

Signal processing simulations of the SWIM wave data

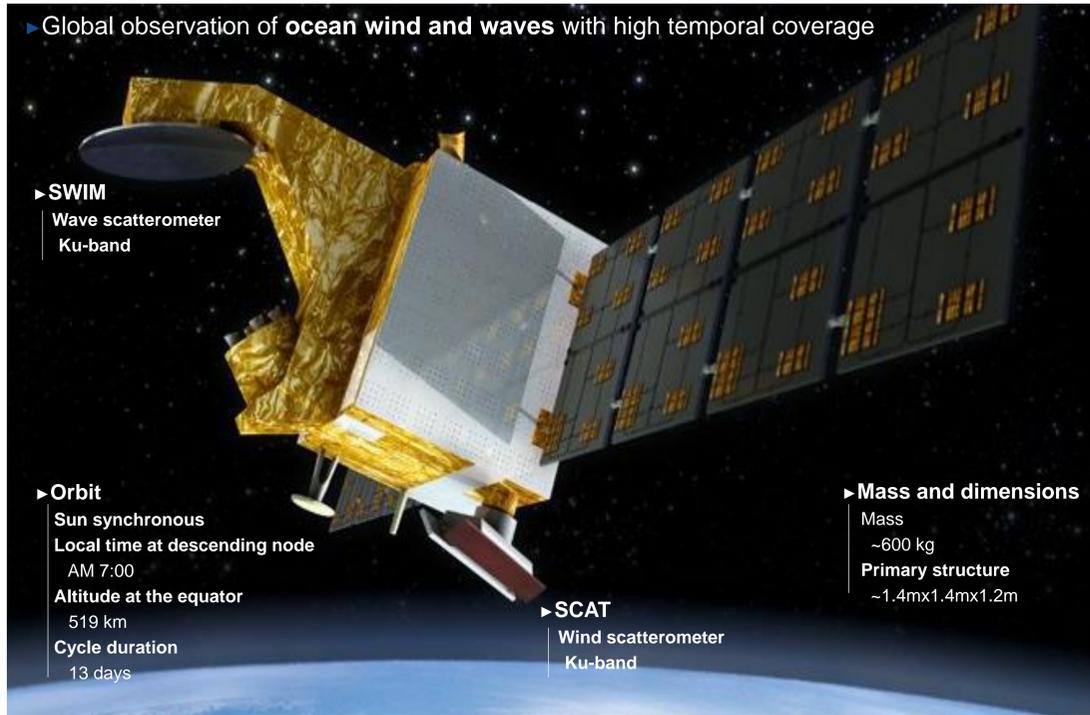
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The CFOSAT Mission (China France Oceanography SATellite)

► Global observation of ocean wind and waves with high temporal coverage



The SWIM instrument (Surface Wave Investigation and Monitoring)

SWIM is a Ku-band radar with 6 incidence beams (0°, 2°, 4°, 6°, 10°). The antenna rotates at a speed of 5.6 rpm.

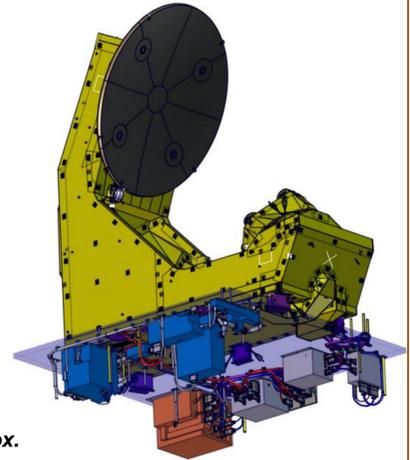
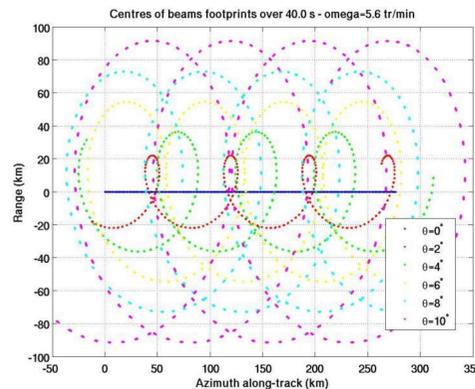


Fig. 1- Footprint centers of the six beams. Each beam has an aperture of 2° x 2° (approx. 18km on ground at 10°)

SWIM enables to measure the following geophysical parameters :

- SWH and wind speed (from nadir beam),
- Backscattering coefficient profile (all beams),
- 2D wave spectra (6°, 8° and 10° beams).

Ground segment and products

The CFOSAT ground segment is made of two mission centers: The products of the CWWIC are split into three product files: L1a product, L1b product and L2 product (this last one one in France and one in China. The poster is focused on the Near Real Time center of the French mission center (CWWIC). The French ground segment is split into two parts:

- the **NRT center**, operated at CNES, processing data from L0 to L2 (SWIM and SCAT),
- the **Differed Time center**, operated at IFREMER, processing data from L2S to L4 (SWIM and SCAT).



Fig. 2 – Geographical organization of the ground segment.

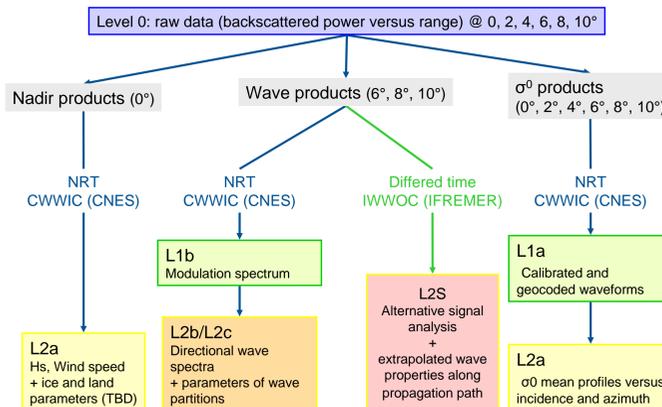


Fig. 3 – Overview of the FROGS products from L0 to L2.

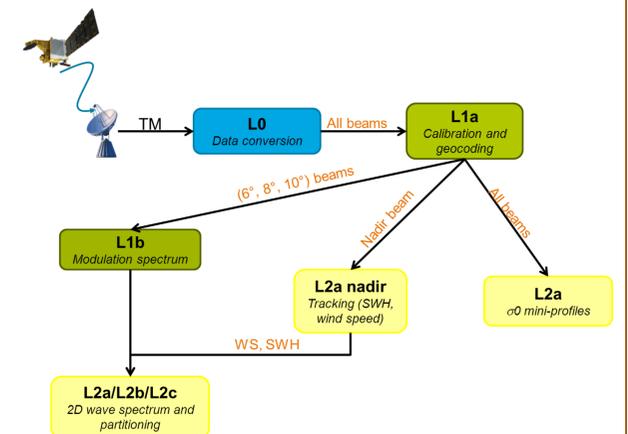


Fig. 4 – Overview of Near Real Time processings.

Simulation for ground segment preparation

Simulations are performed to get datasets over some portions of orbit. First an instrument simulator, SimuSWIM, is run to get the L0 data. It simulates the sensor geometry, the sensor RF property and the on-board processing. Then the L0 data are processed by prototype of the ground segment software. The L1a, L1b and L2a processors are still under development and test. They enable to finalize the algorithm definitions.

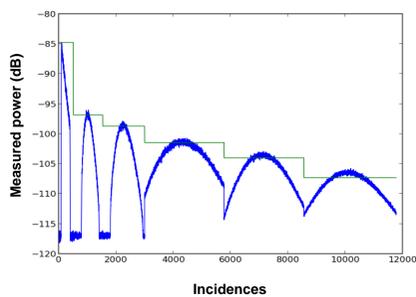


Fig. 6 – Illustration of the L0 products: blue lines are the measured power over the six beams and the green lines are the expected values from the budget link.

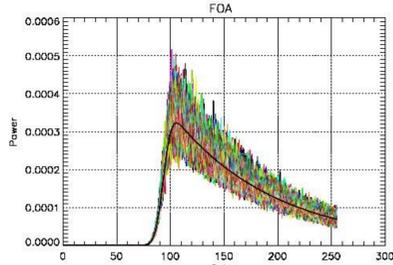


Fig. 9 – Focus on nadir beam (altimetric waveform for 20s of acquisition and corresponding Brown echo in black).

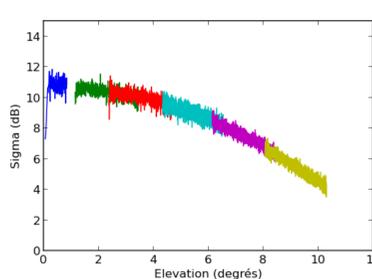


Fig. 8 – Illustration of the L1a products: backscattering coefficient for each range gate.

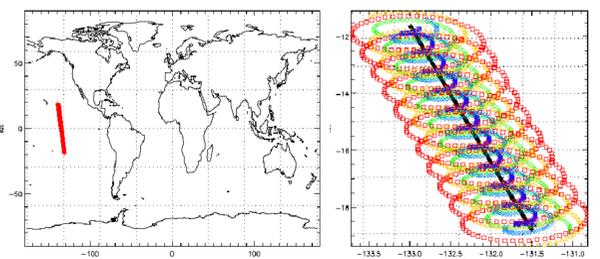


Fig. 5 – Geographical zone for simulation.

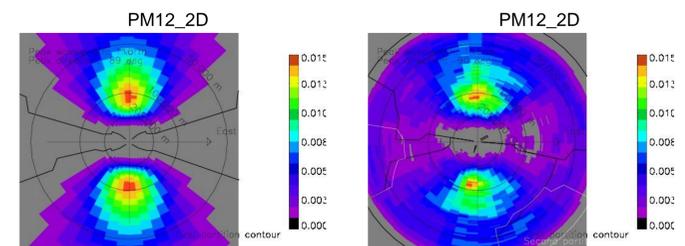


Fig. 9 – Examples of 2D modulation spectrum (L1b).

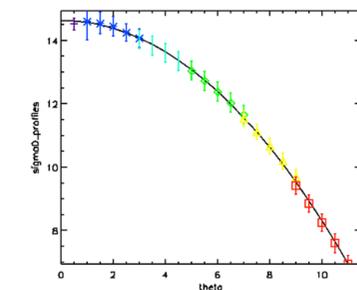


Fig. 10 – Illustration of the L2 σ_0 product for a 70 x 90 km box.

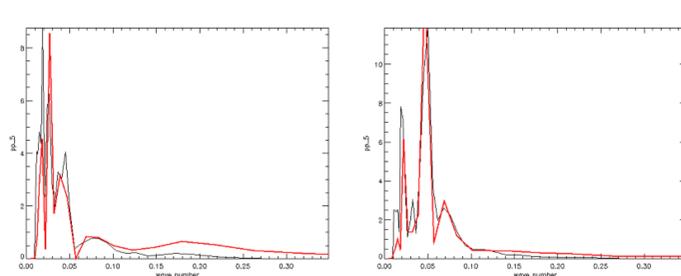


Fig. 11 – Example of omnidirectional wave spectra (L2b product). Red: reference spectrum, black: estimated spectrum.

References

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