



## **A new methodology for estimating snow depth over Arctic sea ice**

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Only satellite remote sensing can provide the pan-Arctic view required to fully understand changes to the Earth's sea ice fields. At present, important observational gaps remain which limit both our interpretation of remote-sensing data and our understanding of the Arctic climate system. Snow on sea ice represents both a major source of uncertainty in sea ice concentration and thickness retrievals from satellite data, and a poorly resolved quantity of climactic importance.

We hereby introduce the Dual-altimeter Snow Thickness product, (DuST) a new methodology which makes use of coincident satellite altimeter data to derive snow depth at high spatial and temporal resolution. In an initial stage, measured freeboards from each altimeter are calibrated with an independent ice freeboard measurement - in this study we use Operation IceBridge data - in order to derive a penetration factor for each satellite, i.e. a measurement of the degree to which each radar penetrates the snow (Armitage and Ridout, 2015). Once these penetration factors have been defined, their difference can be used to extrapolate snow thickness over the dual-satellite range.