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Timing of glacier retreat and spatio-temporal variations in the vertical deformation rate of the Horseshoe Island, Marguarite Bay, west Antarctic Peninsula

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The Antarctic Peninsula is uplifting rapidly due to the isostatic response to ice sheet unloading since the Holocene. Understanding the timing and rate of this process is crucial for addressing several key research questions: (1) exploring the elastic interactions between the mantle and lithosphere to improve Glacial Isostatic Adjustment (GIA) models, (2) assessing the contribution of the Antarctic ice sheet to Holocene global sea level rise, and (3) investigating the modern response of Antarctic ice sheets to climate change, helping to identify high-impact research areas for polar science.

We focus on stepped coastal terrace staircases formed at the Horseshoe Island, Marguerite Bay, west Antarctic Peninsula. We used low altitude UAS aided SfM mapping to measure the horizontal and vertical geometry of stepped terraces and deployed absolute dating methods (luminescence and radiocarbon) to establish their formation timelines for the east (Gaul Cove, #6 dates), north (Sally Cove, #2) and west (Lystad Bay, #2) of the island.

The field observations and achieved data explained the formation mechanisms and evolutionary steps of the terraces and pinpoint (1) the timing of deglaciation of the Island, (2) reconstruct a RSL curve for the Holocene and (3) variations in temporal and spatial vertical uplift rates. Our reconstructed RSL(s) fit the geometry of model curves proposed by Peltier (2004) and Whitehouse (2018) . However, there is an apparent discrepancy between our results and published estimations from coastal record of Antarctic Peninsula. This raises questions on the accuracy of dating or interpretation of the results for studies on stepped-coastal terraces. This presentation aims to represent analytical data to discuss these critical issues.

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