Identifying the footprint of climate modes across Asian river networks using SWOT

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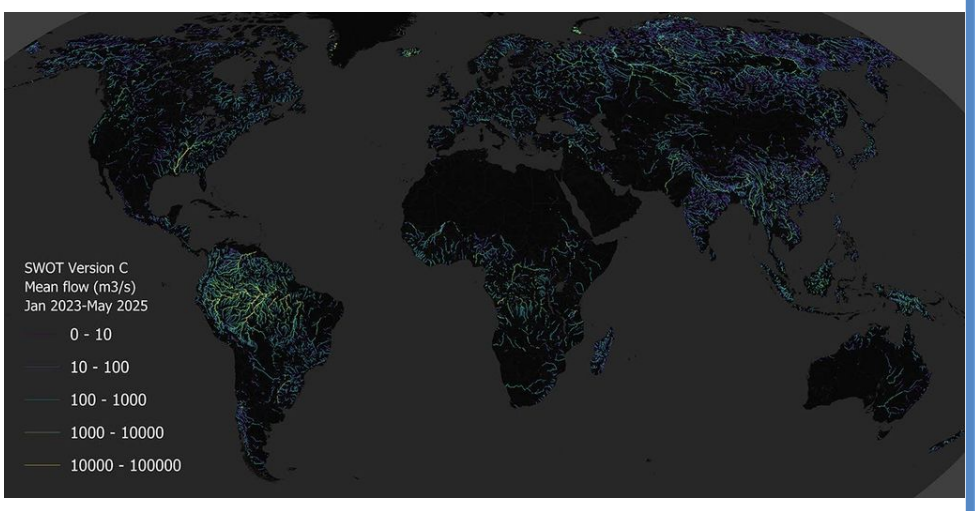
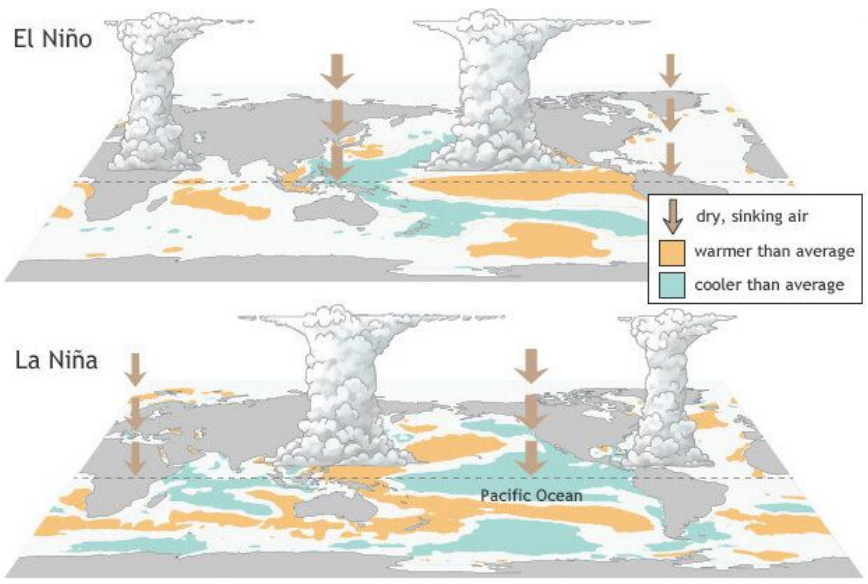
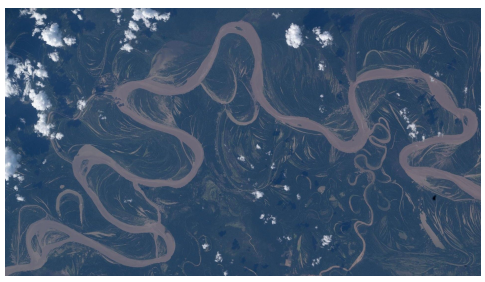
CONTEXT

- South and Southeast Asian floods and droughts are driven by complex climate anomalies (like El-Nino and Indian Ocean Dipole), but how these signals propagate downstream through river networks remains poorly understood.
- Existing monitoring relies on sparse, unevenly distributed rain gauges and hydrological models restricted by simplifying assumptions.
- The SWOT satellite mission overcomes these barriers by capturing high-resolution spatial snapshots of entire river networks to track how climate anomalies move through connected basins.







REFERENCES

1. Fu, L. L., Morrow, R., Farrar, J. T., & Wang, J. (2024). A breakthrough of radar remote sensing of the ocean: the Surface Water and Ocean Topography (SWOT) Mission. *European Geosciences Union General Assembly 2024 (EGU24)*, 12599.
2. World Meteorological Organization. El ni˜no / la ni˜na phenomena (2026). https://wmo.int/themes/el-nino-la-nina-phenomena.
3. Riggs, R. M., Dickinson, J. E., Brinkerhoff, C. B., Sikder, M. S., Wang, J., Gao, H., & Allen, G. H. (2026). Characterizing operational signatures of reservoirs with the SWOT satellite by comparing natural lake and reservoir dynamics. Environmental Research Letters, 21(4), 044008.

SCIENTIFIC OBJECTIVES

The main objective is to determine how climate anomalies propagate as spatially connected water anomalies across major Asian river networks using SWOT satellite observations, testing how natural basin characteristics and human regulation alter their downstream transmission.

THE MISSION

The internship will pursue four complementary missions:

- Identify the major climate and hydroclimatic anomalies occurring during the SWOT period
- Map water anomalies across mainstems and tributaries using SWOT
- Quantify the coherence of climate signals through river networks
- Identify disruptions associated with human water management

REQUIRED PROFILE

Experience or interest in the following areas would be valuable:

- Satellite remote sensing and geospatial data analysis
- Hydrology, climatology or hydroclimatology
- Python programming and scientific computing
- Statistical and time-series analysis

THE RESEARCH UNIT: G-EAU

- G-EAU is an interdisciplinary research unit located in the North of Montpellier at the Agropolis campus
- It unites both social and natural scientists interested in the study of water - from hydrogeologists and remote sensing experts to human geographers and sociohydrologists
- Students will be able to integrate themselves into a rich and welcoming environment of scientific diversity. Weekly events include the Friday discovery seminar series (Vendredi Découverte), and the communal coffee social every Tuesday.