

On-demand
mapping



Rapid
Mapping



Risk and Recovery
Mapping

Early warning
and monitoring



Floods



Fires



Droughts



Copernicus Emergency Management Service

Global Flood Awareness System (GloFAS)

UN-SPIDER / ZFL Regional Virtual Expert Meeting for
Southern Africa

Peter Salamon and E.1 colleagues

14 July 2021



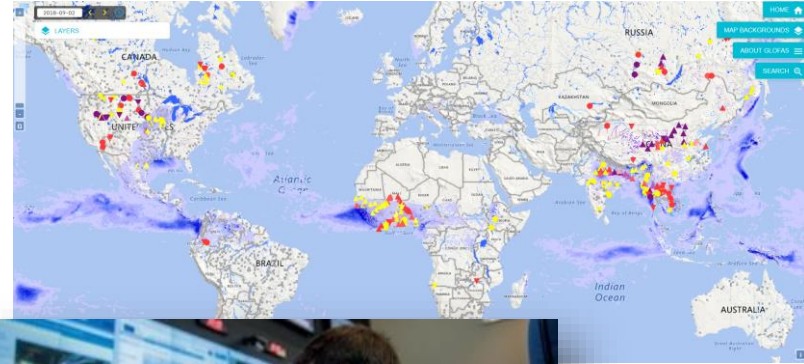
Overview

Emergency
Management

Provides complementary, added value flood forecast information

Supports EU Emergency Response Coordination Center, national hydro-met services, international aid & development organizations, private sector (e.g. insurance)

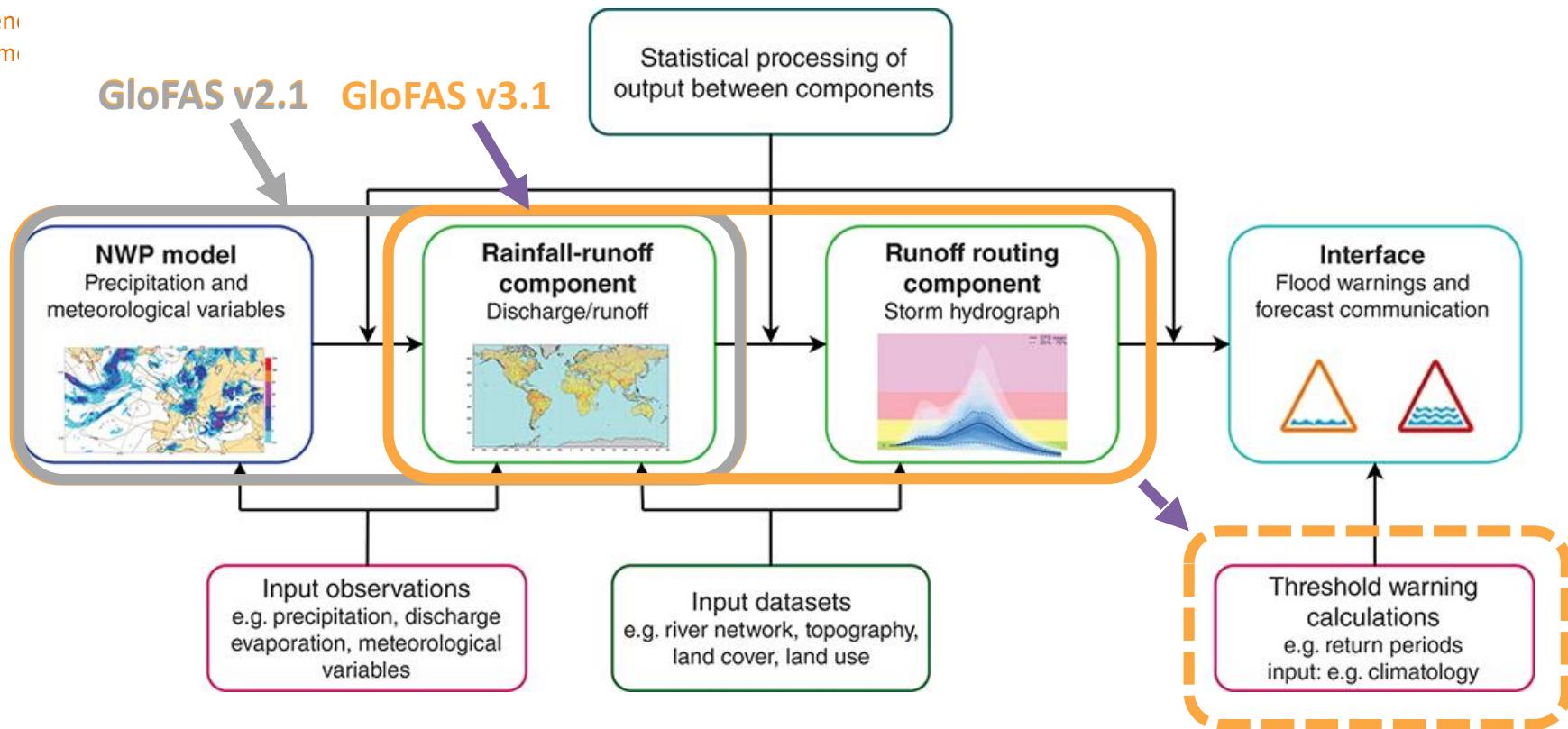
Joint development of EC JRC, ECMWF as well as national hydro-met services and universities.





Set-up

Emergency
Management

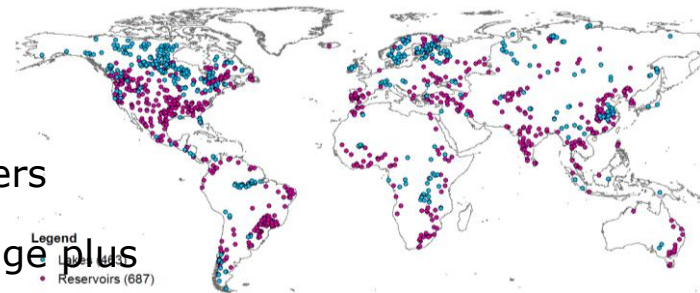




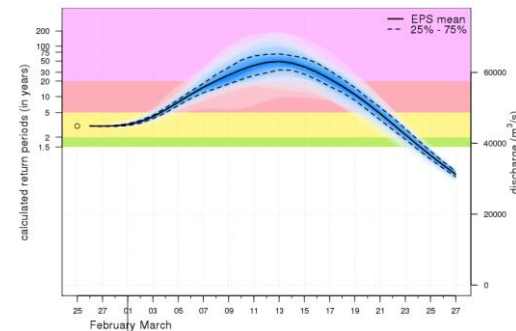
Emergency
Management

Overview

- Updated daily
- Output resolution of 0.1° (~ 10 km)
- Ensemble prediction (ECMWF-ENS) 50+1 members
- Forecast lead time of up to 30 days (medium range plus extended range)
- Hydrological model: Lisflood
- Discharge threshold exceedance based on 2, 5, and 20 year flood return periods
- Persistence diagrams to identify “jumpiness” over consecutive forecasts
- Daily runs since 2011 in pre-operational mode – since 2018 operational
- Regular system upgrade cycle



Forecast Day	21	22	23	24	25	26	27	28	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
21/02/2017											4	24	45	57	65	65	69	67	67	53				
22/02/2017											4	16	27	59	71	71	73	76	80	76	69	59		
23/02/2017													4	24	33	47	65	75	80	80	75	69	47	
24/02/2017														10	27	43	59	71	75	78	82	78	63	49
25/02/2017														4	20	49	59	78	86	92	92	90	76	55

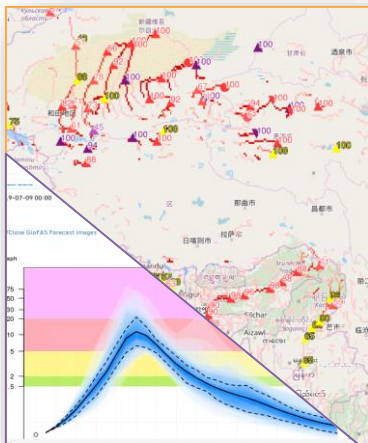




Emergency
Management

Products

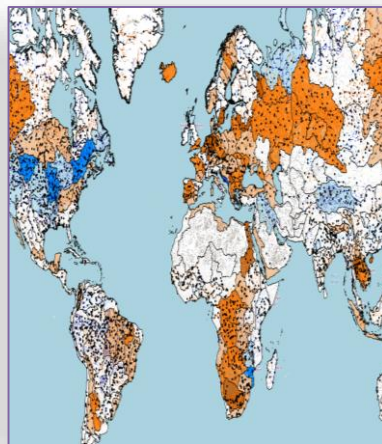
Riverine flood forecast (hazard)



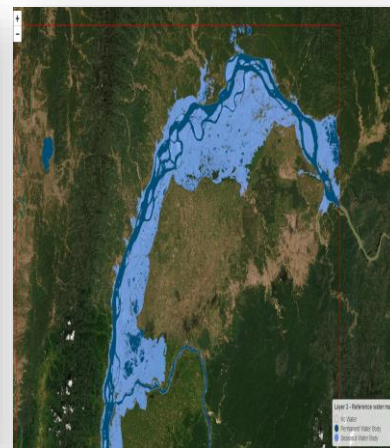
Riverine flood forecast (impact)



Seasonal outlook



Monitoring & ongoing situation (under development)



Meteorological forecast info and hydrological model skill to support decision making



- www.globalfloods.eu
 - main access to map viewer and data
 - News
 - Webinars
 - Link to Wiki

<https://confluence.ecmwf.int/display/COPSRV/CEMS-Floods>

- Wiki space:
 - One –stop site on GloFAS service **documentation**
 - **Detailed** description of models and products
 - **Frequently Asked Questions** and tutorial for CDS downloads
- **Climate Data Store:**
 - Access GloFAS raw data

<https://cds.climate.copernicus.eu/cdsapp#!/provider/provider-cems-without?tab=overview>



GloFAS is composed of an integrated hydro-meteorological forecasting chain and of a monitoring system that analyses results daily for GloFAS forecasts and monthly for GloFAS Seasonal.
[Read more...](#)

Global Flood Awareness System

Created by Christel Prudhomme, last modified by Shaun Harrigan on Mar 29, 2021

GloFAS wiki

In this documentation you will find some basic information on the Global Flood Awareness System (GloFAS). This includes:

- Brief overview of the model configuration and version, as well as planned releases.
- Brief overview of its data archive and the best ways to access the data depending on your needs. If you have any further questions about the data you are welcome to contact us through <http://www.globalfloods.eu/contact-us/>.

You can also find more information on the [GloFAS web portal](#). There you also have access to the GloFAS map viewer.

Current operational system and data availability

Latest operational release: GloFAS v2.2

Search this documentation for...

Browse by content

Expand all Collapse all

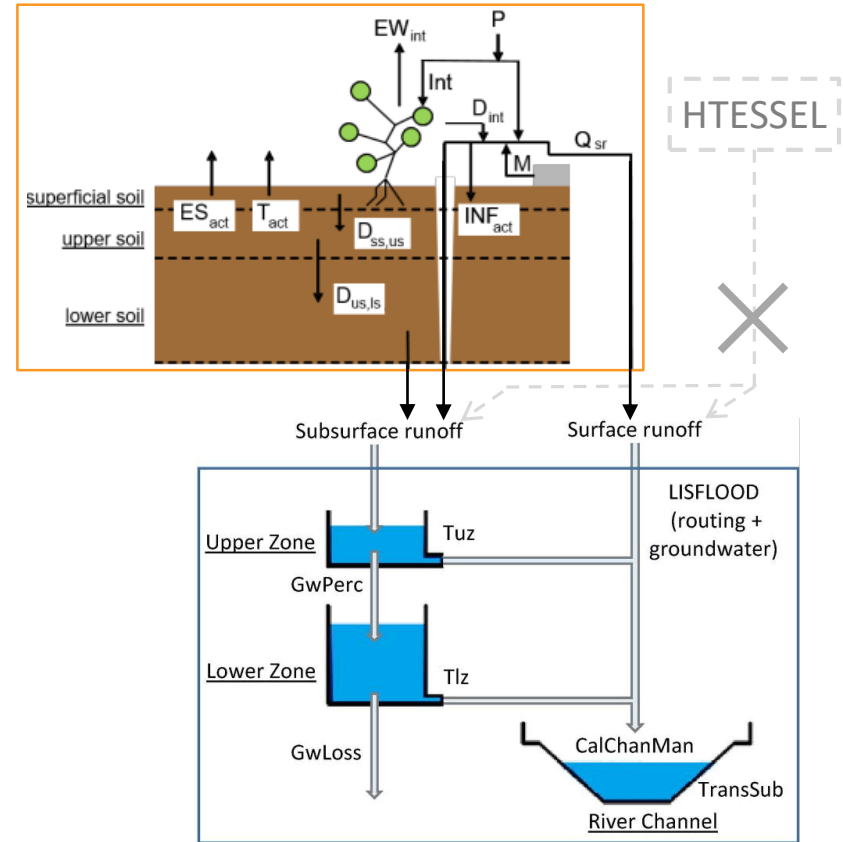
- > GloFAS models and procedures
- > GloFAS operational system
- > GloFAS products
- > GloFAS services



Latest release

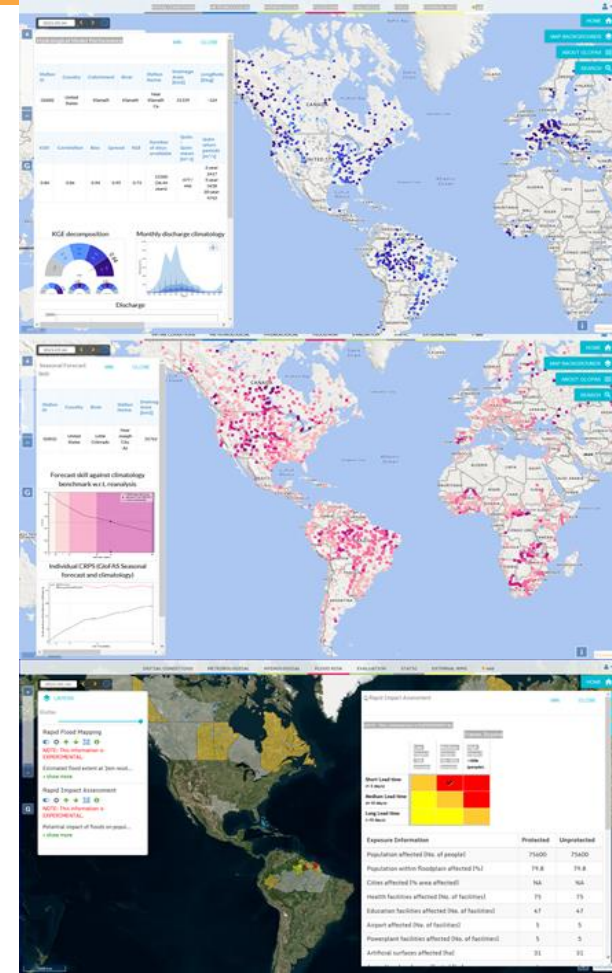
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- GloFAS v2.1: **HTESSEL** to compute surface and subsurface runoff; **LISFLOOD** to compute river routing
- GloFAS v3.1: **LISFLOOD** to model all the hydrological processes from precipitation to river routing.
- **LISFLOOD** is open-source: <https://ec-jrc.github.io/lisflood/>
- Better control on **all the calibration parameters** through the use of only one model.
- Same modelling framework for GloFAS and EFAS so that any modelling development benefits both early warning systems.





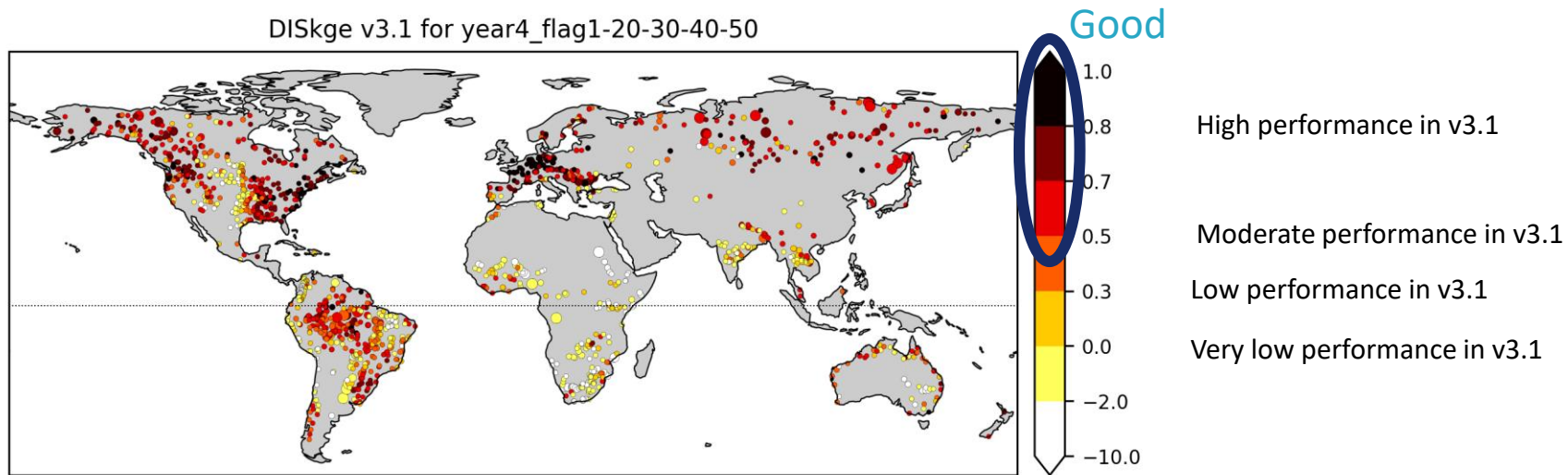
- **New evaluation layers:**
 - **Hydro-model performance**, summarizing the KGE' score on calibration points as map and pop-out window
 - **Seasonal forecast skill**, summarizing the maximum lead time when forecast skill score against a simple benchmark exceeds 0.5 (similar concept to forecast skill layer)
- **Rapid Risk Assessment:** rapid mapping showing unprotected inundation area; more extensive exposure and flood information tables



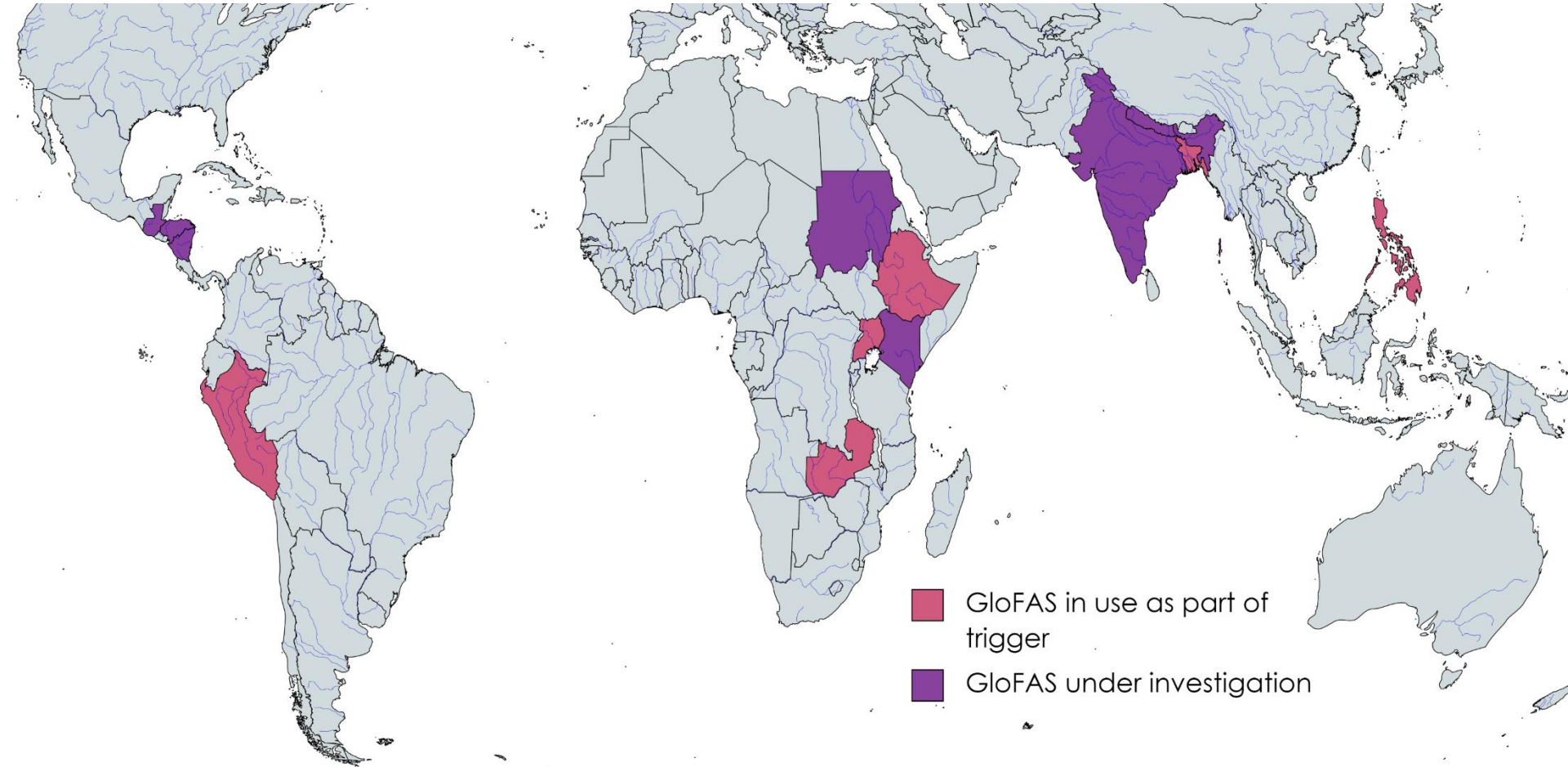


Hydrologic model performance

- Full hydrological calibration: overall improvement
- Moderate to high performance in **47%** of catchments in GloFAS v3.1 (compared with **18%** in GloFAS v2.1)
- **Best performance:** middle and higher latitudes of North America, Europe and Asia and areas in South America (where v3.1 is clearly better than v2.1)
- **Worse performance:** Africa and other areas mainly in the tropics (where v3.1 is sometimes worse than v2.1)



GloFAS part of >1.5 million CHF in Red Cross Red Crescent funding

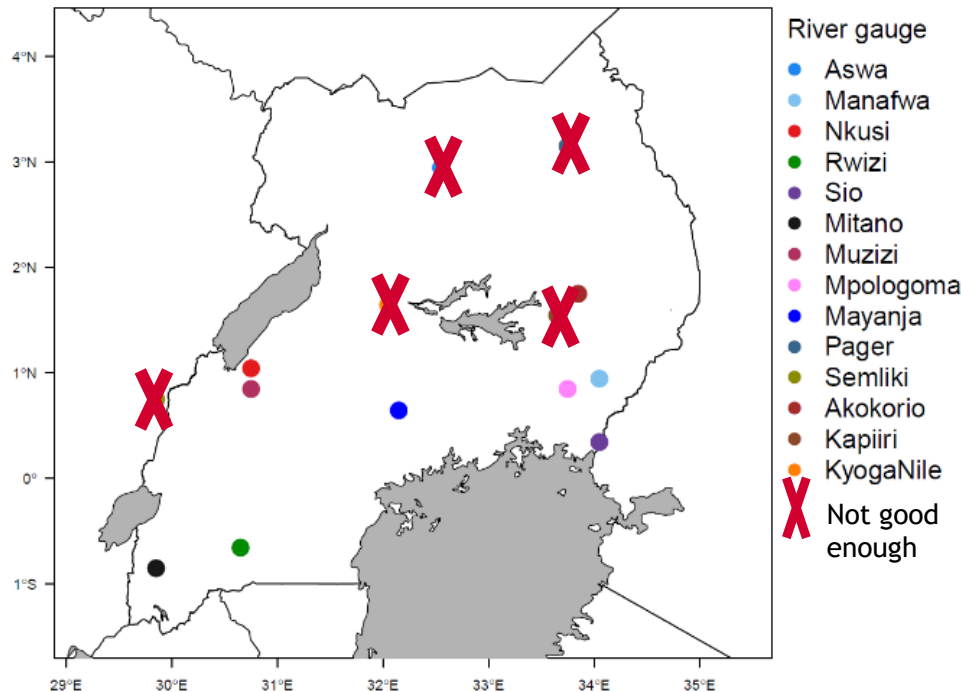
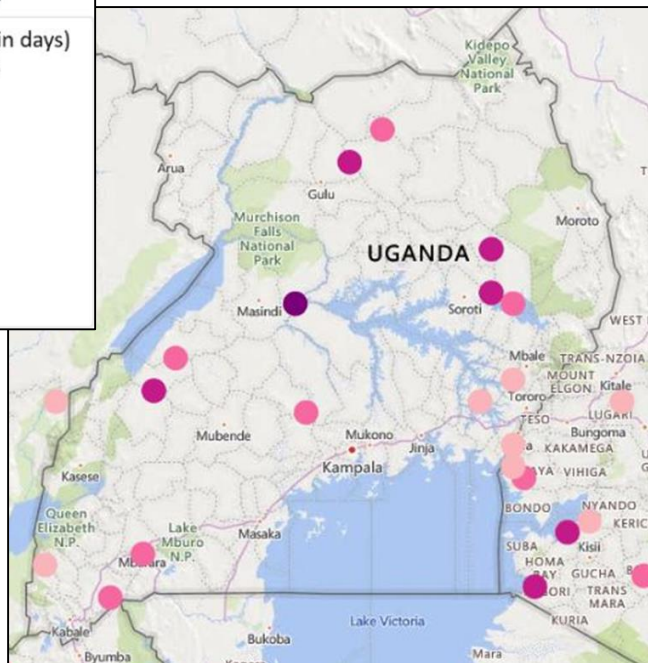
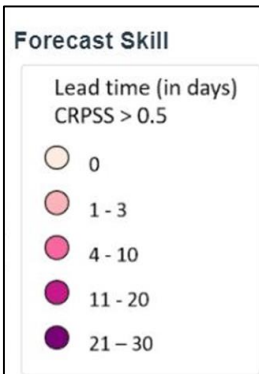


Global model: interim solution +C

- Case study: Uganda
- Collaborating with Uganda Red Cross Society, Ugandan Ministry of Water and the Environment (MWE) (*Douglas Mulangwa, speaking later*), Uganda National Meteorological Authority, 510Global
- **Limited existing capacity** for hydrological forecasting in Uganda
- GloFAS was used for an initial pilot project in Kapelebyong sub-county, reached ~370 households in November 2015
- Scaled-up across the country
- Evaluation carried out using GloFAS reforecasts and gauged data from MWE



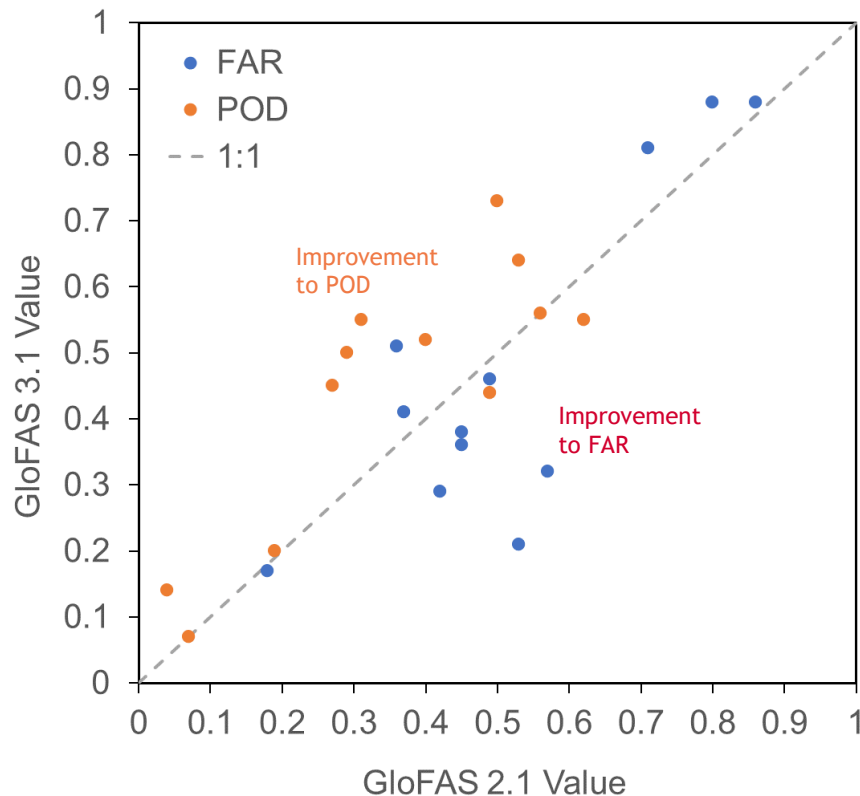
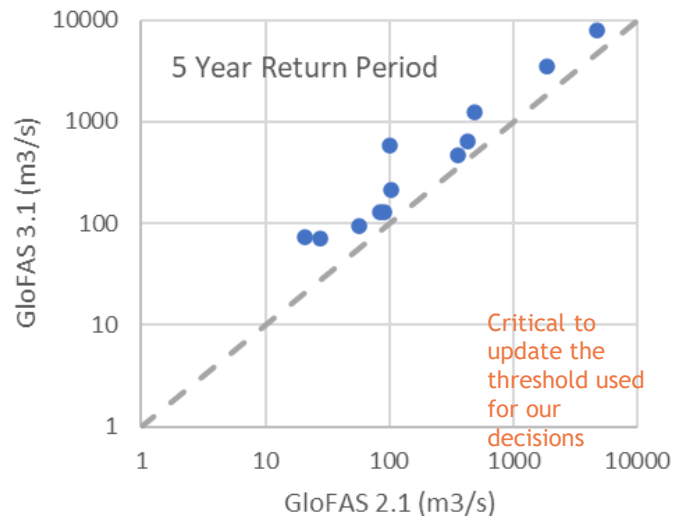
‘Decision-Blind’ skill guidance +C



(Thanks to Andrea Ficchi, University of Reading)

Updating for new model version + C

- Rivers across Uganda
- Evaluation: 70% chance of 90th percentile flow at 5 day lead time

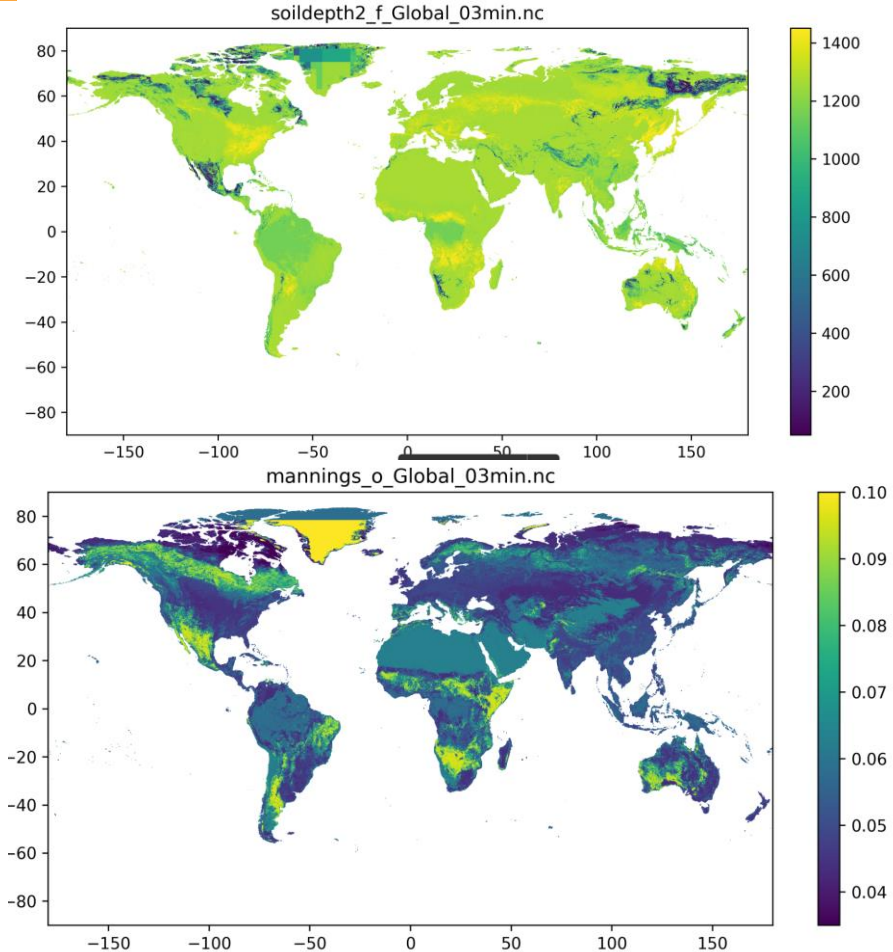




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Next GloFAS upgrade

- Increase in spatial resolution from 0.1deg (6 arcmin) to 0.05deg (3arcmin)
- Complete update of all static maps (landcover, soil, topography, drainage, etc.)
- Improvements and bug fixes to the hydrological model
- New calibration including more stations in Africa
- Work ongoing – release plan: Q3 2022





New global flood monitoring product

Global Flood Monitoring - User requirements:

- **Timeliness:** better response planning
- **Frequent updates/continuous monitoring:** adapt measures depending on the evolution of the flood
- **Resolution:** needs to be adequate for impact assessment
- **Historic data:** improved prevention planning
- **Access:** as diverse as possible to account for all user needs

Sentinel-1 based:

- SAR enables **all day and all weather** flood monitoring
- High **spatial resolution of 20 m**
- High **revisit frequency:** Europe ~ **1 – 3 days** World ~ **3 – 14 days**
(to be further increased with Sentinel-1 C)



Automatic:

- **High timeliness** of the product – **less than 8 hours** between sensing and product delivery
- **Continuous monitoring** for large areas





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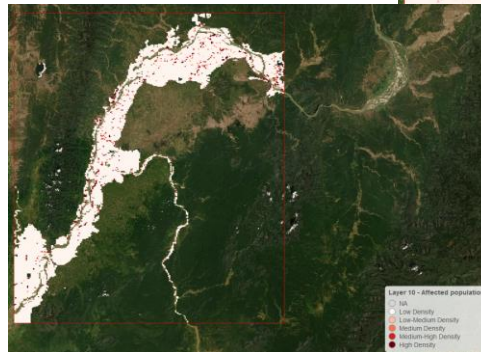
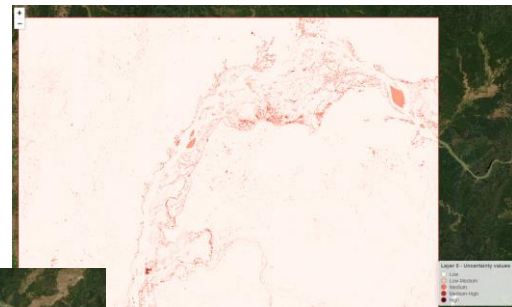
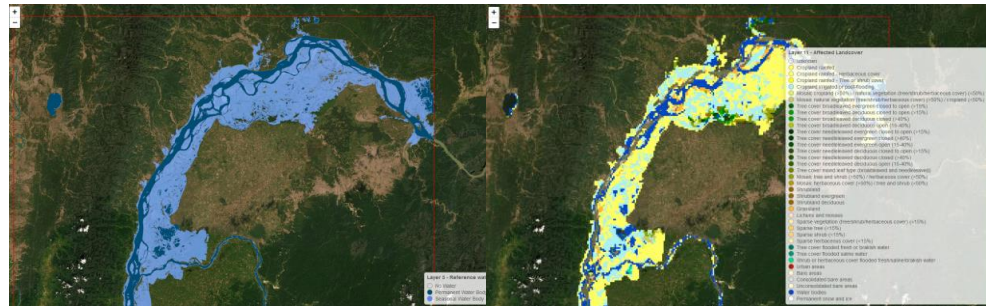
New Global Flood Monitoring

Access:

- **Visualization:**
 - EFAS and GloFAS web interfaces
 - Web services (WMS)
 - Ready-to-print maps
- **Data access: API**

Planned implementation timeline:

- Set up Start: November 2020
- Pre-operational: May – August 2021
- Operational: September 2021



Copernicus
Europe's eyes on Earth



Thank you!



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