



Preliminary daily $\delta^{18}\text{O}$ and $\delta^2\text{H}$ values of precipitation at the Armagh Observatory, Northern Ireland

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It is well established that an understanding of the isotopic composition of precipitation forms an integral part in hydro(geo)logical studies, such as groundwater resources evaluation. The Oxygen and Hydrogen isotopic compositions of precipitation ($\delta^{18}\text{O}$ and $\delta^2\text{H}$) provide a tracer of the origin of water and in association with meteorological data also enable climate modelling. For the island of Ireland, little research has been done to determine the variations of the $\delta^{18}\text{O}$ and $\delta^2\text{H}$ values of precipitation across the entire island. Long-term data are only available from a single station in southern Ireland, the Valentia Observatory, through IAEA's GNIP network. The focus of this study is therefore to provide an insight into the daily to annual variations of the $\delta^{18}\text{O}$ and $\delta^2\text{H}$ values of precipitation at the Armagh Observatory, located in Northern Ireland. This study is part of a larger ongoing comparative study of the $\delta^{18}\text{O}$ and $\delta^2\text{H}$ values of precipitation from 14 stations located across the island of Ireland.

Daily sample collection at the Armagh Observatory started in November 2008 and is ongoing. Detailed meteorological data (e.g. wind direction) are also available for each sampling date. Preliminary data obtained over an 8 month period indicate that $\delta^2\text{H}$ values ranged from 114 to +1‰ and $\delta^{18}\text{O}$ values ranged from -15.5 to -0.8‰. The predominant weather systems affecting the sampling area have been found to prevail from the South-West, followed by some from the East, and very rarely from the North-North-East. Interspersed between periods of little variation within the isotopic composition of precipitation (for $\delta^{18}\text{O} \pm 2.5\%$ for $\delta^2\text{H} \pm 20\%$), among daily samples were precipitation events that resulted in a sharp decrease in the $\delta^{18}\text{O}$ and $\delta^2\text{H}$ values of the water samples (up to -10‰ and -80‰ respectively). Such patterns were observed during autumn, winter, and spring, but were most pronounced during the former two seasons. These sharp decreases in the isotopic composition of precipitation appear to correlate with sudden changes in wind direction. It was also noted that precipitation associated with the predominantly south-westerly winds had an isotopic composition that was much more variable than that of precipitation associated with other wind directions. Furthermore, the data suggest that when there is a change in wind direction and associated volume of rainfall, there is a time lag before the change is reflected in the isotopic composition of precipitation. Further research is needed to confirm these findings. These data in conjunction with the data from Valentia and the other stations across Ireland will help to further the understanding of climate variation across Ireland.