ME 02 Integrated observations and modelling of greenhouse gas budgets at the national level in the Netherlands

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Project website	www.climatexchange.nl/projects/bsikme2/english/Welcome.html
Starting date	1 January 2004 **Completion date** 30 June 2009

Context / Social problem

Many countries, including the Netherlands, have committed themselves under the Kyoto Treaty to reduce their emissions of greenhouse gases. This has generated demand for an independent review of the effectiveness of emission reduction measures; in other words, determining the degree to which they contribute to a real reduction in greenhouse gas concentrations in the atmosphere.

What do we know/not know?

Survey methods exist which allow us to calculate emissions from the measured concentrations of greenhouse gases. For these to work we need to know the relation between the greenhouse gas concentrations in the atmosphere at certain times and places and the emissions of these greenhouse gases from human activity and from nature. This relationship is determined by horizontal and vertical atmospheric transport under the influence of the weather. We know the emissions from human activities (energy, industry, transport and agriculture) quite well at the level of national annual totals. For inversion calculations we need to have a better idea of the spatial and temporal distribution of the emissions. The current inversion methods were developed for use on the global scale and will have to be made suitable for use on a much smaller scale.

What is being studied?

ME02 will increase the capacity for monitoring greenhouse gases in the Netherlands through the addition of two high towers which can 'see' a considerable proportion of the country. The spatial variation will be studied with the additional help of aircraft measurements and the variation in time will be studied using tower measurements from ME01. Together these data will lead to improved emission models. The dynamics of the boundary layer will also be intensively studied. For the first time differences across the land surface will be measured to enhance model representations. Various models and the different existing and upgraded inversion methods will be compared and evaluated.

What are the results, and who are they for?

A key objective of this project is to develop a system for quantifying the greenhouse gas budget at the national and regional scale. Moreover, a protocol will be developed for making reference estimates to be used in verifying national emissions, which will in time open up the possibility of verifying the accuracy and credibility of the UNFCCC and Kyoto reports.