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Investigation of Foehn Events on South Georgia Island using Meteorological Surface Data and GNSS Precipitable Water Vapour

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As one of the most important components of the global hydrologic cycle, atmospheric water vapor shows significant variability in both space and time over a large range of scales. This variability results from the interactions of many different factors, including topography and the presence of specific atmospheric processes. One of the key regions for affecting global climatic variations lies in the sub-Antarctic zone over the Southern Ocean with its Antarctic Circumpolar Current and the associated Antarctic Convergence. There, in this cold and maritime region, lies South Georgia Island with its weather and climate being largely affected by both the dominating ocean currents and the westerly winds in this zone. While the island forms an important outpost for various surface observations in this largely under sampled and extremely remote region, it also forms a barrier for these winds due to its high topography. This, in turn, leads to various local meteorological phenomena, such as warm Foehn winds, which have a significant impact on the near-surface meteorology and contribute to the accelerated glacier retreat observed for the northeast of the island.

Surface meteorological data have been available for several stations near King Edward Point (KEP) in South Georgia for much of the 20th century. Since 2013 and 2014, Global Navigation Satellite System (GNSS) data have been available at five locations around the periphery of the island. In this study, we investigate the consistency between the different surface meteorological data sets and along with GNSS Precipitable Water Vapour we use these to analyse historic Foehn events.