

June 25, 2004

Progress report of the Special Project entitled:

Study of photochemistry, vertical transport of chemical species by clouds, scavenging and wet deposition on the framework of a 3D mesoscale meteorological model including detailed microphysics.

Project account: **SPFRPECH**

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To the members of the Scientific Advisory Committee & Council

The model projects of our laboratory deal with investigations of atmospheric physico-chemistry, cloud dynamics and atmospheric radiation. Our models are mainly the RAMS and Clark models, coupled with special codes: gas, aqueous or heterogeneous chemistry models; special radiation models (accounting for aerosols; photochemistry); aerosol modules (production/sinks). Our models are involved in several international or regional experiments: EXPRESSO, ACE, CIME, INCA, ESCOMPTE, AMMA-WAM, RVF (Rift Valley Fever in Senegal), severe rainfalls (South of France), detailed cloud physics and chemistry at the Puy-de-Dome station... Obviously, the ECMWF database (analyses and observations) is a major point of these projects. Recently, we have undertaken a study of the pollution over SW Europe by Saharan dust during 1 year. The model results will be presented at the 8th IGAC Conference. Another example: we are involved in an intercomparison exercise between several air quality models in a complex urban area. For both examples, the ECMWF analyses are of critical importance. Please see below a partial list of the meetings acts and papers published, accepted or submitted during the period **limited to 2001-2004**, all of them based upon use of the ECMWF data. Of course, we can send you more details if necessary.

Publications

(We do not mention some papers in re-submission or re-writing process)

- Caro, D.; Wobrock, W.; Flossmann, A.I. A Numerical Study on the Impact of Hygroscopic Seeding on the Development of Cloud Particle Spectra *J. Appl. Meteor. Vol. 41, No. 3, p. 333-350 (AMS) 2002*
- Leon, J.-F.; Chazette, P.; Dulac, F.; Pelon, J.; Flamant, C.; Bonazzola, M.; Foret, G.; Alfaro, S. C.; Cachier, H.; Cautenet, S.; Hamonou, E.; Gaudichet, A.; Gomes, L.; Rajot, J.-L.; Lavenu, F.; Inamdar, S. R.; Sarode, P. R.; Kadadevarmath, J. S. Large-scale advection of continental aerosols during INDOEX, *J. Geophys. Res. Vol. 106, No. D22, p. 28,427-28,440 (2001JD900023), 2001*
- Minvielle, F., Cautenet, G., Lasserre, F., Foret, G., Cautenet, S., Leon, J. F., Andreae, M. O., Mayol-Bracero, O. L., Gabriel, R., Chazette, P., Roca, R., submitted. Modelling The transport of aerosols during INDOEX 1999 and comparison with experimental data. Part 1: carbonaceous aerosols distribution. In revision, Atmospheric Environment
- Minvielle, F., Cautenet, G., Lasserre, F., Foret, G., Cautenet, S., Leon, J. F., Andreae, M. O., Mayol-Bracero, O. L., Gabriel, R., Chazette, P., Roca, R., submitted. Modelling The transport of aerosols during INDOEX 1999 and comparison with experimental data. Part 2: continental aerosols and their optical depth. In revision, Atmospheric Environment
- Pradelle, F., G. Cautenet and I. Jankowiak Remote sensing of some radiative or microphysical interactions between marine stratocumulus clouds and Saharan dust: observations and climatology. Part 1: observations and climatology. *J. Geophys. Res. Vol. 107, No. D19, DOI 10.1029/2000JD000155 (AGU)*
- Pradelle, F., G. Cautenet and I. Jankowiak Remote sensing of some radiative or microphysical interactions between marine stratocumulus clouds and Saharan dust: observations and climatology. Part 2: Modelling. *J. Geophys. Res. Vol. 107, No. D19, DOI 10.1029/2000JD000156 (AGU)*
- Taghavi, M.; Cautenet, S.; Foret, G. 2004 Simulation of ozone production in a complex circulation region using nested grids *Atmos. Chem. Phys. Vol. 4, No. 3, p. 825-838*
- Taghavi M., S. Cautenet and J. Arteta, Impact of a high detailed emission inventory on modeling accuracy, acceptée à *Atmos. Res.*, (Special issue ESCOMPTE), 2004.
- Troude, F., Dupont, E., Carissimo, B., Flossmann, A.I. Relative Influence of Urban And Orographic Effects for Low Wind Conditions in the Paris Area *Bound.-Layer Meteor. Vol. 103, No. 3, p. 493-505 (Kluwer) 2002*

Communications and posters (international meetings).

- Bouo-Bella, F., S. Cautenet, and G. Cautenet, 2003: Étude des mélanges de panaches en Afrique de l'ouest: Impact sur les précipitations. Comptes rendus de l'Atelier de Modélisation de l'Atmosphère (AMA2003) de Météo-France, Toulouse, (3-5 décembre).
- Cautenet, G., S. Cautenet, K. Desboeufs, and F. Minvielle, 2003: Distribution 3D des aérosols désertiques dans une ligne de grain en Afrique Sahélienne. Comptes rendus de l'Atelier de Modélisation de l'Atmosphère (AMA2003) de Météo-France, Toulouse, (3-5 décembre).
- Cautenet, S. and J. Arteta, Air Quality Models - Comparison with Airborne Measurements (Escomp Campaign) for Two Chemical Models, 8th IGAC Conference, 4-9 September 2004, Christchurch, New-Zealand.

- Cautenet, G., F. Minvielle and F. Lasserre A model study of the semidirect effect induced by light-absorbing aerosols, 8th IGAC Conference, 4-9 September 2004, Christchurch, New-Zealand.
- Cautenet, G., K. Desboeufs and M.N. Rolland, Aerosols over the Mediterranean region: a model and observational assessment of a 1-year mass budget, , 8th IGAC Conference, 4-9 September 2004, Christchurch, New-Zealand.
- Courault, D., O. Bourg et G. Cautenet, Analyse de l'influence du paysage agricole sur la variabilité spatiale des conditions météorologiques et des flux à l'aide du modèle 3D de transferts atmosphériques RAMS, Colloque AIC, Séville, Septembre 2001.
- Dubreuil, V., G. Cautenet et O. Planchon, Approche par modélisation a mésoéchelle des conséquences climatiques de la déforestation dans la région d'Alta Floresta - MT Brésil, Colloque AIC, Séville, Septembre 2001.
- Desboeufs, K., G. Cautenet, F. Minvielle and F. Pradelle, Effect of mineral aerosol mixing during long range transport on the cloud cover over the Tropical Atlantic Ocean, 7th IGAC Conference, Crete, 18-25 Sept. 2002.
- Foret, G., S. Cautenet, F. Minvielle, G. Cautenet, J. F. Léon, P. Chazette, S. Alfaro, L. Gomes and C. Flamant, Impact of the winter monsoon plume on the tropospheric chemistry over north Indian Ocean, *EGS XXVI General Assembly*, Nice, 25-30 March 2001.
- Foret, G. and S. Cautenet, Deep convection during Indoex and chemistry impact of pollutants in troposphere, 7th IGAC Conference, Crete, 18-25 Sept. 2002.
- Minvielle, F., G. Cautenet, F. Pradelle and F. Lasserre, Modeled radiative/dynamics feedback of aerosol layers in the lower troposphere, and possible impact on cloud development, *8th Scientific Assembly of IAMAS*, Innsbruck, Austria, 10-18 July 2001.
- Minvielle, F. P. Chazette, S. Alfaro, L. Gomes, J.F. Leon, C. Flamant, G. Cautenet, S. Cautenet and G. Foret, Radiative impact of the tropospheric aerosol over North Indian Ocean during Indoex 1999, *EGS XXVI General Assembly*, Nice, 25-30 March 2001.
- Pradelle, F., G. Cautenet, F. Minvielle and F. Lasserre, Radiative interactions of mineral dust and marine low stratiform clouds: a model and satellite study over the eastern tropical Atlantic, *8th Scientific Assembly of IAMAS*, Innsbruck, Austria, 10-18 July 2001.
- M. Taghavi, S. Cautenet, J. Arteta, *Modelling of chemistry during ESCOMPTE (POI2a and POI2b) : comparisons with aircraft measurements and lidars*, 5th ESCOMPTE Workshop, Toulouse, 26-28 May 2003.
- M. Taghavi, S. Cautenet, *A modeling study of the meteorology and photochemical air pollution over an urban area in south-eastern France (ESCOMPTE campaign)*. EGS-AGU-EGU joint Assembly, Nice, France, April 2003.

(Finally, we may mention 4 PhD theses and 4 masters since 2001, largely based upon simulations using ECMWF data)