HydroSOS: A Pilot Global Hydrological Status and Outlooks System

Integrating National to Global Scale Hydrological Services for Increased Resilience to Hydro-Climatic Risks

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What is HydroSOS?

Who is involved?

Developing the Demonstrator

Next Steps

What is HydroSOS?

HydroSOS will be the first global operational mechanism for integrating hydrological status assessments and outlooks from and for National Hydrological Services, in collaboration with Basin Organisations and Global Modelling Centres.

The system will provide information on:

The current global hydrological status including groundwater, river flow and soil moisture

An appraisal of where the current status is significantly different from 'normal,' for example indicating drought and flood susceptibility

An assessment of whether this is likely to get better or worse over coming weeks and months

HydroSOS is currently in its Pilot Phase: developing a global network of experts and stakeholders, determining standardised approaches to the quantification of hydrological status and outlooks, developing implementation plans, and building a demonstration web service.

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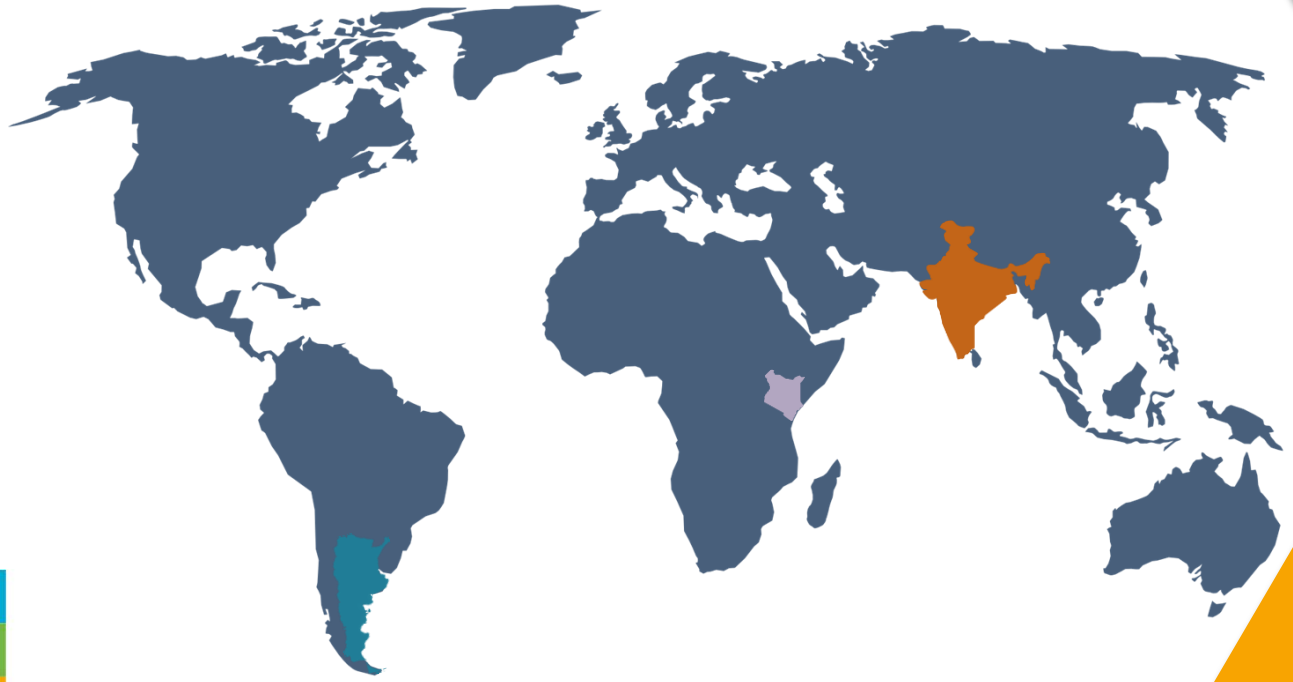
What is HydroSOS?

There is an information gap between locally-informed hydrological status and information products and those developed globally.

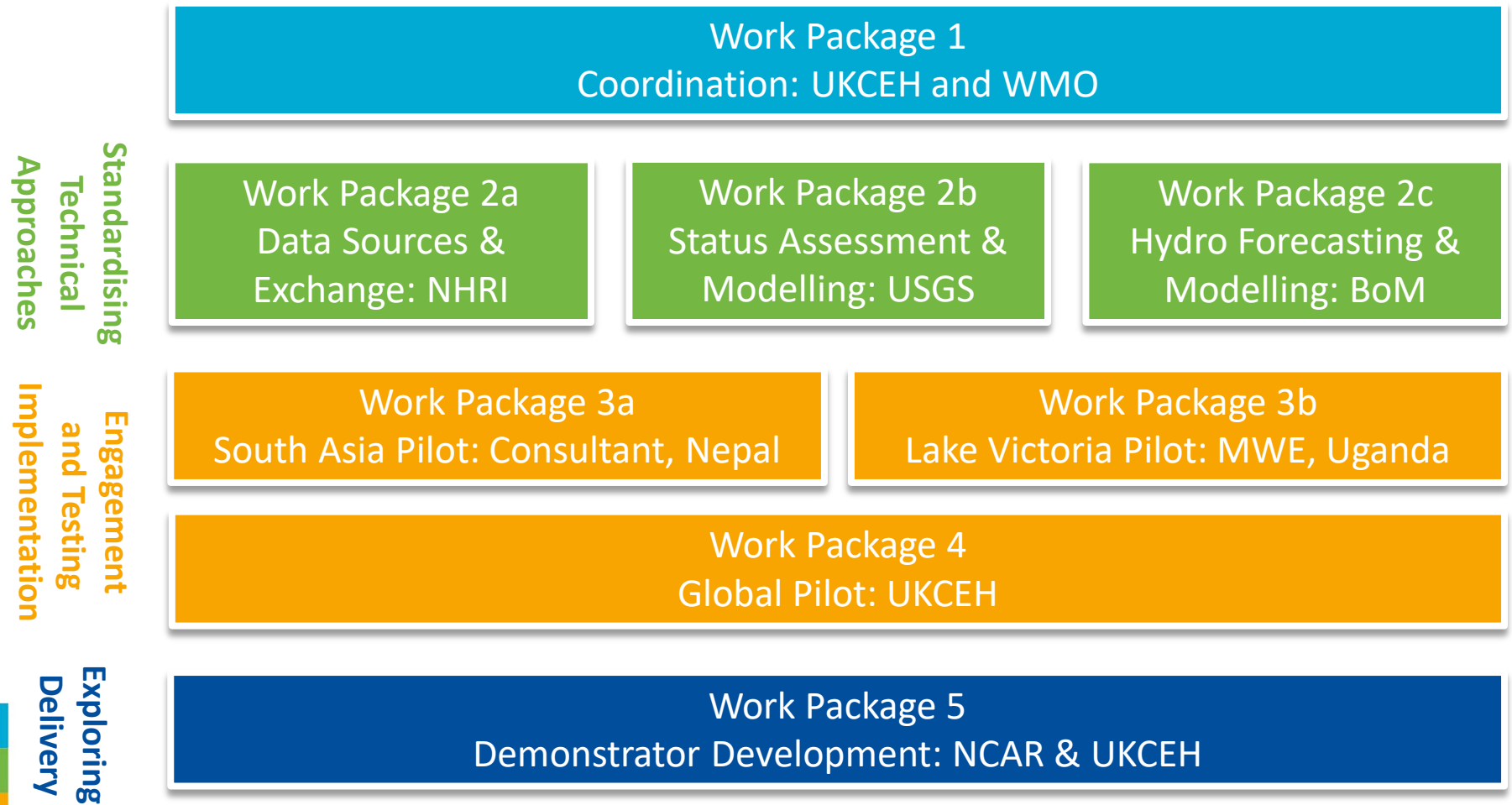


Traditionally, global hydrological services have taken a top-down approach using global models

HydroSOS

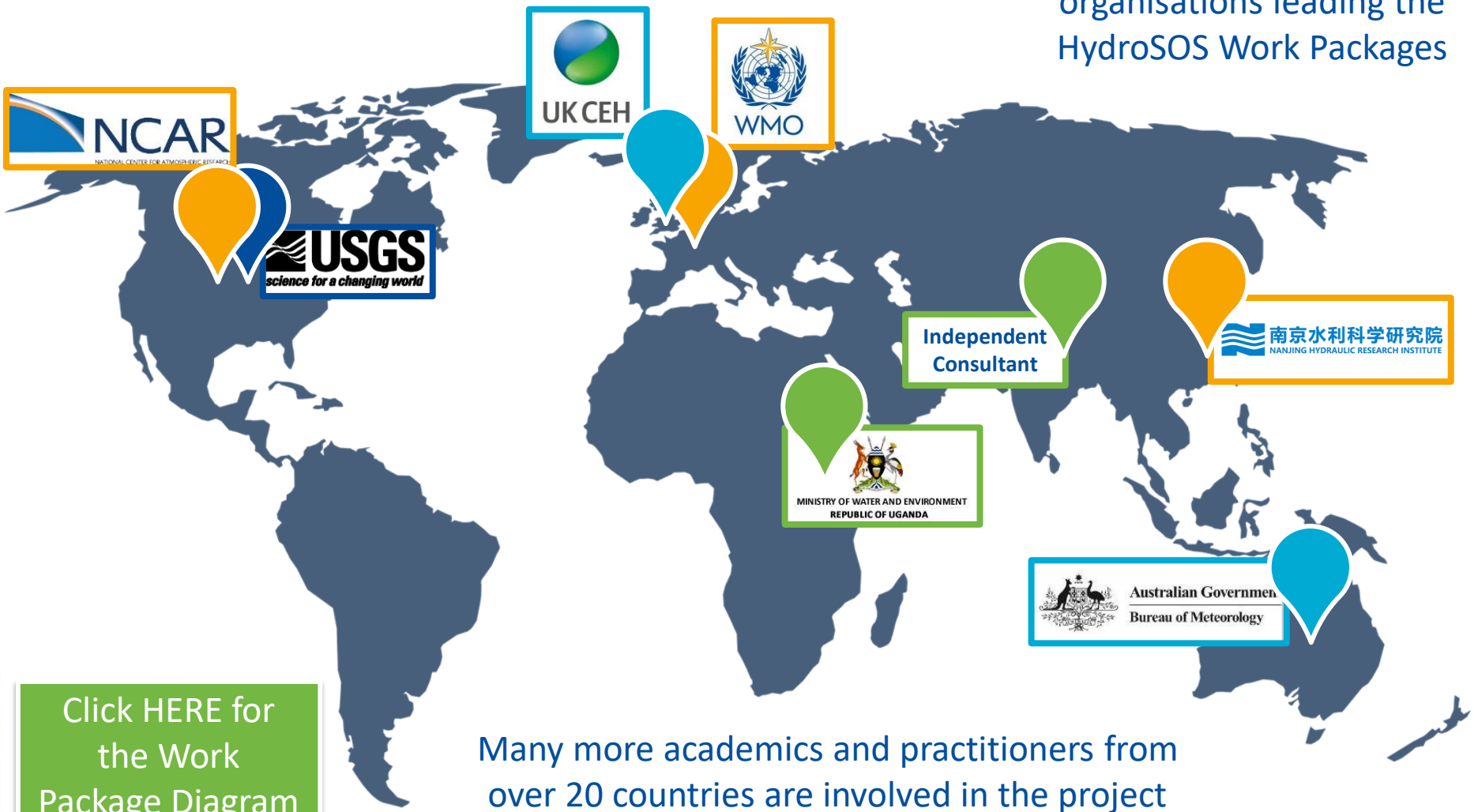
integrates global services with local and regional knowledge

What is HydroSOS? - Work Package Diagram



Who is Involved?

This map shows the organisations leading the HydroSOS Work Packages



Click HERE for the Work Package Diagram

Many more academics and practitioners from over 20 countries are involved in the project

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Developing the Demonstrator

The demonstrator is still being developed and will be offline until early summer. Some initial datasets have been ingested, but the means of presenting the data needs to be developed further. These slides show some progress to date, and some future plans.
Please CLICK on a Button.

Data

1011101011010010
0100101000101010
1000101011110101

Challenges

???

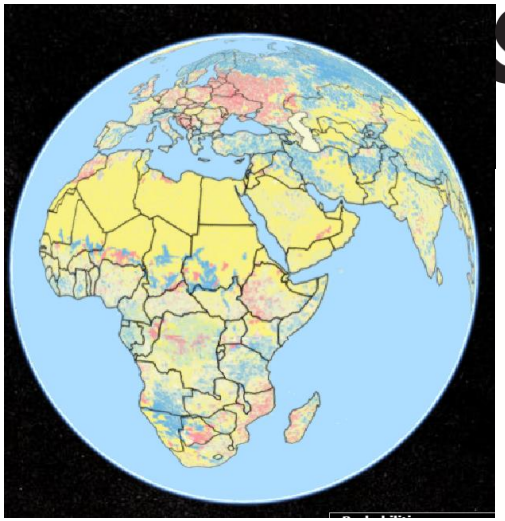
Demonstrator First Look

Graph Concepts

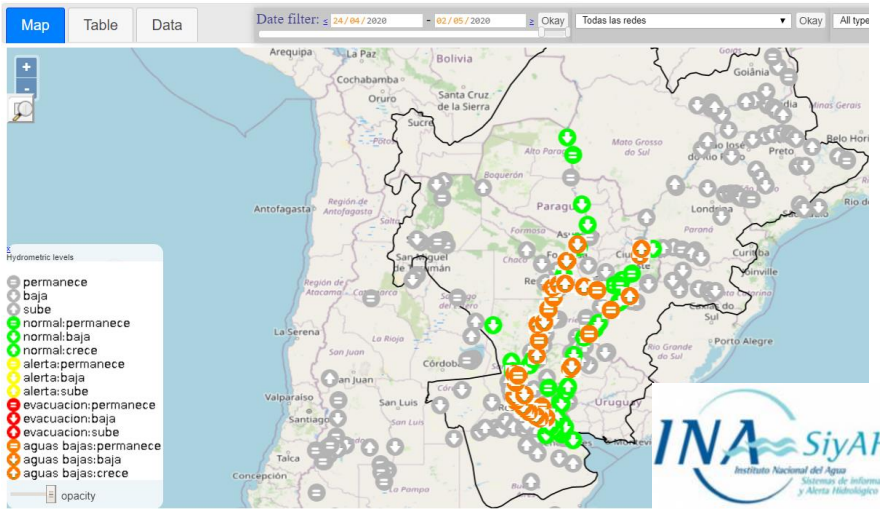
Developing the Demonstrator - Data

Data used so far include:

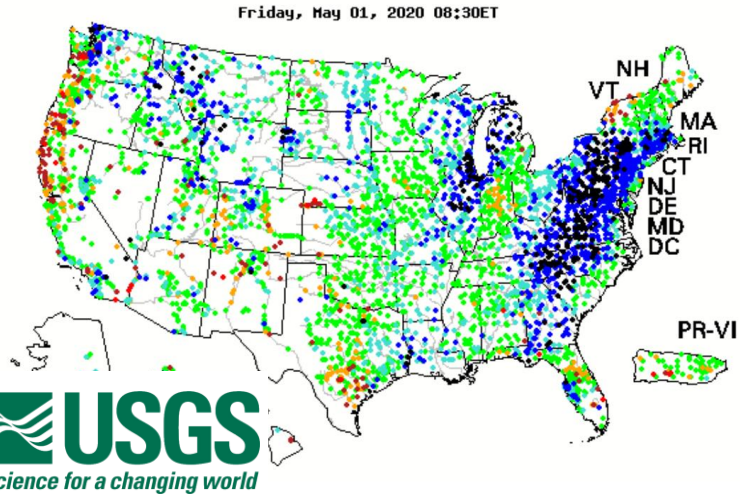
- SMHI WorldWide Hype
- USGS WaterWatch
- UK Hydrological Outlooks
- Argentina National Institute of Water
- Bhutan – COMING SOON



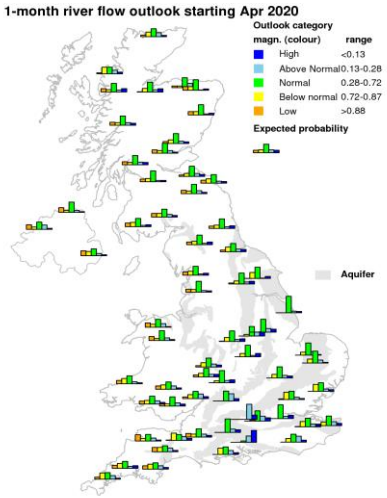
SMHI



INA SiyAH Instituto Nacional del Agua



USGS science for a changing world



Back to Developing the Demonstrator

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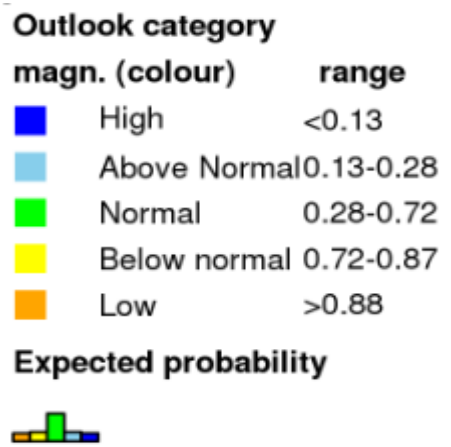
Developing the Demonstrator - Challenges

Some of the many challenges in building a HydroSOS include:

- Defining consistent categories of data: “Normal”, “Above Normal”, “Below Normal”
- Defining how many years of data are needed to provide a baseline for categorisation
- Integrating locally defined alert categories
- Presenting potentially sensitive data
- Re-scaling global and national data when zooming to different levels, whilst retaining the correct message
- Defining and representing skill and uncertainty
- Using simulated observations for the “status” associated with modelled forecasts
- Loading big data quickly
- Colour-blind friendliness

Explanation - Percentile classes						
Low	<10	10-24	25-75	76-90	>90	High
	Much below normal	Below normal	Normal	Above normal	Much above normal	



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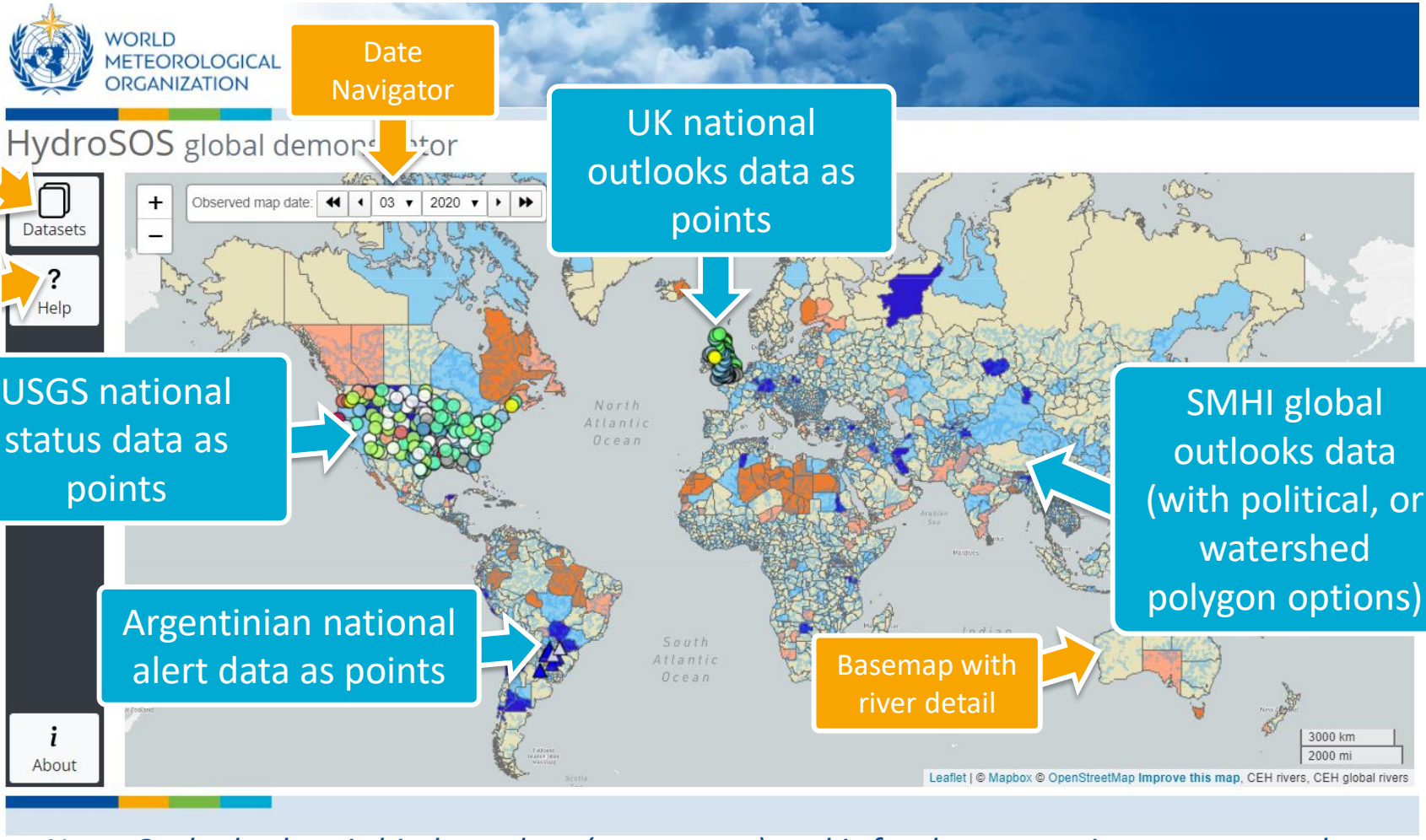
@katieasmith26

First Look at the Demonstrator

CLICK on a blue text box to see each dataset in more detail



Note: Outlooks data is hindcast data (not current) and is for demonstration purposes only

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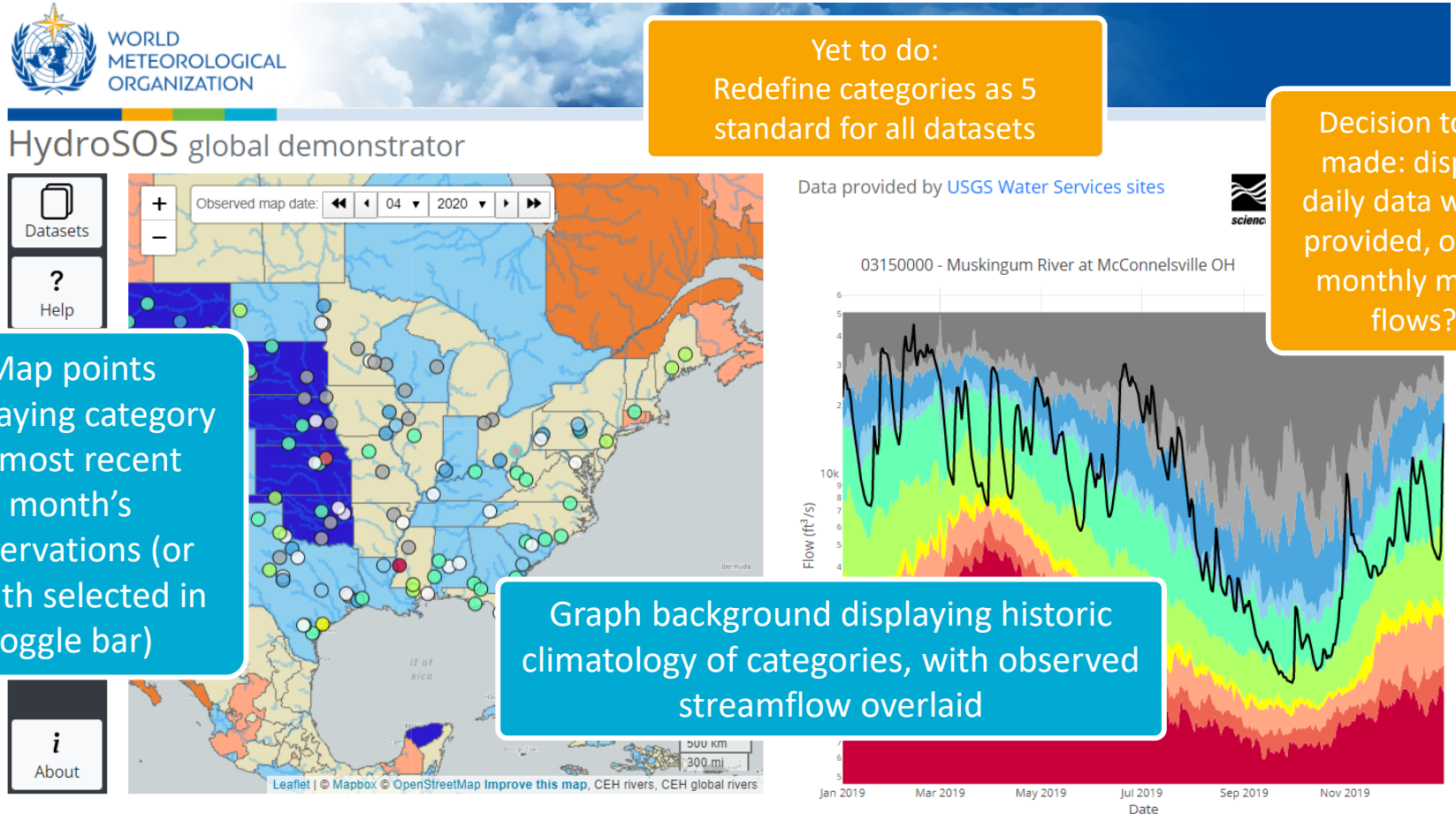
First Look at the Demonstrator - WaterWatch



Yet to do:
Redefine categories as 5 standard for all datasets

Decision to be made: display daily data where provided, or just monthly mean flows?

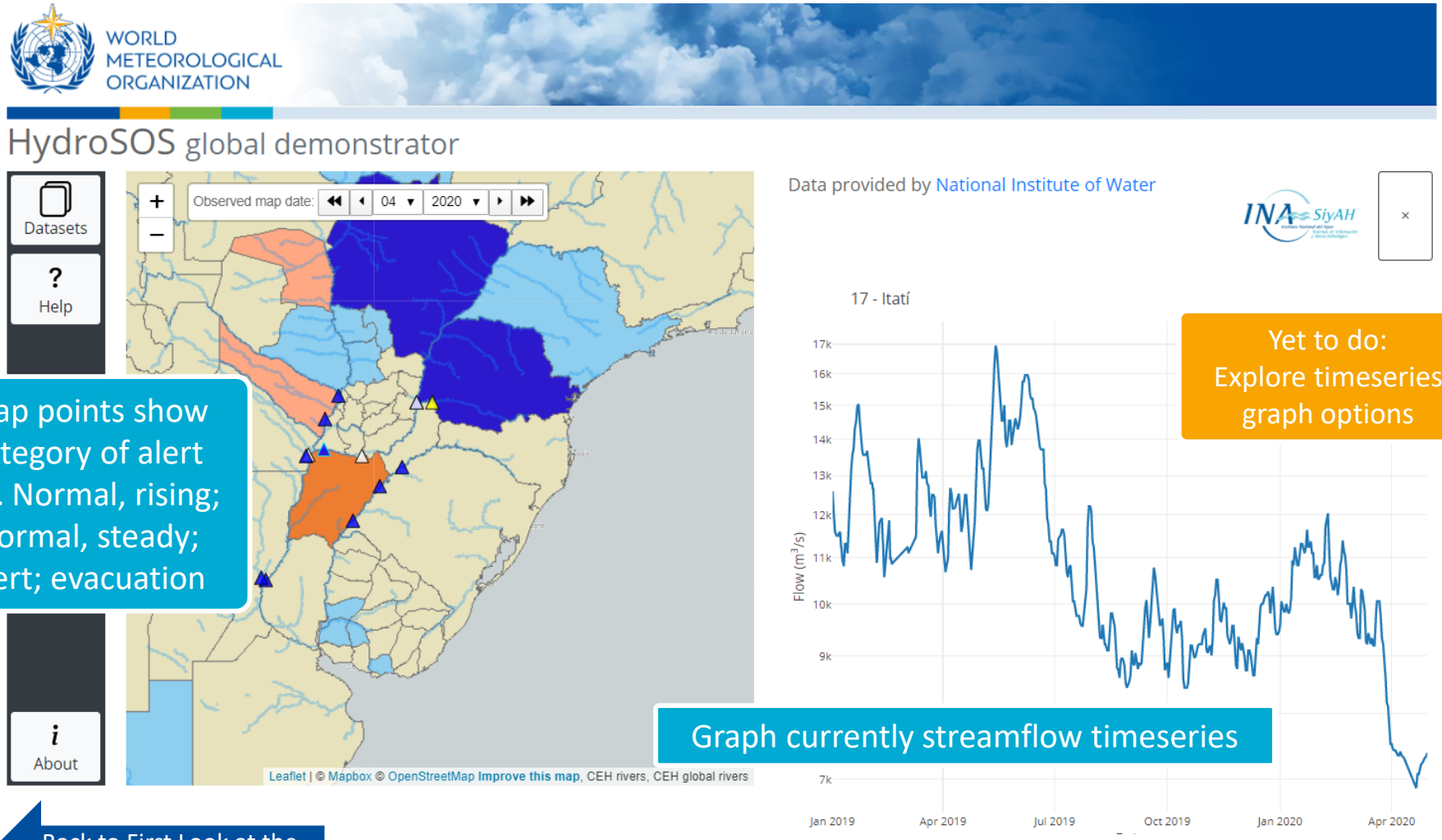
Map points displaying category of most recent month's observations (or month selected in toggle bar)

Graph background displaying historic climatology of categories, with observed streamflow overlaid

Note: SMHI data is hindcast data (not current) and is for demonstration purposes only

Back to First Look at the Demonstrator

First Look at the Demonstrator – Argentina



Map points show category of alert e.g. Normal, rising; Normal, steady; alert; evacuation

Yet to do: Explore timeseries graph options

Graph currently streamflow timeseries

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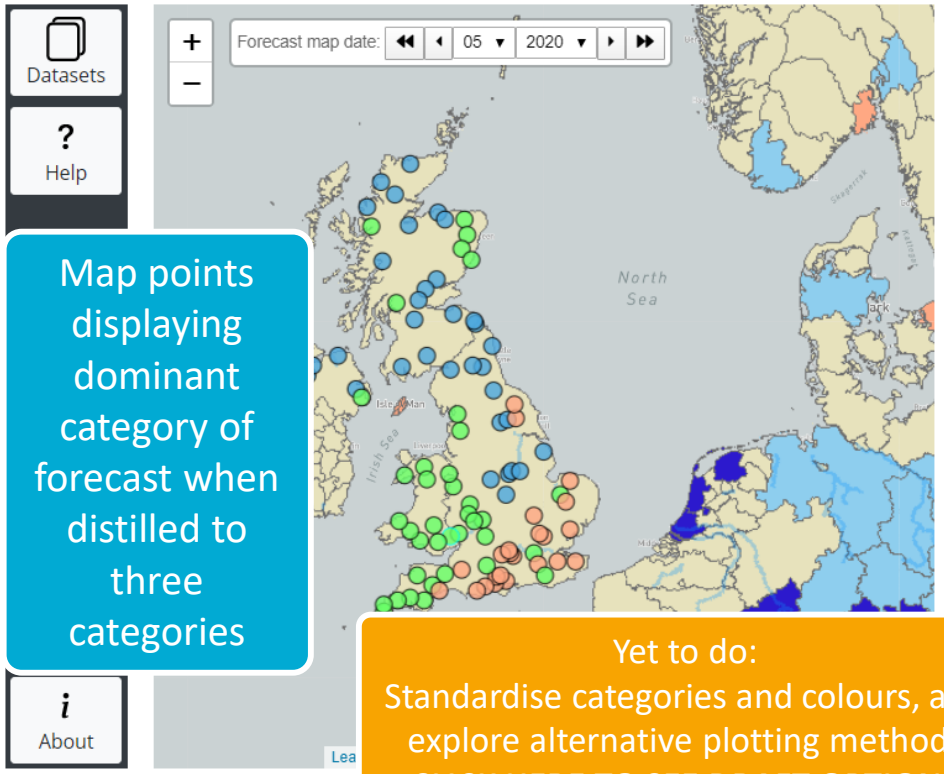
First Look at the Demonstrator – UK Outlook

WORLD METEOROLOGICAL ORGANIZATION

HydroSOS global demonstrator

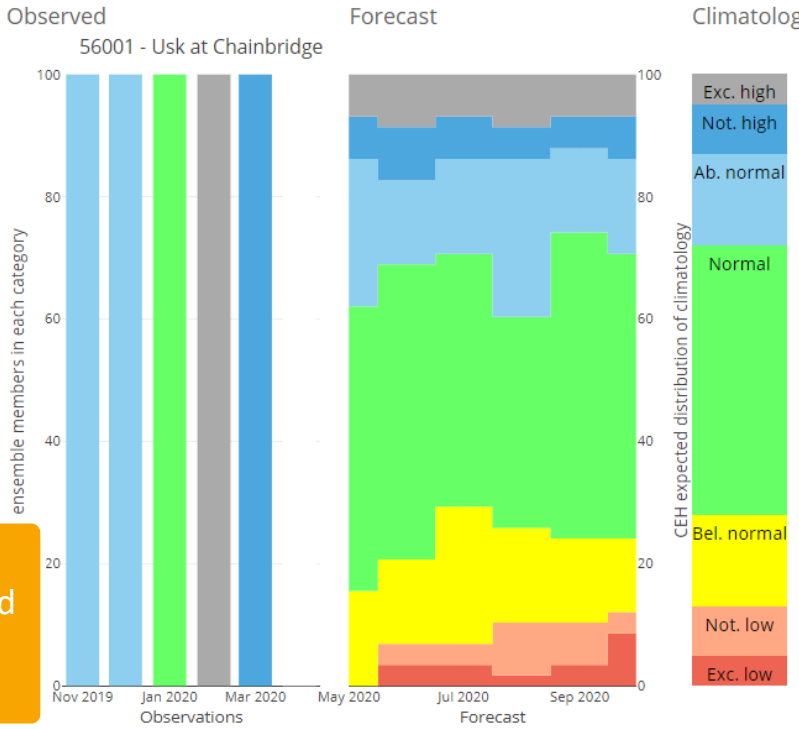


Map points displaying dominant category of forecast when distilled to three categories

Previous 6 months' data displayed as colour of category

6 months' forecast shown as % ensemble members in each category

Expected category distri-bution



Yet to do:
Standardise categories and colours, and explore alternative plotting methods
CLICK HERE TO SEE DRAFT OPTIONS

Note: Data are hindcast data (not current) and used for demonstration purposes only

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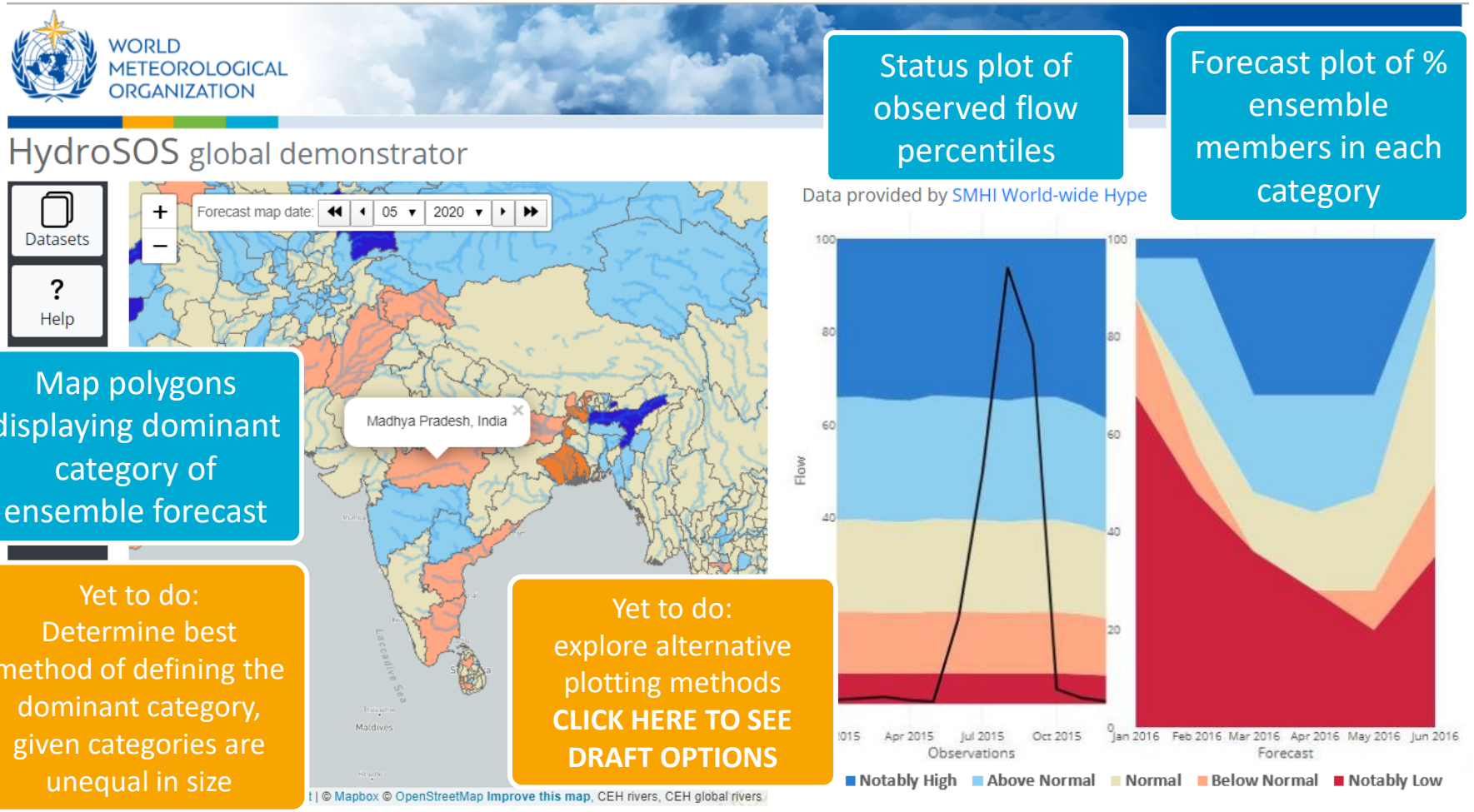
First Look at the Demonstrator – SMHI Global



Status plot of observed flow percentiles

Forecast plot of % ensemble members in each category

Map polygons displaying dominant category of ensemble forecast

Yet to do: Determine best method of defining the dominant category, given categories are unequal in size

Yet to do: explore alternative plotting methods **CLICK HERE TO SEE DRAFT OPTIONS**

Note: Data are hindcast data (not current) and used for demonstration purposes only

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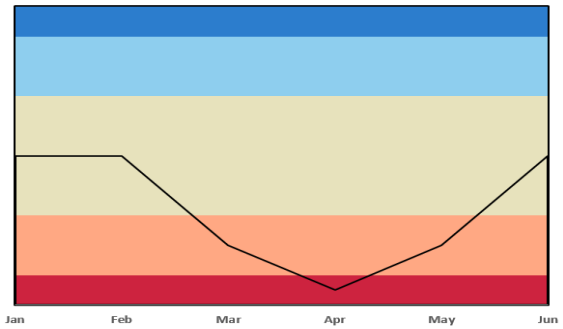
First Look at the Demonstrator – Graph Concepts

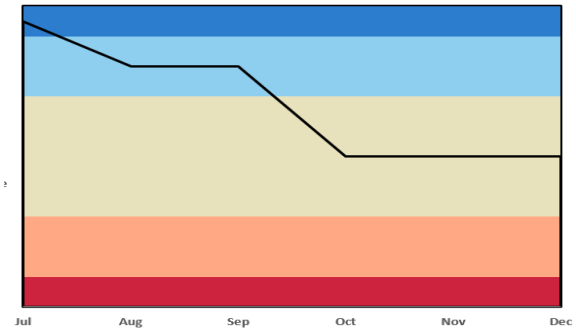
Categorical Only (No Flow Data) – for Very Sensitive Datasets

Back to Developing the Demonstrator

Status plotted mid-category

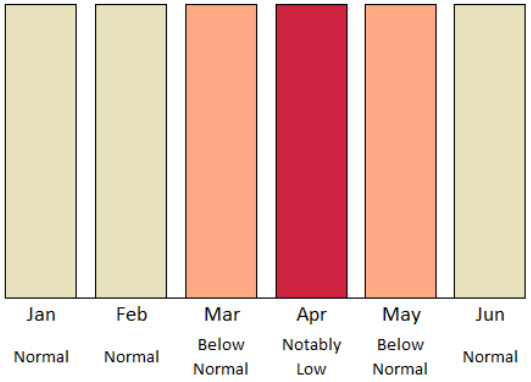


Forecast Best Estimate plotted mid-category

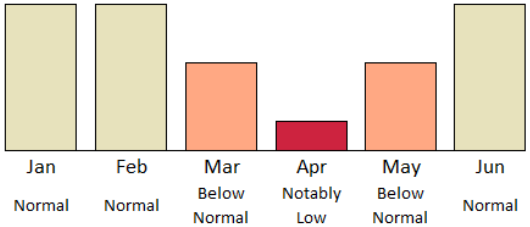


More Plotting Styles

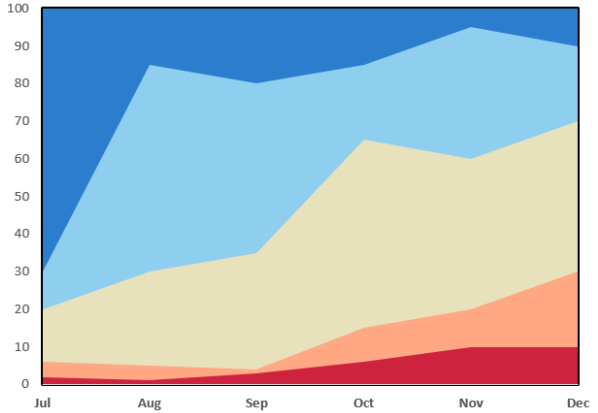
Status Coloured Bars



Status Coloured Bars with Height



Forecast Percentage of Ensemble Members in Each Category



Notably High | Above Normal | Normal | Below Normal | Notably Low

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First Look at the Demonstrator – Graph Concepts

Flow Percentiles – for Semi Sensitive Datasets

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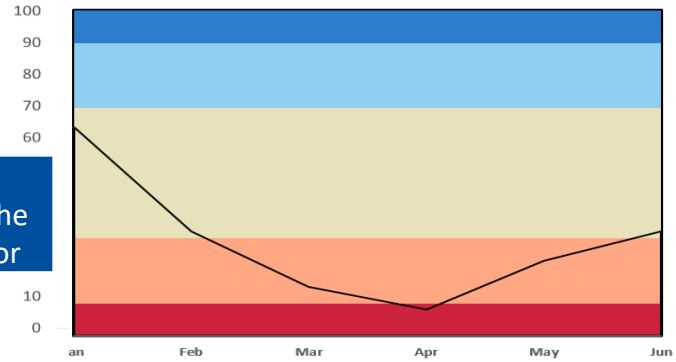
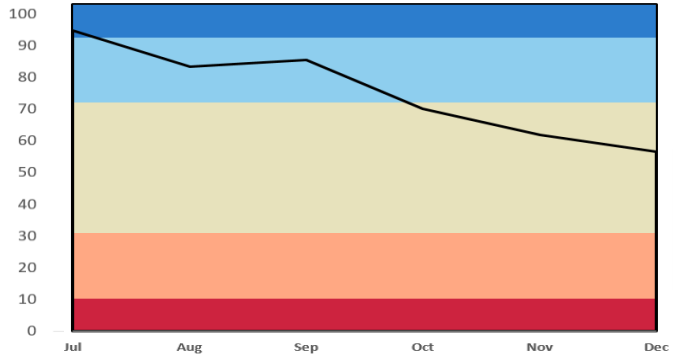
Status plotted at percentile value

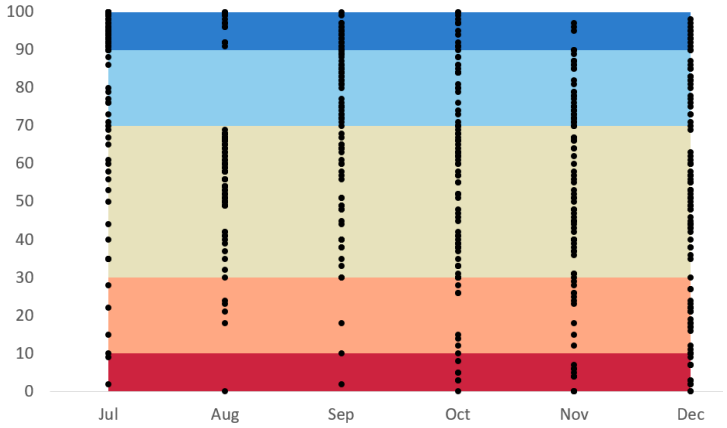


Forecast Best Estimate plotted at percentiles

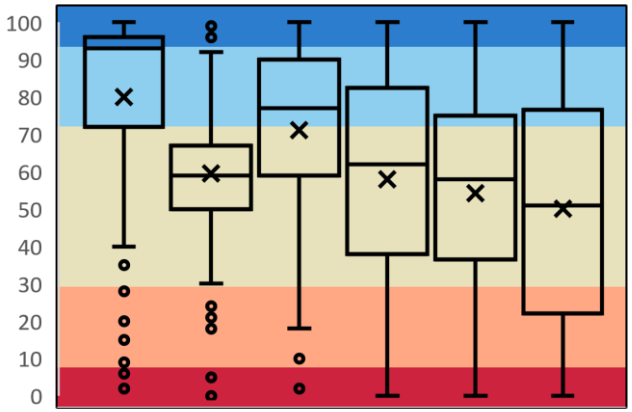


More Plotting Styles

Forecast ensemble plotted at percentile value



Forecast ensemble box plots at percentile



Notably High | Above Normal | Normal | Below Normal | Notably Low

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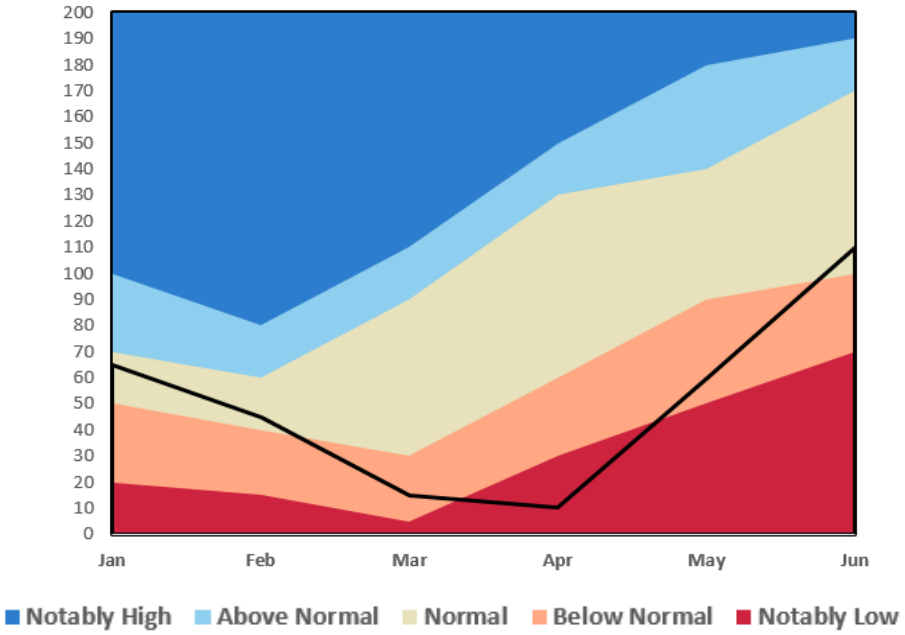
First Look at the Demonstrator – Graph Concepts

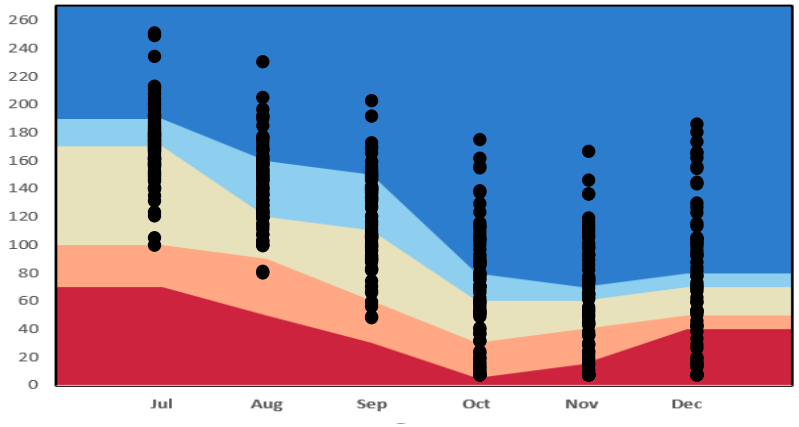
Real Flow Data – for Open Datasets

Back to Developing the Demonstrator

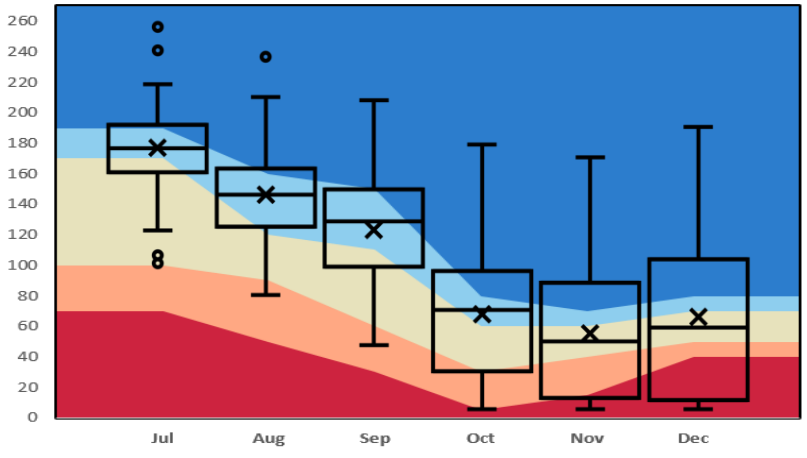
Status plotted at real flow value with flow percentile values as background climatology



Forecast ensemble points at flow values

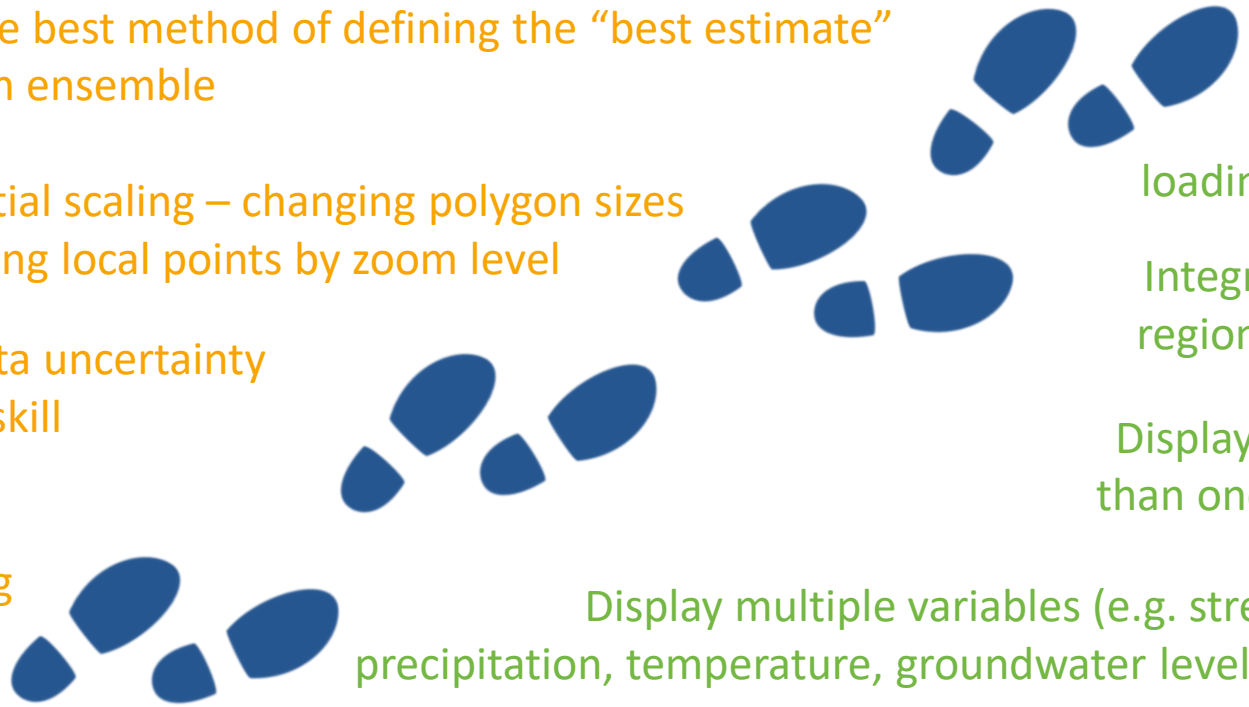


Forecast ensemble box plots at flow value



Next Steps – for the Demonstrator

We have highlighted few next steps for the datasets that we have included so far, but there are also several further steps to take in order to demonstrate the other capabilities that the HydroSOS will need to include.



Determine the best method of defining the "best estimate" category of an ensemble

Integrate spatial scaling – changing polygon sizes and aggregating local points by zoom level

Represent data uncertainty and forecast skill

Develop time series plotting options

Optimise data loading infrastructure

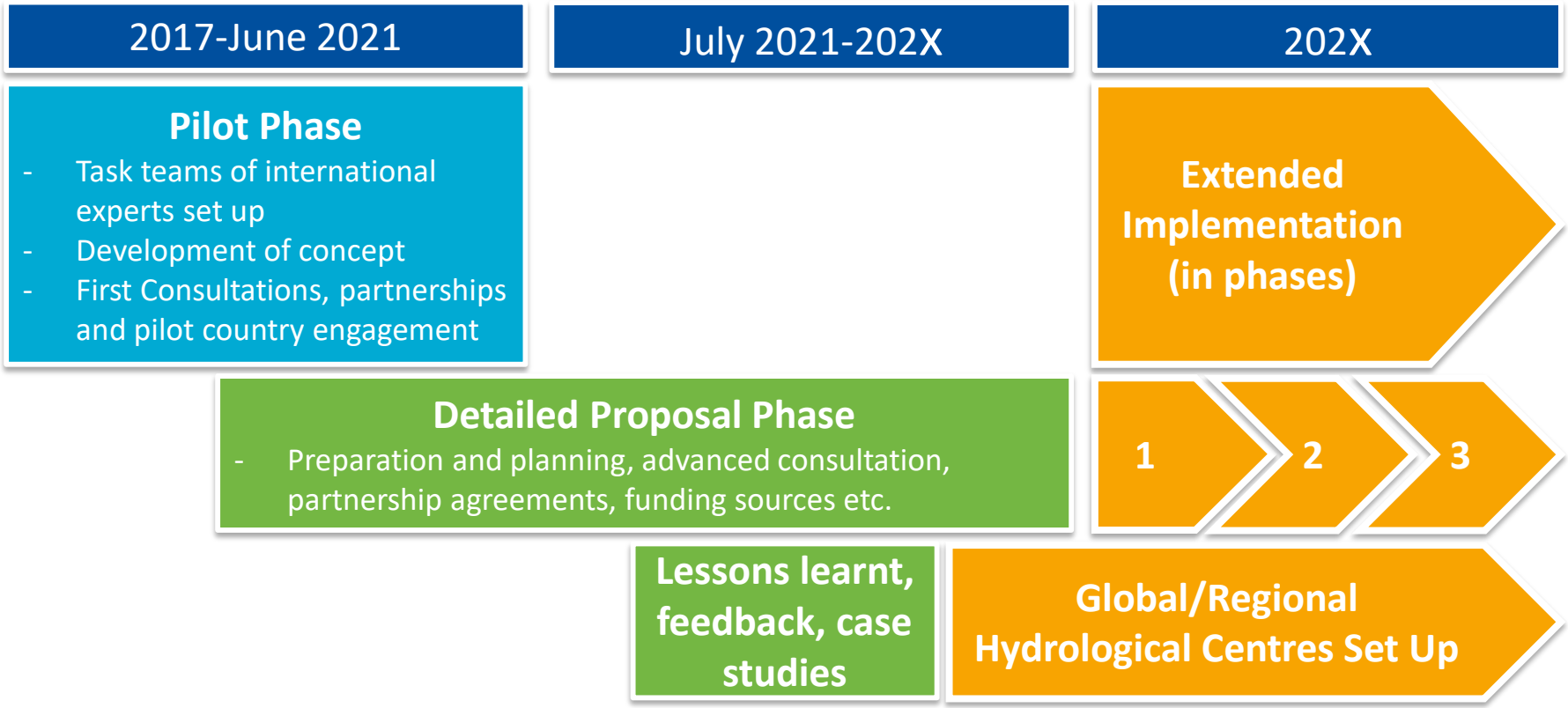
Integrate at least one regional scale dataset

Display/combine more than one global dataset

Display multiple variables (e.g. streamflow, runoff, precipitation, temperature, groundwater levels, soil moisture)

Next Steps – for the Project

This project is currently in its pilot phase, exploring what is needed for a global HydroSOS and how it could be delivered. This diagram shows the stages needed to make such a system operational.



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Thank you, please email me any further questions after the EGU chat session:

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