# FORMATION OF THE CLIMATIC SIGNAL OF THE ISOTOPIC COMPOSITION OF PRECIPITATION IN CENTRAL ANTARCTICA

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Water isotopes are key proxies to reconstruct past climatic conditions on our planet based on Antarctic ice core data. The accuracy of climate reconstructions depends on understanding the whole range of the processes involved in the formation of precipitation isotopic composition, such as water evaporation in mid-latitudes of Southern Hemisphere, moisture transport poleward, condensation in liquid and mixed clouds and kinetic effects during the growth of ice crystals. The isotopic composition of precipitation in Central Antarctica has been studied and mentioned in many works but the difference between the isotopic composition of different types of precipitation has not yet been fully described.

In this work, we analyze the isotopic composition of precipitation (diamond dust, snow from clouds or hoar) that has been collected at Vostok station in Central Antarctica during two full annual cycles (2000 and 2017) and several summer seasons between 1999 and 2020. For each precipitation event we have meteorological data, averaged for the time of precipitation.

We studied the effect of blizzards on the isotopic composition of selected samples and concluded that one should avoid using data collected during a blizzard to study the differences in the formation of the isotopic signal for different types of precipitation. Mean values of δD for each precipitation type were defined as follows: – 444±6.5‰ for diamond dust, – 480± 6‰ for hoar and – 395±11‰ for snow. The seasonal variability of the isotope dependence on temperature was investigated using ice needles (diamond dust) as an example. In winter, according to our data, this dependence is insignificant but this needs to be confirmed by extended dataset. An attempt has been made to identify the relationship between isotopic composition and other meteorological parameters such as pressure or wind direction, and it is found that, based on our database, that the relationship between these parameters is negligible. Measurements of 17O-excess on an event basis at Vostok station show a strong correlation between 17O-excess and δ18O and clear anticorrelation between dxs and δ18O. Samples with negative dxs were further investigated using a Simple Isotopic Model (SIM).

This work brings us closer to understanding how the isotopic composition is formed in each type of precipitation and what information it provides us with. This will help for a more accurate interpretation of the isotope signal from ice cores.