



Contribution ID: 67

Type: Poster

The Global Network of Isotopes in Rivers (GNIR): Integration of Stable Water Isotopes in Riverine Research and Management

Thursday, 27 August 2015 14:00 (1h 30m)

Rivers play a crucial role in the global water cycle as watershed-integrating hydrological conduits for returning terrestrial precipitation, runoff, surface and groundwater, as well as melting snow and ice back to the world's oceans. The IAEA Global Network of Isotopes in Rivers (GNIR) is the coherent extension of the IAEA Global Network for Isotopes in Precipitation (GNIP) and aims to fill the informational data gaps between rainfall and river discharge. Whereas the GNIP has been surveying the stable hydrogen and oxygen isotopes, and tritium composition in precipitation, the objective of GNIR is to accumulate and disseminate riverine isotope data. We introduce the new global database of riverine water isotopes and evaluate its current long-term data holdings with the objective to improve the application of water isotopes and to inform water managers and researchers.

An evaluation of current GNIR database holdings confirmed that seasonal variations of the stable water isotope composition in rivers are closely coupled to precipitation and snow-melt water run-off on a global scale. Rivers could be clustered on the basis of seasonal variations in their isotope composition and latitude. Results showed furthermore, that there were periodic phases within each of these groupings and additional modelling exercises allowed a priori prediction of the seasonal variability as well as the isotopic composition of stable water isotopes in rivers. This predictive capacity will help to improve existing and new sampling strategies, help to validate and interpret riverine isotope data, and identify important catchment processes. Hence, the IAEA promulgates and supports long-term hydrological isotope observation networks and the application of isotope studies complementary with conventional hydrological, water quality, and ecological studies.

Country or International Organization

IAEA

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Session Classification: Session 11C: Posters: Energy, Environment, and Climate Change