Cryosat carries the first radar altimeter of its kind to overcome the difficulties intrinsic to measuring icy surfaces. The instrument is able to determine the thickness of ice floating in the oceans and monitor changes in vast ice sheets on land, particularly around the edges where icebergs are calved.

To make comprehensive observations of the polar regions, Cryosat flies in an unusually high-inclination orbit that takes it very close to the poles. Cryosat reaches latitudes of 88° north and south, improving coverage compared to other Earth observation missions.

Images show differences in Arctic ice cover, summer and winter 1980 and 2007.
The family of Earth Explorer missions focuses on the science and research elements of ESA’s Living Planet Programme. Driven by the needs of the scientific community, the Earth Explorers are designed to provide data to understand Earth system variables. This will advance our knowledge of the impact that human activity has on natural processes and habitats.

Our changing Earth

There is little doubt that the temperature on Earth is rising due to increased concentrations of greenhouse gases in the atmosphere. Evidence strongly suggests that such warming is having a profound influence on natural processes and habitats. Ice plays an important role regulating climate and sea level; the consequences of change, therefore, are far-reaching. By measuring very precisely the variations in the thickness of ice on land and floating in the oceans, the CryoSat mission will lead to a better understanding of the complex interactions between ice, climate and sea level.

Climate and Ice

The orbit of CryoSat reaches latitudes of 88°, taking the satellite closer to the poles than earlier missions. Observations will, therefore, result in an additional area of about 4.6 million km² being covered. This extra coverage amounts to an area larger than all 27 European Union member countries.

CryoSat-2 is launched by a Dnepr rocket from the Baikonur Cosmodrome in Kazakhstan. Unusually, the upper stage flies backwards before releasing the satellite.

With the effects of a changing climate fast becoming apparent, it is increasingly important to understand exactly how Earth’s ice fields are responding. The advanced observation techniques being employed by the CryoSat mission will provide clear information on ice-thickness change and lead to a better understanding of the role ice plays in the Earth system.