Geophysical Research Abstracts
Vol. 14, EGU2012-6569, 2012
EGU General Assembly 2012

Exploiting Sentinel 5's synergy with IRS and 3MI on METOP-SG for Protocol Monitoring and Air Quality-Climate Interaction

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Last Year's unprecedented low ozone episode in the Arctic (March 2011) made again clear that it is important to continue to monitor the ozone layer in support of the Montreal Protocol. Although scientists showed that the developments at the Arctic could be fully understood and explained by the same heterogeneous chemistry as is used for the SP hole (G. Manney et al., Nature, 2011) , an ozone destruction of that order was not seen before at the NP. Continuation of monitoring the Ozone Layer in order to detect the expected recovery of the ozone layer is therefore of paramount importance. Both S5-Precursor (S5P)/TROPOMI as well as Sentinel5 will play a crucial role in that monitoring capacity.

A new capacity of sentinel 5 will be synergistic use of data and synergistic retrievals from Sentinel 5, the IRS instrument and 3MI, all mounted on the same METOP-SG platform. Combination of CO, O_3 and CH4 measurements of the Sentinel 5 and IRS instrument will enable distinction of lower tropospheric, PBL related, concentrations from free tropospheric amounts. These combined retrievals will largely benefit from the fact that the same air mass is sensed at the same time. Synergistic analyses of the aerosol measurements of 3MI and the AQ pollutants measured by Sentinel 5 and IRS will for the first time provide a co-located and synergistic data base that can be used for studying secondary aerosol formation. Secondary aerosol formation is the largest unknown contribution to the total aerosol load of the atmosphere, which is in turn the largest unknown factor in the anthropogenic climate forcing. Moreover, these co-located trace gas and aerosol measurements are essential for further understanding of the relation between climate change and air quality (Shindell, Science, 2009). 3MI will be the only instrument in that timeframe with the needed detailed aerosol detection capacity for this type of analyses.

The presentation will elaborate on the importance of the monitoring capacity of Sentinel 5 and S5P, and the new insights the synergistic use of the data sets of Sentinel 5, IRS and 3MI will provide for air quality and climate change.