

Summary of the *First International Workshop on Advances in Observations, Models, and Measurement Techniques of Atmospheric Water Vapor Isotopes*

Organizers:

Helene Brogniez (LATMOS)

Valerie Masson-Delmotte (LSCE)

Hans Christian Steen-Larsen (LSCE)

Date and Place: October 16 to 18, 2013 at the CNRS Campus in Gif-sur-Yvette.

Background: since the 1950s, water stable isotopes measured in precipitation and in different archives, or simulated within atmospheric models have commonly been used as tracers of the water cycle and for paleoclimate reconstructions. However, the full understanding of the processes controlling water stable isotopes or the full exploitation of these measurements have been limited by the lack of monitoring of the isotopic composition of water vapour. Since the 2000s, a technological revolution has allowed remote sensing or in situ monitoring of water vapour isotopic composition, with a diversity of applications. This workshop has been designed to bring together the community involved in measurements and modeling of water vapour stable isotopes in order to review the state of the art, to stimulate new collaborations, and to formulate recommendations for future research.

Structure: 50 scientists and 8 graduate students from 10 different nations participated to the 3-days workshop. We highlight that 12 participants came from the USA, 4 from Russia, 4 from China, and 2 from Japan. The presentations were structured in 7 topics: surface water vapor measurements and data distribution, evaporation and oceanic moisture sources, atmospheric water vapor transport, atmospheric water vapor isotopes and interactions with the biosphere, remote sensing of water vapor isotopes in the atmosphere, water vapor isotopes and clouds, and new methods for comparing observations and simulations. Altogether, 34 presentations were given, including 8 invited presentations; many of these presentations will be publically available on the IPSL workshop website (<http://www.ipsl.fr/Actualites/Evenements/First-Workshop-on-Water-Vapor-Isotopes>). The overall atmosphere was vibrant with the excitement of new science emerging from the diversity of new measurements.

Workshop outcomes: the workshop schedule aimed at generating a forum for discussion, which proved very successful. Each session ended with a general discussion on the current status and future research questions of the given topic. Break-out group discussions were organized to allow smaller groups to form and to discuss specific questions, such as : *what are the measurement priorities specific to each science target (accuracy, calibration, remote-sensing vs in situ) ? What are our limitations (current / near-future measurement possibilities)? How do we combine the site measurements (network) and the hierarchy of models (global, regional and column models) to push science forward? How to organize the community?* It was decided to write a white paper highlighting the added-value of isotope measurements for atmospheric science studies, the state of the art for each topic,

the progress in different research directions allowed by recent water vapour isotopic composition measurements, and key recommendations. The sections and figures of the paper will be prepared by working groups until the end of January, for a manuscript to be submitted to an open access journal (e.g. BAMS, ACP).

Acknowledgements : the workshop would not have been possible without sponsorship by French academic institutions (IPSL, L-IPSL and UVSQ,) and by three companies (Picarro inc., Ecotech, Los Gatos Research in.).