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# A 15 year record of high-frequency, in situ measurements of hydrogen at Mace Head, Ireland

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Abstract. Continuous high-frequency measurements of atmospheric molecular hydrogen have been made at Mace Head atmospheric research station on the west coast of Ireland from March 1994 to December 2008. The presented data provides information on long term trends and seasonal cycles of hydrogen in background northern hemispheric air. Individual measurements have been sorted using a Lagrangian dispersion model to separate clean background air from regionally polluted European air masses and those transported from southerly latitudes. No significant trend was observed in background northern hemispheric air over the 15 year record, elevations in yearly means were accounted for from large scale biomass burning events. Seasonal cycles show the expected pattern with maxima in spring and minima in late autumn. The mean hydrogen mole fraction in baseline northern hemispheric air was found to be 500.1 ppb. Air transported from southerly latitudes showed an elevation from baseline mean of 11.0 ppb, reflecting both the latitudinal gradient of hydrogen, with higher concentrations in the Southern Hemisphere, and the photochemical source of hydrogen from low northern latitudes. European polluted air masses arriving at Mace Head showed mean elevation of 5.3 ppb from baseline air masses, reflecting hydrogen's source from primary emissions like fossil fuel combustion. Forward modelling of transport of hydrogen to Mace Head suggests that the ratio of hydrogen to carbon monoxide in primary emissions is considerably less in non-traffic sources than traffic sources.

■ Final Revised Paper (PDF, 3738 KB) ■ Discussion Paper (ACPD)

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