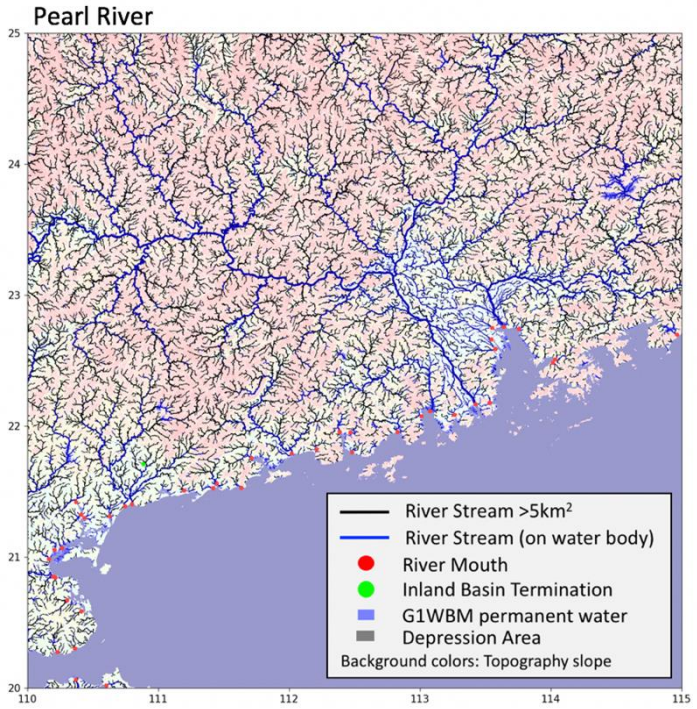
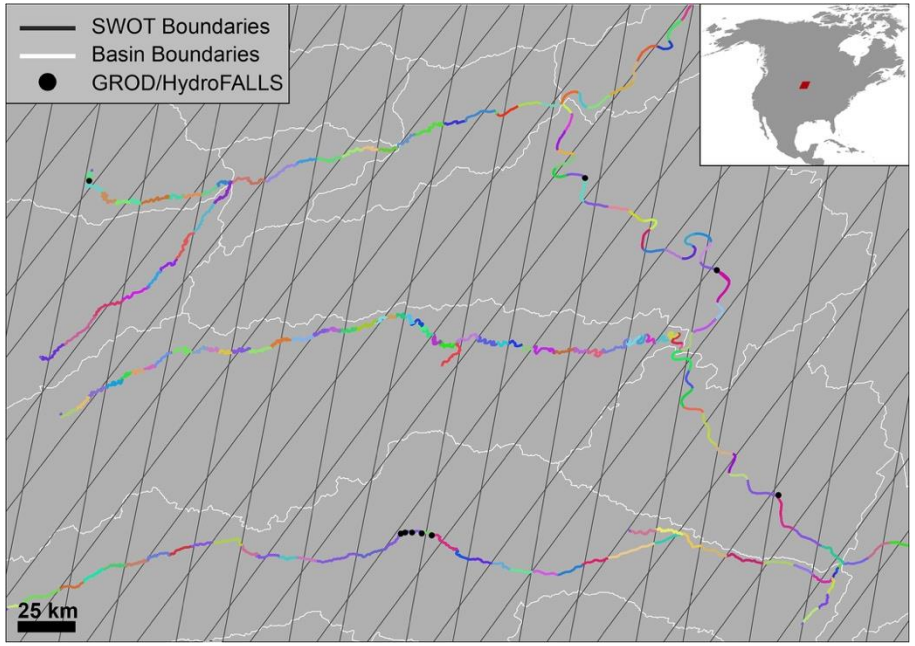
Next Steps??

1. How do we integrate heterogeneous river datasets?

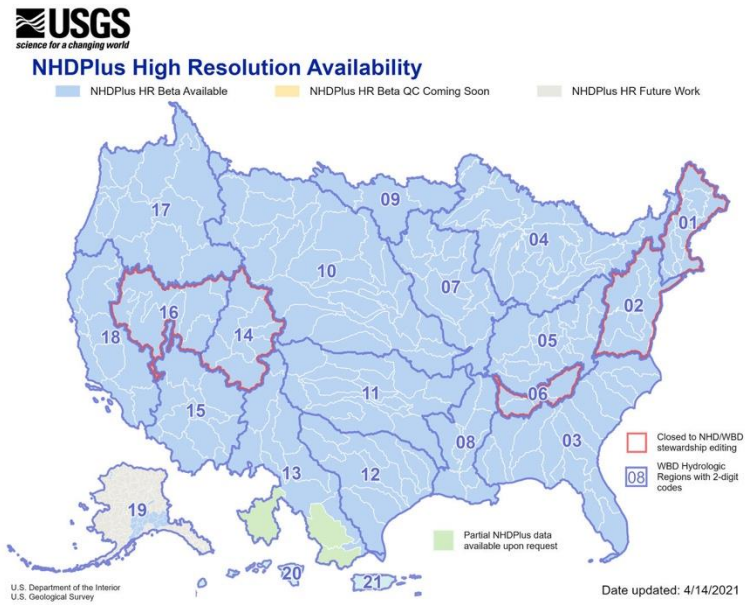
- **Raster hydrography** (MERIT Hydro, HydroSHEDS): DEM-consistent, model-ready.
- **Vector river datasets** (MERIT Basins, SWORD, GRIT): rich attributes, connectivity, widths. Friendly for satellite.
- **National datasets** (e.g. NHD Plus): government official. With many survey data, but low geolocation accuracy.



Raster Hydrography
(primary for models)



Vector Hydrography
(SWORD: used for satellites)

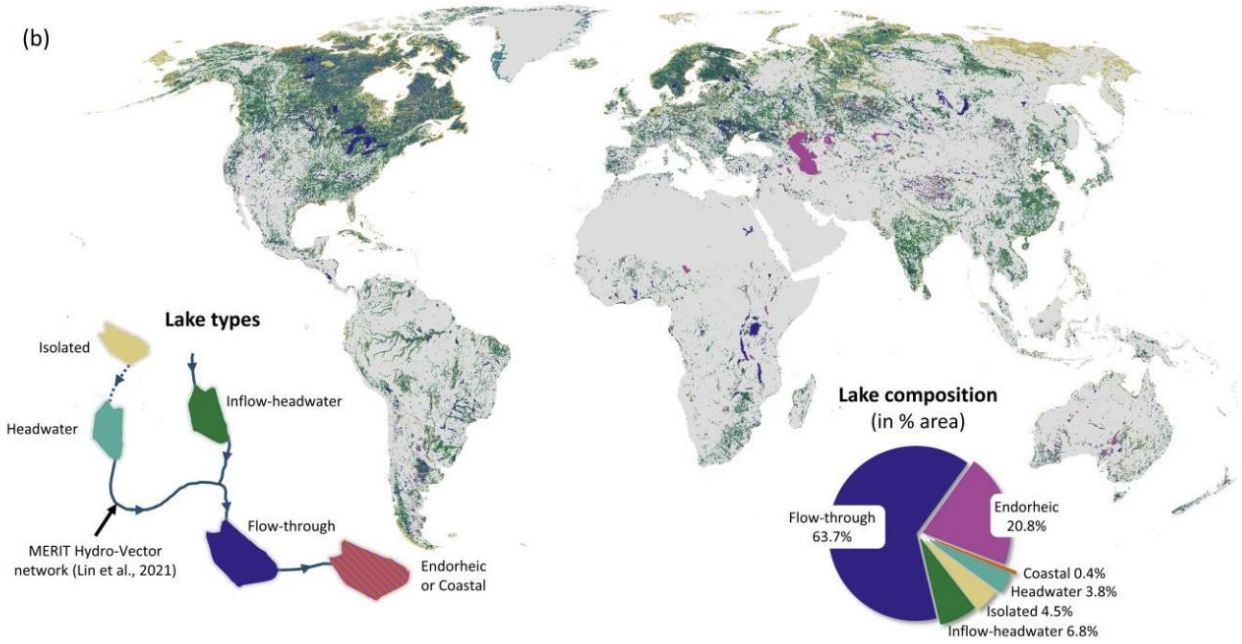


National Hydrography
(Government/Operational Use)

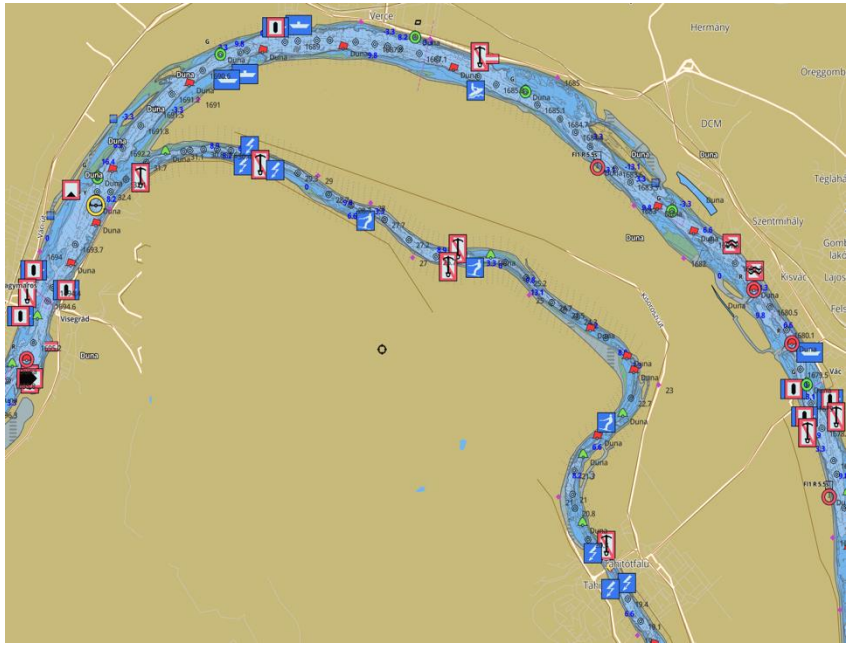
Next Steps??

2. Enriching hydrography with river-related information

- Explicit representation of **lakes, reservoirs, dams, and hydraulic structures**.
- Integration of **river cross-section information.** – in situ surveys, ADCP, sonar, nautical charts, SWOT.
- Linking features to **parameters influencing hydrodynamic processes**, not just flow direction.



Lake-river integrated hydrography (Lake-TopoCat, Skider et al. 2023)

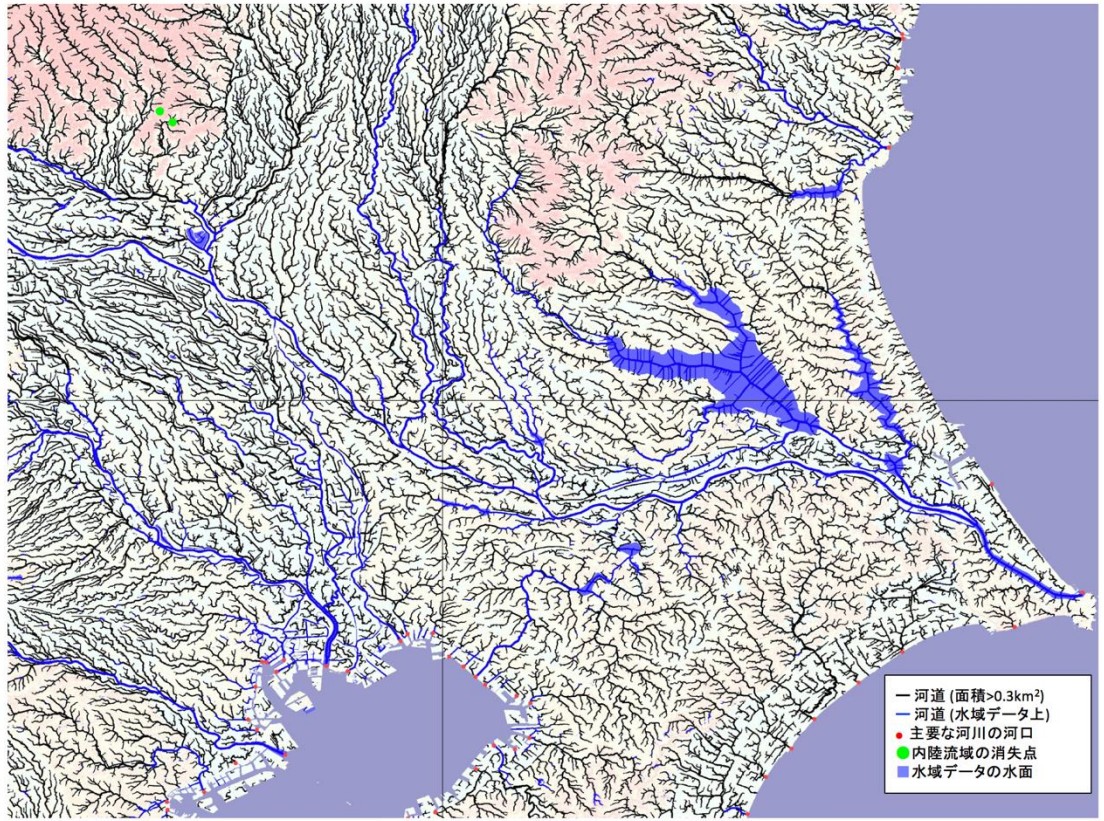


Electrical Nautical Charts

Next Steps??

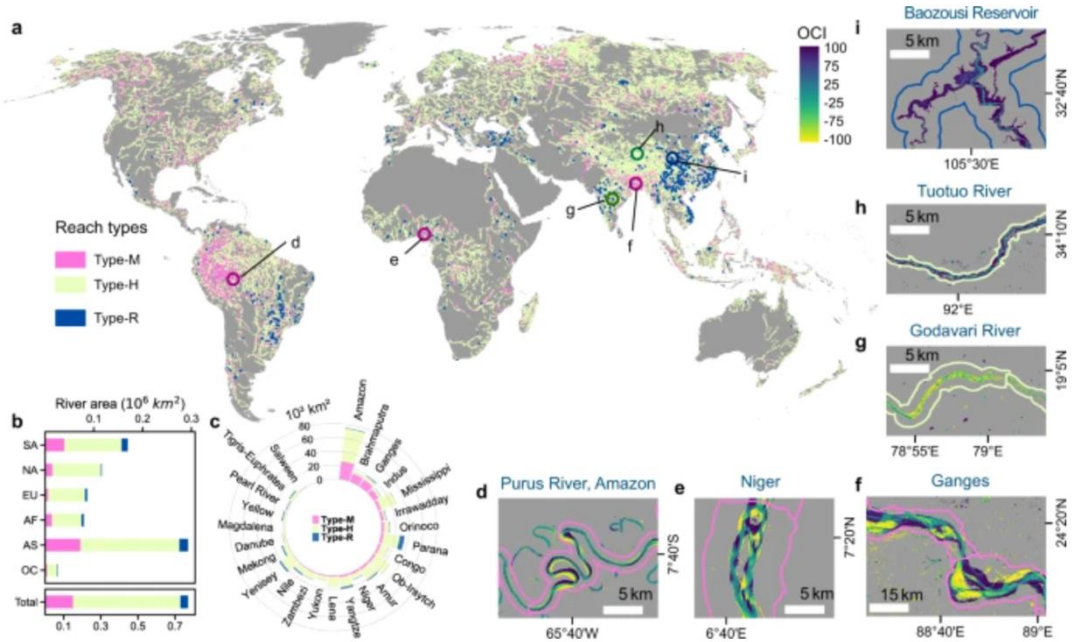
3. Toward dynamic hydrography

- Move from static maps to **regularly updated, dynamic hydrography**.
- Integrate **updated global DEMs** and **regional LiDAR DEMs** when available.
- Incorporate **satellite-observed river morphology changes** (channel migration, widening, cutoff).



J-FIwDir (Lidar-based regional hydrography)

Fig. 1: The global distribution of different types of river extent changes in the early 21st century: morphological dynamics (Type-M), hydrological signals (Type-H), and new reservoir-type river reaches (Type-R).



Wu et al. 2023, Nature Comm