15th EFAS Annual Meeting 2020

Minutes

October 22, 2020, on-line Webex

15th EFAS Annual Meeting was transferred to the on-line platform due to the Covid-19 pandemic situation and was shifted in time to October 22, 2020. 137 people were registered and at least 152 participants from EFAS partners, Third party partners and operational centres were logged in and took part in the meeting.

All presentations including questions are uploaded to the EFAS-IS.

Opening of the meeting

Alessandra Zampieri (JRC, Head of the Disaster Risk Management Unit) welcomed participants and mentioned the increasing number of natural disasters in running climate change. According to JRC estimates, losses from river flooding will rise nearly twice at the end of the 21st century, so EFAS will become more important in the future. Copernicus Emergency Management Service (CEMS) plays an important role in the European Civil protection mechanism. She also stressed a necessity of international cooperation, transboundary risk management and the role of science to better prevention and preparedness. Alessandra informed participants on the Agenda and wished them an interesting and fruitful meeting.

Peter Salamon (JRC) reminded the main rules of on-line communication and chaired the whole meeting.

Status of EFAS operational – experiences, issues, challenges

Ilias Pechlivanidis (EFAS DISS) introduced the **Dissemination centre** and its responsibilities in his presentation. Next he resumed:

- current number of partners is 71 (+6 new joined EFAS since June 2019), 45 Third party partners (+5) and 12 research partners (+3);
- number of issued notifications in 2019: 175 Formal, 115 Informal and 1206 Flash Flood notifications; Jan-Sep 2020: 201 Formal, 119 Informal and 1057 Flash Flood notifications;
- analysis of provided feedback on Formal notifications: Floods were mostly comparable to EFAS predictions last year, while less severe than EFAS prediction in 2020;
- New possibility of providing quick feedback on Flash Flood notifications was set up in July 2020;
- opportunity to get training (contact us on info@efas.eu);
- EFAS webinars were held - *How national information is used in EFAS* (November 21, 2019) and *Flash Flood Updates and Multi-partner feedback process* (May 26, 2020). Both are recorded and uploaded on EFAS IS (www.efas.eu/webinars).
- Partner contact details - if there are changes in Administrative or Technical contacts, inform info@efas.eu, please.
- The Annual Survey was not carried during this meeting. Partners will be requested to provide feedback on EFAS for the entire year 2020 and will receive a questionnaire in January 2021.

Mercedes García Padilla´s presentation introduced a consortium of the **Hydrological Data Collection Centre** (EFAS HDCC or HYDRO) - Environmental and Water Agency of Andalusia (Rediam) and Soologic - and its activities: collection of data, post-processing, sharing of data, contribution to reports and communication with data providers.

- HYDRO focuses on adding more stations on-board from new data providers, switching to collecting through web services when it is possible and upgrading the data licenses.
- Annual report 2019, in which 1149 discharge stations were analyzed, was presented. Discharge values in 2019 did not differ much from 2018, although it was clearly lower compared to the historical period 1991-2016. Especially in Elbe, Oder, Vistula and Dnieper river basins the drier conditions were very pronounced.
- Threshold levels (available in 1092 stations) were exceeded in 51% of them, mostly in summer and late autumn. There were twice more exceedance events registered in 2019 compared to 2018, but with short duration. Most of these stations were located in the Po, Danube, Vistula and Minho basins.
- Only 4.9% of all data were missing and 0.3% were outliers (erroneous values) in 2019, most of them single values.

David Blanco de Cordova presented HDCC current status, new data providers and temporal statistical comparisons.

- 1824 stations from 44 providers are sending water level or discharge data nowadays.
- New developments will involve post-processing, real-time and fixed reporting points layers. Contact e-mail for administrative issues is mercedes.garcia.padilla@juntadeandalucia.es and for technical issues rafael.garcia@soologic.com.

Q1 (Maarten Deschamps, HIC Belgium): On which other platform is data collected by HDCC shared?
A1 (Peter Salamon, JRC): Due to data policy it is not possible to share the original data out of Copernicus. HDCC shares data with JRC and COMP. However, we are looking for possibilities to share back with data providers some quality flags.

Q2 (Klara Finkele, Met Eireann, Ireland): Are you planning to collect soil moisture data in the future?
A2a (Rafael García, HYDRO): Not for the moment. We are only in charge of collecting measurements of water level and discharge.
A2b (Peter Salamon, JRC): Ensuring that we continue to increase our hydrological data collection in Europe as there are still a few gaps. We do not foresee collecting soil moisture data in the near future. Furthermore, for soil moisture data, to be assimilated into our model, it is probably better to use satellite based soil moisture estimates.

Christoph Schweim described the **Meteorological Data Collection Centre** (EFAS MDCC or METEO) and two responsible organisations (Kisters and Global PCClimatology, DWD) in his presentation.

- MDCC collects data from many sensors and stations, runs automatic data aggregation and validation calculations to prepare data for generation of gridded spatial information, that is used as input for COMP.
- Currently, there are 22 active data providers and 15459 active stations in the system.
- Daily grids are provided for precipitation, max and min air temperature, wind speed, vapor pressure and solar radiation.

- 6-hourly grids of precipitation and average temperature are also being prepared for integration into the Lisflood model.
- Data processing system was improved since the last AM and Data licence for non-EUMETNET members is now available.
- As future development, MDCC plans to avoid duplicate stations in grids, to improve the performance of grid creation that will be used in future EFAS higher spatial resolution and to include new data providers and more parameters and stations from existing data providers.
- Contact e-mail is efas.mdcc@dwd.de.

Christel Prudhomme on behalf of the **Computational centre** (EFAS COMP) introduced its role in EFAS in her presentation:

- running operations of EFAS and also GloFAS, computing all forecast to be available on time, implement improvements, and collect feedback on them, operating web interfaces and data services and documenting the whole service;
- all feedbacks and comments from partners and users are welcomed;
- key activities in 2019-2020: the upgrades in the hydrological model, which is the engine of EFAS;
- Novelties since last year: new Reporting point layer, new sub-seasonal products, improvements in the ERICHA and ERIC layers, release of EFAS 4.0, new layers looking at links of national flood centres associated with feedbacks, more data accessible through the Climate Data Centre.
- Failures: COMP is very actively working to reduce the times when fix failures. The number of failures that happened in the last 18 months did not impact the delivery of EFAS products.
- Service delivery: The people in COMP´s production service started working from home in March this year due to the Covid-19 situation. That had no impact on any of the activities on the EFAS 4.0 release.
- New Wiki space provides comprehensive and complementary information on EFAS and GloFAS, information on the new cycles, specific analysis on the model performance, also on all new layers. Wiki is updated very regularly and is accessible to all partners from the EFAS web site.

Christel thanked all colleagues at the Computational Centre at the end that have contributed to that work over the last 18 months.

What's new in EFAS 4.0?

Model improvements (Cinzia Mazzetti, COMP)

Cinzia Mazzetti presented the LISFLOOD model improvements in the next presentation. Over the last two years, LISFLOOD has been constantly developed and all improvements are now included in EFAS version 4.0. The computational step in LISFLOOD has been increased everywhere up to 6-hourly and now LISFLOOD uses sub-daily steps. The hydraulic routing in channels and the way to start from existing state files were improved. The LISFLOOD is now fully open-source, and there's some updated documentation, and test cases available as well as the model code (https://ec-jrc.github.io/lisflood/). These improvements in LISFLOOD are reflected in EFAS 4.0. Better routing improves the simulations in small and medium catchments with a general improvement in flood timing. Some corrections into the

drainage network were also made and more restricted physical ranges for the model parameters were used during the calibration of LISFLOOD.

6-hourly calibration – overview of results (Cinzia Mazzetti, COMP)

Cinzia Mazzetti continued with an overview of the result of 6-hourly calibration. All available river gauges were actually located on the LISFLOOD drainage network. The calibration stations were selected on the basis of data availability and data quality. New calibration was performed on more than 1000 stations from 215 different catchments including 35% of stations with 6-hourly data. The data availability is very different across the 1137 calibration stations, but for all of them at least 4 years of data within the period 1990-2017 were used for the calibration. When both daily and 6-hourly data were available at one station, the 6-hourly data was privileged. This means that for some catchments EFAS 4.0 calibration used a much shorter calibration period than in the past. The calibration was performed on 14 LISFLOOD parameters and the modified KGE was used as an objective function. All details about the EFAS calibration are available on the EFAS wiki on the main page of the EFAS website.

Hydrological model performance (Cinzia Mazzetti, COMP)

Cinzia Mazzetti continued with an overview of the model performance. The comparison between EFAS 3.0 and EFAS 4.0 was performed in the period 1990-2017 only on stations that were used in both calibration exercises. The results show that the KGE for the new calibration increase in most of the stations and in most of the catchments. The median of the KGE across Europe is 0.75. Higher KGE is in central Europe and main European rivers. Lower skill is mostly concentrated in catchments with strongly regulated rivers. Some catchments might have a lower KGE (mainly due to a systematic bias), but have high correlation. The correlation is important for EFAS, and it gives us the timing of the peak. The effects of the improvements to the LISFLOOD model and the new calibration producing EFAS 4.0 are clearly visible in the Water Balance layer. The Water Balance layer shows easier comparing observed discharge and simulation in EFAS. It's available at stations that have real-time historical data. Model thresholds were recomputed as well.

New post-processing points (Cinzia Mazzetti, COMP)

Cinzia Mazzetti ended the presentation with an overview of post-processing. For most of the stations where real-time discharge data is available, forecasts are post-process to become predictors of the future observed discharge. Now post-processing is based on a method that is called Model Conditioner Processor (MCP). The observed discharge and LISFLOOD simulations are used to train MCP. In real-time MCP blends the joint probability distribution, the available observations over the last 40 days, LISFLOOD water balance, and forecast for the probability of the distribution of future observation. EFAS 4.0 increased the number of stations up to 1183, where post-processing is available.

Evaluation layers (Shaun Harrigan, COMP)

Shaun Harrigan continued in the presentation and he presented the Evaluation layers. COMP worked on forecast skill in the development. While the model performance looks how good EFAS performance is against observations and hydrology, the forecast skill looks in terms of prediction and to what lead time can EFAS provide skillful forecasts. As a benchmark 6-hourly discharge from the previous time step was used. Continuous Ranked Probability Skill Score (CRPSS) was evaluated at 2651 fixed reporting points and the overall summary is that EFAS is skillful over its domain.

There are three new Evaluation layers in the EFAS-IS:

- Model Performance Points layer shows model performance for the calibration points with the KGE score and its decomposition into Correlation, Bias errors, and Variability errors. Other plots are for the variability, biases along a year and time series plots as well as include the model threshold as well and observations that give more information to forecasters.

- Model Performance Catchments layer shows the same information but displayed differently- as catchments. It is well visible that the EFAS domain is well covered with observations.
- Medium-range forecast skill layer summarizes a forecast skill score which is defined as the maximum lead time up to 10 days in which the CRPSS > 0.5, when compared against the persistence benchmark forecast.

More information is in the documentation of EFAS Wiki.

Q1 (Nuno Moreira, IPMA, Portugal): I was wondering in regards to the latest map on the CRPSS score, for a higher value of the score closer to 1. There could also be an extra map for the number of days because of the short rain forecast. What do you think about this option of having higher scores for setting the number of days where you have the score higher than thresholds for the short rains?
A1a (Shaun Harrigan, COMP): We had so many different ideas on different ways we could display the score. We wanted to have a few summary layers that describe the basic kind of skill in the model performance. We have decided for a threshold 0.5, which means that a forecast is twice skillful as the benchmark.
A1b (Peter Salamon, JRC): I think we're doing really a bit of pioneering work, because for hydrology it is not a common bizniss to use these types of headline scores. It is also the learning process needed on the user's side and for sure over time we need to finetune and maybe we find some other headlines scores. This is definitely work in the progress.

Q2 (Maik Renner, LfU, Germany): Are model simulations and forecasts directly accessible? For example to be used in our local forecasting system, e.g. for comparison with our own forecasts?
A2 (Christel Prudhomme, COMP): Yes, the hydrological simulations and forecasts are made available after 30 days for the forecasts through the Copernicus Data Store (CDS), but you can request access in real-time to COMP. We are also now publishing all reforecasts through the CDS, so that partners can do their own evaluation (https://cds.climate.copernicus.eu/cdsapp#!/dataset/efas-reforecast?tab=overview).

Q3 (Oliver Nicholson, OPW, Ireland): Is it possible that the improvements that are available in EFAS 4 will lead to a smaller minimum catchment size for EFAS Formal Flood Notifications?
A3a (Cinzia Mazzetti, COMP): Yes, it is possible that new EFAS developments could lead to a smaller minimum catchment size for EFAS Formal Flood Notifications. We'll carry out further investigations before doing that.
A3b: (Shaun Harrigan, COMP): While the catchment size has not yet changed for formal notifications, the new way the fixed reporting points is implemented means you will be able to monitor any station that is available for Ireland (including if EFAS thresholds are triggered).

New products and Services

New reporting point layer (Christel Prudhomme, COMP)

Christel Prudhomme presented the Reporting Point layer. This layer has been existing in EFAS for a long time. COMP has improved the way it displays information. It was released in October 2019. Now the layer shows all the points that can be represented in the LISFLOOD river network where partners have shared discharge data with the EFAS HDCC. From the time of the EFAS 4.0 release, there are 2651 points, called fixed reporting points which are based on location of the observed station. They are displayed as gray or blue squares. Blue squares have the medium-range forecasts post-processed in a 24-hourly time step. Fixed reporting points change colour to yellow or red during flood conditions according to the EFAS criteria. If the flood severity is reached within the next 48 hours a black border

is added to the square. If the upstream area of a fixed reporting point is too small to meet EFAS dissemination criteria, it is displayed as a square with a colour-coded border when the forecast exceeds a 2 or 5-year return period thresholds. Dynamic points are added to the map during flood conditions. They are located along the river network, where there is no discharge data from partners available. Next change is a river discharge forecast hydrograph - now it is shown in $m^3.s^{-1}$ and also as return periods. Precipitation, snowmelt and temperature forecasts are also shown in a 6-hour time step and information for the days up to and including the initialization was added. Persistence tables were upgraded to 4 time steps for each day and the order of forecasts was reversed - the most recent run is on the top.

Q1 (María Concepción García, MITECO, Spain): Is the reporting point layer already fixed?
A1a (Cinzia Mazzetti, COMP): We update the list of fixed reporting points frequently. We add new stations when they become available. We have stations that have discharge data in real-time now.
A1b (Christel Prudhomme, COMP): If the question is about the availability of the reporting point layer, yes, it is shown as presented since October. Nothing is forever 'fixed' in this sense, and we can introduce a new version with changes in the way things are shown. We also did this with EFAS 4.0 on the hydrological model performance which has been completely changed. Adding stations is done through new version releases, so once or twice a year generally.

Q2: Have the notification rules been changed?
A2 (Christel Prudhomme, COMP): The notification rules have not changed. What has changed is that now more points are shown. Before that when the flood criteria was not met, the station was not shown in the map. You could not click on it and therefore you could not see the simulations. Now we believe it adds more information to partners, if they are interested in monitoring what happens within EFAS 4.0 for their stations.

C1 (Peter Salamon, JRC): A comment on adding a discharge - Please remember the principle of EFAS is using thresholds derived from a model long term run and compare forecasts against those, so in principle they are biased in variance, and also the magnitude in relation to return periods.

New product: sub-seasonal to seasonal (S2S extended range) forecasts (Fredrik Wetterhall, COMP)

Fredrik Wetterhall introduced sub-seasonal and seasonal forecasts in his presentation.

- In the Seasonal and Sub-seasonal layers there are overview maps with blue or red color for wetter and dryer periods than the normal conditions. The idea is to give users an outlook on what is going to happen in the next 6 and 8 weeks. The Seasonal outlook (S) is based on the seasonal forecast and is updated monthly. The Sub-seasonal outlook (S2S) is based on the extended-range 46 days forecast, it is updated twice a week and shows weekly averages for larger regions. The forecast is visualised in boxplots, where the forecast is either in blue over the 90%-tile or red is below the 10%-tile over the climatology. The climatology is calculated for the whole year from over 30 years, so it is basically long-term 90% and 10%-tile. The dotted line in the plots is the mean water balance over the same time period for comparison with the forecast.
- In the future it is planned to release the skill score of the seasonal and sub-seasonal outlooks (an average about 5 weeks against climatology), to develop the seasonal outlook into longer lead time, to use monthly averages to increase the skill, to increase a spatial resolution and to define more climate variables. This system will be a part of multi-model seasonal hydrological forecasting developed within the C3S project.

- All information is put into the Climate Data Store (CDS). EFAS forecasts with a 30-day delay, EFAS 4.0 reforecasts, historical EFAS water balance, seasonal and sub-seasonal forecasts (from November 2020) and all the previous EFAS versions are available there and can be downloaded (https://cds.climate.copernicus.eu).

Q1 (Peter Salamon, JRC): What are "more climate variables"?
A1a (Fredrik Wetterhall, COMP): There will be some specific coefficients that would be derived, not only discharge itself, but also anomalies or indexes as well.
A1b (Ilias Pechlivanidis, DISS): We are still focusing on river discharge. This is the variable that we are putting to the CDS, but if there is a request from users of the adding another variable, it is an easy task.

Q2 (Boris Teunis, RWS): What is the difference in skill between high flow forecast and low flow forecast for the sub-seasonal forecast?
A2 (Fredrik Wetterhall, COMP): We haven't done analysis in detail yet. There's a problem in the longer lead time when you have low flow, it is very sensitive to biases, correlation is quite good. For low flow very low numbers are compared, so this is difficult to provide a very good skills score. (More is available in https://hess.copernicus.org/articles/22/3409/2018/#bib1.bibx15).

New electronic feedback form (Marc Girons, DISS)

Marc Girons Lopez presented *What is new in EFAS Feedback collection*. Besides feedback on Formal Flood Notifications and Missed events partners can provide a quick feedback on Flash Flood notifications. It can be done by clicking on the link in the notification email and answering *Yes* or *No* to the question: *Was a flood observed in or around the area*. Visualisation of provided feedback in the EFAS-IS also was shown. Feedback is displayed in list and calendar form. It is possible to view its details and to filter it according to country or basin. Any problems in feedback provision communicate to info@efas.eu, please.

C1: Both partners that are affected by a notification in the border area can provide feedback. The only limitation is that only one feedback on the same notification can be submitted by each partner.

Q1 (María Concepción García, MITECO, Spain): We are receiving some notification for rivers that are not included in our agreement with EFAS. Could dissemination of notifications be done according to EFAS agreements with specific partners?
A1 (Peter Salamon, JRC): The general principle in EFAS is that EFAS notifications are sent to all partners in the same river basin. The aim is that all partners are aware of what is going on in the whole catchment. So partners might receive notifications for e.g. downstream parts of rivers. Of course, there can be an error. Send us, please, some examples, we will look at them, and if it is an error, we can fix it.

C2 (Peter Salamon, JRC): The partner feedback is fundamental for EFAS, all the more after the release of EFAS 4.0. Flash flood is a very specific issue, still a lot of research is needed, we are doing small steps in moving forward. But one of the biggest challenges is missing feedback on flash floods happening or a constant, concrete and harmonized record in Europe.

Case study analysis - Floods in Spain 2019 (Mark Hegnauer, DISS and Mercedes García Padilla, HYDRO)

Mark Hegnauer (DISS) and **Mercedes García Padilla** (HYDRO) presented a Detailed Assessment report that concerned the December 2019 event in Northern Spain (full text is available on EFAS-IS). The detailed assessment aims to provide a thorough understanding of the EFAS forecasts in terms of accuracy, time-efficient availability, and effective communication of the forecasts. This report studied the Ebro, Douro and Minho-Limia basins that were hit by three storms on December 16-22, 2020.

Analyses of the provided EFAS forecasts & information, the hydrological observations and the media reports based on Twitter messages were done, followed by a verification of EFAS information based on the data of the other two analyses. 10 Formal, 2 Informal and 17 Flash Flood notifications were sent out. Predicted probabilities of exceeding 5 and also 20-year return period were high mainly in the West of the studied area. Notifications for Minho-Limia and Douro were sent out also with quite a long lead time. Evolution (Normalized Variation Index), relative (Percentiles) and absolute severity (Threshold levels) were used for Hydrological observations assessment. A reconstruction of the events for each basin was made based on Twitter tags/# containing specific words. It can be concluded that the quality of the provided EFAS forecasts was fairly high and the events were detected by EFAS with a lead-time between 3-9 days. For some rivers, there seem to be some problems in the model with e.g. reservoirs. Incorporating the operational usage of these reservoirs could potentially increase the accuracy of the EFAS forecasts.

What is next for EFAS? (Peter Salamon, JRC)

Peter Salamon started the report on upcoming events in the future. It is planned to:

- EFAS Pre-tasking: Rapid mapping is a CEMS service, which provides fast flood delineation maps and needs to be activated by an authorized user (AU). The idea is to pre-task the acquisition of satellite images in the case of an upcoming flood event based on EFAS forecast to provide the faster provision of maps (it's not activation of rapid mapping). Many of partners have already received these kinds of pre-tasking emails. It will provide the faster provision of these rapid mapping maps. Peter requested EFAS partners to identify the authorized user and agree on internal procedures to handle pre-tasking requests, to invite authorized user to join as EFAS Third party partner and to evaluate the option to share EFAS information with the pre-tasking request to authorized users with a clear reference to EFAS partner at the national level.
- Next increase the Spatial resolution: from 5x5 km pixel to approximately 1 arcmin resolution using the WGS 84 project system, roughly 1.8x1.8 km pixel size. It's between 7 to 8 times more pixels in the model domain to better characterize all the landscape features that are going to LISFLOOD. The model domain will enlarge slightly. Static input maps, drainage networks, land-use, satellite images, soil maps, the number of reservoirs, etc. will also update. This means also that new calibration will be needed with a participatory approach from EFAS partners. Partners will be contacted for providing opinion on selected stations for calibration. The implementation timeline is 2022.
- New global flood monitoring product: Current CEMS Rapid Mapping service have certain limitations: the constant automatic monitoring of floods in all of Europe with the rapid mapping is not provided, it always requires the activation from a limited group of authorised users and there is always a bit of a delay when it comes to flood events. Currently, it is not possible to map all floods due to resources. For new global flood monitoring it is possible to use satellite Sentinel-1 with a very high spatial resolution of the flood extent maps (20 meter

resolution) for any place in Europe. The Sentinel-1 revisits most of Europe between 1 and 3 days. Flood map images will be processed in a fully automatic way and will be provided in less than 8 hours. That enables continuous monitoring for larger areas. The product access (observed flood extent, reference water mask, uncertainty, impact estimates) will be free and open, directly integrated into the EFAS web interface, so partners will be able to see the forecast as well as ongoing flood events. It's a huge task so a number of providers will work with us. This product will be available in August-September 2021.

- New Framework Contracts: All Framework Contracts of the EFAS centres end approximately in August/September/October 2021. It is necessary to go through a public procurement again, but there is no guarantee that EFAS centres will be the same at the end of next year. That is also an opportunity for all EFAS partners and the Third parties to become involved in this process.

*Q1 (Fabian Löw, BBK, Germany): Will we (i.e. AU of the CEMS or EFAS partners, in Germany, my office is both at the same time...) receive an explicit *recommendation* to activate the CEMS in Rush Mode, based on EFAS notifications?*
A1 (Vera Thiemig, JRC): Yes. Once we pre-task the EMS Mapping based on an EFAS forecast (usually 1 day before the event), the respective EFAS partner and AU are informed about this pre-tasking and encouraged to activate the service.

Q2 (María Concepción García, MITECO, Spain): Can the authorised users request the maps outside of their territory, a transboundary river basin?
A2a (Vera Thiemig, JRC): The authorised users can only request the mapping within their territory. The pre-tasking driven by EFAS is however independent of political boundaries and therefore could cover multiple countries, in which case all the authorised users within those countries would be informed and have the option of triggering the Rapid Mapping.
A2b (Milan Kalas, JRC): We had recent activations for border regions and the activation covered also areas in neighboring countries.
A2c (Fabian Löw, BBK, Germany): We (Germany, BBK), too, recently had a transboundary activation of CEMS, the ERCC has helped us to coordinate with the AU of the neighbouring country (it was a Risk & Recovery activation).

Flash floods. Presentation on recent developments. Debate on changes, problems and possible solutions (Calum Baugh, COMP)

Calum Baugh talked about Flash Flood Forecasts in the EFAS system, about changes, the evaluation in EFAS 4.0, and about some challenges and solutions.

- Current ERIC product accumulates surface runoff to 1 km channel network, compares it against climatological thresholds and produces the Flash floods forecasts. It needs to be re-evaluated after each new LISFLOOD calibration.
- Recent developments: Highlight the single point of the flash flood reporting points in each region (bigger triangle), it makes the process most simpler for the forecasters on duty for issuing notifications.
- Evaluation of ERIC for EFAS 4.0: ERIC climatological thresholds were recomputed with using new 6-hourly long term runs. Flash Flood notification thresholds were recomputed by evaluation over 1-year of observations in 2019. Over 2600 observations were taken from media sources (FloodList, ESWD, Austrian Partner) and aggregated onto their respective administrative regions. Unfortunately for many areas, there were no observations available at

all. Calum stresses the importance of Flash flood feedback provided by partners that can enable further evaluation of ERIC. Different exceedance probability thresholds of the 2, 5, 20-year return periods to generate ERIC warnings were tested and compared against the observations for different lead times.

- Evaluation results: The Hanssen-Kuipers score was used for the separation of flash flood and non-flash flood events. The best results were at 10% of the season probability of a 5-year return period (best performance in autumn, more false alarms in winter, more missed alarms in summer). EFAS 4.0 compared against EFAS 3.4 outperforms all lead times. Flash flood threshold criterion remains unchanged (10% exceedance probability 5-year return period with a lead time up to 60 hours). More details about this evaluation are on the Confluence page. https://confluence.ecmwf.int/display/COPSRV/EFAS+4.0+ERIC+flash+flood+forecast+skill
- Challenges with ERIC: missed events in the summer, the prevalence of false alarms in winter, persistence criteria for Flash Floods notifications.
- Solutions for ERIC: better representation of localised extreme rainfall events, finer temporal resolution (6-hourly is too coarse), flash flood forecasts produced more frequently per day, priorities for highlight areas with the greatest impacts on the local population.
- TAMIR project: TAMIR uses radar data with numerical weather prediction model (2 km resolution across Europe, observations are updated every 15 minutes and bias is corrected to rain gauges. The Nowcast is produced every hour at an hourly resolution over the next 6 hours. Nowcasts are blended with medium-range forecasts to produce forecasts to 5 days lead time and are updated every hour.
- Flash Flood Impacts: impact matrix combines hazard, exposure and vulnerability information into a flood impact product.

Q1 (Nuno Moreira, IPMA, Portugal): ERIC now only uses COSMO-LEPS and Tamir only ECMWF-EPS? Would a multi-model approach enhance the scores?
A1a (Calum Baugh; COMP): The COSMO-LEPS is driven at its boundaries by the ECMWF model itself, so those two models may be quite related to each other, they stand the possibility of other limited area models. The problem is they are too limited to be pan-European. I think it's something to consider, but maybe a bit later.
A1b (Christel Prudhomme, COMP): One issue is the spatial domain of COSMO-LEPS which does not cover the whole of EFAS, but multi-model could be an option to consider for a follow-on project.

C1a (Franz Molé, DWD, Germany): to check the coupling of heavy rain forecasts depending on air mass (cape, shear), could also be a benefit.
C1b: (Calum Baugh; COMP) We use it like the extreme forecast index, which is a ECMWF product which compares the forecasted ensemble versus model climatology. If you use an ensemble search of ECMWF and even COSMO-LEPS it's still going to struggle to capture these localised events using things like cape. This is something that colleagues of ECMWF have looked into predicting the locations of extreme rainfall and it's actually a product that they're trying now in GloFAS, which identifies the locations of extreme rainfall given the prevalence of things like cape and other meteorological factors. We're going to be monitoring the situation with that product very closely.
C1c (Christel Prudhomme, COMP): Same for other ways of filtering the forecast using Cape, Shear, etc. We might consider it for future research.

Open data and new EFAS partner agreement – presentation, discussion and voting (Peter Salamon, JRC)

Copernicus regulation calls for a full, open and free-of-charge access to data. EFAS real-time data (RT) is restricted and the EFAS archive is open nowadays. Based on discussions on EFAS Annual Meetings 2018 and 2019 and e-mail discussion of proposed draft of the Condition of Access (CoA) was agreed on:

- EFAS Seasonal forecasts will be open to the public;
- EFAS initial conditions (simulations driven by gridded meteorological observations and not forecasts data) will be open to the public;
- EFAS products (including RT) can be shared with other Copernicus services to create no flood-warning related, derivative products;
- Access to EFAS products (including RT) for research purposes is facilitated through a faster response on possible comments from EFAS partners (reduced to 10 days with a possibility to extent for additional 7 days upon request from EFAS partner);
- EFAS RT products remain restricted and will only be available if 1 month old (EFAS archive).

Further changes that have no impact on the underlying principles (i.e. use of the data and EFAS Partners as well as EFAS Third Party rights and commitment):

- take into account the General Terms and Conditions of the CEMS flood early warning and monitoring systems;
- take into account the Copernicus regulation;
- take into account data protection according to the GDPR;
- merge the different procedural annexes;
- shorten and simplify the overall text.

Process of update of CoA needs consultation with partners. Peter summarized that the first draft was sent to partners on 8th July 2020. No negative feedback was received. Based on feedback a possibility to extend time for comments in relation to the research project for an additional 7 days was added and minor textual changes were implemented. Revised and consolidated text was sent to EFAS partners on 16th September 2020 and also to all EFAS AM meeting participants.

Peter reminded that the Conditions of Access may be updated by a qualified majority, i.e. two thirds of present and voting, decision by all EFAS Partners present at the Annual EFAS Partners Meeting. He also described the voting process. Each EFAS partner had one vote. Everything was clear to the partners and two questions, not affecting CoA, followed:

Q1 (María Concepción García, MITECO, Spain) asked for better visibility of Disclaimer on the EFAS interface.
A1 (Peter Salamon, JRC): Agreed, the Disclaimer will be made more visible on the EFAS-IS.

Q2 (María Concepción García, MITECO, Spain) had concerns on dissemination notifications for transnational river basins.
A2 (Peter Salamon, JRC): This issue did not affect CoA and will be solved separately.

Voting was done via the Webex Chat. Firstly Peter asked whether any institution wanted to abstain from voting. Total there were 41 partners present, 1 was abstained and 40 accepted the draft, so the new Conditions of Access were adopted.

EFAS DISS will send the new EFAS CoA to all EFAS partners and Third Parties via email. If no response within a given timeframe, it is considered that the EFAS Partner/Third Party accepts these new EFAS CoA. New EFAS CoA will be published on the EFAS webpage.

Closing of the meeting

Peter Salamon (JRC), Attilio Gambardella (DG DEFIS)

The meeting was closed by short resumes given by Peter Salamon and Attilio Gambardella.

Peter Salamon hopes this meeting was informative for participants. Organizers were a bit uncertain to put a lot of agenda points in a one-day meeting, because of an online Webex meeting. They also decided to keep it relatively simple in terms of interactivity. Peter hopes that next year we will be able to meet again face to face. It is really good to see that so many of participants have questions and feedback, which are very important for the next developments. There is a lot to discover for the participants in EFAS 4.0 and wiki.

Attilio Gambardella from DG DEFIS, responsible for the CEMS, introduced the new Directorate-General of the European Commission and is an authority in charge of the Copernicus Ecosystems Space Component. Attilio was glad to hear all these prepared works on EFAS and he is looking forward to the EFAS 4.0 in action and its impact on the quality of the service. He will try to work with colleagues of JRC to make the future evolution possible. The experience of this year about the interaction between EFAS component and Rapid mapping component means the overall Emergency Service is working better and better. He thanked all for this excellent meeting at the end and congratulated Peter, colleagues of JRC, and all to make EFAS such efficient and very advanced.