Musings on the HydroSOS
Global Pilot

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A globally consistent, regionally informed analysis of:

a) current hydrological status
b) current anomaly
c) anomaly forecast

Approach 1 (before I came here)
1. Build a global system with ensemble of models
2. Use regional/national products to update & inform

Approach 2 (after two days of discussion)
1. Build patchwork from regional/national products
2. Use global models to fill in
Conclusions

India: 1km
Local catchment
Groundwater

Lake Victoria: 1km
Local information
Abstractions etc

Pilot Studies

New Global Product informed by regional and national data

Global Hydrological Models linked to Reanalysis, Satellite retrievals and Forecasts:
25km

Downscaling
Data-filling

Common Data Protocols

Climate and Hydrologic Services
National and Regional bodies
Conclusions

India: 1km
Local catchment
Groundwater
Lake Victoria: 1km
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Abstractions etc

Pilot Studies

Global Analysis informed by regional products

Global Product as back-up

Alan’s schematic
Current Scientific Capability

• Reanalysis: NCEP, ECMWF, WFDEI (rain adjusted)
• Satellites: GSMAp (precip), GFD (SHMI), ESA (soil m)
• Forecasts from different centres: UK Met Office (Met), GLOFAS (Hyd), SHMI and others?
• Multiple large-scale hydrological models: Hydrology Models and Land Surface Models
View a graph of the indicator for a selected location
The %-age of ensemble members is therefore an indication of the confidence / uncertainty of the ensemble.
The user can mask out cells that are below a chosen “confidence” level.
Model skill has also been calculated and summarised into a simple “Traffic light” scheme for each grid cell and forecast start month.
Challenges in delivery

- Uncertainty in CURRENT precipitation
- Uncertainty in HYDROLOGICAL RESPONSE
- Uncertainty in FUTURE precipitation
- Uncertainty in HYDROLOGICAL RESPONSE

Many studies (WATCH and others) show more variation in modelled HYDROLOGICAL RESPONSE than modelled climate/weather

We are starting to compare responses of EXTREMES and MEANS
Global distributions of the similarity index ($\Omega$) for 2001–2010 of monthly mean (a, c) and (b, d) monthly variance (calculated as the data from each data set) of 2 m air temperature (top panels) and precipitation (bottom panels), respectively. Shown are maps and zonal means. After Kim (2010).
Comparing scaled anomalies (SIndex) of soil moisture content due to uncertainty in precipitation from 5 different satellite products or due to models

Rainfall products: CMORPH, GSMAP, MSWEB, TRMM, TRMMRT

For this region, the PRECIP introduces more uncertainty

Models: HTESSEL, JULES, Orchidee, SURFEX, WaterGAP
For the UK the MODEL introduces more uncertainty.
For today, the challenge is to build options of how the global products can be
a) USED BY the regional products
b) INFORMED BY the regional products

e.g. skill of global product in RUNOFF may be poor but skill in EVAPOTRANSPIRATION may be high

e.g. some regions may be DATA RICH and have HIGH capacity and others maybe DATA POOR
Approach 1
Can we use the REGIONAL and NATIONAL products to filter the global ensemble?
Approach 2

Soil Moisture anomaly map

Discharge anomaly map

HydroSOS to design standardised method to report monthly anomalies
Thank you