The InGOS Project: Setup and First Results

A.T. Vermeulen¹, S. Hammer², P. Bergamaschi³, U. Karstens⁴, O. Peltola⁵ and I. Levin²

¹Energy Research Center (ECN) of the Netherlands, Petten, The Netherlands; +31 224 564 194, E-mail: a.vermeulen@ecn.nl
²Institut für Umweltphysik, University of Heidelberg, Heidelberg D-69120, Germany
³Institute for Environment and Sustainability, European Commission DG JRC, Ispra, Italy
⁴Max Planck Institute (MPI) for Biogeochemistry, Jena 07701, Germany
⁵University of Helsinki, Helsinki, Finland

InGOS is a European Union funded Integrating Activity project targeted at improving and extending the European observation capacity for non-CO₂ greenhouse gases. The project will run from October 2011 to September 2015. InGOS is coordinated by ECN and involves 34 partners from 15 countries.

New (optical) measurements techniques have become available for non-CO₂ flux observations. During an intensive field campaign in June 2012 at Cabauw, Netherlands (Fig 1) we tested 8 different sensors and found that all sensors allowed to measure the mean accumulated flux of CH₄ over the 2-week test period within 10%. In the 2nd phase of the campaign the instruments measured within the footprint of Cabauw tall tower and the variability of the measured fluxes within this footprint proved to be a factor of 3, despite the homogeneity of the landscape over all 3 measurement sites. In the project we also work on improving the existing and future datasets of non-CO₂ mixing ratio observations in the European network, which have been based up to now on Gas Chromatography techniques. We target at providing with every measurement, also estimates of precision and accuracy using a uniform method, despite the differences in measurement approaches. First results will be shown for the historic measurements (period 2000-2012) of mixing ratios at 14 stations for CH₄ and N₂O. These mixing ratio measurements series results will be used for regional inversions in the integrating modelling section of the project using at least 5 independent model systems. Model validation will be performed using ²²²Rn observations and a new prior high resolution flux field of time-varying ²²²Rn emissions (Fig 2).

Figure 1. Upper panel: Mean CH₄ emission flux measured with the eddy-covariance technique during the 2012 measurement campaign at Cabauw, using 8 different optical sensors. Lower panel: Availability of data for all sensors during the field campaign.

Figure 2. Left panel: ²²²Rn emission rates for January 2009 from the high resolution emission model. Right panel: ²²²Rn emission rates for June 2009 from the high resolution emission model.