

The role of the foehn effect in the record maximum temperature (+19.8 degC) observed at Signy Island (South Orkney Islands) on 30 January 1982.

John King, Daniel Bannister, Scott Hosking, and Steve Colwell
British Antarctic Survey, Cambridge CB3 0ET, United Kingdom (jcki@bas.ac.uk)

Signy Island (60.7S, 45.6W) is one of the smaller islands in the South Orkney Islands group. A UK research station was established on the island in 1947 and operated as a year-round station until 1996, when it reverted to summer-only operation. A near-unbroken daily series of basic climatological observations is available for the period 1947-1996. Signy Island is low-lying, but is situated just a few km south of the much larger Coronation Island, which rises to over 1200 m elevation.

On 30 January 1982, a record daily maximum temperature of +19.8 degC was reported by the station. The average monthly maximum temperature for January at Signy Island is +9.9 degC and a maximum January temperature of +13 degC has only been exceeded in one year apart from 1982, making the 1982 record truly exceptional.

Examination of global reanalysis fields shows that this record temperature was associated with southward advection of an exceptionally warm air mass from the subtropical South Atlantic. However, during the southward passage of this air mass over the cold Southern Ocean, there was rapid cooling of the lowest kilometre of the atmosphere, leading to the formation of a deep stable layer with near-surface temperatures that were not exceptional for this region. At the time of the observed record temperature, the wind at 1 km had a strong northerly component and was thus blowing across the high topography of Coronation Island towards Signy Island. Using a high-resolution (1 km horizontal grid spacing) simulation made with the WRF model, we demonstrate that the flow across Coronation Island generated a foehn flow in the lee of Coronation Island that brought relatively unmodified warm air down towards the surface over Signy Island. We discuss this event within the context of the long-term climate records from this region.