

HYDROS: HYdraulic retrievals from Data assimilation, River Observation with SWOT

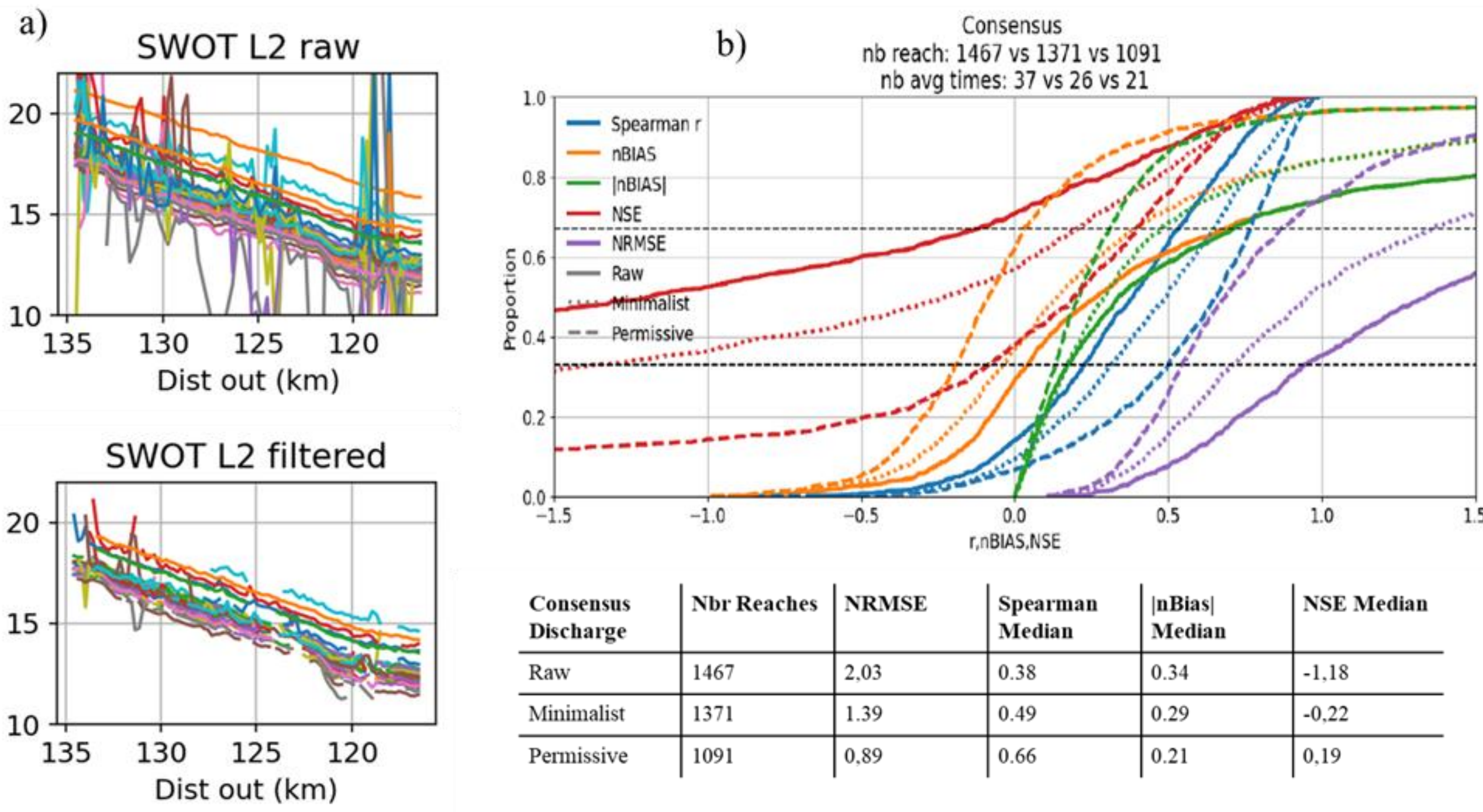
PIs: Hind Oubanas (INRAE) & Sophie Ricci (CECI, CERFACS/UMR5318 CNRS)

Team Members (for the INRAE part): P.-O. Malaterre, I. Gejadze, D. Quittard, C. Cazal (INRAE, CS), I. Rezende (INRAE, CLS, CNES)

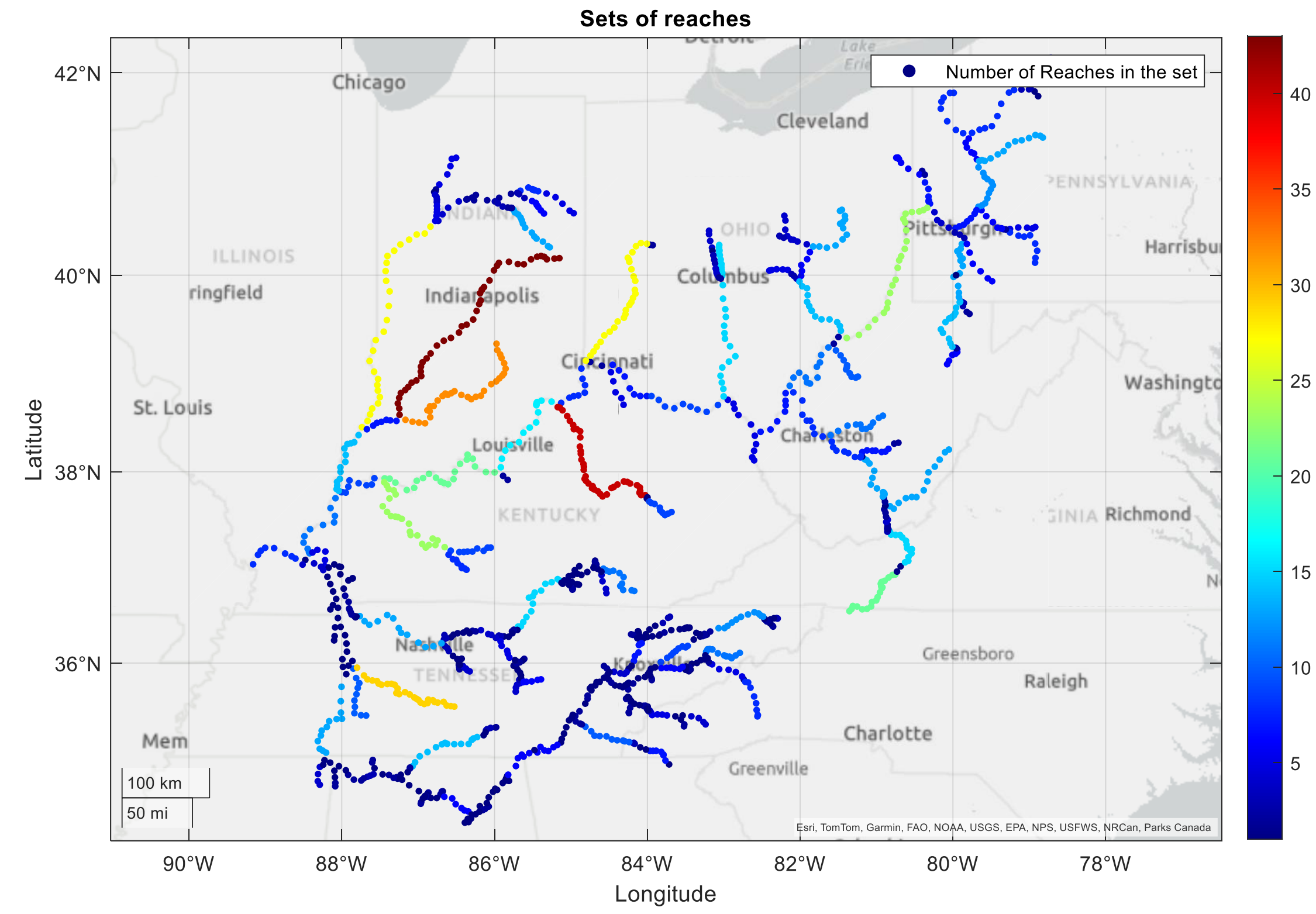
TOSCA Project 2024-2027. New result for 2025

SICFLOW : “Sic Inverse problem Capabilities for river FLOW dynamics”:

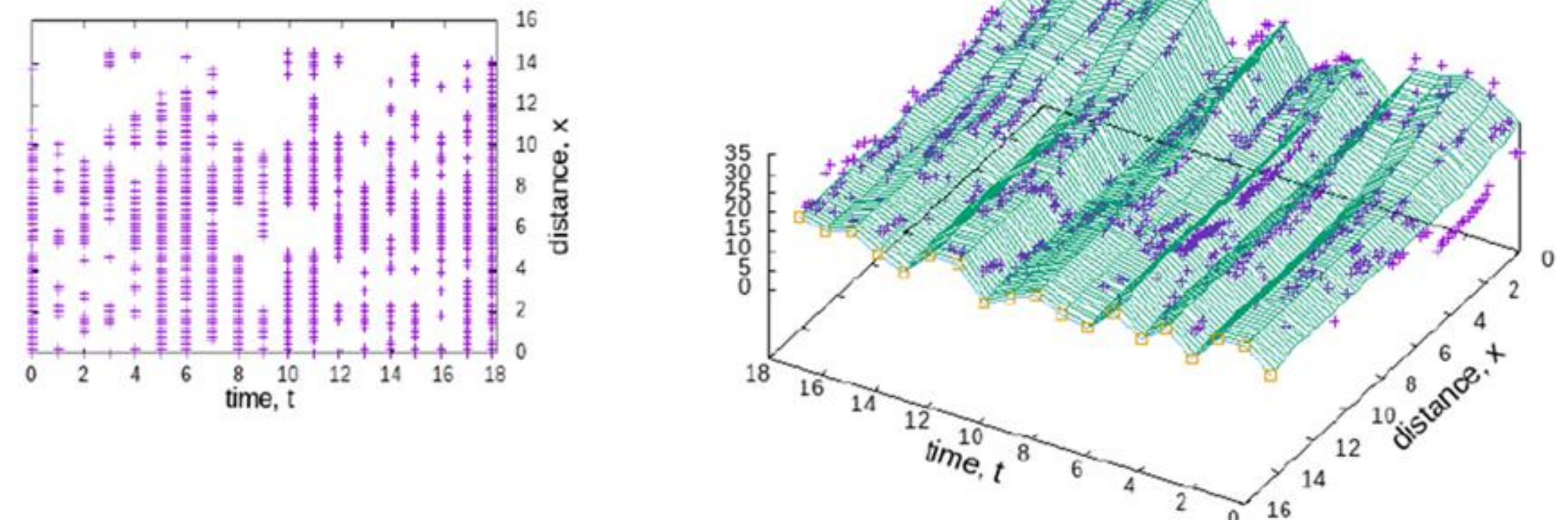
- River system definition
- Data Filtering and Densification approaches
- FloodPlain DEM Approximation
- Prior/Background Estimation
- Data Assimilation: **SIC4DVar** (Global LC version within Confluence platform and Local Full-Cost version for specific Rivers)
- Reanalysis : Historical discharge for climate studies
- Uncertainty Quantification & Error Statistics: Characterization of discharge errors and parameterization of probability density functions.



Data Filtering: the impact of filtering strategies on a) SWOT data after application of the permissive filter (Garonne river) and b) on the global discharge estimation has been assessed, with performance statistics in gauge locations, summarized in the CDFs

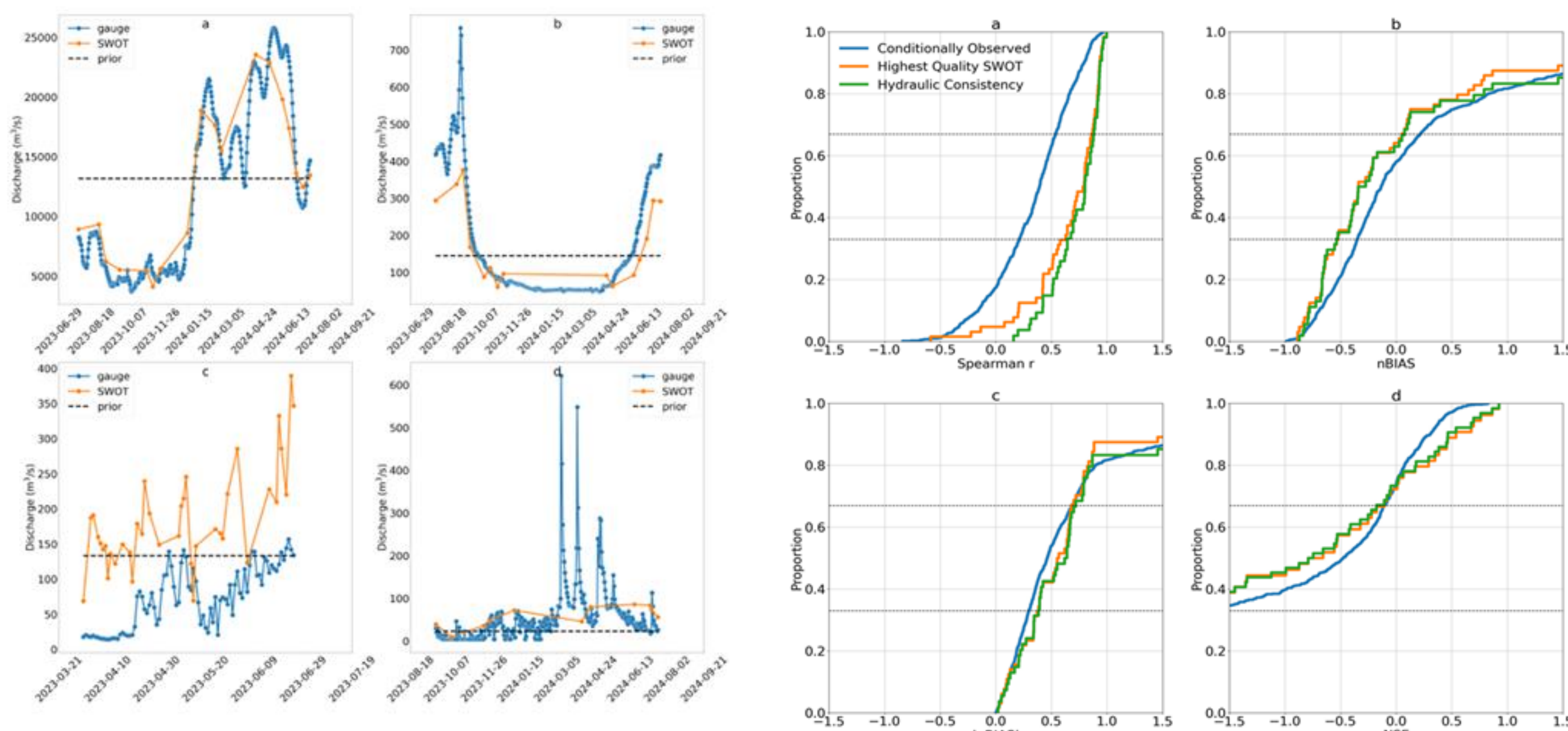


River system definition: a River basin is automatically divided in subsets following given criteria, and a json file is created for SIC4DVar algorithms

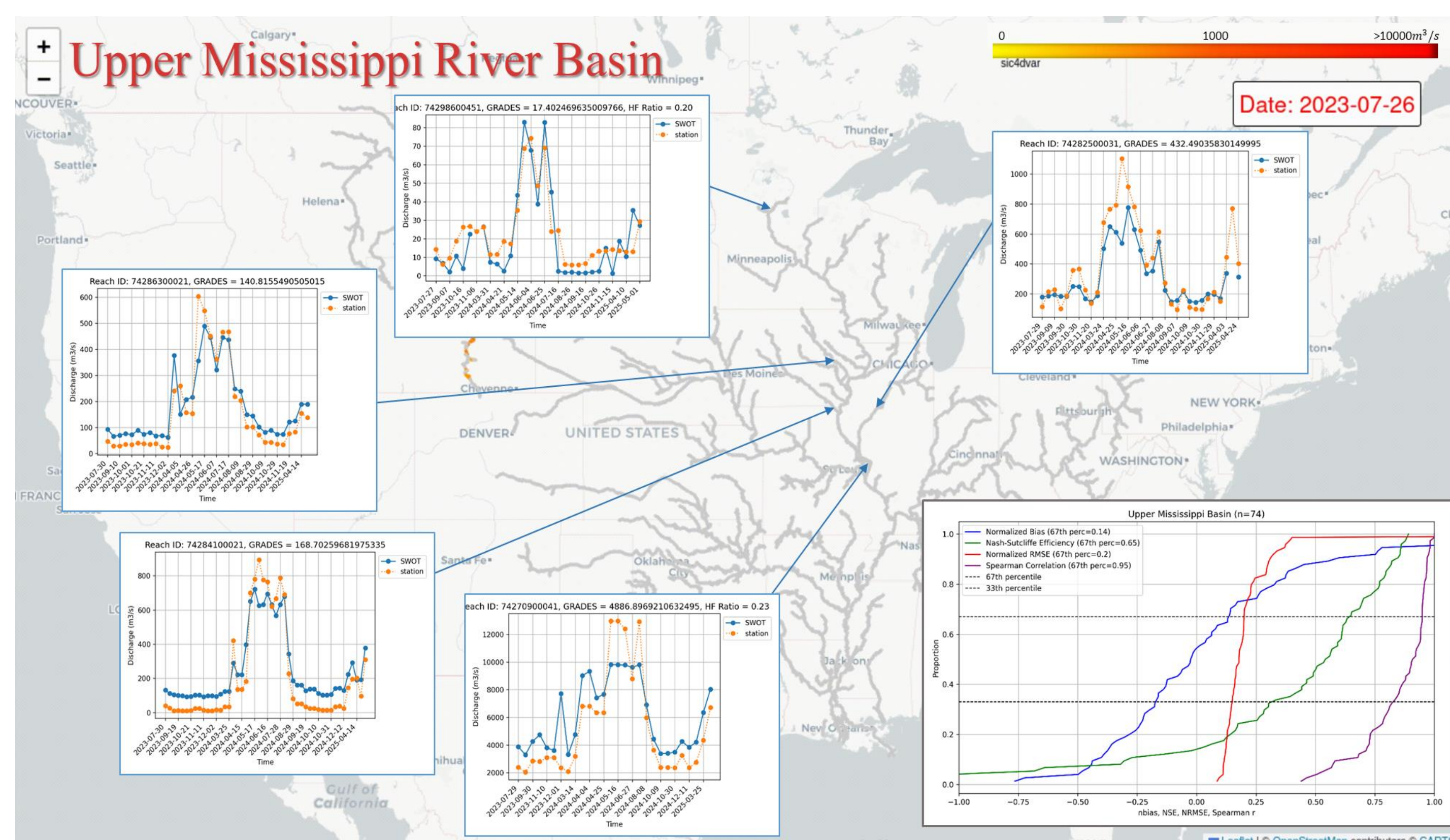


Densification and Preprocessing: Left: Space-time distribution of SWOT WSE observations (purple) with missing observations, Right: the river profiles in space and time before (purple) and after (green) densification and field recovery

SWOT River Discharge from SIC4DVar

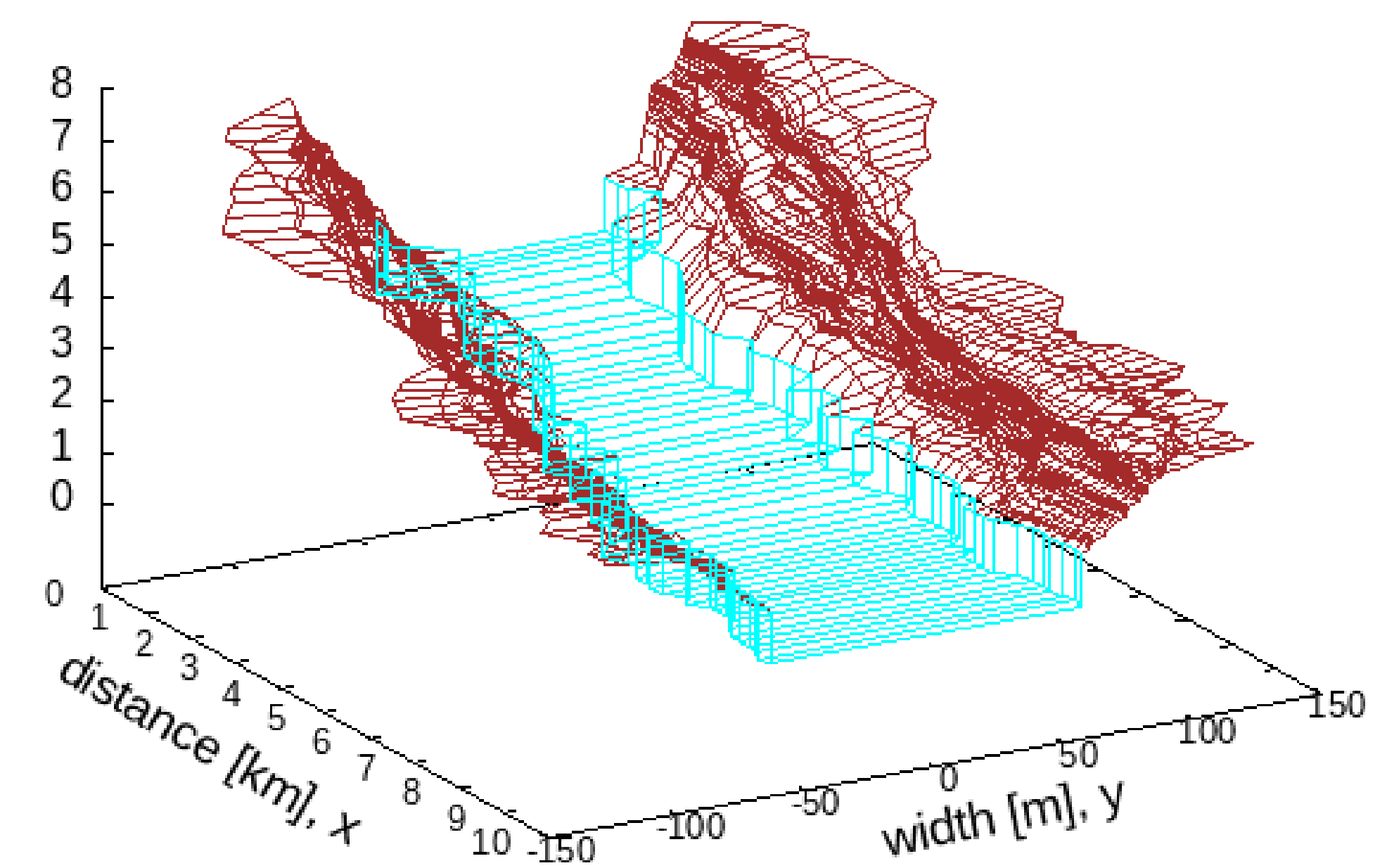


Global L4 river discharge (mean) from Confluence unconstrained run and performance assessment for different quality filtering strategies

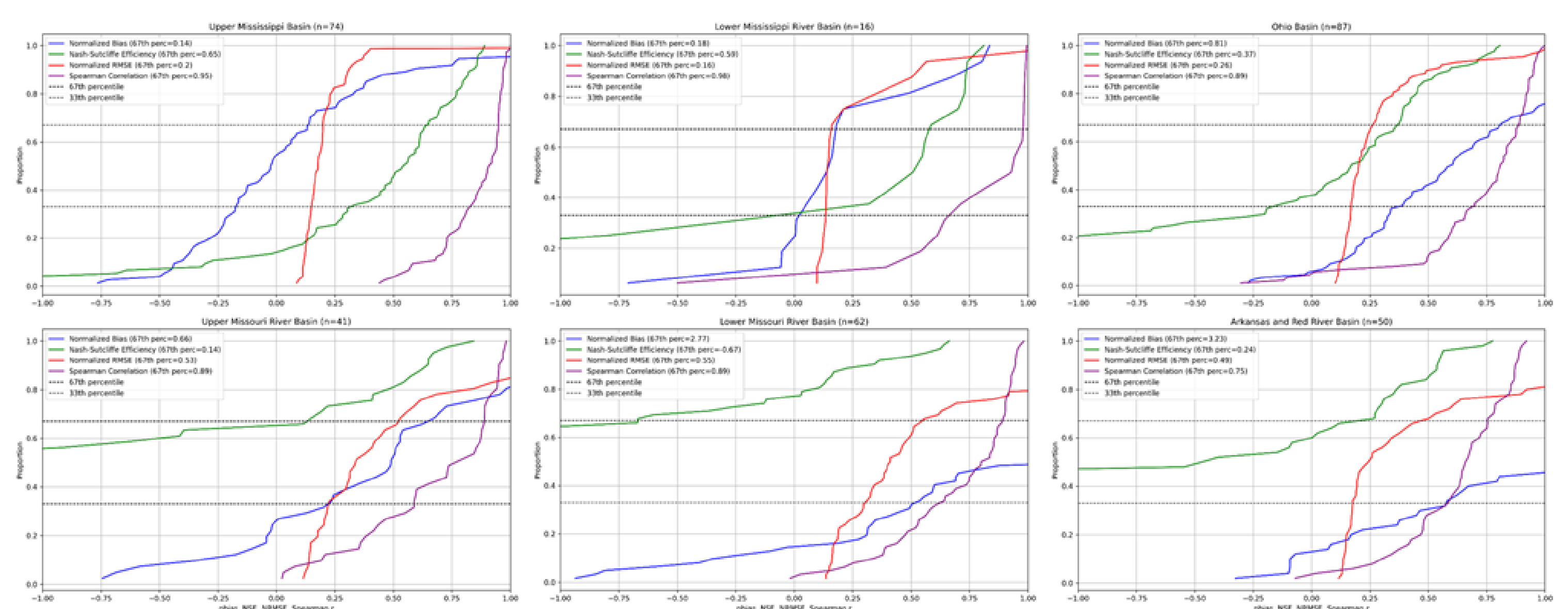


SIC4DVAR discharge estimates across the Mississippi Basin

Bathymetry: case br4ri3sr2160260125



After data filtering, smoothing and densification a DEM is generated for the dry bathymetry, with SWOT only observations. The wet bathymetry is then generated by SIC4DVar data assimilation algorithm, in addition to the discharge Q(t)



CDFs summarizing error statistics for SIC4DVAR discharge across the Mississippi Basin