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H2 in the atmosphere – an integration from the exhaust pipe to a remote alpine site

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Molecular hydrogen (H2) is often regarded as a key component in the future energy chain as many governments, companies, and individuals are increasingly considering alternative energy sources. H2 has the capacity to take on the role as a sustainable energy carrier of the future. For these reasons, measurements of molecular H2 have recently gained broader scientific appeal, as a more thorough understanding of atmospheric H2 and its budget is essential as we move towards an increasingly hydrogen-intensive economy.

We summarize state-of-the-art knowledge of the H2 budget and show results from our investigations, including chassis dynamometer measurements, a highway tunnel study, air quality monitoring at a suburban sampling site near Zurich, and at a remote high-altitude research station in the Swiss Alps. The integration of these measurements allows for the assessment of automobile exhaust as an important source of H2, the evaluation of trends and potential impacts from anthropogenic H2 emissions, the analysis of temporal variations in tropospheric H2 observations, and an investigation of long-range H2 transport from important source regions.