EVERGREEN Global satellite observations of greenhouse gas emissions and air pollution

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The EVERGREEN project of the European Commission 5^{th} Framework Programme has demonstrated new methods able to exploit satellite data in global climate and local air pollution research and application:

- Global maps of CH4, CO and CO2 simultaneously measured were produced for the first time from SCIAMACHY space observations containing new information on sources and sinks
- Major new methane sources in the tropics have been discovered, which has lead to new research in methane emissions from plants
- Global carbon monoxide data from SCIAMACHY and MOPITT have shown generally good agreement with models except for higher concentrations measured in Southern America. These data have resulted in improved agreement with surface FTIR measurements (tens of percent)

- Global carbon dioxide data from SCIAMACHY are in qualitative agreement with existing models and agree with the (limited) ground based FTIR stations to within a few percent.
- Variability in stratospheric methane measured by MIPAS was found to have a relatively small impact on the radiation budget (0.01 W/m2), not exceeding the error bars. Enhanced methane found by SCIAMACHY has a more significant effect on instantaneous radiative forcing (0.1W/m2) depending on profile assumptions made.
- MOPITT data have been used to establish source/sink strengths by inverse modelling
- SCIAMACHY data have allowed inverse modelling of methane sources and sinks showing enhanced tropical emissions compared with a priory estimates

Important new global atmospheric data sets of methane, carbon monoxide and carbon dioxide have been made available by the EVERGREEN project to climate and air pollution research and applications such as the ESA GMES project PROMOTE. Future research will be devoted to reduce biases in these data sets and validate these data with the ground based FTIR measurements.