

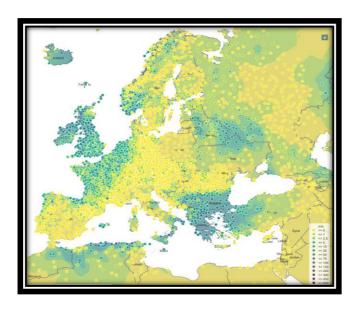




European Flood Awareness System

EFAS Bulletin

April – May 2018 Issue 2018(3)



















NEWS

New features

EFAS extended domain

The EFAS extended domain was launched on the 16 May as expected. Well done to everyone involved in this major upgrade of the EFAS forecasting system! The two major changes are the eastwards expansion of the EFAS domain onto a new grid, and several upgrades of LISFLOOD including a new calibration. For more information on the technical details, please see the EFAS release document published on EFAS-IS here or visit the EFAS web site.

Testing of the new EFAS web site

The new EFAS-IS is now ready for testing. The test phase will be from 15 July-15 September. The EFAS dissemination centre will be using the new website in parallel with the current during this period to test the different features. We encourage all users of EFAS to test it during this period and provide feedback. How to access the website will be announced on EFAS-IS.

Depreciated layer

The EFAS layer "Satellite 10d Snow Anomaly" has been removed from the list of layers available on EFAS-IS. This web service is no longer available from the provider, so it has been discontinued for the time being.

Meetings

Copernicus for Water Workshop, 29 May 2018, Brussels

The Copernicus for Water Management workshop aimed at exploring the relevance of the Copernicus Space Component and the Copernicus Services (and their planned evolutions) to many Water Management issues, with reference to a number of relevant EU policies including the Floods directive. The Copernicus Emergency Management Service was presented by the JRC. It became clear that there are many different products already available in the Copernicus program and services that are relevant for water management and EFAS is clearly a key tool that could be useful in the future also for water resource managers. The foreseen developments regarding making the EFAS archive available publicly and the seasonal forecasts will foster the link of EFAS related output and the water resources management sector.

New partner

We gladly welcome The Department for Infrastructure, Rivers - Northern Ireland as a new EFAS partner.

RESULTS

Summary of EFAS Flood and Flash Flood Notifications

The 65 formal and 22 informal EFAS flood notifications issued in April-May 2018 are summarised in Table 1. The locations of all notifications are shown in Figure 18 and Figure 20 in the appendix. Note that these notifications are still in the old projection. From next issue they will be presented in the new.

33 Flash flood notifications, summarised in Table 2, were issued from April to May 2018. The locations are shown in Figure 19 and Figure 21 in the appendix.

Meteorological situation

by EFAS Meteorological Data Collection Centre

April 2017

The influence of the low-pressure system located over the north Atlantic, combined with snowmelt and extreme rainfall led to surface flooding in several parts of the UK between 31 March and the beginning of April. In north-eastern Spain, flooding affected parts of the Navarre and Aragon regions on 12 April after snow melting in river catchment areas and a period of high precipitation amounts. Wide areas of land were completely submerged by flood waters because of the overflowing rivers Ebro, Aragon, Araquil and Arga. After this event, high-pressure systems gradually dominated the weather conditions in Europe.

Later in the month, these high-pressure systems weakened and low-pressure systems strengthened, especially over Scandinavia. In several places in Svealand and southern Norrland, snow melt caused inland and river floods on 21 April. Gävleborg county in Sweden was hardest affected with the Norralaån river overflowing its banks and flooding some nearby buildings. By the end of the month a strong low-pressure system located over western Europe led to stormy weather condition and caused flooding, wind damage and huge waves in coastal regions. During this event

the German city of Aachen recorded 63.3 mm of rain in 24 hours, most of it fell in a very short time period.

In April the highest precipitation amounts with up to 352.1 mm were recorded in southern France and the Pyrenees (Figure 6). The precipitation anomaly displayed drier conditions in Central Europe, the Balkans and most regions of the Mediterranean area (Figure 7). In Portugal, southern France, parts of Spain, western as well as eastern Europe it was mostly wetter than normal which correlated with the weather situation during this month.

Overall, the average temperature ranged from -9.2°C in the Alps and North Europe to 19.8°C in regions further south (Figure 10). The temperature anomalies indicated lower temperatures than the average in Iceland, Portugal, central parts of Norway and Sweden (Figure 11). In central and south-eastern Europe, it was up to 11.2°C warmer than normal. Overall the month of April almost provided a summerlike weather in Europe.

May 2018

In the beginning of May, low-pressure systems dominated the weather conditions almost throughout Europe. Two days of heavy rain caused flooding and landslides in Sardinia, Italy, between 1 and 3 May. During this event, more than 100 people were evacuated from their homes. Some areas recorded up to 150 mm of precipitation which exceeded the average monthly total in May more than four times. After this, high pressure systems gradually strengthened over central Europe and moved towards Scandinavia. Low-pressure systems were strengthening and led to flooding in Tuscany, Italy, after an intense storm which brought more than 50 mm of rain in about 3 hours on 8-10 May. 10 people were evacuated and 30 buildings damaged due to extreme rainfall. Furthermore, severe thunderstorms, hail and heavy precipitation amounts affected parts of Germany on the same day.

Mid-month high-pressure and low-pressure systems alternated. Only Scandinavia was still influenced by high pressure, which lasted until the end of the month. Thunderstorms with hail across central Europe caused surface flooding in Belgium, Germany, Netherlands and France, including the capital Paris 22-24 May. In the German town Bad Elster, 124 mm of rain were recorded in just 5 hours. Flooding also affected

neighboring parts of the Czech Republic. In northwestern Paris, the highest precipitation sum was observed with up to 70 mm within 1 hour. Towards the end of the month the weather situation did not change dramatically. Low-pressure systems over UK led to a stormy weekend with 136,000 lightning strikes with heavy rainfall and floods in the west Midlands and Wales 26-28 May. Severe storms also caused flash floods and mudslides in parts of north and central Europe between the 31 May and 1 June.

The maximal accumulated precipitation amounts were recorded in southern France and southeastern Austria with up to 440.3 mm (Figure 8). In May, the precipitation anomalies indicated wetter conditions in parts of central Europe and in countries bordering the Mediterranean Sea (Figure 9). In the rest of Europe negative anomalies could be documented, causing a drought situation with forest fires for example in southern Sweden.

The average temperature ranged from -5.3°C in mountainous regions of Iceland and parts of northern Russia to a maximum of 23.4°C (Figure 12). In Portugal, Spain and western Iceland colder temperatures than the average was measured. All other parts of Europe experienced positive temperature anomalies (Figure 13). Many stations in Sweden experienced the warmest May ever recorded.

Hydrological situation

by EFAS Hydrological Data Collection Centre

Over the past two months, the highest concentration of stations that surpassed the minimum discharge and/or stage threshold levels were found throughout the central areas of the Danube basin (Serbia, Bulgaria, Slovakia, Croatia and Bosnia and Herzegovina) mainly along the Sava and Tisza rivers, across the Dnieper river basin (Belarus and northern-western Ukraine), and across a high number of stations in Sweden and Norway as well as the Po river (Northern Italy) and the Minho river basin in north-western Spain (Figure 14 and Figure 16). Other stations that surpassed their minimum threshold levels were the Neman river basin in Belarus, the Don and Dniester river basins in Ukraine and in the Vistula river basin (shared between Belarus and Ukraine) as well as Elbe river basin in Czech Republic and the Mediterranean river basin in Southern Spain.

The majority of stations that registered discharge values above the 90% quantile are located across the Danube river basin, the Ebro, the Llobregat, the Guadalquivir and the Mihno river basins in Spain and those located in the Scandinavian countries. This was less frequent for stations located across England, Ireland, the Southern Rhine river basin and the Vistula river basin in Poland (Figure 15 and Figure 17).

Stations that did not reach the 10% quantile for discharge values are mainly located across the Oder and the Elbe river basins in Eastern Germany, the Northern Czcech Republic and Southern Poland respectively, This ocurred as well across the Danube river basin (in Germany, Czech Republic, Austria and Slovakia), the Southern Vistula river basin in South-Eastern Poland, in Western Ukraine (in the Vistula, Dniester and Dnieper river basins) and some isolated stations of the Ebro river basin in Spain, Sweden, Norway and England.

Verification

Figure 1 - Figure 2 shows the EFAS headline score, the Continuous Ranked Probability Skill Score (CRPSS) for lead times 3, 5 and 10 days for the April to May period across the EFAS domain for catchments larger than 2000km². The scores are still for the old domain. The scores for the new domain will be presented starting with the next Bulletin. 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.

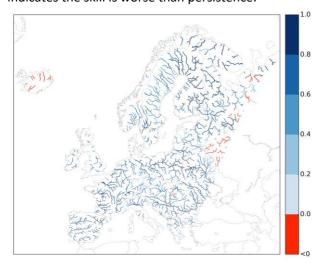


Figure 1. EFAS CRPSS at lead-time 3 days the February-March 2017 period, for catchments >2000km2. The reference score is persistence.

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.

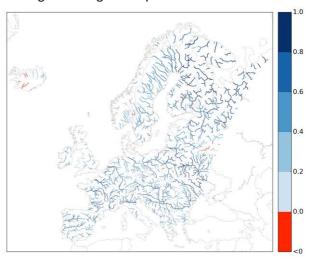


Figure 2. EFAS CRPSS at lead-time 10 days the February-March 2017 period, for catchments >2000km2. The reference score is persistence.

Publications

L. Arnal, S.-S. Asp, C. Baugh, F. Dottori, J. Disperati, R. Garcia, M. Garcia-Padilla , G. Gomes, M. Kalas, B. Krzeminski, M. Latini, V. Lorini, C. Mazzetti, M. Mikulickova, D. Muraro, C. Prudhomme, A. Rauthe-Schöch, K. Rehfeldt, P. Salamon, C. Schweim, J.O. Skoien, P. Smith, E. Sprokkereef, V. Thiemig, F. Wetterhall, M. Ziese, EFAS upgrade for the extended model domain – technical documentation, JRC of the European Commission, 2018.

Arnal, L., Cloke, H. L., Stephens, E., Wetterhall, F., Prudhomme, C., Neumann, J., Krzeminski, B., and Pappenberger, F.: Skilful seasonal forecasts of streamflow over Europe?, Hydrol. Earth Syst. Sci., 22, 2057-2072, https://doi.org/10.5194/hess-22-2057-2018, 2018.

Hirpa, F. A., Pappenberger, F., Arnal, L., Baugh, C. A., Cloke, H. L., Dutra, E., Emerton, R. E., Revilla-Romero, B., Salamon, P., Smith, P. J., Stephens, E., Wetterhall, F., Zsoter, E. and Pozo, J. T. (2018). Global Flood Forecasting for Averting Disasters Worldwide. In Global Flood Hazard (eds G. J. Schumann, P. D. Bates, H. Apel and G. T. Aronica). doi:10.1002/9781119217886.ch12

FEATURES

User Survey from the 13th EFAS Annual meeting

by Elinor Andersson, EFAS Dissemination centre

The 13th EFAS Annual Meeting took place in Norrköping between 13 and 14 of March, and the participants were invited to answer the yearly survey regarding the satisfaction of the EFAS performance in general, the service and the products. A link for a web-based survey was made available to all EFAS partners, with a different link collector depending on if they that attended the Annual meeting in March 2018 or not. 41 responses were collected compared to 22 responses 2017, an increase by 86%. The reasons for this are probably a combination of more reminders, the promise of a prize and because we send the invitation to all EFAS partners, not only those

that participated in the EFAS annual meeting. The survey was anonymous.

The rating of the overall EFAS satisfaction, the perceived performance of EFAS last year, and the overall interest in EFAS were all similar to last year's survey (Figure 1). There are slight decreases in satisfaction and perceived performance, but not by much. The value of probabilistic forecasting was the question with the biggest decrease of rating (from 4.05 to 3.59).

Skill, performance and trust

There was a similar trend for the questions regarding skill, performance and trust (Figure 2). The perceived increase of EFAS skill was rated the same as in 2017. All the other questions showed a slight decrease compared to last year.

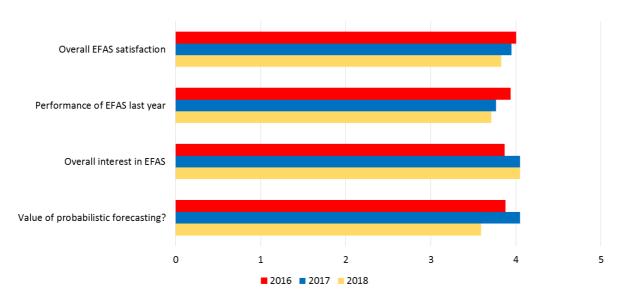


Figure 3. Average user response on the user satisfaction, performance and overall interest in EFAS as well as the value of probabilistic forecasting (1 = very low, 2 = low, 3 = medium, 4 = high, 5 = very high). Yellow = Survey 2018, Blue = Survey 2017, Red = Survey 2016.

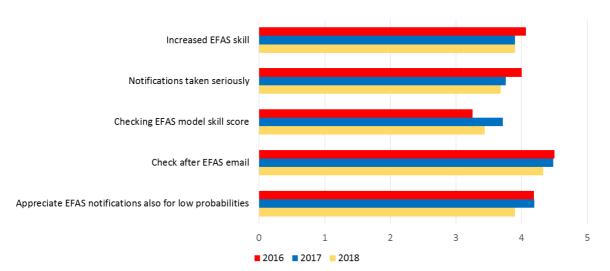


Figure 4. Average user response on skill, performance and trust (1 = very low, 2 = low, 3 = medium, 4 = high, 5 = very high). Red = Survey 2016, Blue = Survey 2017, Yellow = Survey 2018.

EFAS services

The same trend is persistent for the questions related to the EFAS services, except for the new questions that were added in 2017 (Figure 3). There were slight increases regarding the usefulness of the partner network, the organisation of the annual meetings and if the respondent would like to attend the next one.

Like last year, the survey takers were asked about which topics they would like training or a webinar on (Figure 4). Impact based forecasting was the most requested topic followed by the EFAS WMS and SOS webservice on second place and seasonal forecasting/EFAS-IS in general and its products at shared third place.

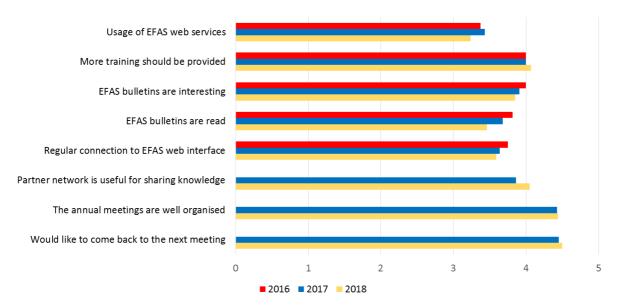


Figure 5. Average user response on the different EFAS services (1 = very low, 2 = low, 3 = medium, 4 = high, 5 = very high). Red = Survey 2016, Blue = Survey 2017, Yellow = Survey 2018.

Requested training or webinar topics

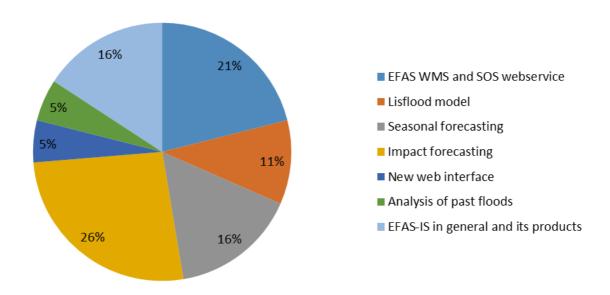


Figure 4. Topics the survey takers would like training on or a webinar about.

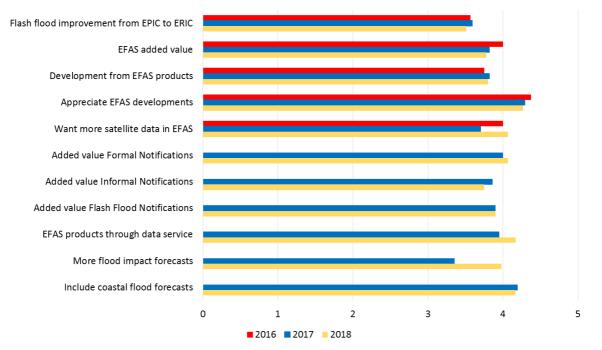


Figure 5. Average user response on EFAS products (1 = very low, 2 = low, 3 = medium, 4 = high, 5 = very high). Red = Survey 2016, Blue = Survey 2017, Yellow = Survey 2018.

EFAS products

The EFAS products were rated high like previous years (Figure 5). The users especially appreciated that EFAS keeps evolving with new products. Notable is the increase of interest compared to last year regarding having satellite data incorporated in EFAS and also regarding flood impact forecasts.

Like in 2017, the added value of formal notifications was unsurprisingly rated the highest followed by flash flood notifications and informal notifications. The demand for EFAS products through data services was slightly higher than last year and the demand for coastal flood forecasts was about the same.

The most wished was products through data services, and the increase could possibly be an effect of the workshop on web services that was held during the EFAS annual meeting

The electronic feedback form of formal flood notifications has been reviewed since last contract period (Figure 6). Some partners have reported difficulties in answering some of the survey questions, and we wanted to know more. A majority found it easy to provide the EFAS Dissemination Centre with feedback to formal notifications, but compared to other questions it was rated relatively low (3.51).

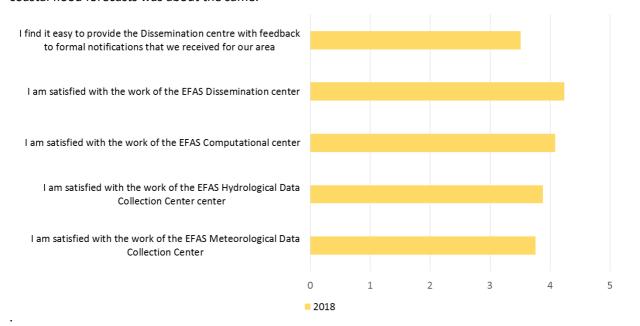


Figure 6. Average user response on formal notification feedback collection and the satisfaction of the work of the different EFAS centers. When asked about HDCC and MDCC, the survey participant was asked to rate their satisfaction both as a partner and a data provider (1 = very low, 2 = low, 3 = medium, 4 = high, 5 = very high). Yellow = Survey 2018.

The survey takers were also asked to suggest improvements regarding the feedback collection. There were several comments that were positive to a new web application form integrated in EFAS-IS (currently under development by the EFAS Computational Centre). Others suggested 1) that an easier and faster way to provide feedback should be implemented, 2) that it should be possible to report missed events, and 3) that the feedback requests should be sent to same email that the notifications are sent to. Some users would also appreciate the inclusion of the option to print a copy of the provided feedback.

Questions regarding the satisfaction with the work of the EFAS centers were added for this year's survey. When asked about HDCC and MDCC, the survey participant was asked to rate their satisfaction both as a partner and a data provider. All the centers received a rating above medium satisfaction.

I support the EFAS open data policy as presented during this year's meeting

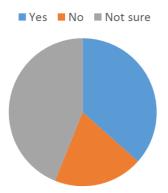


Figure 7. Answers to the question "I support the EFAS open data policy as presented during this year's meeting".

Finally, the survey takers were asked if they supported the EFAS open data policy which was introduced at the annual meeting (Figure 7). 36.59% answered "yes" (15 responses), 19.51% answered "no" (8 responses) and 43.9% were not sure (18 responses). Judging by this result, is seems clear that the subject needs to be further discussed. Like last year, the participants were asked about three wishes they had for EFAS (e.g. additional suggestions, comments, new development and products). The most common wishes were an improvement of the EFAS-IS webpage (the prototype showed at the annual meeting was well received), a finer model resolution, the inclusion of reservoirs in the model, and the promotion of networking and information exchange between EFAS partners. Someone wished for an EFAS-IS app, someone wanted EFAS-IS translated to their language, someone wanted more workshops, and someone wanted an easier way to provide feedback on notifications.

If you are interested in reading a more detailed review of the survey you can find it in the FWC2/SC3 Performance Report.

Case study: Storms and flash floods in Europe in May 2018

by Richard Davies, FloodList

Central Europe was hit by a seemingly endless run of storms during May and June 2018, with many of them bringing dramatic lightning strikes, strong winds and intense rainfall. The heavy rain, sometimes at record breaking levels, caused countless flood events in over a dozen countries, including France, Germany, UK, Italy, Spain, Belgium, Netherlands, Luxembourg, Czech Republic, Switzerland and Bulgaria.

On 11 May, flash flooding was reported in Hamburg and areas of Schleswig-Holstein in northern Germany. DWD said that 42 mm of rain fell in Oststeinbek in just 30 minutes. Emergency services received over 2,000 calls for help. Also in Germany, a thunderstorm and heavy rain on 24 May caused flooding in the Vogtland region of Saxony. Emergency services responded to over 200 calls for assistance in the towns of Adorf, Bad Elster and Elsnitz. DWD said that Bad Elster recorded 124 mm of rain in 5 hours. Flooding also affected neighbouring parts of Czech Republic late on 24 May.

A few days later a man died after a storm caused flooding in the West Midlands of England on 27 May. The UK's Met Office said that Winterbourne in Edgbaston (Birmingham), recorded 53.6 mm of rainfall in one hour on 27 May and 93.6 mm in a 24-hour period. Storms affected much of northern and eastern France during late May and into June. France's Ministry of the Interior said that between 25 May and early June, emergency services had carried out over 8,000 flood and severe weather related interventions.

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: Overview of meteorological observations included in the new domain, snapshot of the daily precipitation grid from 10 February 2018.

Appendix - figures

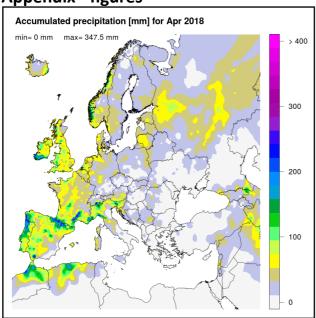


Figure 6. Accumulated precipitation [mm] for April 2017.

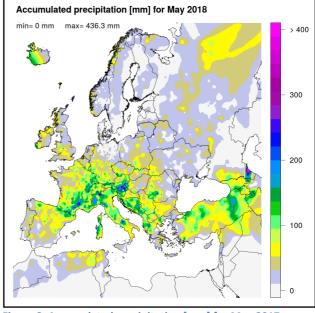


Figure 8. Accumulated precipitation [mm] for May 2017.

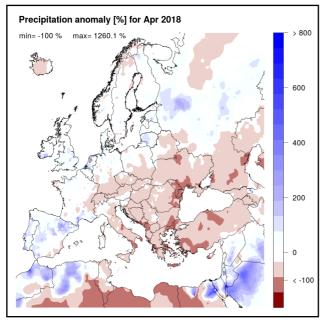


Figure 7. Precipitation anomaly [%] for April 2017, relative to a long-term average (1990-2013). Blue (red) denotes wetter (drier) conditions than normal.

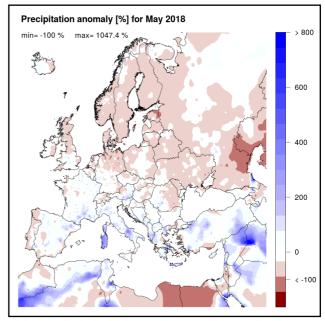


Figure 9. Precipitation anomaly [%] for May 2017, relative to a long-term average (1990-2013). Blue (red) denotes wetter (drier) conditions than normal.

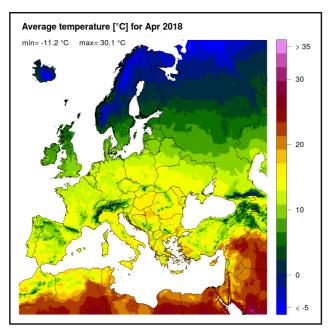


Figure 10. Mean temperature [°C] for April 2017.

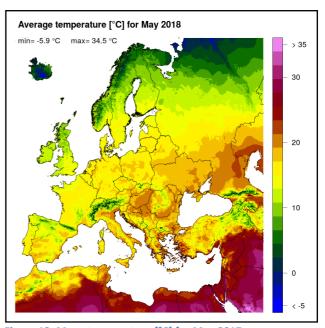


Figure 12. Mean temperature [°C] for May 2017.

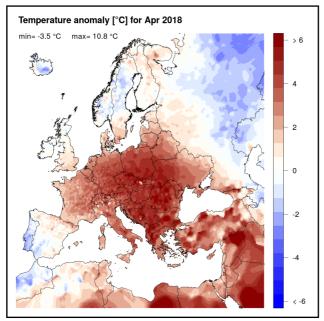


Figure 11. Temperature anomaly [°C] for April 2017, relative to a long-term average (1990-2013). Blue (red) denotes colder (warmer) temperatures than normal.

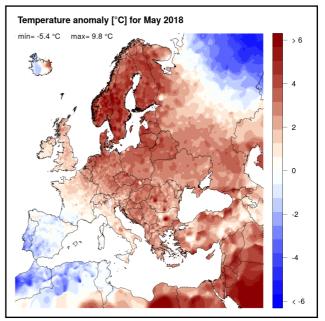


Figure 13. Temperature anomaly [°C] for May 2017, relative to a long-term average (1990-2013). Blue (red) denotes colder (warmer) temperatures than normal.

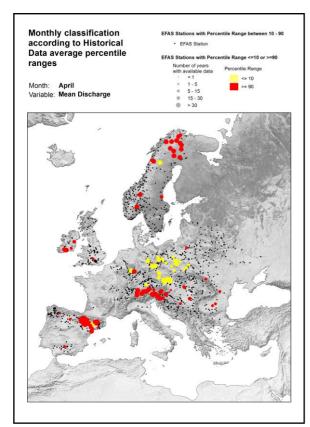


Figure 14. Monthly discharge anomalies April 2017.

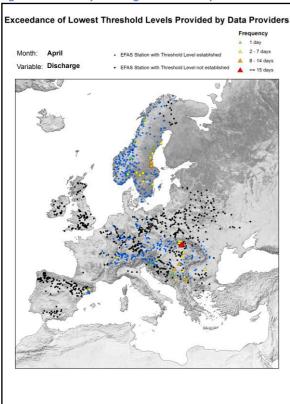


Figure 15. Lowest alert level exceedance for April 2017.

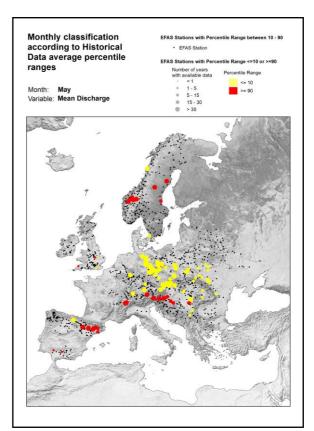


Figure 16. Monthly discharge anomalies May 2017.

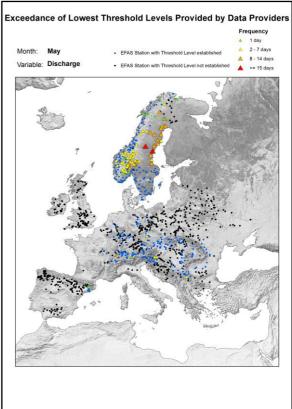
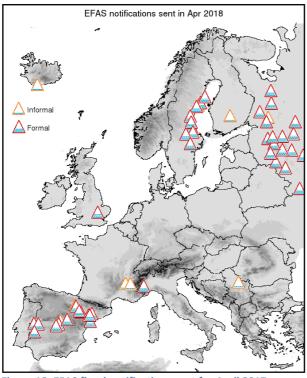
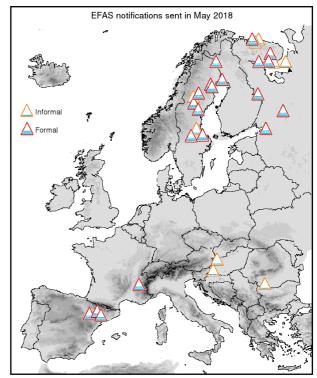


Figure 17. Lowest alert level exceedance for May 2017.





EFAS flash flood notifications sent for April 2017.

EFAS flash flood notifications based on ERIC - Apr 2018

Figure 20. EFAS flood notifications sent for May 2017.

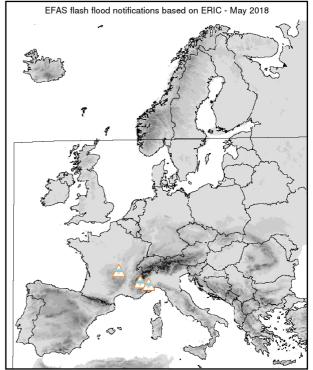


Figure 19. Flash flood notifications sent for April 2017.

Figure 21. Flash flood notifications sent for May 2017.

Appendix - tables

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

Туре	Forecast date	Issue date	Lead time*	River/Region	Country
Informal	03/04/2018 00 UTC	03/04/2018	0	Velika Morava, below Zapadna	Serbia
Formal	03/04/2018 12 UTC	04/04/2018	2	Guadiana, below Zujar	Spain
Formal	04/04/2018 12 UTC	05/04/2018	3	Desna, section Bolava - Sudost	Russia
Formal	04/04/2018 12 UTC	05/04/2018	6	Dnepr, above Drut	Russia
Formal	04/04/2018 12 UTC	05/04/2018	5	Msta	Russia
Formal	05/04/2018 00 UTC	05/04/2018	5	Lovat, above Pola	Russia
Informal	05/04/2018 12 UTC	06/04/2018	4	Segre	Spain
Formal	06/04/2018 12 UTC	07/04/2018	4	Segre	Spain
Informal	06/04/2018 12 UTC	07/04/2018	5	Tejo, section Jamara - Alberche	Spain
Formal	07/04/2018 00 UTC	07/04/2018	2	Ebro, section Gallego - Jalon	Spain
Formal	07/04/2018 00 UTC	07/04/2018	4	Tejo, section Jamara - Alberche	Spain
Formal	07/04/2018 00 UTC	07/04/2018	2	Tejo, above Henares	Spain
Formal	07/04/2018 12 UTC	08/04/2018	4	Ebro, section Gallego - Jalon	Spain
Formal	07/04/2018 12 UTC	08/04/2018	2	Ebro, section Huerva - Cinca	Spain
Formal	07/04/2018 12 UTC	08/04/2018	3	Ebro, below Segre	Spain
Informal	07/04/2018 12 UTC	08/04/2018	0	Aragon	Spain
Formal	08/04/2018 12 UTC	09/04/2018	2	Coastal zone	Russia
Formal	09/04/2018 00 UTC	09/04/2018	3	Volga, section Bazuskoye Vdkhr	Russia
Formal	09/04/2018 00 UTC	09/04/2018	3	Zapadnaya Dvina, above Mezha	Russia
Formal	09/04/2018 00 UTC	09/04/2018	1	Volga, above Osuga, Sezha and Gzhat	Russia
Formal	09/04/2018 00 UTC	09/04/2018	1	Pola	Russia
Formal	09/04/2018 12 UTC	10/04/2018	2	Ilmen lake	Russia
Formal	10/04/2018 00 UTC	10/04/2018	2	Ebro, section Aragon - Jalon	Spain
Formal	10/04/2018 00 UTC	10/04/2018	6	Mälaren, sub-catchment Arbogaån	Sweden
Informal	10/04/2018 12 UTC	11/04/2018	0	Henares	Spain
Formal	11/04/2018 00 UTC	11/04/2018	2	Henares	Spain
Formal	11/04/2018 00 UTC	11/04/2018	4	Tejo, section Tietar - Algon	Spain
Formal	11/04/2018 12 UTC	12/04/2018	3	Dalälven	Sweden
Formal	11/04/2018 12 UTC	12/04/2018	3	Msta, above Syezha	Russia
Formal	12/04/2018 00 UTC	12/04/2018	4	Storsjön catchment	Sweden
Formal	12/04/2018 12 UTC	13/04/2018	5	Svanganälven	Sweden
Informal	12/04/2018 12 UTC	13/04/2018	4	Kymijoki	Finland
Formal	14/04/2018 12 UTC	15/04/2018	6	Tejo, section Alagon to Zezere	Spain
Formal	14/04/2018 12 UTC	15/04/2018	2	Moroga	Russia
Informal	14/04/2018 12 UTC	15/04/2018	3	Isere	France
Formal	15/04/2018 00 UTC	15/04/2018	3	Rybinskoe Vodokhranilshche sub-	Russia
Informal	15/04/2018 00 UTC	15/04/2018	2	Skafta, Kudatljot catchment	Iceland
Formal	17/04/2018 00 UTC	17/04/2018	1	Pola	Russia
Formal	17/04/2018 00 UTC	17/04/2018	2	Rybinskoe Vodokhranilshche	Russia
nformal	17/04/2018 12 UTC	18/04/2018	4	Rhone, section Isere - Durance	France
Formal	18/04/2018 00 UTC	18/04/2018	4	Sweden - coastal zone	Sweden
Formal	18/04/2018 00 UTC	18/04/2018	7	Volkhov	Russia
Formal	19/04/2018 00 UTC	19/04/2018	2	Ljungan	Sweden
Informal	19/04/2018 00 UTC	19/04/2018	1	Pasha	Russia
	19/04/2018 12 UTC	20/04/2018	1	Gideälven	Sweden
Informal					

Formal	24/04/2018 00 UTC	24/04/2018	3	Lake Lagoda sub-catchment	Russia
Formal	24/04/2018 12 UTC	25/04/2018	3	Shuya	Russia
Formal	25/04/2018 12 UTC	26/04/2018	2	Volkhov	Russia
Formal	26/04/2018 12 UTC	27/04/2018	2	Cinca	Spain
Formal	27/04/2018 12 UTC	28/04/2018	0	Coastal zone	Sweden
Formal	27/04/2018 12 UTC	28/04/2018	3	Great Ouse	United Kingdom
Formal	28/04/2018 12 UTC	29/04/2018	2	Sweden - coastal zone	Sweden
Formal	29/04/2018 12 UTC	30/04/2018	5	Ozero Vygozero catchment	Russia
Formal	30/04/2018 00 UTC	30/04/2018	3	Oreälven	Sweden
Formal	30/04/2018 00 UTC	30/04/2018	3	Po, above Dora Baltea	Italy
Formal	03/05/2018 12 UTC	04/05/2018	3	Isere	France
Informal	04/05/2018 00 UTC	04/05/2018	2	Cinca	Spain
Formal	07/05/2018 00 UTC	07/05/2018	3	Teriberka	Russia
Formal	07/05/2018 00 UTC	07/05/2018	3	Pitealven	Sweden
Formal	08/05/2018 12 UTC	09/05/2018	3	Varzuga	Russia
Formal	08/05/2018 12 UTC	09/05/2018	2	Umba	Russia
Informal	09/05/2018 00 UTC	09/05/2018	2	Voronja	Russia
Informal	09/05/2018 12 UTC	10/05/2018	1	Coastal zone	Russia
Informal	09/05/2018 12 UTC	10/05/2018	1	Coastal zone	Russia
Formal	10/05/2018 00 UTC	10/05/2018	2	Ponoy	Russia
Formal	10/05/2018 12 UTC	11/05/2018	0	Dalälven	Sweden
Informal	11/05/2018 12 UTC	12/05/2018	0	Ljusnan	Sweden
Informal	11/05/2018 12 UTC	12/05/2018	2	Umeälven, above Vindelälven	Sweden
Formal	12/05/2018 00 UTC	12/05/2018	2	Ångermanälven, section Langseleån -	Sweden
Formal	12/05/2018 00 UTC	12/05/2018	1	Umeälven, above Vindelälven	Sweden
Formal	13/05/2018 00 UTC	13/05/2018	0	Långseleån	Sweden
Formal	13/05/2018 00 UTC	13/05/2018	2	Lake Ladoga sub-catchment	Russia
Formal	13/05/2018 12 UTC	14/05/2018	4	Österdalälven	Sweden
Formal	14/05/2018 12 UTC	15/05/2018	4	Lieksanjoki	Russia
Formal	14/05/2018 12 UTC	15/05/2018	4	Verkhne Svirskoye Vod.	Russia
Informal	14/05/2018 12 UTC	15/05/2018	2	Jiu	Romania
Formal	16/05/2018 00 UTC	16/05/2018	0	Pitealven	Sweden
Formal	16/05/2018 00 UTC	16/05/2018	1	Tornealven, below Muoniojoki	Finland
Formal	16/05/2018 00 UTC	16/05/2018	0	Muoniojoki	Sweden
Informal	16/05/2018 00 UTC	16/05/2018	0	Coastal Catchment White Sea	Russia
Informal	16/05/2018 00 UTC	16/05/2018	0	Ångermanalven, above Långseleån	Sweden
Informal	16/05/2018 00 UTC	16/05/2018	1	Mura	Croatia
Informal	16/05/2018 00 UTC	16/05/2018	2	Raab, Raba	Hungary
Formal	17/05/2018 12 UTC	18/05/2018	3	Segre	Spain
Formal	18/05/2018 12 UTC	19/05/2018	2	Cinca	Spain
Formal	26/05/2018 12 UTC	27/05/2018	3	Ebro, section Huerva - Cinca	Spain

^{*} 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

Туре	Forecast date	Issue date	Lead time*	Region	Country
Flash flood	05/04/2018 12 UTC	06/04/2018	24	South-West (IE)	Irish Republic
Flash flood	05/04/2018 12 UTC	06/04/2018	24	Nisava	Serbia
Flash flood	06/04/2018 00 UTC	06/04/2018	48	Zaragoza	Spain
Flash flood	06/04/2018 12 UTC	07/04/2018	36	Zaragoza	Spain
Flash flood	07/04/2018 00 UTC	07/04/2018	30	Zaragoza	Spain
Flash flood	07/04/2018 00 UTC	07/04/2018	24	Huesca	Spain
Flash flood	07/04/2018 12 UTC	08/04/2018	96	Jaen	Spain
Flash flood	08/04/2018 00 UTC	08/04/2018	96	Zaragoza	Spain
Flash flood	08/04/2018 00 UTC	08/04/2018	66	Guadalajara	Spain
Flash flood	08/04/2018 12 UTC	09/04/2018	42	Tarn-et-Garonne	France
Flash flood	09/04/2018 00 UTC	09/04/2018	24	Haute-Garonne	France
Flash flood	09/04/2018 00 UTC	09/04/2018	54	Zaragoza	Spain
Flash flood	09/04/2018 00 UTC	09/04/2018	42	Cuenca	Spain
Flash flood	09/04/2018 00 UTC	09/04/2018	60	Jaen	Spain
Flash flood	09/04/2018 12 UTC	10/04/2018	66	Burgos	Spain
Flash flood	09/04/2018 12 UTC	10/04/2018	48	Tarn	France
Flash flood	10/04/2018 00 UTC	10/04/2018	54	Zaragoza	Spain
Flash flood	10/04/2018 00 UTC	10/04/2018	42	Huesca	Spain
Flash flood	10/04/2018 00 UTC	10/04/2018	60	Alpes-Maritimes	France
Flash flood	10/04/2018 00 UTC	10/04/2018	54	Navarra	Spain
Flash flood	10/04/2018 00 UTC	10/04/2018	54	La Rioja	Spain
Flash flood	10/04/2018 00 UTC	10/04/2018	54	Alava	Spain
Flash flood	10/04/2018 12 UTC	11/04/2018	42	Guipuzcoa	Spain
Flash flood	10/04/2018 12 UTC	11/04/2018	24	Herault	France
Flash flood	11/04/2018 00 UTC	11/04/2018	12	Aude	France
Flash flood	11/04/2018 12 UTC	12/04/2018	12	Teruel	Spain
Flash flood	28/04/2018 12 UTC	29/04/2018	54	East of England	United Kingdom
Flash flood	28/04/2018 12 UTC	29/04/2018	48	East of England	United Kingdom
Flash flood	28/04/2018 12 UTC	29/04/2018	54	East of England	United Kingdom
Flash flood	28/04/2018 12 UTC	29/04/2018	60	East of England	United Kingdom
Flash flood	02/05/2018 00 UTC	02/05/2018	72	Piemonte	Italy
Flash flood	03/05/2018 12 UTC	04/05/2018	30	Hautes-Alpes	France
Flash flood	13/05/2018 12 UTC	14/05/2018	24	Puy-de-Dome	France

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

^{**} The designation of Kosovo is without prejudice to positions on status, and it is in line with UNSCR 1244/1999 and the ICJ Opinion on the Kosovo Declaration of Independence.

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

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

ECMWF has been awarded the contract for the EFAS Computational centre. It is responsible for providing daily operational EFAS forecasts and 24/7 support to the technical system.

A consortium of Swedish Meteorological and Hydrological Institute (SMHI), Rijkswaterstaat (RWS) and Slovak Hydro-Meteorological Institute (SHMU) has been awarded the contract for the EFAS Dissemination centre. They are responsible for analysing EFAS output and disseminating information to the partners and the ERCC.

A Spanish consortium (REDIAM and SOOLOGIC) has been awarded the contract for the EFAS Hydrological data collection centre. They are responsible for collecting discharge and water level data across Europe.

A German consortium (KISTERS and DWD) has been awarded the contract for the EFAS Meteorological data collection centre. They are responsible for collecting the meteorological data needed to run EFAS over Europe. Finally, the JRC is responsible for the overall project management related to EFAS and further development of the system.

Contact details:

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

Tel: +44-118-9499-303 Fax: +44-118-9869-450 Email: comp@efas.eu

www.efas.eu www.ecmwf.int