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The climate of Ulvebreen, Svalbard

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In August 2015 an automatic weather station (AWS) was placed on Ulvebreen, Svalbard as part of the Netherlands Scientific Expedition Edgeøya Spitsbergen (SEES.nl). Ulvebreen is a glacier on the Central East coast of Spitsbergen. The AWS is located at ∼135 m a.s.l., about 2 km from the glacier front. The station measures air temperature, wind speed and direction, relative humidity, air pressure, and short and long wave incoming and outgoing radiation. In addition, the station is equipped with a sonic height ranger in combination with a draw wire to measure snow accumulation and ice melt, respectively. The AWS observations can be used for in situ studies of the climate and surface energy balance of Ulvebreen, in addition to being used for evaluation of model and satellite products.

The AWS site is located in the ablation area and experiences about 1.5 to 2 m snow fall in winter and 1.6 to 1.8 m ice melt in summer. The average annual temperature at the site is ∼-3.8°C, which is ∼2.8°C lower than measured at Svalbard airport, Longyearbyen, and can only partly be explained by the elevation difference. The remaining difference is explained by the fact that in summer the temperature of the surface is limited to the melting temperature of ice, and by to the location of the AWS on the eastern side of Spitsbergen where the influence of the North Atlantic drift is smaller and the amount of sea ice in winter larger. Annual mean wind speed is ∼4.8 ms^{-1} and is predominantly from the North or South West. The South west flow coincides with the downslope direction of Buckfallet, a tributary of Ulvenbreen and is of katabatic nature. The Northern flow is more influenced by the large scale circulation and is relatively cold in summer.

The AWS observations can be used to calculate the individual surface energy fluxes using a surface energy balance model. First results show that from all energy fluxes, net radiation contributes most to melt, up to 80% of the melt energy is provided by the net short wave radiation. This is not unexpected given the low surface albedo of the ice (∼0.3).