HYDRANT

The atmospheric branch of the hydrologic cycle in Antarctica

Duration of the project:	Research budget:
	Campaign budget:

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Over the recent decade we have been witnessing an increasing contribution of the melting of Greenland and Antarctic ice sheets to the sea level rise. Our ability to predict what will happen to the ice sheets in the (near) future depends largely on our knowledge of snow accumulation in the interior of the ice sheet and the ice discharge into the ocean by glaciers and ice streams at the ice sheet edge. These two competing processes determine the total mass balance of Antarctica.

Our project focuses on the hydrologic cycle of Antarctica with the goal of understanding all its stages - from the sources of water vapour, its transport, cloud formation and snowfall.

The response of the global climate to increased greenhouse gases will influence the largescale wind patterns in the atmosphere, and by this will affect the transport of moisture and heat into Antarctica. In the middle of all this stand clouds, as they are the "agents" by which the atmosphere passes the moisture to the ground in terms of the snow fall (from which the ice sheet is built) and also passes the heat to the ground via the greenhouse effect. Because we lack the "ground-truth" for both clouds and precipitation properties in Antarctica, the first stage of our project is to do detailed measurements of these two end-components of the hydrologic cycle. The next stage will be to combine our measurements with regional climate model simulations to understand the large-scale processes behind them, i.e. the large-scale wind patterns in the atmosphere and transport of the heat and moisture.

With these goals in mind, we started to establish long-term observations of clouds, precipitation and meteorology at the new Belgian Antarctic station Princess Elisabeth.

In February 2009 we installed an Automatic Weather Station measuring temperature, pressure, wind, radiation, snow height, and snow temperature data. Detailed cloud and precipitation measurements followed during the two months January-February 2010 using advanced meteorological equipment (ceilometer, pyrometer and precipitation radar), which gave us cloud height and temperature, and snowfall profiles in the atmosphere.