

About the CRYO2ICE Campaign

What

In 2020, a campaign called CRYO2ICE took off, where ESA raised the orbit of its CryoSat-2 satellite, to periodically align with NASA's ICESat-2 — a total novelty of collaboration between the two space agencies

Who

ESA's Flight Dynamics team and Mission Control facility in Darmstadt, Germany, planned and executed the manoeuvres with support from ESA's Space Debris Office and the Payload Data Ground Segment

How

To reach this goal, CryoSat-2's semi-major axis had to be increased by 887 metres through a series of 14 manoeuvres

Why

The campaign's aim was to achieve a partial space coincidental ground-track every 19th revolution of CryoSat-2 and every 20th revolution of ICESat-2—**allowing data in the polar areas to be collected by the two satellites, within a few hours of each other.**

Through a small orbit change, CryoSat-2 and ICESat-2 pass over the same areas nearly simultaneously, originally over the Arctic, and then the Antarctic as of June 2022. The near-simultaneous acquisitions provide **radar and lidar measurements of the same ice—an innovative type of dataset**



Coverage

When the campaign first started, observations occurred every three hours. **In July 2022, the orbital plane separation reached 25 degrees, constituting a time difference of about 1 hour and 40 minutes between observations.** This means that in late 2024/early 2025, it will bring quasi-synchronous, co-spatial coincidences

Benefits

The resulting measurements will allow scientists to calculate snow depth from space on both sea and land, improving:

- The accuracy of sea ice thickness measurements and ice-sheet elevation time series
- Mapping of snow over the poles
- Our understanding of currents in polar oceans
- Further applications in the study of inland waters and the atmosphere
- Ultimately improving the understanding of the ongoing changes in the cryosphere due to climate change

Quasi-synchronous orbit

near-simultaneous acquisitions provide **radar and lidar measurements of the same ice**

Future

The campaign will continue for as long as the satellites remain in a coincident orbit

Data Access: cs2eo.org/