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The isotopic composition of daily-collected precipitation samples at Dome C, East Antarctica

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Oxygen and hydrogen stable isotopes have been widely used as a temperature proxy. The water stable isotope content of the Antarctic ice cores provides integrated tracers of the atmospheric water cycle and local climate, allowing to obtain exceptional past climate records. The coring sites of the East Antarctic plateau, characterized by a low accumulation and a pronounced thickness of the ice sheet, provide the oldest records, permitting to extend the coverage to the last eight climate cycles in the case of the record-breaking EPICA Dome C drilling. However, the isotope-temperature relationship, commonly used to derive the temperature, may be characterized by significant geographical and temporal variations. Moreover, post-depositional effects may further complicate the climate interpretation. A reasonably long and continuous series of precipitation data at a specific site is therefore needed in order to achieve a better understanding of the factors affecting the water stable isotopes in Antarctic precipitation of the location. The first and so-far only multi-year series of daily precipitation sampling and isotope measurements from an East Antarctic plateau site is presented in this study. The sampling has been carried out in proximity of the French-Italian Concordia Station, located at Dome C (75°06'S 123°21'E; elevation: 3233 m a.s.l.; mean annual temperature: -54.5°C; snow accumulation rate: 25-27 kg m-2 yr-1), where the oldest deep Antarctic ice core has been drilled. The US automatic weather station, placed 1.5 km away from the base, has provided the surface air temperature data, while tropospheric temperature profiles have been obtained thanks to the IPEV/Italian Antarctic Meteo-climatological Observatory, by means of a radiosonde, launched once per day. Here we present the complete data series of water stable isotopes ([U+F064]18O, [U+F064]D and deuterium excess) in precipitation at Dome C, covering the period from 2008 to 2014, in the framework of the PNRA PRE-REC project.