



Two decades of Automatic Weather Station Observations in East Antarctica

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Since 1995, the Institute for Marine and Atmospheric research, Utrecht (IMAU), in collaboration with, among others, the British Antarctic Survey (BAS) and the Alfred Wegener Institute (AWI), has operated Automatic Weather Stations (AWS) in Antarctica. A total of 19 stations is or has been operational, of which 15 are/were situated in East Antarctica, i.e. on Berkner Island and in Western Dronning Maud Land (DML). The remaining four are/were located on the ice shelves in the eastern Antarctic Peninsula. The obtained meteorological records are fairly complete and between 4 and 20 years long. The observed quantities include air temperature, relative humidity, wind speed, air pressure, the short- and longwave radiation components and snow temperatures. These data are used to study the temporal and spatial variability and changes in the climate of these regions. We use output of the regional climate model RACMO2.3 to interpret spatial and temporal patterns, and perform hierarchical cluster analyses to characterise the climate at individual sites.

For the inland sites the results clearly show the relation between the (mostly negative) radiative balance, the surface temperature inversion and katabatic winds. The hierarchical cluster method illustrates that the extremes in wind speed are not katabatic in nature, but synoptically forced, and that these high wind speeds coincide with relatively high temperature, specific humidity and cloud cover. The two sites with records over 10 years long show a significant increase in annual mean 2 m temperature of about 1°C/decade. Three other stations in DML also show an increase in annual mean 2 m temperature, although these are not significant. These results are corroborated by RACMO2.3 model output, which also shows an increase in 2 m temperature in western DML over the past two decades, with the largest warming on the plateau. The trend decreases or even reverses towards the coast and towards eastern DML.