INVESTIGATING THE USE OF CRYOSAT FOR RETRIEVING GLACIER TOPOGRAPHY OVER THE HIMALAYAS

Luca Foresta and Noel Gourmelen
School of Geosciences, University of Edinburgh, UK
luca.foresta@ed.ac.uk

Abstract – We investigate the ability of CryoSat (CS) interferometric (SARIn) mode to image glaciers over the Spiti Lahaul, western Himalaya, and the Karakoram range by modelling the intersection between the CS beam limited footprint and the Earth’s surface. Despite the large topographic range, CS is able to image over 50% of glaciated areas, mostly in the accumulation areas of the glaciers although lower areas in the ablation zone are also imaged. We find that the increased range window provided by the baseline C processor provides 7% more coverage than with baseline B.

Method – We simulate the CS beam footprint size and use the range calculated from SARIn L1B/L1C data to estimate the surface elevations probed by the SIRAL altimeter. Elevations are extracted from a SRTM-3 Digital Elevation Model. We then compare the mapped areas to the glaciers’ outline (source, RGI v4.0) and compute the percentage of area that the CS altimeter is able to monitor. We assess ascending and descending passes separately and we use an interval range of 120m (baseline B) and 240m (baseline C).

KARAKORAM – Intersection of the simulated CS baseline B footprint (orange) and glaciers’ outline (cyan) is shown in red. The E-W valley is mapped by the ascending pass (east) but not from the descending one (west). Black dots are CS L2 data. Background topography from SRTM. (Dehecq et al., 2013)

CONCLUSIONS
• CS SARIn data have the potential to map over 50% of mountain glaciers’ area, mostly in the accumulation zone
• Over the region of interest, the use of baseline C data should increase area coverage by about 7% w.r.t. to baseline B data

References: