Management and Impacts of Climate Change Programme GICC
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The objective of the CARBO-CONTROLE project is **to evaluate the various complementary methodologies used to assess CO_2 fluxes on European (10,000 km), national (1,000 km) and regional (100 km) scales**. The adopted strategy combines the disaggregation – downscaling – of large-scale fluxes by inversing atmospheric CO_2 measures, and the aggregation – upscaling – of national stocks and fluxes using the climatic fields of an ecosystem model.

To reach this objective, we proposed to use three-dimensional models of atmospheric CO_2 transport and a model of the carbon cycle in vegetation and soils. These pre-existing models were improved to meet the specific requirements and constraints of the project.

For the atmosphere, **we re-calculated European fluxes with three transport models in order to estimate European fluxes** (TM2, TM3 and GCTM) **in 'inverse' mode**, i.e. under the direct constraint of observations. We exceeded our initial objectives since only one model (TM2) was originally planned.

Given the imperfect coverage of atmospheric CO_2 recordings in France, we had proposed to add a monitoring station at the Puy-de-Dôme observatory to supplement the existing measuring network over a period of one year, in order to analyse the variability of CO_2 concentrations in the continental atmosphere and to be able to decide, according to the results, whether or not to continue monitoring in the long term. **The Puy-de-Dôme station was installed at the end of 2000, within the time limit, and the resulting data have been analysed**. The setting up of radon-222 monitoring will allow a more direct estimation of the fluxes.

Regarding the continental biosphere, we had proposed to use climatic fields and high-resolution satellite data for France to force the ORCHIDEE biogeochemical model, which describes the totality of the processes of carbon fixation, transformation and respiration within ecosystems on time scales ranging from one hour to one decade. **The simulations proposed with ORCHIDEE have been completed, in particular a long high-resolution simulation over the period 1901-2000**. Comparison with observed values (fluxes, biomass) is under way. In addition, our generic model ORCHIDEE was improved using other models specific to cultivated areas (STICS) and to grassland areas (PASIM), in cooperation with the INRA teams.