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## ABSTRACT

### **The aeolian processes observations in Ebba valley (central Spitsbergen), 2010-2015**

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Studies of aeolian processes have a long history, but there are still some issues that have not been fully resolved yet. Provided for this scientific investigation tasks were designed to verify hypotheses concerning the important role of niveo-aeolian and aeolian processes in periglacial environment modelling. Studies were focused mostly on the accumulation of the wind transported sediments but also include problems of existing aeolian covers and landforms generation, their wind erosion and degradation. They answer to the following research questions: What is the overall rate of the sediments accumulated by wind activity in periglacial environment during one year time span? How different climatic and local factors can affect the niveo-aeolian and aeolian accumulation? What is the degradation and aggradation rate of the existing niveo-aeolian and aeolian covers and features in areas characterized by dry polar climate variant? What is the possible origin of accumulated sediments and how wind transportation affects its components?

Ebba valley is located in central Spitsbergen and is perpendicular to the eastern coast of Petunia Bay. The analyzed area is characterized by relatively large variety of sediments and landforms. Typical for the mouth section of the valley are raised marine terraces. For this part of Svalbard archipelago dry polar climate type is distinctive. The mean annual temperature in the region is about -6.5°C. In relation to the other areas of Spitsbergen, the values of annual precipitation are relatively low. Snow cover is usually not thick. There is a dominance of southern and north-eastern winds. However, maximum wind speed gusts were observed from the east, north and north-west.

To measure the aeolian accumulation mostly modified MDCO catchers (marble dust collector) were used. Originally they consists of a plastic tray with two layers of glass marbles. In this research the glass marbles were replaced by washed beach coarse material. Measurements were conducted on nine research sites. Aeolian deposits samples were collected from the ground surface, pits made in the niveo-aeolian and aeolian covers and from the sediment collectors localised throughout the valley. Grain size composition was established on the basis of the standard dry-sieve method.

Results of the research in Ebba valley show that average wind velocities for summer periods amounted to  $4 \text{ ms}^{-1}$ , with wind gusts exceeding  $20 \text{ ms}^{-1}$ . It means that wind reaches morphologically effective velocities (greater than  $5 \text{ ms}^{-1}$ ) only temporally. Generally winds from the south-west dominated. However, the biggest amount of aeolian sediments was not transported from the south-west but from the north (38%), northeast (28%) and northwest (18%), so from the direction where strongest winds were observed. Moderately well sorted fine sands were mainly transported and there was a domination of 0.125 mm fraction within the deposited material. Aeolian accumulation rates during the summer periods 2012 - 2014 varied (depending mostly on morphological and vegetation cover situation) from 3 to  $1713 \text{ gm}^{-2}$ . Analysis of the snow cover indicate the importance of autumn periods, when dried up material is more susceptible for wind transportation.