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Cold rock coast geomorphology: A quantitative analysis of rock coast processes in Hornsund.

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Many arctic coastal systems are experiencing altered thermal and hydrological regimes. Of particular note within the High Arctic is Svalbard, a region undergoing a distinct and sustained rise in mean annual temperatures. Hornsund, at the southern tip of the Svalbard archipelago, is situated at the northern extreme of the North Atlantic current and as such provides a site of unique climate sensitivity with a concentration of geomorphic processes. There is a paucity of studies achieving sufficient resolution to account for geomorphic behaviour and over timescales that allow climatic conditioning to be considered. This research utilises high resolution multiscale surface monitoring and characterisation to quantify and model both contemporary and relic cliff responses in order to revisit one of the first quantitative studies, undertaken almost sixty years ago, on the rates and intensities of rock coast change. The fragmentation and failure in contemporary coastal cliff responses reflects a decrease in the overall rates of change relative to historic rates during a period that has seen the loss of an icefoot that regularly lasted until late summer and a transition to open water coastal dynamics. To investigate the drivers of rock degradation and failure, thermal analyses that characterise both spatial and temporal patterns across and within the rock coast have been used to indicate a potential shift in process activity zones. The significance of localised influences such as storm influences, iceberg influxes and topographic shading highlights some considerations for the development of broader scale models of rock coast evolution.