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# Evaluation of PAZ satellite imagery for the assessment of intra-seasonal dynamics of permafrost coasts (Beaufort Sea, Canada)

**Carla Mora**[1], Gonçalo Vieira[1], Pedro Pina[2], Dustin Whalen[3], and Annett Bartsch[4]
[1]Universidade de Lisboa, CEG-IGOT, Lisbon, Lisbon, Portugal (carlamora@campus.ul.pt)
[2]CERENA, IST, University of Lisbon, Portugal
[3]Geological Survey of Canada, NRCAN, Dartmouth, Canada
[4]b.geos, Austria

Arctic permafrost coasts represent about 34% of the Earth's coastline, with long sections affected by high erosion rates, increasingly threatening coastal communities. Year-round reduction in Arctic sea ice is forecasted and by the end of the 21st century, models indicate a decrease in sea ice area from 43 to 94% in September and from 8 to 34% in February (IPCC, 2014). An increase of the ice-free season leads to a longer exposure to wave action. Monitoring the Arctic coasts is limited by remoteness, climate harshness and difficulty of access for direct surveying, but also, when using satellite remote sensing, by frequent high cloudiness conditions and by illumination. In order to overcome these limitations, three sites at the Beaufort Sea Coast (Clarence lagoon, Hopper Island and Qikiqtaruk/Herschel Island) have been selected for monitoring using very high-resolution microwave X-band spotlight PAZ imagery from Hisdesat. Bluff top, thaw-slump headwalls and water lines were digitised from images acquired during the ice-free seasons of 2019 and 2020 at sub-monthly time-steps. The effects of coastal exposure on delineation accuracy in relation to satellite overpass geometry have been assessed and coastal changes have been quantified and compared to meteorological and tide-gauge data. The results show that PAZ imagery allow for monitoring and quantifying coastal changes at sub-monthly intervals and following the evolution of coastal features, such as small mud-flow fans and retrogressive thaw slumps. This shows that high resolution microwave imagery has a strong potential for significantly advancing coastal monitoring in remote Arctic areas. This research is part of project Nunataryuk funded under the European Union's Horizon 2020 Research and Innovation Programme (grant agreement no. 773421) and of Hisdesat project Coastal Monitoring for Permafrost Research in the Beaufort Sea Coast (Canada).