Curriculum Vitae

Personal data

Maria Cristina Facchini

Address (work)	Istituto di Scienze dell'Atmosfera e del Clima – Consiglio Nazionale delle Ricerche (ISAC-CNR) Via Gobetti 101, 40129 Bologna
Telephone	+ 39 051 639 9563
Fax	+39 051 639 9647
E-mail	mc.facchini@isac.cnr.it
Personal web page	http://atmoschembo.freshcreator.com/eng/m-cristina-facchini
Citizenship	Italian
Birth date	19 April, 1960

Research positions

2007 - present	Research Director, Institute of Atmospheric Sciences and Climate of CNR, Bologna
2001 - 2006	Senior Scientist, Institute of Atmospheric Sciences and Climate of CNR, Bologna
1996-2001	Scientist, Institute of Physics and Chemistry of the Lower and Higher Atmosphere of CNR, Bologna
1992-1995	Head of Laboratory, Regional Environmental Agency, Bologna
1987- 1991	Research Fellow, Microphysics Branch, Institute of Atmospheric Physics of CNR, Bologna
1986	Post-doc, Department of Analytical Chemistry, University of Bologna

Education

1985	Doctoral Degree in Chemisty *magna cum laude* – University of Bologna

Membership of Professional Organisations

American Geophysical Union
European Geophysics Society
European Aerosol Society
Italian Aerosol Society

Membership of Committees and Panels

International Committee on Nucleation and Atmospheric Aerosols (ICNAA) (2006-present)
International Global Atmospheric Chemistry Scientific Steering Committee (2008-2011)
Council of European Geochemistry Society (EGS) (2009-present)
Italian Aerosol association Scientific Steering Committee (2009-2012)
Lead Author of Working Group 1 (The Physical Science Basis) of Fifth Assessment Report-Intergovernmental Panel on Climate Change (*IPCC WGI AR5*) (2010-present)
Scientific Advisory Board, Max Plank Institute for Chemistry, Mainz (Germany) (2011-present)
NOAA Earth System Research Laboratory's Chemical Sciences Division reviewer (2013-present)

Reviewing for Funding Agencies

European Commission – Directorate General Research
European Research Council (ERC)
US National Science Foundation (NSF)
French NationalResearch Agency (NOAA)

Research Projects

Principal Investigator in several national and international research projects dealing with aerosol and cloud research:

- *International Projects*
  - University of Manchester, Institute of Science and Technology Project "Understanding cloud-aerosol interactions in ACE-Asia" (2001)
  - EC Project QUEST: Quantification of Aerosol Nucleation in the European Boundary Layer (2001-2004)
  - EC- Project PHOENICS: Particles of Human Origin Extinguishing Natural solar radiation In Climate Systems (2002-2005)
  - University of Manchester, Institute of Science and Technology Projects "Tropospheric Organic Chemistry Experiment" and "CLOud Processing of Regional Air Pollution advecting over land and sea" (CLOPAP) (2003-2004)
  - EC Project POLISOA: Polymers in Secondary Organic Aerosols (2005-2007)
  - EC Project MAP: Marine Aerosol Production: Primary & Secondary Marine Aerosol Production from Natural Sources (2005-2009)
  - EC Project EUCAARI: European Integrated Project on Aerosol, Cloud Climate Aerosol Interaction (2007-2010)
  - EC Project PEGASOS (2011- 2013)
  - EC Project BACCUS (2013-2017)

- *National projects*
  - CNR Project Agenzia 2000 "Microclima urbano e rurale: dinamica, processi di formazione e reattività di microinquinanti e di aerosol in atmosfere complesse (URMIC)"(2000)
  - CESI Project: "Analisi dei fenomeni di formazione ed accrescimento degli aerosol in atmosfera", (2000-2001).
  - ARPA/SMR Project: "Meccanismi chimici per modelli della qualità dell'aria", (2000-2001).
  - CESI Project "Indagini sperimentali per la caratterizzazione di concentrazioni/deposizioni. Caratterizzazione dell'aerosol atmosferico (2001)
  - FISR Programme: "Sustainable Development and Climate Changes" of the Italian Ministry of the University and Scientific Research. Sub-project "Study of the direct and indirect effects of aerosols and clouds on climate (AEROCLOUDS)" (2006-2011)
  - CNR Pilot study on "Assessment of health effects of the chemical composition of ultrafine and fine particles in Italy (2010-2011)
  - Region Emilia Romagna: Supersite project: Integrated study of atmospheric pollution in the region Emilia-Romagna by means of measurements of chemical, physical and tossicologiacl parameters and by modelling evaluation of sanitary, epidemiological and environmental impacts.(2010-present)

Current value of live contracts: 1.8 M€
Total (from 1998): 6.3 M€

Editorial activity

Editorial Board of Atmospheric Environment (2001-2007)

Editorial Board of Atmospheric Chemistry and Physics (2009-present)
Editorial Commission of the American Association for Aerosol Research (AAAR) (2012-present)
Scietific Sterring group of the Sapere (Dedalo Editor) (2014- presemt)

Has reviewed for the most prestigious international journals in the field of atmospheric sciences and global environmental change including *Nature, Science, PNAS, Geophys. Res. Letts., J. Geophys. Res., Atmos. Environ., Atmos. Res., Atmos. Chem. Phys.*

Bibliometric data

Author of 144 ISI publications, including contributions to *Nature, Science and PNAS*, and of > 300 presentations (several invited) at national and international Symposia.

According to the ISI Science Citation Database, number of ISI publications: 144; number of citations exceeds 8000, with a h-factor of 48.

Career Highlights

The main research interest is on physical and chemical processes in multiphase atmospheric systems (aerosols and clouds) and their effects on atmospheric composition change and climate.

Scientific career started in the late 80s', during the graduate studies, investigating the chemical properties of fog and clouds in the pioneering sector of *water soluble organic* fraction composition and properties.

The first important scientific achievement was published in 1999 in *JGR,* concerning the partitioning of the aerosol organic fraction between fog droplets and the interstitial air. This paper discussed for the first time in literature the role of *polar organic compounds on cloud droplet formation*.

Contributed to the development of a *new functional group technique for aerosol organics* based on Proton Nuclear Magnetic Resonance which resulted a powerful tool for understanding the properties of the polar organic component of aerosol particles and which, at present, is still widely quoted in the literature (Decesari et al., 2000). In this as in other companion papers started to characterise the so-called *aerosol humic-like fraction (HULIS)* role by coupling separation methods, functional group techniques and elemental analysis.

In 1999 published in *Nature* a paper showing the potential effect of *surface tension decrease* due to the aerosol organic fraction (mainly the HULIS fraction) on cloud formation and albedo. This paper opened a new research field on the organic aerosol properties and is still widely quoted in literature.

In 2001 contributed to a joint paper in *Science*, where the major experts in the field discussed the need of reshaping the theory of cloud formation on the basis on the new findings on the organic aerosol solubility and surface tension as well as on the effects of soluble gases.

In 2004 led the preparation of a *Nature* paper in which was observed, for the first time, the importance of the biogenic organic component in determining the marine aerosol CCN properties and the dependence of the CCN size distribution and chemical composition on the biological oceanic activity. This work changed the view of the *interaction between marine biota, atmospheric aerosol and climate*, showing a complexity not taken into account by the CLAW hypothesis.

As a follow-up study, a simple parameterization was developed for calculating the *enrichment of organics in the sea spray as a function of chlorophyll* concentration derived by satellites measurements. This parametrization is at present widely used in global models

In the following years the chemical composition of biogenic marine fraction, constituted by sea spray and secondary organic compounds was explored in several papers widely quoted in literature. In particular the chemical and physical properties of the sea spray organic component was explored during pioneering laboratory experiments carried out with natural sea water during algal blooms. These experiments (Facchini et al., 2004) showed that the *sea spray organic fraction is mainly water insoluble and constituted by colloidal matter having spectroscopic characteristics of the phytoplankton exudates and surface active properties*.

Moreover, a new *biogenic marine source of secondary amines* was discovered which represents a potential source of marine SOA and organic nitrogen at the global scale (Facchini et al., 2008).

Maria Cristina Facchini and her group have presently a large number of stable and long-standing collaborations with leading atmospheric groups in the field of organic aerosol in the US and Europe, as evidenced by the scientific production, the invitations as a key presenter at several prestigious international conferences.

Key Publications

1. Facchini*, M.C., S. Fuzzi, S. Zappoli, A. Andracchio, A. Gelencser, G. Kiss, Z. Krivacsy, E. Meszaros, H.C. Hansson, T. Alsberg and Y. Zebuhr (1999) Partitioning of the organic aerosol component between fog droplets and interstitial air. *J. Geophys. Res.*, **104**, 26821-26832 (134 total citations; 11.83 citations/year)
2. Facchini*, M.C., M. Mircea, S. Fuzzi and R.J. Charlson (1999) Cloud albedo enhancement by surface-active organic solutes in growing droplets. *Nature*, **401**, 257-259. (349 total citations; 24.93 citations/year)
3. Decesari, S., M.C. Facchini, S. Fuzzi and E. Tagliavini (2000) Characterization of water soluble organic compounds in atmospheric aerosol: a new approach. *J. Geophys. Res.*, **105**,1481-1489 (193 total citations; 14.85 citations/year)
4. Charlson, R.J., J. H. Seinfeld, A. Nenes, M. Kulmala, A. Laaksonen, M.C. Facchini (2001) Reshaping theory of cloud formation. *Science*, **292**, 2025-2026. (104 total citations; 11.83 citations/year)
5. O'Dowd*, C.D., M.C. Facchini*, F. Cavalli, D. Ceburnis, M.Mircea, S. Decesari, S. Fuzzi, Y.J. Yoon and J.-P. Putaud (2004) Biogenically-driven organic contribution to marine aerosol. *Nature*, **431**, 676-680 (255 total citations; 28.33 citations/year)
6. Kanakidou, M., J.H. Seinfeld, S. N. Pandis, I. Barnes, F. J. Dentener, M.C. Facchini, R. van Dingenen, B. Ervens, A. Nenes, C.J. Nielsen, E. Swietlicki, J.P. Putaud, Y. Balkanski, S. Fuzzi, J.Horth, G.K. Moortgat, R. Winterhalter, C.E.L. Myhre, K. Tsigaridis, E. Vignati, E.G. Stephanou and J.Wilson 2005). Organic aerosol and global climate modelling: a review. Atmos. Chem. Phys., 5, 1053-1123.
7. Facchini,* M.C., S. Decesari, M. Rinaldi, C. Carbone, E. Finessi, M. Mircea, S. Fuzzi, F. Moretti, E. Tagliavini, D. Ceburnis and C.D. O'Dowd (2008). An important source of marine secondary organic aerosol from biogenic amines. *Environ. Sci. Technol.*, **42**, 9116-9121. (71 total citations; 17.75 citations/year)
8. Facchini,* M.C., M. Rinaldi, S. Decesari, C. Carbone, E. Finessi, M. Mircea, S. Fuzzi, D. Ceburnis, R. Flanagan, E. D. Nilsson, G. de Leeuw, M. Martino, J. Woeltjen and C.D. O'Dowd (2008). Primary submicron marine aerosol dominated by insoluble organic colloids and aggregates. *Geophys. Res. Lett.*, **35**, L17814, doi:10.1029/2008GL034210. (61 total citations; 12.20 citations/year)
9. Primary and secondary marine organic aerosols over the north atlantic ocean during the map experiment - Decesari, S., E. Finessi, M. Rinaldi, M. Paglione, S. Fuzzi, E. G. Stephanou, T. Tziaras, A. Spyros, D. Ceburnis, C. O'Dowd, M. Dall'Osto, R. M. Harrison, J. Allan, H. Coe, M. C. Facchini. - J. Geophys. Res. A, doi:10.1029/2011JD016204, 2011.
10. Evidence of a natural marine source of oxalic acid and a possible link to glyoxal – Rinaldi, M. ; Decesari, S ; Carbone, C; Finessi, E; Fuzzi, S; Ceburnis, D 2,3; O'Dowd, CD; Sciare, J; Burrows, JP; Vrekoussis, M; Ervens, B; Tsigaridis, K; Facchini, MC - JOURNAL OF GEOPHYSICAL RESEARCH - ATMOSPHERES , Volume:116, 2011 - DOI:10.1029/2011JD015659

(* Lead -Authorship)

Selected Invited Presentations

- Facchini M.C. (2013) Marine polymers / micro-gels distribution and atmosphere ocean interactions, Gordon Research Conference, Atmospheric Chemistry, July 28 - August 2, 2013, Mount Snow Resort, West Dover, VT, USA
- Facchini M.C: (2012) Submicron Marine Organic Aerosols: primary vs. secondary , SOLAS Open Science Conference 201207-10 May 2012, CleElum, USA.
- Facchini M.C: (2010) Biogenic organic components in marine aerosol Telluride Workshop on "Organic Particles in the Atmosphere: Formation, Properties, Processing, and Impact" from Aug. 2-6, 2010, Telluride, Colorado.
- Facchini M.C. and C.D.O'Dowd. Different chemical characteristics of primary and secondary marine organic aerosol relevant for climate studies . IGAC Conference 2008, September 7-12, 2008, Annecy, France.
- Facchini, M.C. and C.D. O'Dowd . Organic Marine Aerosol: State Of The Art And New Findings. 17th ICNAA Conference, August 13-17, 2007, Galway, Ireland.
- Facchini, M.C., S. Decesari, E. Finessi, J. Dommen and U. Baltensperger. Chemical Characterization of Secondary Organic Aerosols with Emphasis on Functional Group Analysis. 16th ISAM Congress, June 16-20, 2007, Tours, France.
- Facchini, M.C., S. Decesari, M. Mircea, F. Cavalli and S. Fuzzi. Chemical effects on cloud activation with special emphasis on the effect of carbonaceous aerosol from biomass burning. EGS-AGU-EUG Joint Assembly, April 6-11, 2003, Nice, France
- Facchini, M.C. Chemical effects on cloud activation with special emphasis on the effect of organic compounds. Gordon Research Conference on Water and Aqueous Solutions, August 4-9, 2002, Plymouth, New Hampshire, USA
- Facchini, M.C. Cloud multiphase processes and their impact on climate 7th IGAC Scientific Conference, September 18-25, 2002, Crete, Greece