



Stable isotope variability in snow on an alpine glacier in Switzerland

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Understanding the variability and post-depositional modification of water stable isotopes in snow is of significant importance to paleoclimatology and alpine hydrology. There is modeling evidence that the stable isotopic content of near-surface snow may change as a result of deposition of atmospheric water vapor within the snow. These findings have yet to be confirmed by observation. In addition, ground water and river sources are often identified by their isotopic signature. Understanding the source of the isotopic signature, the recently fallen snow, and how that signature changes just after deposition may aid alpine watershed assessments. Here we present meteorological, hydrologic, and isotopic data taken from Feb-Mar 2008 on a high altitude alpine glacier, the Plaine Morte, in Switzerland. The Plaine Morte is large plateau (8 km²), surrounded by a 300 m ridge line. We use this site (2775 m a.s.l., 46.3°N, 7.5°E) as a laboratory for understanding the effect of meteorology on the isotopic signature of the near-surface snow. The snow surface of the Plaine Morte is isotopically uniform, except in areas that collect large amounts of drift from neighboring ridges and slopes. We present $\delta^{18}\text{O}$ profiles down to 1.2 m for five different days. While the spatial variability of $\delta^{18}\text{O}$ of the surface snow is less than 1 per mil, the variability of the profiles is on the order of 15-20 per mil. We investigate the relationship between the $\delta^{18}\text{O}$ profiles and the available meteorological data to look for evidence of post-depositional modification due to the influence of the atmosphere.