



Overview and Status of the Copernicus Polar Ice and Snow Topography Altimeter candidate mission

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Evolution in Europe's Copernicus Programme and the Copernicus Space Component (CSC) is foreseen in the mid-2020s to meet priority user needs not addressed by the existing infrastructure, and/or to reinforce existing services by adding monitoring capability in the thematic domains of CO₂, polar, and agriculture/forestry. This evolution will be synergetic with the enhanced continuity of services provided by the next generation of Copernicus Sentinels (-1,-2, -3, -6), in Copernicus 2.0.

This presentation gives an overview of the scientific/user and technical requirements for the Copernicus polar Ice and Snow Topography Altimeter (CRISTAL) High Priority Candidate Mission (HPCM) currently undergoing Phase A/B1 preparatory study by the European Space Agency (ESA).

The primary objectives of the candidate mission are:

1. To measure and monitor variability of Arctic and Southern Ocean sea-ice thickness and its snow depth. Seasonal sea-ice cycles are important for both human activities and biological habitats. The inter-annual variability of sea ice is a sensitive climate indicator; it is also essential for long-term planning of any kind of activity in the polar regions. Knowledge of snow depth will lead to improved accuracy in measurements of sea ice thickness and is valuable input for forecast models. On shorter timescales, measurements of sea-ice thickness and information about Arctic Ocean sea state are essential support to maritime operations over polar oceans.
2. To measure and monitor the surface elevation and changes therein of glaciers, ice caps and the Antarctic and Greenland ice sheets. The two ice sheets of Antarctica and Greenland store significant amounts of fresh water and are important for climate change which today have become the primary contributors to sea level. Monitoring grounding-line migration and elevation changes of floating and grounded ice sheet margins is important to identify and track emerging instabilities, which can negatively impact the stability of the ice sheets and result in future sea-level rise.

The mission also has several secondary objectives: a) to contribute to the observation of global-ocean topography as a continuum up to the poles; b) to support applications related to coastal and inland waters. Observation of water level at the (Arctic) coast as well as of rivers and lakes is a key quantity in hydrological research; c) to support applications related to high latitude snow cover and permafrost.