APO2026_006 - Reconstructing riverine outflow from remotely sensed data

David Samuel Trossman
david.trossman@noc.ac.uk

National Oceanography Centre

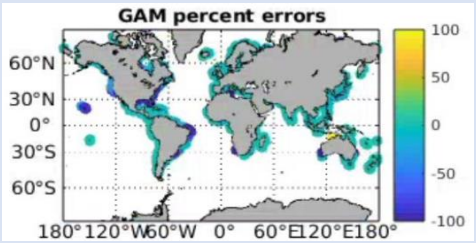
Overview:

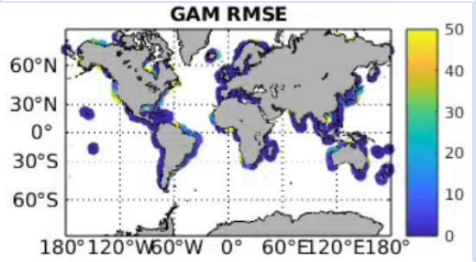
There are several data products for riverine outflow. The exact solution to a previously established partial differential equation in for riverine outflow involves an unknown function of the Coriolis parameter, sea surface salinity, and haline contraction coefficient. Therefore, we can reconstruct riverine outflow for each existing data product from sea level anomalies and the above-listed remotely sensed variables by making use of a machine learning algorithm (GAM).

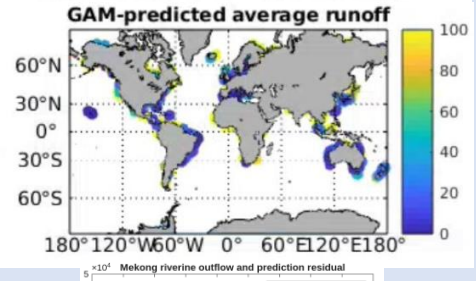
Monthly data used:

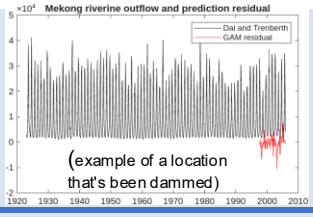
- Level-4 Copernicus sea level anomalies
- OISSSv2 sea surface salinities
- NOAA GeoPolar Blended nighttime sea surface temperatures

Dai and Trenberth dataset:



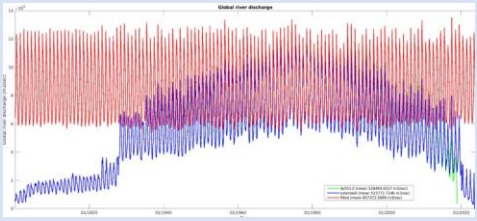


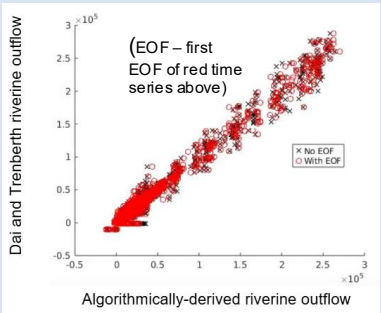




(example of a location that's been dammed)

Gap-filled and adjusted Dai and Trenberth dataset (in red):





Conclusions:

- Machine learning approach for reconstructing river discharge using remotely sensed variables works well
- Remaining errors are likely due to inconsistencies between remotely sensed data and river discharge dataset
- A gap-filled and adjusted river discharge dataset (courtesy of James Carton and Gennady Chepurin) used for SODA reanalysis looks reasonable

Future work:

- Finish assessing algorithm with ERA5-derived, SWOT/altimetry-derived, GRDC-derived river discharge
- Investigate relationship between riverine outflow from GRDC river gauges and sediment fluxes from Sentinel-3 OLCI-derived TSM_NN and ADCPs
- Test algorithm for river discharge in a numerical model simulation (for hindcasting and forecasting purposes)