REQUEST FOR A SPECIAL PROJECT 2013–2015

MEMBER STATE: JRC

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Project Title: Global and Regional Inverse Modeling of Atmospheric CH_4 and N_2O

If this is a continuation of an existing project, please state the computer project account assigned previously.	**SP** _____ spjrc4dv	
Starting year: (Each project will have a well defined duration, up to a maximum of 3 years, agreed at the beginning of the project.)	2012	
Would you accept support for 1 year only, if necessary?	YES ☒	NO ☐

Computer resources required for 2013-2015: (The maximum project duration is 3 years, therefore a continuation project cannot request resources for 2015.)	**2013**	**2014**	**2015**
High Performance Computing Facility (units)	500000	500000	
Data storage capacity (total archive volume) (gigabytes)	400	400	

*An electronic copy of this form **must be sent** via e-mail to:* *special_projects@ecmwf.int*

Electronic copy of the form sent on (please specify date): 13 April 2012

Continue overleaf

[1] The Principal Investigator will act as contact person for this Special Project and, in particular, will be asked to register the project, provide an annual progress report of the project's activities, etc.

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Extended abstract

Project description

EC-JRC-IES performs detailed inverse modelling studies of atmospheric greenhouse gases, using the TM5-4DVAR inverse modelling system. The objective of this special project (SP) is to further improve the estimates of global and regional CH_4 and N_2O emissions, by (1) further improving the TM5-4DVAR inverse modelling system, (2) using new in-situ and satellite observations, and (3) detailed comparisons with other inverse models. This SP will contribute to the new FP7 projects MACC II ("Monitoring Atmospheric Composition and Climate - Interim Implementation") (http://www.gmes-atmosphere.eu/) and InGOS ("Integrated non-CO_2 greenhouse gas Observing Systems" (http://www.ingos-infrastructure.eu/)

Improve global CH_4 inversions using new satellite retrievals

In MACC II JRC performs the pre-operational CH_4 inversions, using satellite and surface measurements (http://www.gmes-atmosphere.eu/d/services/gac/delayed/ch4_flux_inversions/) . The objective of this SP is to further improve these inversions by improving model resolution and further details of the TM5-4DVAR system. Furthermore, new satellite retrievals from GOSAT, which are currently developed by different groups (including the ESA GHG climate change initiative:(http://www.esa-ghg-cci.org/, will be evaluated. Detailed sensitivity experiments will be performed to analyze the robustness of derived emissions. Furthermore, we will investigate strategies to combine NIR sensors as SCIAMACHY and GOSAT with MIR sensors as IASI in the inversion system. Inversion results will be validated vs. independent observations, including in-situ observations (surface, ship and aircraft data) and FTS measurements.

Improve European CH_4 and N_2O inversions using in-situ observations

Continuous in-situ observations have been demonstrated to provide significant constraints on European CH_4 and N_2O emissions [*Bergamaschi et al., 2010; Corazza et al., 2011*]. Further improvements of the European top-down emission estimates are expected from the InGOS project, which will standardize and improve the quality of atmospheric non-CO_2 measurements, which is in particular important for N_2O, for which still significant biases exist among the different laboratories. The objective of the SP is to further develop the optimal use of the new observational CH_4 and N_2O datasets in the TM5-4DVAR inverse modeling system, including detailed sensitivity experiments. Furthermore, the TM5-4DVAR results will be compared with independent global and regional inverse models (in the framework of the InGOS inverse modeling work package, coordinated JRC).

Improve TM5-4DVAR inverse modelling system

The TM5-4DVAR system will be applied as described in detail by *Meirink et al.* [2008] and further developed by *Bergamaschi et al.* [2009, 2010]. The SP will support the further development of the TM5-4DVAR system, including higher temporal resolution of derived emissions, improved use of satellite data (e.g. improved bias correction), and speed-up of the model (including OpenMP parallelization).

References

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