



## **Publishable executive summary**

The main goal of QUANTIFY is to quantify the climate impact of global and European transport systems for the present situation and for several scenarios of future development. The climate impact of various transport modes (land surface, shipping, and aviation) is being assessed. Effects of long-lived greenhouse gases like CO<sub>2</sub> and N<sub>2</sub>O are included, and in particular the effects of emissions of ozone precursors and particles, as well as of contrails and ship tracks. The project goal includes provision of forecasts and other policy-relevant advice, which is and will be supplied to governments and to international assessments of climate change and ozone depletion, such as the IPCC reports (Kyoto Protocol) and WMO-UNEP ozone assessments (Montreal Protocol). Using significantly improved transport emission inventories, combined with better evaluated and hence more reliable models, these new forecasts in QUANTIFY will represent a considerable improvement of current predictions. Long time scales are involved in the transport system and its effects on climate: Some transportation modes have long development and in-service times; some emissions have long residence times and thermal inertia of the climate system protracts possible effects. Yet the impact of short-lived species depends on location and time of the emissions. So several transport scenarios and potential mitigation options need to be assessed on a sound common basis to identify the most effective combination of short and long-term measures and to inform policymakers and industry. We are providing such guidance by focused field measurements, exploitation of existing data, a range of numerical models, and new policy-relevant metrics of climate change. To achieve the goal, several advances in our fundamental understanding of atmospheric processes are required such as the mechanisms by which pollutants are transported from exhaust into the free atmosphere, the impact of pollutants on clouds and the role of absorbing aerosols.

The first four years of the QUANTIFY project were a success. During the kickoff-meeting we have been able to develop a common "QUANTIFY spirit" necessary to run complex large projects like this. This common spirit was enforced by co-operation of scientists from different thematic backgrounds and different culture. So far we have maintained the "QUANTIFY spirit". In the second year, we have been able to enlarge the QUANTIFY consortium by partners from China, India and Russia, which are providing QUANTIFY a better view of the transport systems in these large countries.

The recent 4<sup>th</sup> annual meeting in Prague, Czech Republic (February 2009) made obvious that QUANTIFY is quite "on track". Quite noticeable results have been obtained.

Gridded emission inventories of aviation, shipping and road transport for the present day (year 2000) have been generated and scenarios for future emissions until 2100 have been developed, considering 4 different SRES scenarios. Modelling tools for all scales (from plume scale to global scale) and for various components (chemistry, aerosols, clouds and climate) have been prepared for application in QUANTIFY tasks and have been further developed where necessary. Simulations of the impact of aviation, shipping and land transport on the composition of the global atmosphere have been calculated. The emission inventories and scenarios are now public available at the quantify homepage <http://ip-quantify.eu/>, after signing a data protocol. The requests about access to the database is increasing, and also IPCC asked for the data for calculations of the upcoming 5AR.

A project highlight was the ship measurement campaign in June 2007, where we have been able to measure the impact of individual ships on the chemical composition of the atmosphere in order to study the dilution and processing of exhaust from ships.

By means of GCM simulations of idealised emission scenarios we found the current simple climate models have much stronger restrictions in their applicability than was previously assumed by the science community. This aspect is being further explored.

QUANTIFY successfully organised a Summer School held in Athens, Greece, from 10.-26 September 2007. 36 summer school students, graduate students and young researchers on QUANTIFY related science topics, attended the school.

A follow up Conference of the successful “International Conference on Transport, Atmosphere and Climate” (TAC) held in Oxford 2006 is scheduled for 22 – 25 June 2009. It will take place as a cross-boarder event in the two cities Aachen (Germany) and Maastricht (The Netherlands), jointly organized by the QUANTIFY partners DLR and KNMI. See: <http://www.pa.op.dlr.de/tac/>

QUANTIFY runs a web site, which contains an overview of the project: <http://ip-quantify.eu>.