AVISO+
Satellite Altimetry Data

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Jason-3 Special Issue

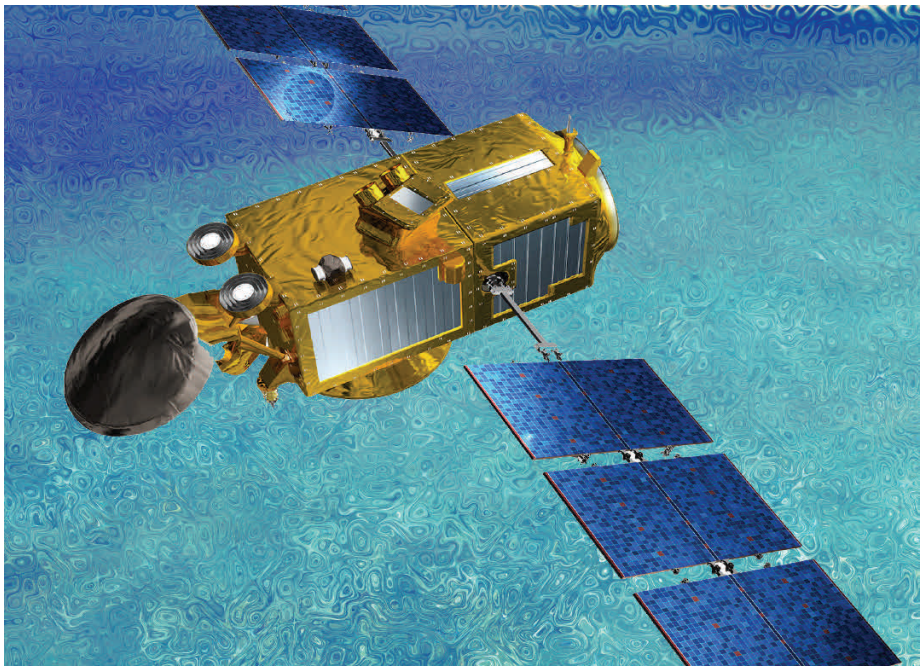
Jason-3 mission returns first data

Just over a month after its launch, Jason-3—the latest satellite in the Topex/Poseidon - Jason series—has produced its first complete map of global sea surface height anomalies, capturing the signal of the 2015-16 El Niño. The map was generated from the first 10 days of data collected once Jason-3 had reached its operational orbit of 1,336 kilometres on 12 February. It shows the continuing evolution of the ongoing El Niño event that began early last year. After peaking in January, the high sea levels in the eastern Pacific are now beginning to decline.

Launched on 17 January from California's Vandenberg Air Force Base, Jason-3 is operated by the National Oceanic and Atmospheric Administration (NOAA) in partnership with the US National Aeronautics and Space Administration (NASA), the French space agency (Centre National d'Etudes Spatiales CNES) and the European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT). Immediately after being injected into orbit by the Space-X launcher, the satellite came under the control of teams at the Toulouse Space Centre, who successfully switched on all the Proteus bus systems and spacecraft instruments. Over the past several weeks, mission controllers have activated and checked out Jason-3's systems, instruments and ground segment, all of which are functioning properly. They also manoeuvred Jason-3 into its operational orbit, where it is now flying in formation with Jason-2 along the same orbit, approximately 80 seconds apart.

The two satellites will take near-simultaneous measurements over the mission's six-month checkout phase to allow engineers to precisely calibrate Jason-3's instruments.

Developed by CNES and Thales Alenia Space, Jason-3 is built around a Proteus spacecraft bus. The main mission instrument is the Poseidon-3B altimeter built by Thales Alenia Space, which measures the range from the satellite to the ocean surface. It is also carrying an advanced microwave radiometer (AMR) to measure emitted radiation, a GPS payload (GPSP) and a laser retroreflector array (LRA)—all three developed by NASA/JPL—along with a CNES-designed DORIS orbit determination system, the CARMEN 3/AMBRE instrument also supplied by CNES and the Light Particle Experiment supplied by the Japan Aerospace Exploration Agency (JAXA), which



will be tasked with characterizing the satellite's radiation environment.

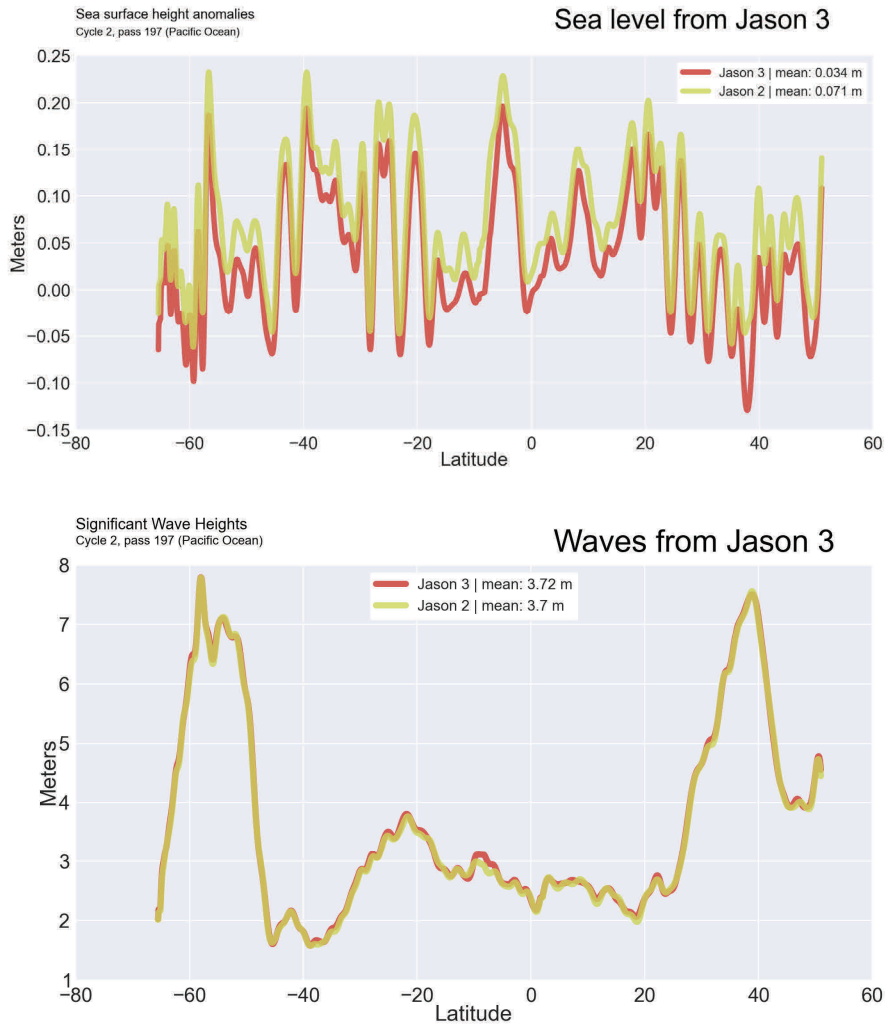
Jason-3 is currently being calibrated and validated. Comparisons are made with Jason-2, using *in situ* data in addition to statistical analysis within Jason-3 data (crossover comparisons in particular). The results are very good, though ongoing investigations will further this validation.

Once Jason-3 is fully calibrated and validated, it will begin full science operations, precisely measuring the height of 95 percent of the world's ice-free ocean every 10 days and providing oceanographic products to users around the world like its predecessors, and in full continuity with them. Jason-2 will be moved into a new orbit around August or September 2016 so that its ground tracks lie halfway between those of Jason-3. This move will double coverage of the global ocean and improve the spatial resolution of multi-mission altimetry data (Ssalto/Duacs data distributed by CMEMS and Aviso) by providing more measurements. This tandem mission, like the Jason-1 & Jason-2 one previously, the Topex/Poseidon &Jason-1 tandem before that, will improve our understanding of ocean currents and eddies and provide better information for forecasting them throughout the world's oceans.

Jason-3 will continue the reference altimetry mission for the Copernicus Marine service. During the commissioning of the recently-launched Sentinel-3A, its SRAL altimeter will be calibrated against the Jason-2 and -3 missions. Taken together, these missions will help not only to monitor large-scale changes in the ocean but also those at smaller scales, especially taking into account the unprecedented constellation now available, with no less than six different altimetry satellites currently in orbit, namely Jason-2, Cryosat, Saral, HY-2, Jason-3 and Sentinel-3A.

Information from Jason-3 will be used to monitor climate change and track phenomena like El Niño. Like its predecessors, it will also enable more accurate weather, ocean and climate forecasts. Jason-3 data will also be used for operational applications, including the monitoring of deep-ocean waves; forecasts of surface waves for offshore operators; and forecasts of currents for commercial shipping and ship routing.

Jason-3 data will be processed by EUMETSAT, CNES and NOAA, with NASA providing long-term expertise on altimetry and radiometry. EUMETSAT is responsible for data services to users of EUMETSAT and EU Member States on behalf of the EU Copernicus Programme. Data access in Europe will be secured via the multi-mission infrastructure available at EUMETSAT and CNES, including EUMETSAT's EUMETCast real-time data dissemination system, Earth Observation Portal and archives, as well as the CNES/AVISO data distribution centre.Jason-3 is the result of an international partnership between EUMETSAT, CNES, NOAA, NASA and the European Union, which funds European contributions to Jason-3 operations as part of its Copernicus Programme. Within Copernicus, Jason-3 is the reference mission for sea surface height and the precursor to the future cooperative Sentinel-6/Jason-CS mission also implemented in partnership between Europe and the United States.



Sea level anomalies and Significant wave height difference for Jason-3 versus Jason-2, pass 197 cycle 2

Jason-3 launch sequence and first data

Falcon9 with Jason-3 onboard on its launch pad

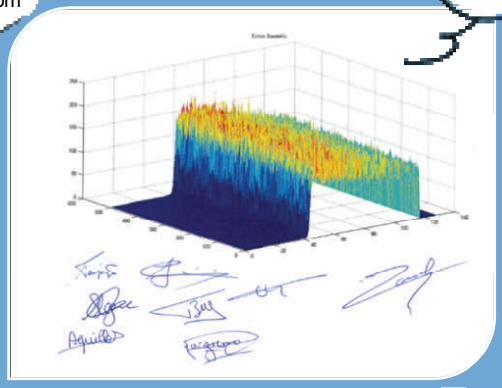
T0-10 min

T0 (2016/01/18, 18:42 UTC Jason_3_lift-off

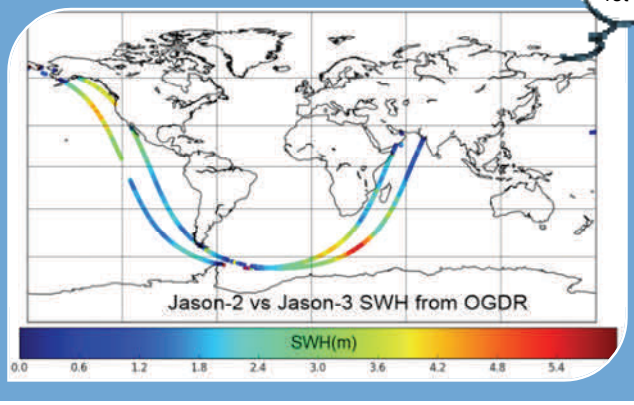
T0 + 10 s

T0 + 1h J3 CNES Control room

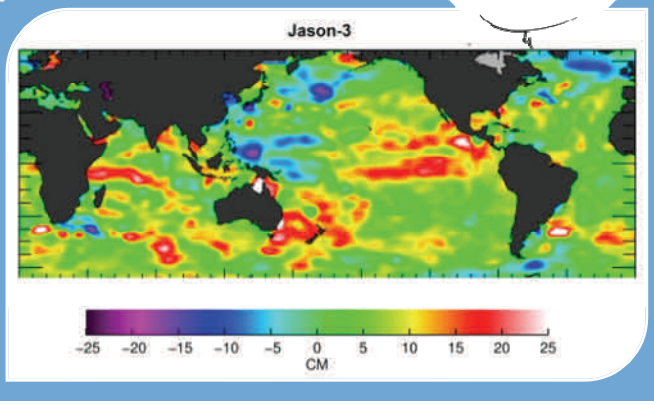
D + 1 J3 1st waveforms

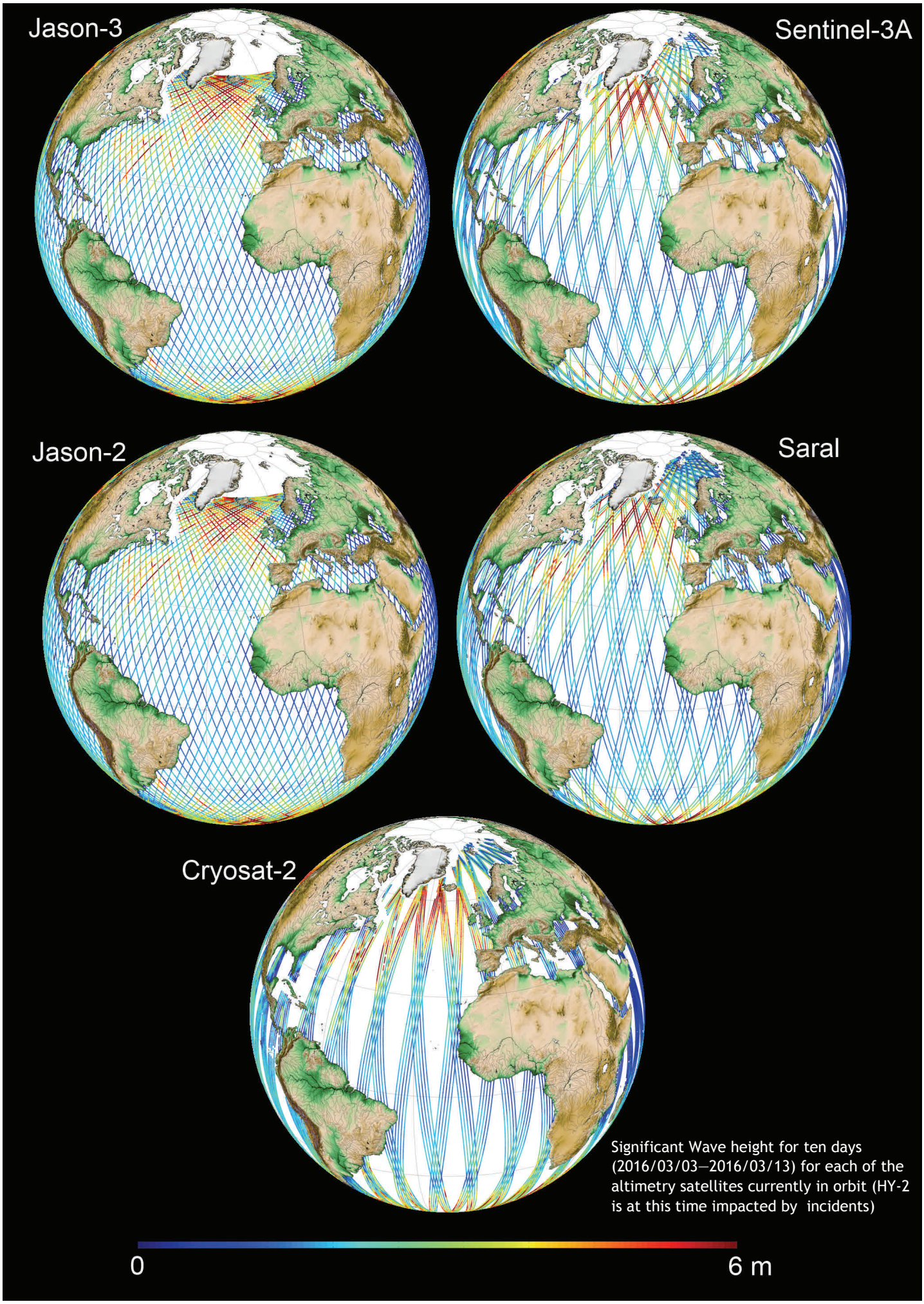


D + 2 J3 1st map

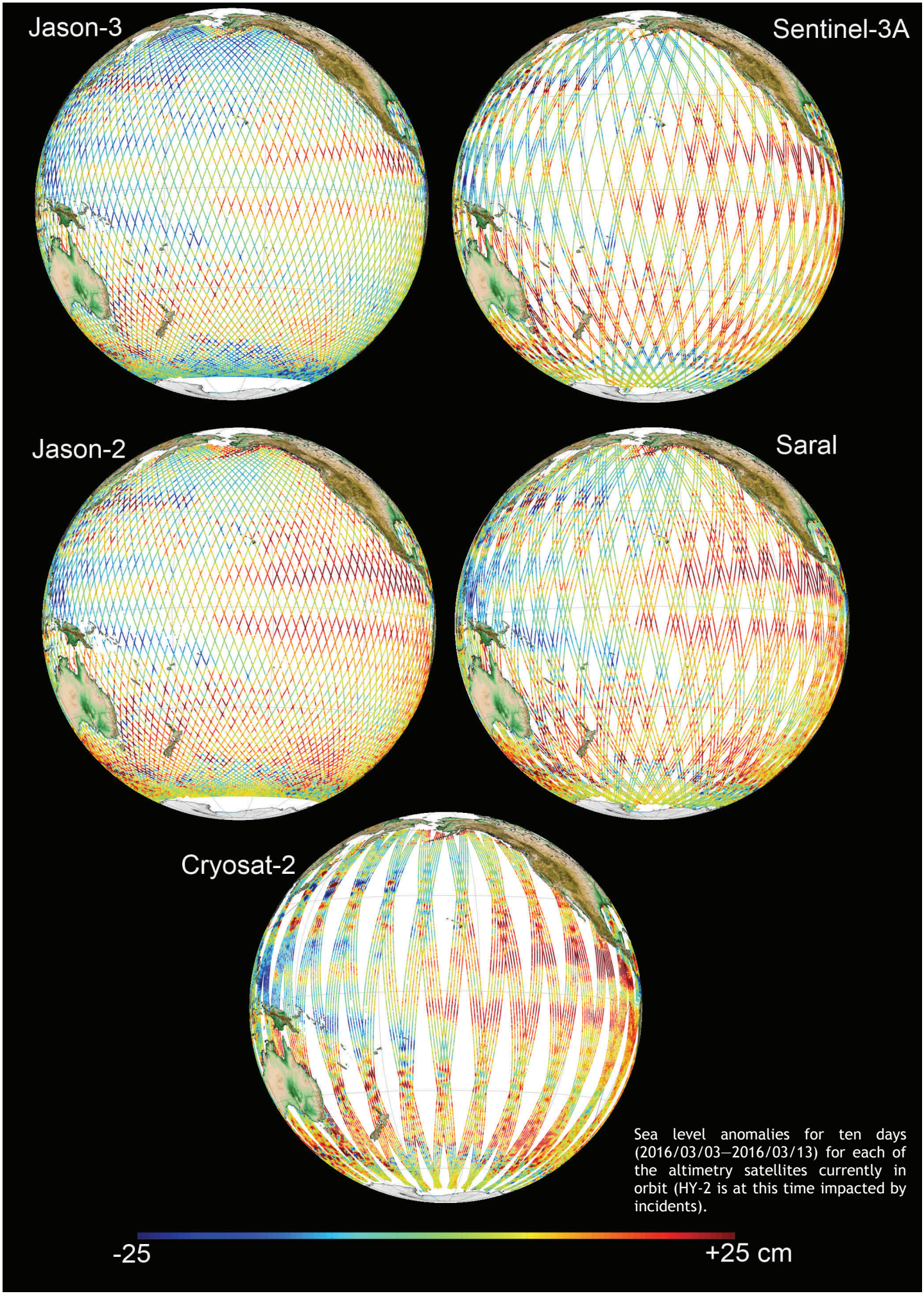


Feb.17: first complete map





Significant Wave height for ten days (2016/03/03—2016/03/13) for each of the altimetry satellites currently in orbit (HY-2 is at this time impacted by incidents)



Sea level anomalies for ten days (2016/03/03—2016/03/13) for each of the altimetry satellites currently in orbit (HY-2 is at this time impacted by incidents).