

New method for D/H measurements from halite fluid inclusions. Clues to ancient hydrosphere?

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Hydrogen isotopic analyses have undergone major technical innovations in the past 20 years from water analyses through dual inlet measurements and offline preparation to fully automated continuous flow online analyses. EA-IRMS for D/H measurements have developed with various options for solid/liquid samples with today two main families of reaction processes: carbon based reactors or chromium based reactors depending on the type of analytes. Halogenated compounds have demonstrated poor results when reacted with carbon based reactors. Halite samples have been used in the past as paleoclimate proxies based on analyses of their fluid inclusions. But the low H concentrations from those samples was a major drawback for reliable D/H analyses. Here we present a new method we have optimised based on a Pyrocube elemental analyser configured with a chromium based ceramic reactor which allowed us to measure D/H from halite fluid inclusions. We first discuss tests for our method with synthetic halite crystals with known D/H values from their fluid inclusions presenting H concentrations at the 0.2% level. The reproducibility for those measurements are close to +/-3permil. Using available D/H calibrated material we present results in good agreement with the expected values for those synthetic halites. We then used the same technique to access D/H signatures from ancient halite samples (1.4Ga, 0.8Ga) presenting H concentrations as low as 300ppm with reproducibilities in the range of 5permil. This is promising to use those data for paleoclimatic reconstructions from ancient times.