTC	25/07/2017	42	Niedersachsen	Germany
Flash flood	25/07/2017 00 UTC	25/07/2017	30	Brandenburg	Germany
Flash flood	25/07/2017 00 UTC	25/07/2017	24	Lubuskie	Poland
Flash flood	25/07/2017 00 UTC	25/07/2017	30	Brandenburg	Germany
Flash flood	25/07/2017 12 UTC	26/07/2017	24	Mecklenburg-Vor-	Germany
Flash flood	26/07/2017 00 UTC	26/07/2017	30	Zachodniopomorskie	Poland
Flash flood	26/07/2017 00 UTC	26/07/2017	12	Thuringen	Germany
Flash flood	31/07/2017 00 UTC	31/07/2017	48	Brandenburg	Germany

* 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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