



Long open-path instrument for simultaneously monitoring of methane, CO₂ and water vapor

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A new, long open-path instrument for monitoring of path-averaged methane, CO₂ and water vapor concentrations will be presented. The instrument is built on the monostatic scheme (transceiver –distant retroreflector). A VCSEL with a central wavelength of 1654 nm is used as a light source. The receiver is built around a 20 cm Newtonian telescope. The design optical path length is 2000 m but can be further extended. To avoid distortions in the shape of the spectral lines caused by atmospheric turbulences they are scanned within 1 μ s. The expected concentration resolution for the above mentioned path length is of the order of 2 ppb for methane, 100 ppb for CO₂ and 100 ppm for water vapor.

The instrument is developed at the Swiss Federal Institute of Technology – Lausanne (EPFL) Switzerland and will be used within the GAW+ CH program for long-term monitoring of background methane and CO₂ concentrations in the Swiss Alps. The initial calibration validation tests at EPFL were completed in December 2012 and the instrument will be installed at the beginning of 2013 at the High Altitude Research Station Jungfrauoch (HARSJ). The HARSJ is located at 3580 m ASL and is one of the 24 global GAW stations. One of the goals of the project is to compare path-averaged to the ongoing point measurements of methane in order to identify possible influence of the station. Future deployments of a copy of the instrument include the Canadian arctic and Siberian wetlands. The instrument can be used for ground truthing of satellite observation as well.