

IAF EARTH OBSERVATION SYMPOSIUM (B1)  
Assessing and Mitigating the Global Freshwater Crisis (6)

Author: Dr. Shailen Desai

Jet Propulsion Laboratory - California Institute of Technology, United States, shailen.desai@jpl.nasa.gov

Dr. Nicolas Picot

Centre National d'Etudes Spatiales (CNES), France, nicolas.picot@cnes.fr

## GLOBAL MEASUREMENTS OF FRESH WATER FROM THE SWOT MISSION

**Abstract**

The Surface Water and Ocean Topography (SWOT) mission was launched on December 16, 2022. It entered into a 21-day repeat orbit at the start of its nominal science phase in July 2023, after a 6-month commissioning, calibration, and validation phase. The primary science payload, a novel Ka-band Radar Interferometer, provides almost global measurements of the height of fresh water over land as well as sea surface over the oceans. These measurements are performed at significantly higher spatial resolutions than any prior space mission, on 50 km swaths extending 10-60 km on both sides of nadir. In effect, SWOT provides global snapshots of terrestrial water bodies whose surface area exceeds 250 m<sup>2</sup> (lakes, reservoirs, wetlands) and rivers whose width exceeds 100 m (rivers) at least every 21 days. In doing so, SWOT also enables measurements of changes in lake water storage and river discharge.

In this paper, we provide an overview of the hydrology science data products that are being generated by the SWOT project and summarize their current performance. The river and lake height measurements are required to have an accuracy of 10 cm (1-sigma) over an area of 1 km<sup>2</sup>. The basis for the hydrology science data products is a product that provides geolocated measurements of water height and water fraction in the swaths at effective along-track posting intervals of 22 m. These high-resolution measurements are then aggregated, to reduce noise, into separate products for rivers and lakes. The river product provides measurements of water surface elevation, river width, and river area for nodes defined at 200 m intervals along rivers, as well as reaches defined at 5-20 km intervals along rivers. River slope and estimates of discharge are also provided for river reaches. Similarly, the lake product provides water surface elevation, water surface area, and estimates of storage change. An additional product provides rasterized water surface elevation and area at spatial resolutions of 100 and 250 m. The goal is to generate these products with a latency of less than 3 days. Furthermore, digital elevation maps of land elevations near the boundaries of water bodies will be generated approximately once every 18 months by evaluating time series of the water surface boundaries observed through the life of SWOT.