



Operational bias correction tool for GeoGlows and GlowFAS forecasts

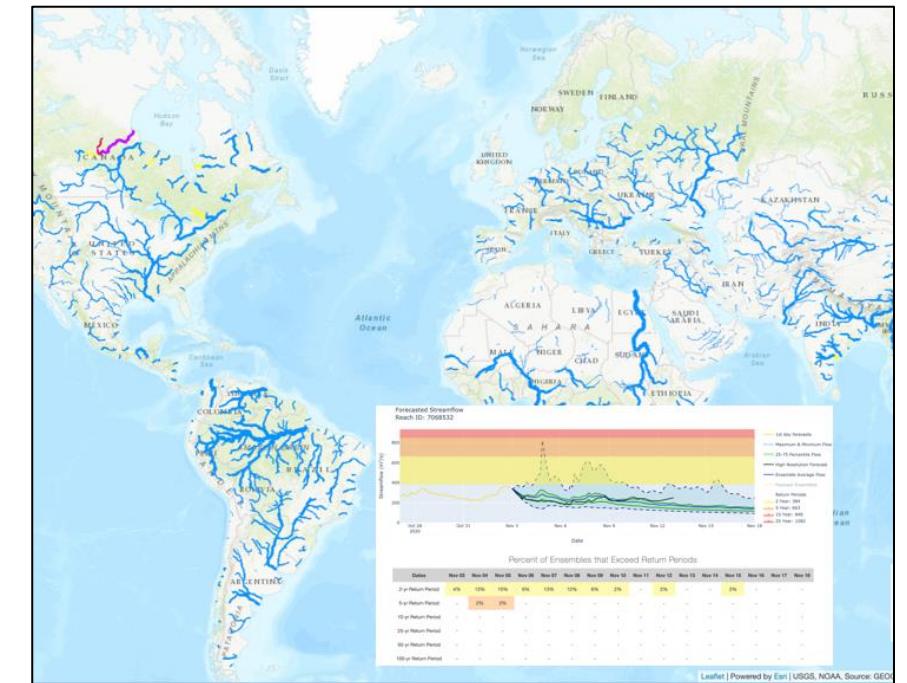
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The study objectives:

- Developing an Automatic bias correction tool for GeoGlows and GlowFAS real-time forecasts
- Use the GeoGlows and GlowFAS forecasts for medium (150 km^2) Mediterranean and semi-arid basins for operational flood forecasting

Methodology:

- Applying bias correction algorithm code based on the "flood frequency mapped bias correction methodology" (Sanchez Lozano, 2021) using observed historical time series (1980-2021) based on 60 hydrometric stations in Israel
- Applying the corrected parameters in a real-time forecast mode for all the Rivers in Israel

Sanchez Lozano, J.; Romero Bustamante, G.; Hales, R.C.; Nelson, E.J.; Williams, G.P.; Ames, D.P.; Jones, N.L. A Streamflow Bias Correction and Performance Evaluation Web Application for GEOGloWS ECMWF Streamflow Services. *Hydrology*, **2021**, *8*, 71.

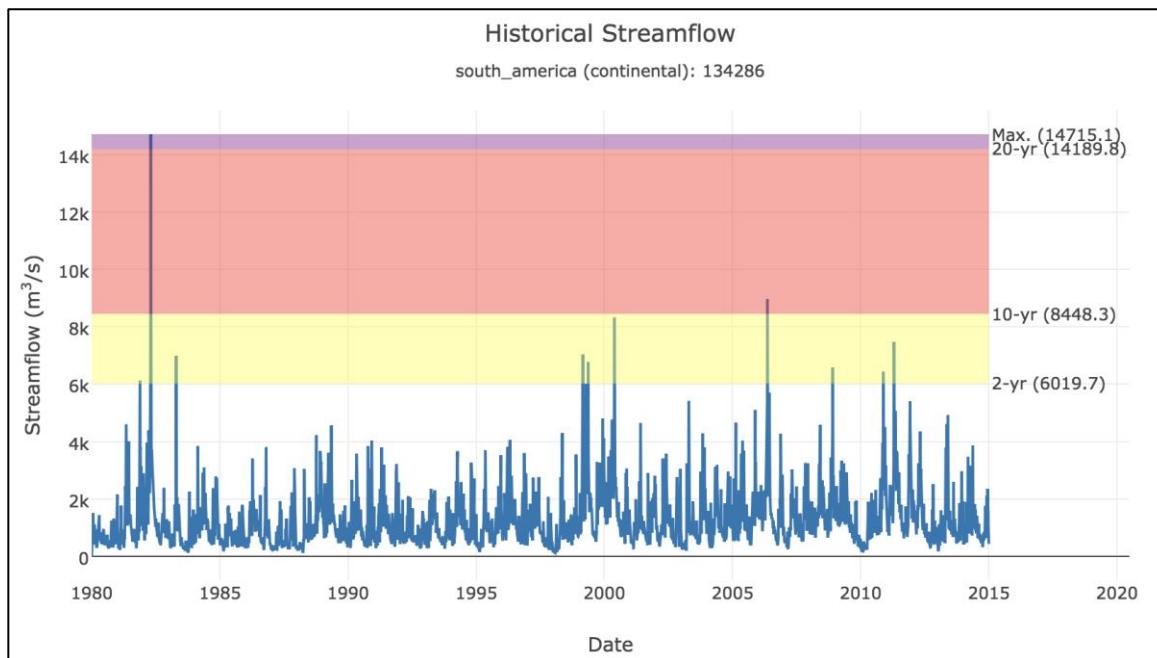
ECMWF Streamflow Services: A global hydrological model

Historic mode

Deterministic Simulation

Based on ERA5 reanalysis

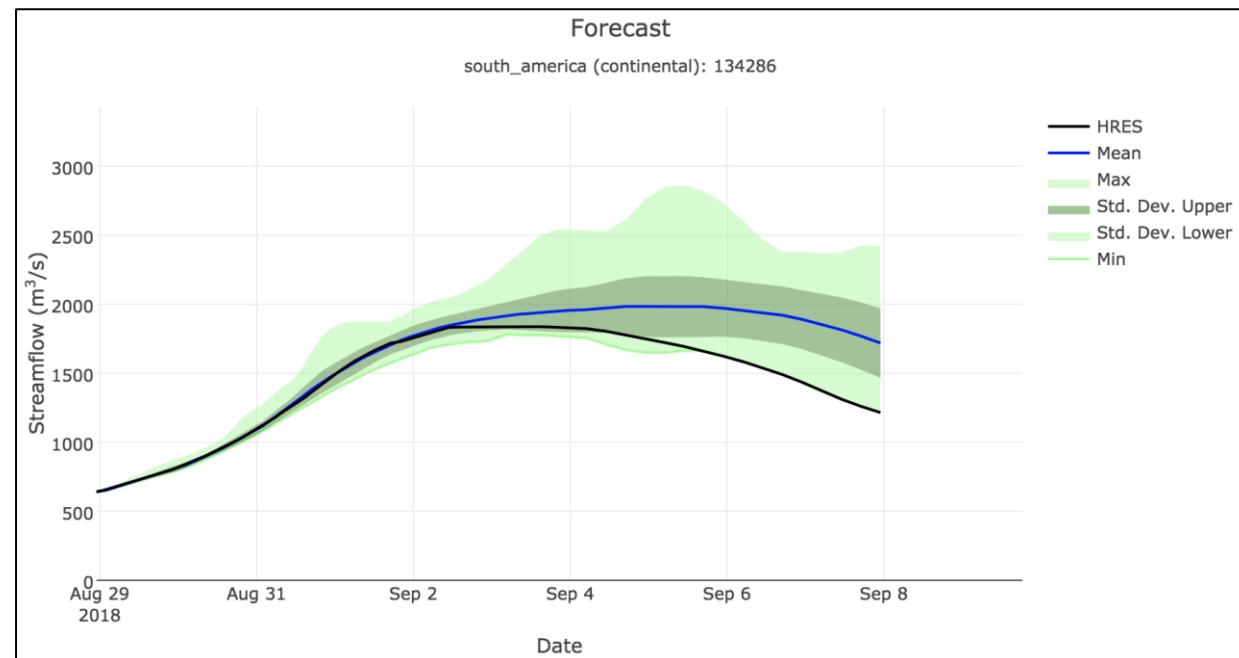
(Available from 1/1/1979 to 12/31/2021)



Forecast mode

Probabilistic forecasting:

- Ensemble forecasting: 51 members low resolution – up to 15 days ahead
- 1 member high resolution – up to 10 days

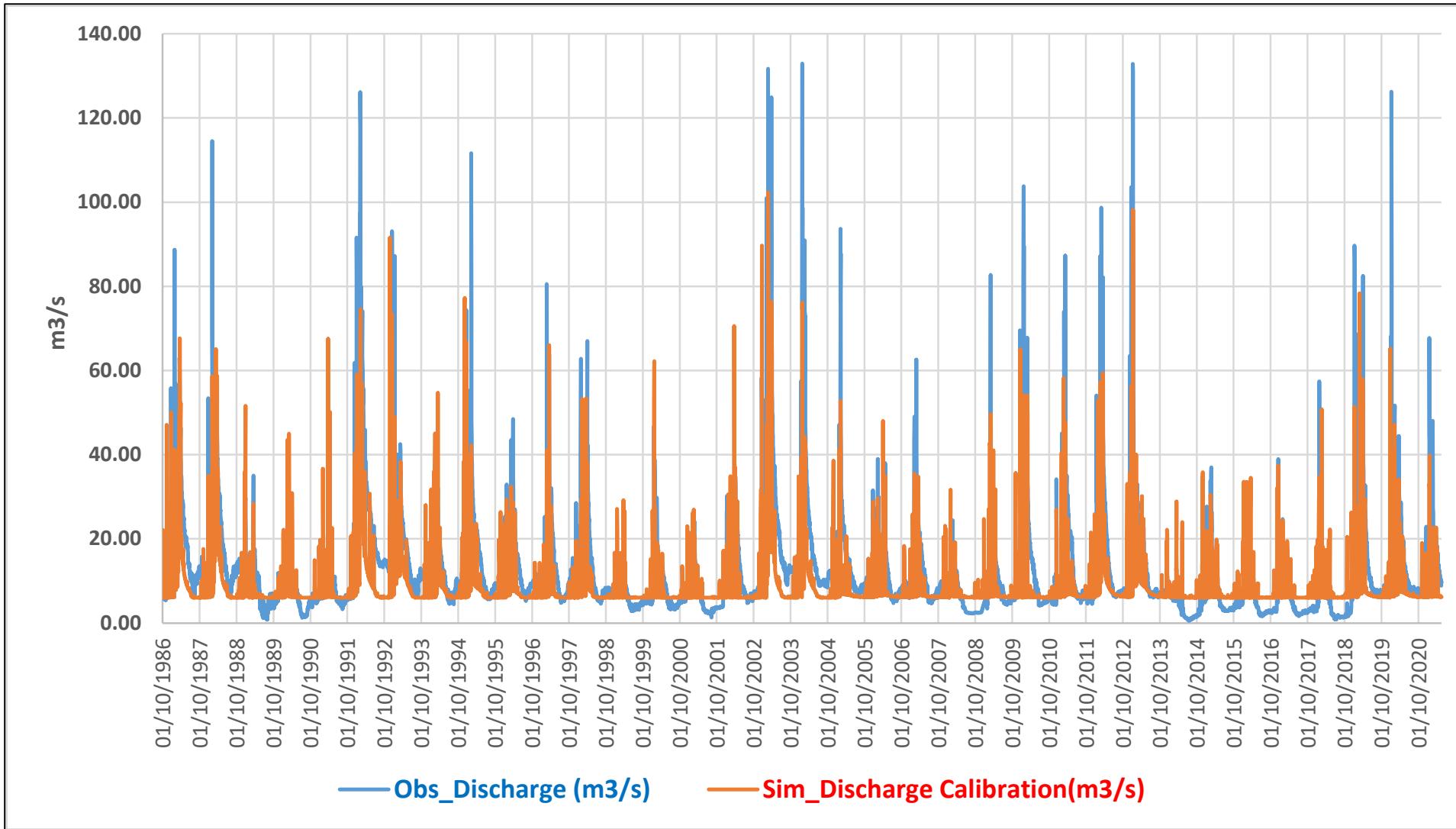


Operational streamflow forecasting for medium basins in the Israeli domain
using the bias-correction ECMWF Streamflow model



Model calibration and validation:

Observed (blue) vs. simulated (orange) flow
at the Jordan River, Israel, after bias correction



Model results before and after bias correction for the period 1986-2021 at 15 medium size basins in Israel

| ID | COMID | Station | Latitude | Longitude | KGE Before_Bias_Correction | KGE After_Bias_Correction |
|-------|--------|---------------------|----------|-----------|----------------------------|---------------------------|
| 31155 | 612594 | Meshushim | 32.90831 | 35.64951 | 0.429 | 0.533 |
| 30120 | 612308 | SenirMayanBarukh | 33.23611 | 35.62384 | 0.419 | 0.599 |
| 31160 | 612590 | Daliyyot | 32.88856 | 35.66432 | 0.412 | 0.568 |
| 17164 | 613886 | AyalonAirport | 31.99994 | 34.86357 | 0.403 | 0.336 |
| 31163 | 612587 | Yehudiya | 32.89745 | 35.65543 | 0.382 | 0.463 |
| 17135 | 613706 | YarkonHerzeliaRoad | 32.1046 | 34.82507 | 0.356 | 0.437 |
| 18131 | 614241 | SoreqYesodot | 31.80741 | 34.84679 | 0.302 | 0.407 |
| 13135 | 613131 | BarqanKefarGlickson | 32.50251 | 34.99884 | 0.280 | 0.443 |
| 31165 | 612689 | Samakh | 32.82932 | 35.65049 | 0.264 | 0.437 |
| 13105 | 613103 | TaninimAmiqam | 32.55484 | 35.00872 | 0.253 | 0.485 |
| 18150 | 614120 | SoreqYavne | 31.87751 | 34.75793 | 0.247 | 0.009 |
| 17168 | 613834 | AyalonEzra | 32.04043 | 34.7915 | 0.246 | 0.357 |
| 17144 | 614089 | AyalonLod | 31.95946 | 34.90406 | 0.209 | 0.385 |
| 12130 | 613016 | DalyyaBatShelomo | 32.59137 | 34.98699 | 0.144 | 0.497 |
| 15120 | 613321 | AlexanderElyashiv | 32.36724 | 34.90504 | 0.011 | 0.167 |

Summary:

- Global hydrological models like the GeoGlows and GlowFAS can be powerful tools for flood forecasting
- We showed here that adding automatic bias correction methodology based on historical observation can add value and allow users to downscale and apply those global tools on a locale scale
- The bias correction methodology can be used also for ungauged hydrological basins