

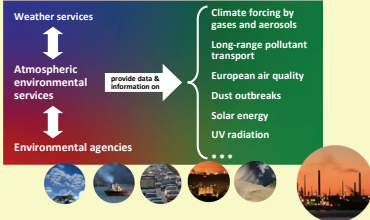
Towards European-scale Air Quality operational services for GMES Atmosphere

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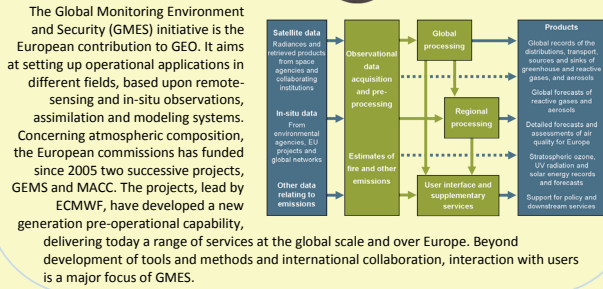
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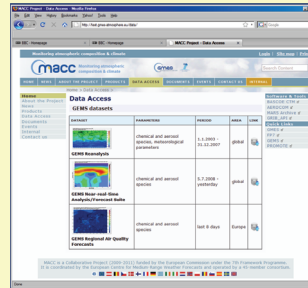
1. GMES atmospheric environmental services



BAMS, 89(8) August 2008, 1147-1164

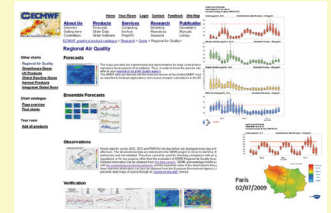


2. Pre-operational ensemble regional AQ forecasts



A multi-model of up to ten models has been run for a period of more than a year, delivering daily 72h forecasts for key pollutants. All models use the same anthropogenic emissions, the same chemical boundary conditions and the same large-scale meteorology. In MACC, seven pre-operational models contribute to the regional ensemble.

Basing upon the experience gained in national operational or pre-operational air quality forecasting activities, as for instance PREV'AIR in France or EURAD in Germany, a range of European scale services have been developing in the context of the EU-funded project GEMS and the ESA-funded project PROMOTE, and are now brought a step further in the new project MACC.



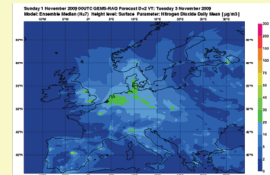
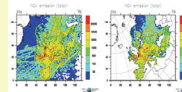
The multi-model ensemble is used to provide chemical EPS-gams, indicating the range of individual 72h forecasts for 40 European cities (see above).

Though work is currently on-going on ensemble products based upon differentially weighted members, in particular depending upon skill over the last few days, the median model (defined in each grid-cell as the median values of all available individual model forecasts) is currently used as the reference ensemble product. Its skill is generally among the best in terms of average statistical indicators (bias, RMSE, correlation), compared to individual models.

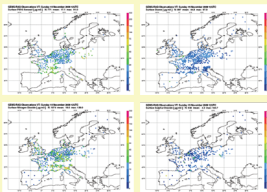


A dedicated emissions inventory has been built by TNO (~ 8km resolution, base year 2003). The GEMS-TNO (left) is compared below with EMEP emissions (right).

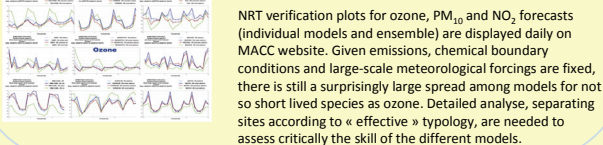
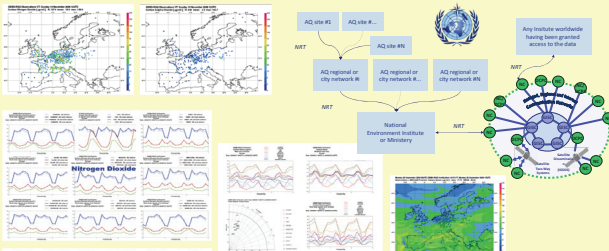
A good consistency has been found between the two inventories, except from Eastern Europe countries.



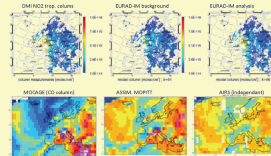
3. Near-Real-Time forecast verification



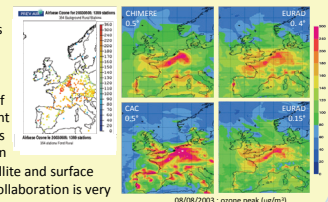
Exchange in NRT of surface data (14 countries : 900 sites for ozone and PM10, 1200 sites for NO2, 550 for SO2, 300 for CO) is currently organised by means of ad hoc agreements. The WMO Information System (WIS) represents a promising long-term solution.



4. Data assimilation, re-analyses and applications



are also assessed with the multi-model ensemble. Assimilation of satellite and surface observations is progressively introduced in the forecast suites (left). Collaboration is very useful on representativeness issues and on the estimation of background errors covariances.



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maîtriser le risque
pour un développement durable