

GEMS

Global Environmental Monitoring using Satellite and in-situ data

The EU-funded GEMS project is developing comprehensive data analysis and modelling systems for monitoring the global distributions of atmospheric constituents important for climate, air quality and UV radiation, with a focus on Europe. GEMS is coordinated by the European Centre for Medium Range Weather Forecast (PECMWF) in Reading, UK. The GEMS project is a first step on the way to an operational monitoring system for global and regional atmospheric composition and produces routine forecasts and reanalyses since early 2008.

GEMS has three thematic activities for the global analysis of atmospheric composition:

- greenhouse gases (
 <u>GHG products</u>)
- reactive gases in the troposphere and stratosphere (
 <u>Forecast</u> and
 <u>analysis</u> products,
 <u>UV forecast</u>)
- aerosols (<u>aerosol optical depth</u> forecast)

The ICG-2 institute is a key partner in GEMS providing the MOZART chemistry transport model (MOZART <u>homepage</u> at NCAR) and expertise in atmospheric chemical processes and trace gas emissions from forest and savanna fires. Near realtime satellite data from the NASA <u>MODIS</u> and EUMETSAT <u>SEVIRI</u> sensors are used to derive estimates of fire emissions and monitor the transport and chemical evolution of smoke plumes.

The animation below shows a typical transport event of pollution from North American forest fires (there was a lot of forest burning in <u>Alaska</u> during July 2004) and anthropogenic activities (note the coloured clouds over New York) onto the North Atlantic and towards Europe. One can also see the export of pollution from Europe into the tropical Atlantic region. The animations show a composite of NASA <u>blue marble</u> images with superimposed layers of carbon monoxide pollution (left) and ozone pollution (right) at a pressure level of 900 hPa (roughly 1 km above sea surface).