Global Flood Awareness System GloFAS
Overview and development

GloFAS team
6 services use Earth Observation data to deliver ...
**Service Overview**

**Flood Awareness Systems**
Flood monitoring & forecasting

- [https://www.efas.eu/](https://www.efas.eu/)
- [http://www.globalfloods.eu/](http://www.globalfloods.eu/)

**Drought Observatories**
Drought monitoring & forecasting


**Forest Fire Information Systems**
Near real-time & historical information on forest fires


**On-demand Mapping**

**Rapid Mapping**
24/7 on-demand and fast provision of geospatial information

**Risk and Recovery Mapping**
On-demand GI supporting prevention, preparedness, disaster risk reduction, reconstruction, recovery

https://www.efas.eu/
http://www.globalfloods.eu/
http://edo.jrc.ec.europa.eu/
http://edo.jrc.ec.europa.eu/gdo/
http://effis.jrc.ec.europa.eu/
http://gwis.jrc.ec.europa.eu/
Early warning for preparation of aid assistance

European/World-wide comparable information

Complement National/regional services

Knowledge transfer & exchange

Support international organisations

Improved data sharing
GloFAS operational chain (supported 24/7)

**Hydro-met. Initial Conditions**
- ERAS-T, ENS-Crtl.

**Meteorological Forecast Forcing**
- ECMWF ENS (45r1):
  - Daily 00UTC
  - 51 members
  - Extended to 30d LT

**Hydrological Modelling**
- HTESEL, Lisflood routing (~10 km)

**Post-processing**
- Probability of exceedance at different lead time, graphs, maps

**Web Interface**
- Visualisation, background information

**Input Observations**
- Satellite and in-situ

**Input (static) Datasets**
- Topography, soil, river network etc.

**Flood Thresholds**
- Reference discharge reanalysis (GloFASv2-ERA5)
Why using ensemble forecasts?

Initial Condition Uncertainty

Analysis

Climatology

Deterministic Forecast

Forecast uncertainty

time
Hydrological Model: Cascade of

Output from global NWP land-surface scheme forecast:
HTESSEL (ECMWF)
(Hydrology Tiled ECMWF Scheme for Surface Exchange over Land)
- Surface heat & evaporation
- Soil water budget
Output: surface flux & subsurface flux

LISFLOOD (JRC)
Groundwater + Routing processes
Input used: global runoff network, channel characteristics, etc.

Output: daily river discharge at 0.1° spatial resolution
Advantages:

• HTESSEL code and updates are maintained by ECMWF within the NWP updates
• No set up of a full rainfall runoff model necessary
• Less data requirements for LISFLOOD
• Easier operational maintenance as HTESSEL is included in the ECMWF operational procedures

Disadvantages:

• Entire model cascade cannot be calibrated for improved runoff only - atmospheric feedback needs to be improved as well
• Spatial resolution of H-TESSEL is lower than spatial resolution of LISFLOOD

To quantify the forecasted river flows according to the potential flood severity we use flood return periods.
Daily ensemble flood forecasts for next 30 days (catchments > 1000km²)

- **Hydrological reanalysis**
- **Real time forecast**
- **Thresholds**

**GloFAS products**

**EUROPEAN CENTRE FOR MEDIUM-RANGE WEATHER FORECASTS**

**GloFAS**

- **Daily ensemble flood forecasts**
  - for next 30 days (
  - catchments > 1000km²)
Customizable web interface
Different meteorological and hydrological layers
Return period hydrographs and forecast persistence graphs
Possibility to add external WMS-T to the interface
**GloFAS products**

Seasonal hydrological anomalies outlooks once a month for next 16 weeks

- Weekly mean discharge (Mon-Sun)
- 80th and 20th percentile for high and low flow thresholds
- Maximum probability on rivers with area summaries
- Hydrograph and probability tables for ~3000 points
**New model version**

- Implementation on 14 November 2018
- Calibrated Lisflood parameters at 1287 river sections
- ERA5 based climatological baseline run and thresholds

**Hydrological verification suite**

- Comprehensive probabilistic verification suite (under dev)
- Verification against discharge observations and water balance (modelled discharge at initialisation)
New model version

- Implementation foreseen in Q1 2020
- ERA5 based climatological baseline run and re-forecasts available Q4 2019
- Check the news on the website

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<td>HTESSEL + LISFLOOD</td>
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Calibrated stations: 1287 (v.2018) vs. 1226 (v.2019)

KGE Skill Score (calibration period)
Sources include: GRDC, National Hydro. Met. Services, others

Discharge observations are critical to improve GloFAS

- Evaluation of the model against observations
- Improving the model skill by calibration of the GloFAS routing component
- please feel free to ask for new reporting points (e.g. where observations area available) to be added onto the GloFAS web
Tailored ftp access for users requesting it

NetCDF files for selected reporting points or areas (grids)

- Automatic feed of real-time forecasts
  - Existing examples: Red Cross, CEMADEN (Brazil), FFC (Bangladesh), JBA consulting
- On demand one-off access for climatological runs, past forecasts for case studies and general evaluation
  - A lot of examples with various users

We encourage users to collaborate with us!

- Request GloFAS forecasts
- Evaluate with locally available observations and give invaluable feedback
- Then And also please provide the observations to us for improving the system

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NEW! Lisflood open source now available at: https://ec-jrc.github.io/lisflood/
Collaborations and outreach

- Automatic ftp feeds for selected reporting points
  - Red Cross Red Crescent Climate Centre
  - Centro Nacional de Monitoramento eAlertas de Desastres Naturais (Brazil)
  - Flood Forecasting Centre of Bangladesh
  - UCAR (201 stations across Asia)
  - JBA consulting (India / Brahmaputra)

- Afghanistan Spatial Data Centre / IMMAP
  - GloFAS forecasts included in flood forecast layers

- US Army Engineer Research and Development Centre
  - Locally downscaled forecasts

- Thethys Streamflow Forecast Platform

- Capacity building and training on GloFAS
  - Webinars
  - Workshops
  - YouTube videos

- GloFAS User Community workshops

- Global Flood Partnership
GloFAS 2.0

GFP

Global Flood Partnership

Partnership for global flood forecasting, monitoring and impact assessment to strengthen preparedness and response and to reduce global disaster losses

Join for free, participate and connect with the GFP through:

https://gfp.jrc.ec.europa.eu
CEMS in action cyclone Idai

Flood Forecast from GloFAS

CEMS Rapping Mapping
Thank you

For more information, please contact the GloFAS Team

info@globalfloods.eu