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Isotopic variability of molecular hydrogen in the atmosphere and isotope signatures of its major sources

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Because of the exceptionally large mass difference between hydrogen (H) and deuterium (D), isotope effects in molecular hydrogen are particularly large. In the framework of the EUROHYDROS project, we investigate the spatial and temporal variability of the isotopic composition of molecular hydrogen in the atmosphere in order to find isotopic constraints on its global budget. Regular isotope analyses are carried out on flasks from more than 6 sites worldwide. The strongest seasonal cycle in the isotopic composition is observed at northern high latitudes. In addition, the isotope source signatures of the various sources of molecular hydrogen are re-examined. This presentation will focus on the largest sources of molecular hydrogen, namely photochemical production, and combustion of fossil fuel and biomass. Finally, a hydrogen isotope scheme has been implemented in the global atmospheric chemistry model TM5 and first results will be presented.