**16th EFAS Annual Meeting 2021**

Minutes

October 27 and 28, 2021, on-line Webex

The 16th EFAS Annual Meeting was again transferred to the on-line platform due to the Covid-19 pandemic situation. In the first part of the meeting on 27 October 174 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.

**Day 1: Wednesday 27-10-2021**

## Opening of the meeting

**Peter Salamon** (JRC) welcomed the participants and opened the meeting. He emphasized that this will be a special meeting because it is part of the CEMS week 2021 which brings together experts, users and policy makers to discuss the future of the European Emergency Management Service. On the second day, following the EFAS meeting, the first GloFAS annual meeting will take place.

The program of both days is exiting and there is much news to share, e.g. about data use, training and what happened in the basins of Rhine an Meuse in July 2021.

Unfortunately the meeting is again in a virtual environment but we are going to make the best out of it.

Peter explained the main rules of on-line communication and chaired the whole meeting.

## What is new since the 15th EFAS Annual Meeting?

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

Tasks of DISS is to analyse and disseminate notifications, collect feedback to improve the existing products, give trainings, compile reports and act as the bridge between the EFAS system and the partners.

* current number of partners is 75 (+4 new full partners joined EFAS since October 2020), 53 third party partners (+5) and 12 research partners (no changes);
* number of issued notifications in 2020: 240 Formal, 159 Informal and 1815 Flash Flood notifications; Jan-Sep 2021: 106 Formal, 117 Informal and 1283 Flash Flood notifications;
* analysis of provided feedback on Formal notifications: partners are more happy with the prediction than last year;
* In 2021 extreme rainfall was mainly the driver of floods and not that much long lasting rainfall;
* 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](mailto:info@efas.eu));
* EFAS webinars were held – *Use of EFAS 4.0* (December 10, 2020) and *Rapid Mapping for Satellite pre-tasking* (June 15, 2021). Both are recorded and uploaded on EFAS IS ([www.efas.eu/webinars](http://www.efas.eu/webinars)). Partners are encouraged to provide ideas for future webinars.
* Partner contact details - if there are changes in Administrative or Technical contacts, inform [info@efas.eu](mailto: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 2021 and will receive a questionnaire in January 2022.

*Q: from Mihaela Ionita*

*Can we integrate your DATA in other applications, after dissemination? What type can you disseminate?*

*A: from Christel Prudhomme - ECMWF*

*Hello Mihaela, we provide access to products as WMS-T and to hydrological daily simulations via the Climate Data Store, so that you can integrate the forecast in your applications and use your own decision thresholds.*

*A: from Ilias Pechlivanidis – SMHI  
@Mihaela: Thanks for the question Mihaela. How do you define DATA? Regarding forecasts, Christel's response about the time series existing in CDS is the most appropriate. The notifications that we sent are only providing information on the river system, predicted date for the peak and start of the event, and the various probabilities (exceeding 5-yr and 20-yr return periods).*

*Reply from Mihaela Ionita*

*@Ilias Pechlivanidis I was referring at the format of the DATA. I work for the General Inspectorate for Emergency Situations and i was wondering if we can integrate the data you provide in our web applications for defining, predictions in establishing the flood notifications in our workflow ?*

*A: from Christel Prudhomme - ECMWF*

*@Mihaela Ionita, COMP is in charge of data exchange. Maybe we can have a discussion offline regarding your needs. But as said earlier, the WMS-T service enables to import all EFAS products/ layers into GIS-based applications*

*A: from Paolo Battino*

*@Mihaela Ionita , in principle yes it is possible to integrate a wide range of data we have, including notifications. But devil is in the details.... At any rate we operate a RESTful backend so it's relatively easy and standard-compliant to have interoperability with other web services.*

*Q: from Alexey ROMANOV*

*Due to a number of subjective and objective reasons, archival hydrological information has not yet been sent to EFAS from the fourth Departments of Hydrometeorology and Environmental Monitoring located in the European territory of the Russian Federation. How much does its absence slow down the process of high-quality calibration of the LISFLOOD model, and how EFAS is going to overcome this problem?*

*A: from Cinzia Mazzetti - COMP@ECMWF*

*Hello Alexey, we include in the calibration stations with a least 4 years of discharge data in the period 1990-2021, either from historical and/or NRT data. You'll see more details during today's presentation from COMP and in the breakout session*

*Reply from Alexey ROMANOV*

*Hi Cinzia, "4 years..." is a very small period. From my point of view it is impossible to improve calibration of LISFLOOD using such small period of time observations. You have to insist on receiving archival data through Roshydromet and WMO.*

*A: from Cinzia Mazzetti - COMP@ECMWF*

*Alexey, I agree with you, but 4 years is just the minimum. We use more years when they are available, but we also try to include as many stations as possible in the calibration.*

*Q: from Alexey ROMANOV*

*The volunteer movement is developing in the world. The computing power of servers is growing exponentially. Why don't you want to use the data obtained through volunteers?*

*A: from Milan Kalas*

*@alexey, we are using already some volunteer generated information for the exposure mapping which is used in the rapid mapping procedure. Using volunteer hdryo/meteo data still to come :-)*

*Remark from Ilias Pechlivanidis – SMHI*

*You can also find the detailed assessment report for 2020 "The 2020 spring floods in the Scandinavian countries" under the link: https://www.efas.eu/en/report/detailed-assessment-report-2020-spring-floods-scandinavian-countries*

**Mercedes García Padilla**´s presentation introduced the 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 is a fully operational and automatically data collection service of the Copernicus EMS.
* HYDRO collects real time and historical observations from 44 data providers (situation end 2020) and supports EFAS with the provision of quality controlled and standardized hydrological data.
* Data is used for the calibration of the hydrological model Lisflood as well as for the real time monitoring of the hydrological conditions in the EFAS domain.
* Annual report 2020, in which 1149 discharge stations were analysed, was compiled.
* EFAS HYDRO has contributed to the event assessment report for the 2020 spring flood event in Scandinavia.
* The percentage of stations for which threshold levels were exceeded has increased in the past year compared to the previous year but is still lower than the historical average between 1991 and 2015.
* The number of data gaps has decreased in respect to the previous year, even when the total number of data points has increased with approximately 10%.
* 1824 stations from 44 providers are sending water level or discharge data nowadays.
* Contact e-mail for administrative issues is [mercedes.garcia.padilla@juntadeandalucia.es](mailto:mercedes.garcia.padilla@juntadeandalucia.es) and for technical issues [rafael.garcia@soologic.com](mailto:rafael.garcia@soologic.com).

*Remark from Vera THIEMIG – JRC*

*You can find the annual report 2020: "CEMS hydrological data collection Centre" under the following link: https://www.efas.eu/en/report/annual-report-2020-cems-hydrological-data-collection-centre*

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

* MDCC collects data from over 240.000 sensors and stations, does quality control checks on these data, runs automatic data aggregation and validation calculations, to prepare data for generation of gridded spatial information, that is used as input for COMP.
* Daily grids are provided for precipitation, max and min air temperature, wind speed, vapour pressure and solar radiation.
* A filter has been developed to detect and remove multiple stations and merge them into one station. This prevents overrating of multiple available stations and improves the performance of grid creation.
* Necessary minimum data coverage for including stations in post processing was reduced.
* Acceleration of interpolation has been achieved. Also output format has been changed which made the procedure faster.
* An annual overview report of the meteorological data collection in 2020 has been produced. This will be done every year from now.
* Contact e-mail is [efas.mdcc@dwd.de](mailto:efas.mdcc@dwd.de).

*Remark from Armin Rauthe-Schöch DWD*

*These are example reductions in computational times. But if you have more cores, you can get an even higher speed-up for the calculation time per grid with the parallelized version of the interpolation programme.*

*Remark from Christoph Schweim - DWD*

*Please find the annual report 2020 of the meteo data collection center here:* [*https://www.efas.eu/en/report/annual-report-2020-cems-meteorological-data-collection-centre*](https://www.efas.eu/en/report/annual-report-2020-cems-meteorological-data-collection-centre)

*Q: from Angela Corina*

*It is worth to inform you that WMO Congress has approved the new data policy for all earth system data. It is important for Eu activities: see https://public.wmo.int/en/our-mandate/what-we-do/observations/Unified-WMO-Data-Policy-Resolution*

*A: from Peter Salamon - JRC*

*Angela, this is indeed of high importance for the data collection in EFAS!*

*A: from Angela Corina*

*@Peter yes, and also there are other WMO initiative ongoing for hydrological service provision with interesting possibility of collaboration/interaction with EFAS*

**Marc Girons Lopez** on behalf of the **Dissemination Centre** (EFAS DISS) presented the issue of feedback in EFAS; how do we collect it, why do we collect it and what is it used for?

Feedback is essential to improve the EFAS system. It helps us to verify case studies, validate skill scores, assess the model performance and shape future developments.

DISS collects feedback on different types of notifications: formal notifications, flash flood notifications but also on missed events. A webinar on feedback provision has been organised in spring 2020. It is available on the EFAS website.

Feedback is analysed on a yearly basis. A summary of the feedback of 2020 is available on the EFAS website.

The current feedback system was already available during the annual meeting 2020. We have done some polishing and bug fixing since then.

In the future we will extend the feedback collection procedure for all types of EFAS notifications. Additionally we will also start with the analysis of missed events.

The flash flood product in EFAS has been improved leading to a reduced number of flash flood notifications. In order to analyse the effectiveness of this improvement we need more feedback on flash flood notifications. The questionnaire that has to be returned is very simple.

## What’s new & next for EFAS

Vera Tiemig, JRC

EFAS/GLOFAS activities will continue in new framework contracts for the period 2021-2027. Contracts have been awarded in July 2021. The only change is that HYDRO continues with only Soologic.   
In the new framework contracts there is additional user support, more analytical service, additional and improved data validation procedures.

From 2021 a GLOFAS annual meeting will be organized.

## A sneak preview at EFAS 5.0

Cinzia Mazzetti, COMP @ ECMWF

**Cinzia Mazzetti** presented EFASNext that is expected to be available by the end of 2022.   
The most important features of EFASNext are:

* Increased spatial resolution to 1 arcmin (~1.3 km);
* New meteo and hydro datasets with longer lead times, more stations and improved interpolation methods;
* New improved static maps and
* New LISFLOOD calibration with more stations and longer calibration periods.

The higher spatial resolution leads to an improved representation of the drainage network and better modelling of small catchments.

With the use of better static maps more physically based parameters for the LISFLOOD model become available which leads to a better hydrological simulation and improved soil moisture modelling.  
The new meteo and hydro datasets are used to improve calibration results.

The minimum catchment area for calibration is now 150 km2.   
1886 hydrological stations are used for calibration.

Peter Salamon compliments EFAS COMP with the new developments. It is a big step forward and will certainly improve the quality of forecasts. He thanks all data providers. Without their data the developments wold not have been possible.

*Q: from Nuno Moreira - IPMA*

*What is the possibility to antecipate notifications that currently happen around 18 hours after model run time? Usually at that time forecasters are already starting to use the next and most recent run. Thank you.*

*Q: from Stefan Plötner - NLWKN*

*As you increase the spatial resolution to 1 arcmin - do you increase the temporal resolution as well?*

*A: from Christel Prudhomme - ECMWF*

*Hi Stefan Plotner, no we will continue to run EFAS at a 6hourly time step*

*Q: from Alexey ROMANOV*

*To Cinzia Mazzetti - What is the reason for the absence of any forums on which we could discuss many issues related to the installation of the LISFLOOD model, as well as its modification in order to improve it?*

*A: from Christel Prudhomme - ECMWF*

*@Alexey Romanov, I suggest you contact the JRC who are the main developers of Lisflood. The model is now open source and can be co-developed. You can find more on https://ec-jrc.github.io/lisflood-model/*

*A: from Peter Salamon - JRC*

*@Alexey You can also simply open an issue on the LISFLOOD github repository in case you have problems with the model installation or if you want to develop new modules to LISFLOOD.*

Parallel breakout sessions “Performance”  
Session 1: EFAS evaluation layers  
Shaun Harrigan, COMP @ ECMWF

**Shaun Harrigan** presented the evaluation layers that are currently available in EFAS-IS. In the map viewer the evaluation layers can be found under a drop down tab with a speedometer icon. The layers show performance and forecasting skill.

Feedback on the evaluation layers is requested via the padlet: <http://tiny.cc/efas_padlet_1> or <http://tiny.cc/efas_padlet_2>

The following layers are available:

* Hydrological model performance – station points map
* Hydrological model performance – KGE ‘speedometer’ plots
* Hydrological model performance – discharge time series
* Medium range forecast skill – station points map
* Medium range forecasts skill

For the hydrological performance 1137 observation stations from 1990 to 2017 with at least 4 years of data have been evaluated. Evaluation was done at 6-hourly time steps, but model series averaged to daily for stations with only daily data.

The KGE efficiency metric gives information on correlation, bias and variability.

Forecast skill refers to the relative accuracy of a set of forecasts, with respect to a set of standard benchmark forecasts. Benchmarks are persistence and climatology.

Next steps will be to implement operational monitoring of forecast skill and scalability of evaluation products.

*Remarks from Christel Prudhomme – ECMWF*

*This is the padlet for you to enter your comments on what we are discussing today*

*https://padlet.com/shaunpharrigan/dcm4ka80l67zl72h*

*We really value your opinion on the new layers. We tried to design them for accessibility and readability, but I am sure we can improve and aim to get your view on how to do so*

*please use the padlet to rate the look and feel of the layers and to add comments about what you think is not clear, could be improved and how*

*The padlets will remain open after the end of the session. You can come back to them if you have more ideas later on how to improve the evaluation layers.*

*What is missing? What is not clear? What is not useful?*

*Q: from Barbara Staudinger*

*6-hourly time step - is there always the value of discharge at this moment compared? forecast and observation*

*A: from Christel Prudhomme – ECMWF*

*Not sure I understand your question @Barbara. At the moment we do not evaluate the forecast quality against near-realtime observations.*

*There is also a survey made on the reporting point layer:* [*https://www.surveymonkey.co.uk/r/6YNCHDJ*](https://www.surveymonkey.co.uk/r/6YNCHDJ)

*Q: from C Dere*

*for what month of 2022 will efas 5.0 be released?*

*A: from Cinzia Mazzetti - COMP@ECMWF*

*Hi, we don't know the exact month yet, but it'll be towards the end of the year.*

*Q: from Alexey ROMANOV*

*@Cinzia & @Peter - EFAS has carried out and continues to carry out an enormous amount of work related to operational hydrology. However, сurrently, WMO, and in particular RB of WMO, together with UNESCO, has prepared a document (“WMO Hydrological Research Strategy 2022-2030:“ Operational Hydrology Research Priorities ”), which will determine the activities of national hydrometeorological and national hydrological services until 2030 in the field of operational*

*hydrology, which includes also flood forecasting. How does the EFAS expert group interact with the WMO expert team in terms of the preparation of this document and its implementation in the future?*

*A: from JRC Peter Salamon*

*@Alexey: Indeed a very relevant question. We continue to work with WMO to ensure that also the work on EFAS is being considered in the relevant WMO activities. I have to admit that we have not been very successful in this matter so far but we continue to look for ways to improve this. For example, there is links being established between the WMO initiative SEE-MHEWS and EFAS and we want to re-vitalise the connections between the WMO FFG and EFAS Flash Flood products that we had initiated a few years ago.*

The session ends with a discussion that it is an issue to decide what is useful information to share and when it will become too complicated. COMP doesn’t have the right answer yet, so suggestions are needed.

Session 2: How user feedback improves the EFAS service  
**Cinzia Mazzetti** (EFAS COMP @ ECMWF) presented station metadata and discharge time series.

Discharge time series are the backbone of any new EFAS calibration. Users are requested to suggest to exclude stations for the calibration of EFASNext if they are aware of bad quality of the respective station. Furthermore they are asked to suggest stations they strongly would like to be included in the calibration. A total of 980 new stations have been added to the database, which will join the existing ones for recalibration. The final list of calibration stations includes 1886 stations, 971 with 6-hourly data and 915 with daily data.  
A quality check has been performed on discharge data for all stations with more than 4 years of discharge data that can be potentially used for EFASNext calibration.

The minimum upstream drainage area for calibration stations has been decreased to 150 km2.

**Calum Baugh** (EFAS COMP @ ECMWF) presented partner feedback for flash flood verification. The aim of the verification is to identify the optimal criteria for issuing flash flood notifications.

Flash flood forecasts are compared against observations at the administrative region level. Observations are derived from media, but also from EFAS partners and from the European Severe Weather Database.

To provide Flash Flood Notification feedback a link at the bottom of each flash flood notification email can be used. The only feedback that is requested is a ‘yes/no’ reply that the event occurred or did not occur.

**Ilias Pechlivanidis** (EFAS DISS @ SMHI) presented how user feedback is used by EFAS DISS

Feedback enables the EFAS team to verify case studies, validate skill scores and assess and improve the performance of the system. A new feedback collection system integrated in EFAS-IS was introduced last year to streamline feedback provision, collection, and analysis. Feedback can be provided on formal flood notifications, flash flood notifications and missed events. In the coming contract period the possibility to provide feedback on informal notifications will be added.

The received feedback on notifications in terms of accuracy and relevance to the EFAS partners is analysed on a yearly basis.

In May 2020 a webinar about feedback collection was organized. The webinar is available on the EFAS website.

*Q: from Maik Renner LfU Brandenburg*

*Question for the feedback evaluation team: Is there a deadline (days after an event, or annually) to when submit the feedback via the form? When is it evaluated?*

*A: from Calum ECMWF*

*@maik From my perspective at COMP there is no formal deadline for submitting feedback. However before I perform an evaluation of the flash floods I could send out an email requesting any feedback or observations to be submitted, that way they can be included in my evaluation*

**Peter Salamon (JRC)** gave a short wrap up of the first day.

Peter thanks all operational centres for the amount of work that they have done in the past year. This work is fundamental for the development of EFAS.

The outlook is that we are working towards a big improvement of the EFAS system (EFASNext). Please continue to give us feedback on these developments via the padlets.

In the second part of the EFAS meeting tomorrow there will be some very exiting presentations, like the satellite monitoring flood product that we be included both in EFAS and in GLOFAS. The combination of ongoing flood images and flood forecasts will be a key strength. There will also be a presentation of a Horizon2020 project related to coastal flood forecasting and presentations of a WMO initiative on a multi hazard early waning service for eastern Europe and on the DG Echo funded Tamir project about flash floods and radar now casting.

In the second part of the EFAS meeting we will also look back on the tragic flood events of July this year in Germany, Belgium and Luxembourg.

At the end of day 1 a virtual group picture has been taken.

**Continuation of the EFAS Annual Meeting**

**Day 2: Thursday 28-10-2021 (approximately 140 participants)**

Re-opening of the meeting

Peter Salamon (JRC)

In his opening remarks Peter gave a short introduction on the presentations that are scheduled for the second part of the EFAS annual meeting. We will start with 4 presentations on relevant projects related to EFAS. After the coffee break there will be 2 parallel sessions that focus on hydrological and meteorological data collection. In the last part before lunch we look back on the flood events of July 2021 with presentations from the Dissemination Centre and from a representative of Rhineland-Palatinate, the German federal state that have been struck severely by the floods.

Everything you wanted to know about …

The CEMS Global Flood Monitoring Service GFM

Wolfgang Wagner, Earth Observation Data Centre for water Resources Monitoring (EODC), Technical University Vienna

The CEMS Global Flood Monitoring Service (GFM) is a system based on 2 Sentinel-1 satellites that provides systematic coverage and near real time monitoring of land surfaces. A fully automatic process derives 11 output layers with a spatial resolution of 20 meters, including a flood extent map and uncertainty maps. A beta version of the GFM is available on the GLOFAS website since 27 October 2021 and will be integrated in EFAS-IS next year.

Maps are available within 8 hours after the satellite has passed.

Flooded area is derived based on 3 scientific algorithms. At least 2 algorithms must agree.

GFM is the first-of-its-kind fully automatic SAR based flood monitoring service. No time is lost due to human intervention between image acquisition and flood map display.

Not all retrieval errors can be captured, e.g. information on wet snow extent and frozen soils is not available with the required resolution.

*Q: from Jasper Stam - RWS*

*Can you tell me what makes multi algorithm for the Meuse and Mexico flooding so consistent ?*

*A: from Bernhard Bauer-M*

*To a great deal this is bound to the fact, the all three algos ingest the same Sentinel-1 IW backscatter image. In these examples, the local conditions and the water-land contrast is very strong.*

Everything you wanted to know about …

The European Coastal Flood Awareness System ECFAS

Paolo Ciavola, University of Ferrara

ECFAS is a Horizon2020 funded project for predicting coastal flooding. From hazard forecasting to flood mapping.

The project started 1st January 2021 and has a duration of 2 years.

ECFAS provides validated pan-European forecasts of total water levels at the coast (including the effects of ocean circulation, atmospheric pressure forcing, tides and waves). It provides thresholds that can trigger the awareness system.

Total water levels will be produces as hourly time series of sea level forecasts along the EU coast.

Flood impact forecasts will be made by combining water levels with information on population, buildings, land-use, transport and infrastructure.

The result of the project will be a proof of concept that can possibly be integrated in CEMS.

*Remark from Bruna Alves*

*Hello all, we will be happy to register your collaboration and compile your replies. Please, access our external link: https://scuolaiuss2019.limequery.com/357415?lang=en*

*The survey's title is ECFAS Project - Collection of Users' Requirements*

*Q: from Nuno Moreira - IPMA*

*The islands are covered, correct? How small can the Islands be to have results?*

*A: from Paolo Ciavola*

*Consider that the coastline is segmented onto 100 km linear tracts. Small islands are a challenge, especially because in the bathymetric datasets we use (e.g. EMODNET) they are NOT well resolved*

*Remark from Paolo Ciavola*

*Feel free to continue to ask questions about ECFAS. Our team is online for all aspects*

*For further question about the project visit the website or contact Dr Clara Armaroli at IUSS Pavia*

Everything you wanted to know about …

The TAMIR project and the link to EFAS

Calum Baugh, EFAS COMP @ ECWMF

TAMIR is a DG Echo funded project to enhance the response capacity in emergencies caused by convective and heavy rainfall events by developing rapid risk assessment products and IT tools for improved impact forecasting to support decision making.

In TAMIR flash flood impact forecast products are developed to display on the EFAS website.

Radar nowcasts (5h lead time) of precipitation are blended with medium range numerical weather prediction (120h lead time). NWP is bias corrected and phase shifted to match radar data. The result is used to calculate flash flood hazard using EPIC approach.

Prototype of TAMIR products will be available in EFAS-IS and as web services by March-May 2022. Products available on EFAS:

* Animated forecast products, e.g. flash flood impacts
* Lead time summary products, e.g. impact by sub catchments
* Previous 24 hour summary products, e.g. maximum flash flood impact

*Q: from Eva Kopacikova*

*What method is used for the bias correction?*

*A: from Christel Prudhomme - ECMWF*

*@Eva, the bias correction is defined based on observational precipitation fields*

*Q: from Nuno Moreira - IPMA*

*What is the range of spatial shifts you have encountered in the studied cases within the blended radar/nwp ?*

*A: from Calum Baugh COMP - ECMWF*

*@Nuno I would need to check the precise values but the shifting is only on the order of a few grid cells (<10km). However, before the shifting we match each radar nowcast ensemble member to the closest matching NWP ensemble member, this procedure aims to minimise the amount of shifting that is required*

*Reply from Nuno Moreira - IPMA*

*Thank you Callum. With the spatial and temporal phase disagreement that can exist for NWP models in extreme events I was assuming more than 10km. The 5h nowcast from radar is matched with what range of forecast steps from ECMWF/ENS?*

*A: from Calum Baugh COMP - ECMWF*

*@nuno for the first 5h lead time, each hourly step of the radar is blended to each hourly step of the NWP also up to 5h ahead. As we get to a 5h lead time the majority of the weighting is given to the NWP data, beyond 5h the data comes exclusively from the NWP forecast*

*Reply from Nuno Moreira - IPMA*

*@Callum – Just to be sure – for eg 3h ahead in the nowcast model, the blending is done with the corresponding NWP ensemble output at the same validity time, and for the most recent available run? so it can be up to, let´s say, H12 to H18 forecasts from NWP Ensemble?*

*A: from Calum Baugh COMP - ECMWF*

*@nuno apologies for the delay, I was in the breakout room. Yes you've understood correctly.*

*Q: from Alexey ROMANOV*

*@JRC & ECMWF - We see that, despite the lack of archival hydrological information on the European part of the Russian Federation, EFAS is trying to work out flood awareness for the river systems of this territory. Does EFAS envisage the development of its activities on the Asian territory of the Russian Federation beyond the Ural ridge?*

*A: from Peter Salamon - JRC*

*@Alexey: Thanks for your question! We do not plan to increase the model domain of EFAS beyond the boundaries as shown for EFASNext.*

*A: from Christel Prudhomme - ECMWF*

*@alexey: you can also use GloFAS which has a global coverage and includes the whole territory of Russia. We welcome any data exchange to calibrate GloFAS to improve the hydrological simulation*

*Q: from Lorenzo Alfieri*

*Very nice application Calum, why did you base the FF forecasts on EPIC rather than ERIC, the latter already operational in EFAS?*

*A: from Calum Baugh COMP - ECMWF*

*@lorenzo for ERIC we use soil moisture forecasts from LISFLOOD which are only produced x2 per day, for TAMIR we would need to run LISFLOOD every hour to get the latest soil moisture conditions, this would take too long to run, so we decided to use the EPIC method. I didn't mention in my talk but in the TAMIR forecasts we remove precipitation which is likely to fall as snow*

Everything you wanted to know about …

The South-East European Multi-Hazard Early Warning Advisory System SEE-MHEWS-A

Sari Lappi, WMO and Fredrik Wetterhall, EFAS COMP @ ECWMF

South-East Europe has experienced a significant number of severe meteorological and hydrological hazardous events such as floods, extreme temperatures, severe storms, droughts, wildfires and landslides. National hydrological and meteorological Services are facing challenges to secure adequate financial and human resources to provide timely and accurate warnings. International cooperation can improve the quality of weather and water related information, forecasts and warnings. In the first phase (2016-2017) an implementation plan was prepared. Between 2018 and 2022 a pilot phase supporting the implementation of a prototype was conducted. In the period 2022-2026 an operational system should be implemented.

The system consist of a database with synop observations, 4 numerical weather predictions and 3 hydrological models.

*Remark from Sari Lappi, WMO*

*More information of the SEE-MHEWS-A project: https://public.wmo.int/en/projects/see-mhews-a*

Parallel breakout sessions “Hydro-Meteo Data”  
Session 1: CEMS Hydrological Data Collection Centre  
Rafael Garciá, HYDRO @ SOOLOGIC

**Rafael Garciá** presented the tasks currently performed by the EFAS Hydrological Data Collection Centre, the quality control and the possibility of retrieving quality flags as well as the expansion of the hydrological data collection.

HYDRO collects near real time data (water levels and discharges) and processes these data in an automated way. HYDRO also collects historical data and processes them offline.

Several quality checks are applied and meta data is added for collected data.

In 2022 reservoir information will be collected (inflow, outflow, level, volume). Also from 2022 HYDRO will start with collecting historical data for GLOFAS.

Peter Salamon stresses the importance of reliable data on reservoirs and asks all EFAS partners to provide these data if available.

*Q: from Marisa Moreno*

*I suppose that aggregation interval of 15 minutes is real time, isn't?*

*A: from Mercedes*

*Yes Marisa, it is OK*

*Q: from Bino Maiheu*

*Thanks for the interesting presentation ! You mentioned you are using FTP & webhooks to collect data from providers. Do you have any thoughts/recommendations on standardisation (data models, protocols) for data ingestion from IoT devices ?*

*A: from Mercedes*

*Thanks Bino. Of course, we can send to you some indications on it.*

*Q: from Marisa Moreno*

*Reservoir are essential to include in models, yes.*

*A: from Cinzia Mazzetti COMP@ECMWF*

*we have ~1400 reservoirs in LISFLOOD at the moment*

*Reply from Marisa Moreno*

*Spanish River Basin Authorities have data from reservoirs bigger than 4,5 Hm3*

*Remark from Tatjana Vujnovic, DHMZ*

*Our retention areas are included-data are within CEMS.*

*Reply from Peter Salamon - JRC*

*@Tatjana: And what about reservoirs? Do you have access to this data or is this managed by private companies that do not share the data with you?*

*A: from Tatjana Vujnovic, DHMZ*

*@Peter-we do not have access to that data. But there is a new EFAS third party from my country, who is in charge of it. Maybe that is the proper way?*

*Reply from Peter Salamon - JRC*

*@Tatjana: Thanks a lot. This is good to know and indeed very useful! HDCC will reach out to them to see whether we can access this data for EFAS!*

*Remark from Andrea Ficchì POLIMI*

*At Politecnico di Milano we work closely with the Lake Como operator in several research projects*

*from Bino Maiheu to everyone in this breakout session: 10:45 AM*

*Thanks for the interesting presentation ! You mentioned you are using FTP & webhooks to collect data from providers. Do you have any thoughts/recommendations on standardisation (data models, protocols) for data ingestion from IoT devices ?*

*From Ervin Zsoter ECMWF to everyone in this breakout session: 10:45 AM*

*We are really looking forward to the global hydro data collection!*

*Q: from Peter Salamon to all participants: We will start to collect reservoir data, because of the issue with reservoirs. This is needed to improve the model calculations. If you have these data please reply, and with the status of this data: is it public or only private.*

*A: from Andrea Ficchì POLIM @ Politecnico di Milano: we work closely with the Lake Como operator in several research projects. How big should the reservoirs be to be included?*

*A: from Peter Salamon: A good question: we want to collect everything*

*A: from Marisa Moreno : Spanish River Basin Authorities have data from reservoirs bigger than 4,5 Hm3*

*A: from Tatjana Vujnovic: Our retention areas are included-data are within CEMS.*

Session 2: CEMS Meteorological Data Collection Centre

Markus Ziese, METEO @ DWD

The Meteorological Data Collection Center is operated by KISTERS and the German Weather Service (DWD). METEO provides information from more than 63,000 stations to the EFAS system and processes over 7 million data records each day. Data is imported or received from multiple partners. The fetching cycle differs from once per day to every five minutes. Files are converted into uniform format.

METEO performs automatic quality checks and all data is processed into mean, minimum, maximum values, accumulated over periods, extracted at specific timestamps and disaggregated to get high temporal resolution.

Data can be used for Copernicus services and is not made publically available. Derived products can be made available to the public.

Peter Salamon highlights that the meteorological data collection is extremely important to compute the right initial conditions for the LISFLOOD model. He also stresses that there is a possibility to deliver the quality control flags to all partners. This is implemented due to the question of some years ago.

The recent floods in Germany, Belgium and Luxemburg in July 2021

**Peter Salamon** gives a short introduction to this topic. The floods that happened in July 2021 in the catchments of Rhine and Meuse had tragic impact. We are all aware that flood forecasting is only one piece of the puzzle in a very complex picture to improve flood risk management and reduce impact of floods. Nevertheless we can contribute with EFAS to improve the situation and reduce impact. There will be 2 presentations related to the flood events. Jan Verkade (EFAS DISS) will first give some information on how EFAS performed and after that Margret Johst from the environmental agency from the German federal state Rhineland-Palatinate will present the event from the view of the regional agency.

July 2021 floods: EFAS performance

Jan Verkade, EFAS DISS @ RWS

In his presentation **Jan Verkade** showed some meteorological and hydrological characteristics that will eventually lead to a detailed assessment report about the July 2021 floods. The report will focus on the quality of EFAS model simulations and forecasts and the quality of the EFAS service.

The events in July 2021 happened during storm Bernd between 12 and 15 July. The study area for the assessment report is the Meuse basin till approximately Nijmegen and various Rhine tributaries from the Moselle till the Lippe.

In the presentation accumulated rainfall and broken hydrological records were shown. At some locations in the Ruhr, Saar Ourthe and Meuse records of observed water levels were broken. Notably is that previous records all dated from winter periods.

In the report that should be published in December 2021 it will be investigated whether notifications were sent to the appropriate recipients, whether they were used in forecast informed decision-making (if so, how) and whether the EFAS forecasts provided additional information over ‘home produced’ forecasts. To answer these questions the assessment group needs information from EFAS recipients/users.

*Remark from Florian Pappenberger - ECMWF*

*FYI (complementing Jan's presentation) Assessment by ECMWF on Extreme rain in Germany and Belgium in July 2021:* [*https://www.ecmwf.int/en/newsletter/169/news/extreme-rain-germany-and-belgium-july-2021*](https://www.ecmwf.int/en/newsletter/169/news/extreme-rain-germany-and-belgium-july-2021)

The July flood In Germany with focus on the Ahr basin and challenges in forecasting

Margret Johst, State Environmental Agency Rhineland-Palatinate (LfU RP), Flood Forecasting Center in Mainz

In her presentation **Margret Johst** first gave an introduction in the flood that happened in the Ahr basin between 14 and 15 July. The Ahr river has a length of 85 km and flows through a low mountain region. The gauging station Altenahr with an upstream area of 764 km2 had an increase of water level of about 9 meters in 12 hours. In the basin 3 gauges were completely destroyed. The return period of the flood (based on 80 years measurements) is larger than 1000 years. About 130 people died in the flood. Copernicus EMS was activated.

5 EFAS notifications were received. 1 of them was as predicted, 2 were in fact more severe and 2 were false alarms.

A big challenge during the flood was that there was no data transmission for 20 of 36 gauges in the region due to the interruption of the mobile communication network.

Conclusion after the flood:

* We need a coordinated approach to deal with very extreme events (our part: e.g. higher warn levels, considering historical events)
* Everybody must be able to deal with (early) false alarm, that is a good exercise for moderate to extreme situations
* Uncertainty and probability information must be comprehensible to civil protection
* Civil protection has to transfer water level forecast in local vulnerability (hydrologic warning  -> impact warning)
* Flood-endangered areas have to be re-defined (including historical floods) and communicated (against resistance from various sides)
* Predicting and handling natural disasters will always be a challenge! A “normal” flood is only little training for an extreme.

*Remark from Florian Pappenberger - ECMWF*

*@margret - thank you very much for your informative talk! 2 questions: (1) do you publish long term performance/verification statistics of your forecasting system? (discharge) & (2) your discharge hydrographs seems to show a deterministic forecast whilst you said you use several weather models incl ECMWF?*

*A: from Margret Johst DE, LfU RP*

*@Florian (1) there are long term verification statistics or our forecasts, that we use also as uncertainty information. (2) we show the uncertainty bands up to now only for the river Rhine but not yet for the gauges at other rivers (work in progress...)*

*Remark from ANTOINE Michaël*

*A suggestion would be to add a >100 yr threshold in addition to the 5 or 20yr*

*Reply from Christel Prudhomme - ECMWF*

*We are also reviewing the reporting point layer which is the back bone of the notification. Please fill in the survey to help us improve the layer:* [*https://www.surveymonkey.co.uk/r/6YNCHDJ*](https://www.surveymonkey.co.uk/r/6YNCHDJ) *Thanks!*

*Reply from Jasper Stam*

*In the role as a partner I agree with Margret and Antoine. It would be nice to introduce new thresholds like >50yr or >100yr. That gives a better picture and also improves the DISS*

*Q: from Hannah Cloke*

*I would like to ask a question about ways of using the information on uncertainty that you have perhaps in a different way*

*Remark from Florian Pappenberger - ECMWF*

*I would replace "single voice" by "trusted voice" - which I think is more than semantics - different information will be increasingly available in the natural hazard domain (and others)*

**Peter Salamon** reported from a lessons learned meeting that was held in the framework of the EU Civil Protection Mechanism. Some of the conclusions were similar to that Margret Johst showed in her presentation. We need to establish linkages between CP and hydro-meteorological services. This is also what we do in EFAS by adopting CP as third parties in the EFAS community. Early warning services need to be improved, but this is not the complete story. Prevention and preparedness are just as important and historic events that have been forgotten need to be included.

Modern public warning systems break down in such extreme events. Should we go back to sirens? Information must be understandable for everyone and people need to know what they should do.

A concrete point for EFAS is to set up ad hoc meetings to raise awareness about EFAS early warnings with relevant authorities in case of extreme situations in transnational events.

*Remark from Christian SBB*

*thanks again Peter because of the sirens ;-), every village in CH has one*

**Christel Preudhomme** asks Margret about the single voice message and avoiding confusion. Margret explains that this is also part of the legal aspect. The notification chain should be very clearly defined. The CP only acts according to this message. In modern times there are many ways to obtain information, e.g. for the weather prediction. It is expected that in future also more hydrological forecasts will become available.

**Hannah Cloke** asks how information on uncertainty is presented in the flood forecasts. Margret replies that uncertainty information is available for the Rhine and it is also presented in the forecasts. For the smaller basins it is different because of the fast reaction times. Information about uncertainty is known by the forecasters. However the alarm and emergency planning is defined on a single (deterministic) water level value only. The emergency plans (e.g. evacuation) should first be adapted to deal with uncertainty information.

Peter Salamon hopes that this discussion is a start and will continue in future. The assessment report will be finished in December 2021. Input from EFAS partners is crucial.

Closing of the meeting

Peter Salamon, JRC

The EFAS annual meeting was closed by a short resume given by Peter Salamon.

In the past 2 days we were informed about a lot of developments that go in the right direction. The spatial resolution of EFAS-IS will improve in the next version. In the next EFAS annual meeting you will be able to look at the pre-operational version of EFASNext. EFAS will be able to provide the medium range probabilistic forecast for small river basins.

The work on impact based forecasts continues. This will not aim at implementation in local emergency planning, but gives information on a European scale to help CP were major impact is expected based on a flood forecast.

Peter thanked the participants and expresses the hope that everyone took at least one or two things virtually home that are of use for his or her daily work.

Finally Peter expressed the hope that we can meet next year physically for the 2022 EFAS and GLOFAS annual meeting.