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Weather types in the South Shetlands (Antarctica) using a circulation type approach

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Weather types in the South Shetlands (Antarctica) were defined using an automated method based on the Lamb Weather Type classification scheme (Jones et al. 1993). This is an objective classification originally developed for the British Isles (Jones et al., 1993) and also applied to southeast (Goodess and Palutikof 1998) and northwest Spain (Lorenzo et al, 2009), Portugal (Trigo and DaCamara 2000) and Greece (Maheras et al. 2004) with good results.

Daily atmospheric circulation in the South Shetlands region from 1989 to 2009 was classified using a 16-node grid of sea level pressure data from the ERA Interim. The classification is obtained through the comparison of the magnitudes of the directional and rotational components of the geostrophic flow. Basic circulation types were combined into 10 groups of weather types: four directional types (NW, N, S and SW), three anticyclonic types (A, ASW and ANW), and three cyclonic types (C, CSW and CNW). Westerly flow and cyclonic circulation are the most frequent events throughout the year.

The sea level pressure field for each weather type is presented and the synoptic characteristics are described. The analysis is based on ERA-Interim fields, including mean sea level pressure, precipitation, cloud cover, humidity and air temperature. Snow thickess modelled using HTESSEL is also considered. Analysis of variance (anova) and multivariate analysis (principal component analysis) are applied to evaluate the characteristics of each weather type.

This circulation-type approach showed good results in the past for the downscaling of precipitation in other regions, and we are interested in evaluating the possibilities that the classification offers for downscaling precipitation, but also for snow and air temperature. For this we will be using observational data at test sites in Livingston and Deception islands. We are also motivated by the possibility of using the circulation-type approach as a predictor in statistical downscaling.

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