

## IMOS and Space

National research infrastructure supporting and delivering satellite-derived ocean observations

The Australian Civil Space Strategy 2019-2028 identifies satellite-derived Earth and marine observations as one of Australia's key areas of space capability. These types of observations are estimated to be worth \$20.2b to the Australian economy.<sup>1</sup> Through our Satellite Remote Sensing Facility, IMOS data collection and delivery includes sea surface temperature, altimetry (ocean height), ocean colour, surface waves, and wind speed and direction. IMOS capability, which works to calibrate and validate observations in situ, is critical to international space missions such as PACE, SWOT and Sentinel-6.

## IMOS Impact

IMOS' satellite remote sensing data support an increasing number of research papers and projects, the applications of which span the improvement of operational models for vessel navigational safety and efficiency; understanding extreme events in the Pacific; and monitoring and management of the Great Barrier Reef World Heritage Area.



Satellite detection of oil spills in the Great Barrier Reef using the Sentinel-1, -2 and -3 satellite constellations - a technical assessment of a synergistic approach using SAR, optical and thermal information. DOI: [10.25919/5e46e030e3029](https://doi.org/10.25919/5e46e030e3029)



Severe Flooding in the Atoll Nations of Tuvalu and Kiribati Triggered by a Distant Tropical Cyclone Pam. DOI: [10.3389/fmars.2020.539646](https://doi.org/10.3389/fmars.2020.539646)



Global Wave Height Trends and Variability from New Multimission Satellite Altimeter Products, Reanalyses, and Wave Buoys DOI: [10.1029/2019GL086880](https://doi.org/10.1029/2019GL086880)



IMOS' New Technology Proving capability supports the development of new and innovative satellite remote sensing products, including wind-wave scatterometer data products that help inform operational knowledge of ocean conditions; and satellite ocean colour products which will help with supporting Australia's food security.

<sup>1</sup>Current and future value of earth and marine observing to the Asia-Pacific region, Australian Government | Asia-Pacific Economic Cooperation.

# IMOS Research Infrastructure Capability

## IMOS contributions to international space missions

Alongside its open-access satellite-derived products, IMOS' Satellite Calibration and Validation sub-Facility provides the only Southern Hemisphere calibration data stream to the various international mission agencies. These agencies include NASA and NOAA (United States), CNES (French), and EUMETSAT (European Union), who are part of the Ocean Surface Topography Science Team. This critical infrastructure is located in Bass Strait, off the northwest coast of Tasmania.

Satellite calibration and validation underpins the accuracy of global mean sea level measurements, which in turn leads to critical information for decision-makers from countries with low lying areas at risk to inundation and those with large coastal populations.



Land based global navigation satellite system (GNSS) reference station on Three Hummocks Island that forms part of IMOS' satellite calibration and validation infrastructure.

## Sentinel-6 and SWOT Missions

The Bass Strait site provides calibration for the newly launched European Space Agency's Sentinel-6 satellite (Nov 2020). This ocean-monitoring satellite has a vital role to play in understanding climate change and sea level.

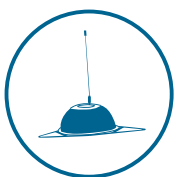
IMOS calibration and validation is also relevant to the new NASA and French National Centre for Space Studies (CNES) Surface Water Ocean Topography mission that will provide the first global survey of Earth's surface water. This mission will observe fine details of the ocean's surface topography and measure how water bodies change over time. NASA selected the satellite track for the Surface Water Ocean Topography mission based on the location of the IMOS Bass Strait calibration site, and the IMOS team is recognised for their world-class expertise in assisting with satellite measurements and missions.

## Other IMOS Facility data streams contributing to observing the ocean from space



Measuring the colour of the oceans is crucial for understanding marine ecosystems, their productivity and health. IMOS ocean colour measurements help quantify ocean productivity which is the basis of marine food webs, thus providing valuable information to fisheries and environmental managers.

IMOS infrastructure off the WA coast will contribute to the Southern Hemisphere validation and calibration of the NASA Plankton, Aerosols, Clouds and Oceans Ecosystems (PACE) satellite mission.



Data from IMOS wave buoys is delivered to the Australian Ocean Data Network (AODN). Their in situ role to calibrate and validate the accuracy of wave observations collected by international satellite missions is used to ensure operational wave forecasts and models are precise. Observations from these buoys have a dual role and are also used by anglers, surfers and recreational boaters to assess local conditions.