IMC Innsbruck 2019
International Mountain Conference

Ural Federal University

Isotopic composition of atmospheric precipitation as input parameters for climate modelling and paleoreconstruction in Altai Mountains

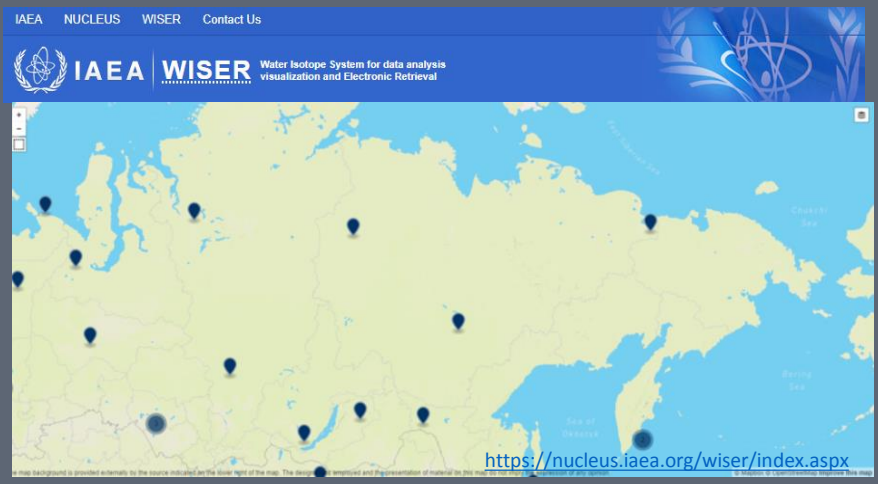
Malygina Natalia[1], Eirikh Alla[1], Papina Tatiana[1], Gribanov Konstantin[2], Denisova Nina[2]
[1]Institute for Water and Environmental Problems, Siberian Branch of the Russian Academy of Sciences
[2]Institute of natural sciences and mathematics, Ural Federal University
natmgn@gmail.com

IMC Innsbruck 2019
International Mountain Conference

Ural Federal University

Several climate models use the two stable water isotopologues (HDO and $H_2{}^{18}O$) to simulate climate water cycles in global and regional scales. These isotoplogues are also used in paleoclimatic reconstructions based on ice core, speleotherm and other archives.

Altai Mountains is a large mountains region located in center of Eurasia, and is extended for more than 1200 km from the north to the south, where contrasting air masses interact



Very few GNIP stations in North Asia

Climatic modelling and paleoreconstructions are especially difficult in mountain regions, since meteorological parameters (including isotopologues of atmospheric precipitation) are known with insufficient spatial resolution for these regions, especially in North Asia.

In this study we present the results of isotopic composition measurements for atmospheric precipitation and snow cover sampled in foothills of Altai during 2014-2018.

IMC Innsbruck 2019
International Mountain Conference

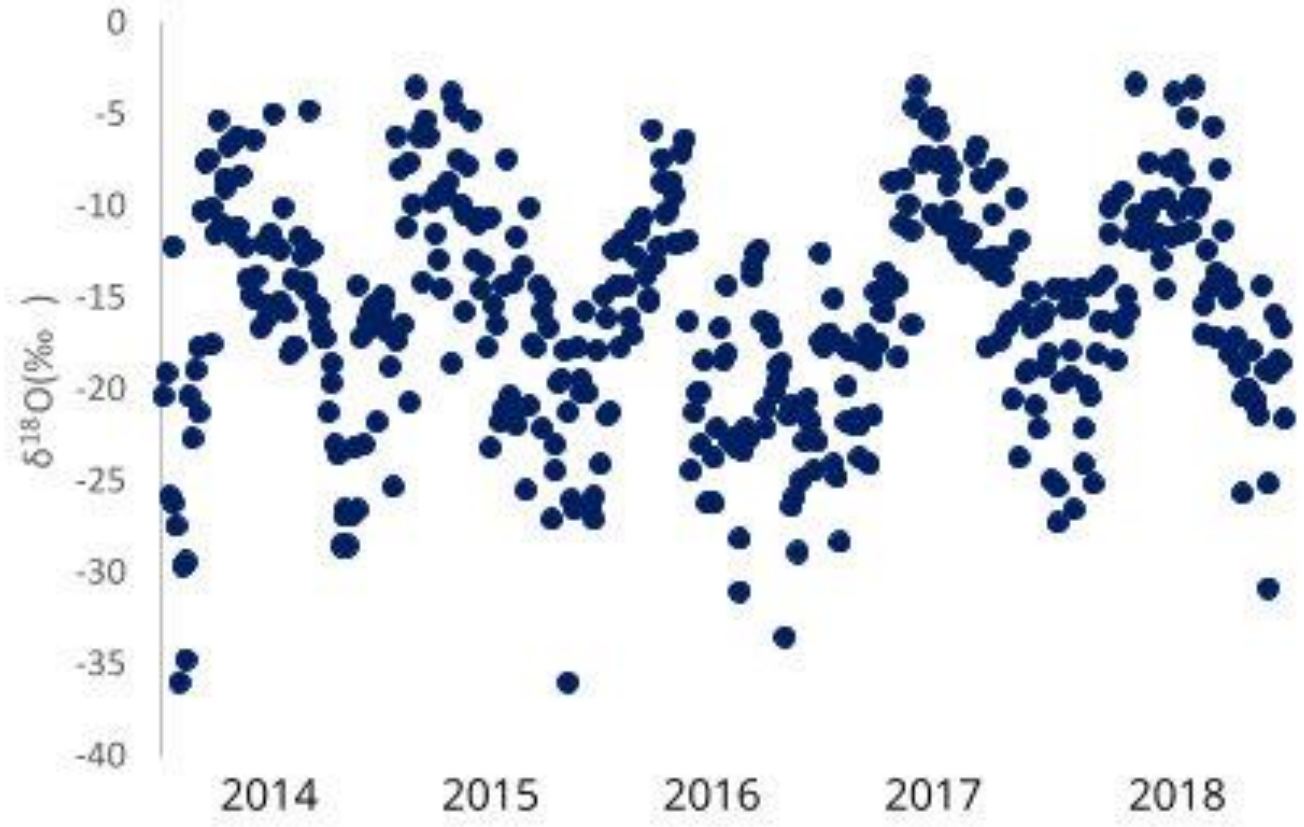
Ural Federal University

IAEA/GNIP precipitation sampling guide

This booklet on precipitation sampling for isotopic analysis serves as a guideline for the Global Network of Isotopes in Precipitation (GNIP), but also includes siting and equipment guidelines for projects that may not be contributing to GNIP.

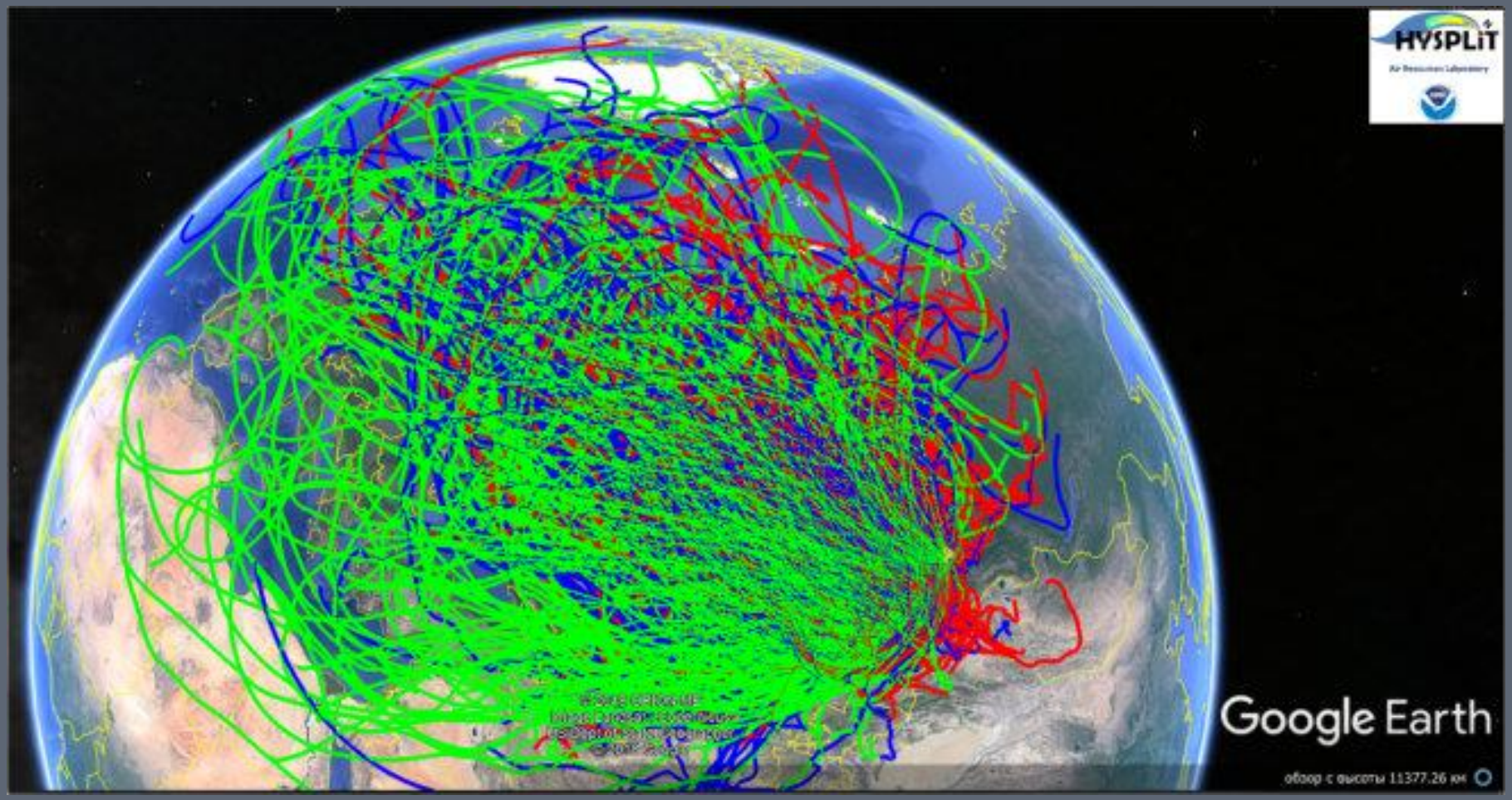
Part A is for managers who are involved in the assessment of the sampling station and are responsible for adopting operational protocols. We promote an open formulation; however the responsible persons for GNIP stations are requested to clarify changes in protocols in advance with the GNIP team at IAEA.

Part B details the routine operations such as integrated accumulation and sample preparation.



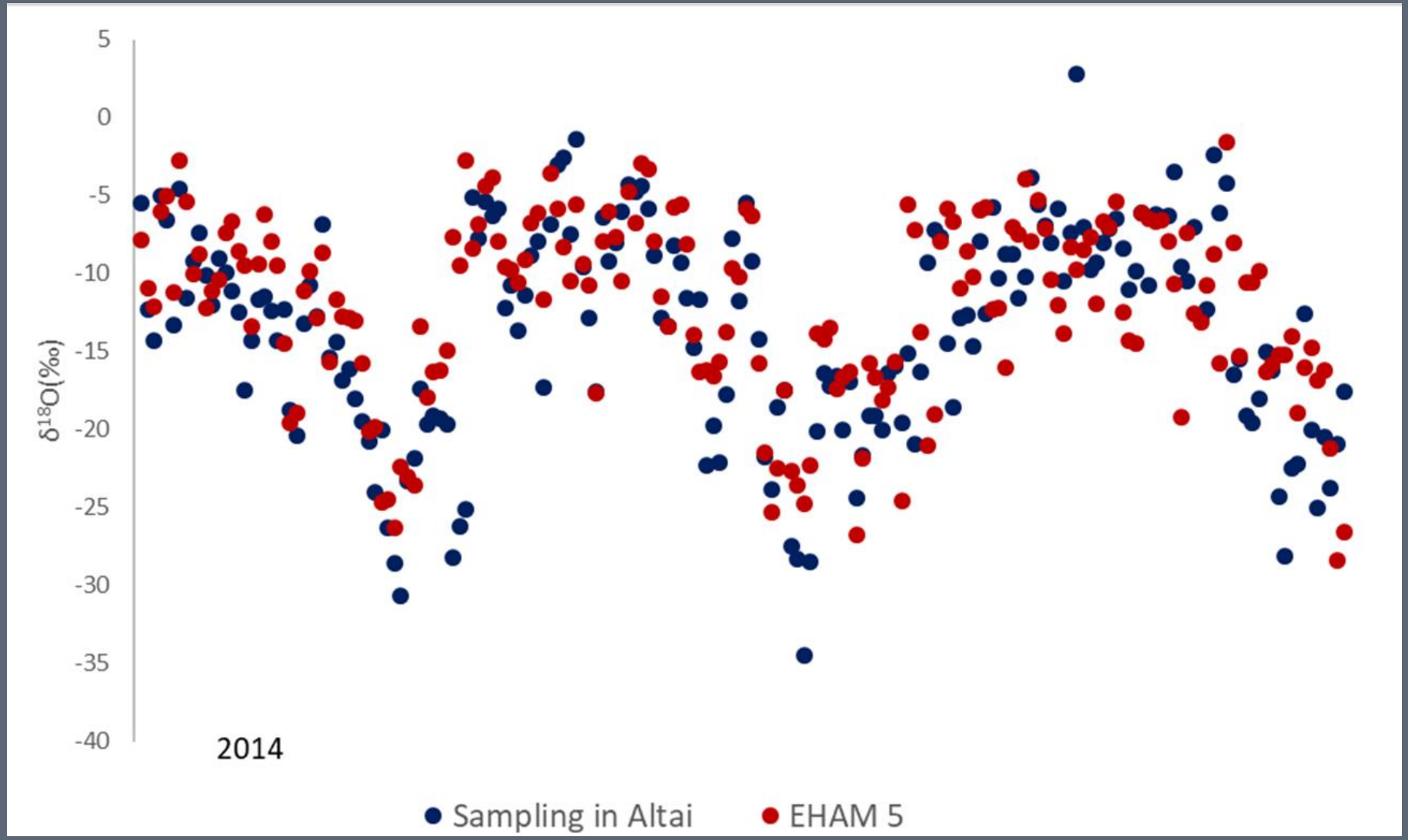
The isotopic composition of precipitation varies widely, about 35‰ for $\delta^{18}O$, 210‰ for δD, and 50‰ for d-excess. The results of the isotopic analysis of the integral samples of snow cover are consistent with the average values of the isotopic composition of the precipitations that formed this cover. Thus, with the interpretation of the results, the data on the snow cover isotopic composition on Altai foothills can be used as an alternative data source instead isotopic composition of precipitations in cold season.

IMC Innsbruck 2019
International Mountain Conference



Ural Federal University

Based on backward trajectories of air masses (model HYSPLIT, >3500 trajectories) and isotopic composition of precipitation, five regions have been identified as sources of the atmospheric moisture which precipitated in foothills Altai. It has been shown that Atlantic and Arctic Oceans are the dominant source (>50%) of precipitation in foothills Altai, but in the warm season Central Asian sources make a significant contribution (up to 20%).



Comparison of the results of the isotope analysis of precipitation and the ECHAM5-wiso modelling data showed a good agreement. The found relations can be used as the reliable transfer functions for the climate modelling and paleoreconstructions in Altai Mountains.

IMC Innsbruck 2019
International Mountain Conference

Ural Federal University

Isotopic composition of atmospheric precipitation can be used as input parameters for climate modelling and paleoreconstruction in Altai Mountains

Thank you for attention!