

First results of tall tower surface-atmosphere N₂O flux measurements over a mixed agricultural region in Central Europe

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In summer 2015 an eddy covariance (EC) system was put into operation at the Hungarian WMO GAW tall tower greenhouse gas monitoring site (Hegyhátsál - 46°57'N, 16°39'E, 248 m asl) to monitor the vertical flux of nitrous oxide (N₂O). The site is located in rural environment, as far from direct pollution sources as it is possible in Central Europe. The N₂O EC system is co-located with a previously installed EC system that monitors the surface/atmosphere exchange of CO₂ at 82 m above the ground. The high-elevation, large-footprint EC systems are primarily intended for the monitoring of the net fluxes of the mixed agricultural fields surrounding the tower and characteristic for an extended region. Monitoring of the greenhouse gas exchange of a typical mixture of different agricultural fields might better support the estimation of the regional/national level emission than that of specific ecosystems. The measurements also contribute to the development and validation of ecosystem models. Both EC systems are precisely calibrated and also suitable for the long term monitoring of the atmospheric concentrations. The poster focuses on the first results of the N₂O flux measurement system describing the setup, presenting the temporal variations in both the concentration and the vertical flux, as well as the upgraded version of Biome-BGCMuSo process oriented biogeochemical model (Hidy et al., 2016) extended for the simulation of the full nitrogen budget of the ecosystems. This biogeochemical model has proved to be suitable for filling the data gaps in the direct surface-atmosphere N₂O flux measurements. According to the preliminary data the annual N₂O emission for year 2016 was ~200 mg N/m². The development of the quality assurance and uncertainty estimation methods are in progress. The concentration data series between May, 2015, and December, 2016, indicate a 0.95 ppb/year upward trend, which is closed to the global tendency. Early 2017 several regional scale pollution episodes, elevated CO₂, CH₄ and N₂O concentrations were observed at the monitoring site. These episodes will be further studied.

References

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