Countdown to satellite launch

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The first satellite to accurately measure how fast the Earth's polar ice caps are shrinking will be launched this weekend (on Saturday, October 8) and one of the lead researchers is from the University of Aberdeen.

Reports of record lows for the extent of Arctic sea ice precede the launch of CryoSat, the European Space Agency satellite. The mission is set to address one of the most hotly debated issues in the environmental science community – how quickly are the ice caps thinning?

The three-year mission, scheduled to blast off from the Khrunichev Space Centre, Plesetsk, Russia, was proposed by UK scientist, Professor Duncan Wingham from the Natural Environment Research Council's Centre for Polar Observation and Modelling. Dr Douglas Mair, Lecturer in Physical Geography, Department of Geography and Environment, University of Aberdeen, is a co-Principal Investigator of this NERC-funded consortium of UK polar scientists who are currently involved in research to validate satellite measurements of changes in polar ice cover and thickness.

Dr Mair explains: "A major part of this mission involves making accurate in-situ measurements of spatial and temporal variations in the structure of the surface layers of the ice sheet from ice cores, snow pits, neutron-probes and ground radar measurements.

"Last year, myself and Julian Scott (a post-doc on the grant) carried out these measurements with colleagues from Edinburgh and Cambridge on the Greenland Ice Sheet, and Christina Bell (a PhD student on the grant)

did the same with colleagues from Canada on the Devon Ice Cap in the Canadian High Arctic. We spent over two months on the ice caps last year and at times the wind and cold can make simple tasks seem overwhelming, but in many ways it's a beautiful part of the world and there's real satisfaction in contributing to such an important project."

The new measurements are going to be taken by the European Space Agency's (ESA) latest satellite, CryoSat, which is due to be launched on Saturday. Ultimately, the satellite data aims to measure changes in global land and sea ice cover and thickness to determine how ice sheets, glaciers and sea ice will respond to climate change.

Science Minister, Lord Sainsbury, said: "CryoSat will be crucial to our understanding of one of our planet's most fragile areas. The UK's world-class science and innovative engineering has put us right at the heart of this cutting edge mission."

Dr Mair and his colleagues will repeat their experiments in Spring and Autumn of 2006. Using their measurements, Dr Mair and his collaborators will then be able to compare the satellite radar measurements of surface structure and elevation with ground-based measurements thereby validating the satellite data with unprecedented accuracy.

Professor Wingham said: "The great difficulty at present is to figure out whether changes in ice cover are due to melting or to changes in the winds that shift the ice around. The only way to do this is to examine the entire Arctic at the same time. CryoSat is the first satellite designed to do this job, and after six years in the making, we are really looking forward to getting our hands on the data."

The Natural Environment Research Council's Chief Executive, Professor Alan Thorpe, said: "We know the Arctic is one of the fastest warming

regions on the planet and that it is particularly sensitive to climate change. The reports of a major loss of Arctic sea ice cover in August and September only serve to highlight the importance of the three-year mission."

But, the satellite will do more than just measure Arctic sea ice: its orbit takes it over the major ice sheets – Antarctica and Greenland. Scientists will be able to use CryoSat data to accurately predict sea level rise caused by melting ice sheets.

CryoSat's altimeter, the primary instrument onboard, has the ability to measure ice sheets and sea ice with unprecedented accuracy. Until now satellites have been unable to monitor melting ice at the very point where it is most significant: at the ice edge. CryoSat's ability to do just that thrills scientists working in the field, while the altimeter's ability to pick out sea ice of around one kilometre in diameter will greatly improve annual melt estimations.

Meanwhile, UK industry has played a key role in the mission technology. For example, UK space software experts at SciSys developed the onboard application software that will be responsible for controlling the precise orbit and attitude of the spacecraft. It will also handle all communications with ground control.

Source: University of Aberdeen