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The WSibIso program: water and carbon isotopes observations and modeling for understanding high latitude climate processes

Jean Jouzel (1), Vyacheslav Zakharov (2), Konstantin Gribanov (2), Nikita Rokotyan (2), Vladislav Bastrikov (1,2,6), Victor Gryazin (1,2), Irina Nizovtseva (1,2), Viktor Valdayskikh (2), Philippe Bousquet (1), Francois-Marie Breon (1), Olivier Cattani (1), Philippe Ciais (1), Cathy Clerbaux (3), Francesca Guglielmo (1), Valérie Masson-Delmotte (1), Catherine Ottlé (1), Matthieu Pommeir (3), Camille Risi (4), Martin Butzin (5), and Martin Werner (5)

(1) Laboratoire des Sciences du Climat et de l'Environnement, Institut Pierre Simon Laplace, Gif-sur-Yvette, France, (2) Climate and Environmental Physics Laboratory, Ural Federal University, Yekaterinburg, Russia, (3) Laboratoire Atmosphères, Milieux, Observations Spatiales, Université Pierre et Marie Curie, Paris, France, (4) Laboratoire de Météorologie Dynamique, Université Pierre et Marie Curie, Paris, France, (5) Alfred Wegener Institute for Polar and Marine Research, Bremerhaven, Germany, (6) Institute of Industrial Ecology UB RAS, Yekaterinburg, Russia

The WSibIso program aims to investigate the water and carbon cycles in Western Siberia (55-70N, 55-90E) and their projected changes under a warming climate. Global warming is a major environmental issue and is expected to be greatest at high latitudes. In this context, Western Siberia is particularly vulnerable to temperature changes because of the presence of large pristine wetlands with discontinuous permafrost, which play an important role in the regional carbon balance. The WSibIso program was established in order to better understand and quantify the water and carbon cycles in this region. The specificity of the program resides in the use of water and carbon isotopes following an approach which combines observations (surface local measurements and satellite data) and coupled modeling, encompasses atmosphere, land surface and permafrost, and is thus able to represent the various isotopic processes of interest. The first aim of the program is to document the atmospheric distribution of water isotopes and of carbon greenhouse gases in Western Siberia using in situ measurements (laser spectroscopy) and remote sensing techniques (ground based FTIR high resolution spectra and satellite measurements). Surface measurements (soil and vegetation) supplement this data-set. The second focus concerns modeling the water and carbon cycles based on the use of two general circulation models (LMDZiso and ECHAM5-wiso) both representing water isotopes in the biosphere as well as in the atmosphere. The ongoing developments along these 2 axes are presented.

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