
Curriculum Vitae for David Michele Cappelletti,

coordinator of the Environmental Chemistry and Technology (ECT) research group

Dipartimento di Chimica, Biologia e Biotecnologie (DCBB),

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Education and Professional preparation

- 1994 Post-doc, National Taipei University, Taipei, Taiwan
- 1993 Ph.D. in Chemistry, Università degli Studi di Perugia
- 1989 Laurea in Chimica, magna cum laude, Università degli Studi di Perugia

Current position(s)

- 2018- Full Professor of Chemistry, University of Perugia
- 2022- Director of the Center for Climate Research, CRC-CIRIAF, Università degli Studi di Perugia
- 2023- Member of Accademia Nazionale delle Scienze, detta dei XL.
- 2019- Delegate for Scientific Research of DCBB, Università degli Studi di Perugia.
- 2020- Associate researcher to ISP-CNR (Institute of Polar Sciences, National Research Council).
- 2014- Member of CGI (Italian Glaciological Committee)

Previous positions

- 2006-2018: Associate Professor of Chemistry, University of Perugia;
- 1993-2006: Associate Researcher, University of Perugia, Italy;
- 1995: visiting researcher, University of Rochester, USA.

Supervision of graduate students and postdoctoral fellows

I have graduated 4 Ph.D. students in Chemistry, 1 Ph.D. in Physics and 1 Ph.D. in Biology and mentored 6 Post Docs and over 50 undergraduate students in Chemistry and Environmental Engineering at the University of Perugia.

Biography and research focus

I'm Full Professor of Chemistry at the University of Perugia where I teach Biogeochemistry and Environmental Chemistry. I moved at the Department of Chemistry, Biology and Biotechnology in 2013 as coordinator of the Environmental Chemistry and Technology (ECT) research group, after starting my career at the Department of Civil and Environmental Engineering of the same University in the 1993. This followed on from visiting research positions (Dip. Fisica, Trento, Italy; Dept. Chemistry, Rochester, NY, USA), Post Doctoral position at the Institute of Atomic and Molecular Science (NTU Taipei, Taiwan), under the supervision of Y.T. Lee (Nobel Laureate in Chemistry), Ph.D. in Chemistry (University of Perugia) and first degree in Chemistry (University of Perugia). Since 2009 I served as operator of the WGMS (World Glacier Monitoring Service) with annual field campaigns mainly at the Calderone Glacier (Gran Sasso d'Italia). I also participated to several Italian Arctic Expeditions (2011-2023). I'm a member of the Doctorate School of Chemical Sciences of the Perugia University and to the National PhD school in Polar Sciences. I was the supervisor of several Ph.D. thesis in Chemistry, Physics and Biology and more than 50 undergraduate thesis in Chemistry, Physics, Environmental Engineering and Biology.

My scientific activity started, in the early 1990s, in the field of the dynamics of elementary chemistry processes in the gas phase, with a particular emphasis on the characterization of nature and role of interatomic and intermolecular forces and stereodynamics of molecular collisions by molecular beam experiments with prototype mass spectrometers and by semi-empirical modeling. Highlights in this topic are well illustrated by highly cited papers (Nature 1994; J Am. Chem. Soc. 1999; Chem. Phys. 2006). Lately I was interested in the study of surface physics (see for instance, Angew.Chemie, 2006; Prog. Surf. Science, 2008) with the use of synchrotron light sources and XPS probes and hydrogen and halogen bonded systems (i.e., Acc. of Chem. Res., 2012). Since 2005, I turned my attention on environmental chemistry and in particular on atmospheric aerosols research (i.e. Atmos. Environ. 2012; Atmos. Chem.Phys, 2014) and, since 2011, on Polar research (i.e. Atmos. Environ., 2015). On these topics I've been invited to give more than 40 talks at International Conferences and Universities. Current research in my group is based on chemical and morphological characterization of atmospheric aerosols in urban, remote and indoor environment, vertical profile measurements of aerosol properties by tethered balloon experiments and aerosol source apportionment methodologies, implementation and optimization of chemical transport models (Lagrangian and Eulerian), atmosphere-cryosphere interaction, snow chemistry and physics. The activity is based on various research infrastructures which include the TRACES laboratory (Trace Analysis for Chemical Speciation) dedicated to the development of cutting-edge analytical methods for chemical speciation realized within the AMIS project Department of Excellence (2018- 2022), the monitoring site for the atmospheric aerosol of Monte Martano, node of the European network EMEP, the Italian Arctic station Dirigibile Italia on the Svalbard islands where I coordinated the Italian monitoring of the lower troposphere with the use of tethered balloons (2011-2019) and participated to various snow and ice monitoring campaigns (2015-2024) including the recent deep drilling at Holtedahlfonna glacier (ICE Memory project).

Publications and bibliometrics

I co-authored of more than 200 scientific (WOS+SCOPUS) publications, including well-renowned international journals of high impact factor (such as Nature, Angewandte Chemie, Journal of the American Chemical Society, Physical Review Letters, J. Hazard. Mat., ACP). I also co-authored more than 20 chapter of books and non ISI papers. I contributed to important review papers (Accounts of Chemical Research, International Reviews in Physical Chemistry, Progress in Surface Science, Advances in Quantum Chemistry). In 2016 I was lead editor of the special volume "Environmental Changes in the Arctic: an Italian Perspective" published by Springer. I participated in the drafting of several international reports on the state of the Arctic regions including four SESS reports (State of Environmental Science in Svalbard) in the period 2019-2022 and the recent AMAP 2023 report (Arctic Monitoring & Assessment Programme). My publications received >7000 citations, h-index: 48 (ISI WOS) 51 (Google Scholar). I also co-authored more than 300 communications at scientific meetings.

Public Engagement & Communication

- Perugia Expo Water - May 30 2015
- [SuperQuark \(RAI\) - July 2, 2015](#)
- [Scienza Infusa \(Un. Perugia\) - May 11, 2017](#)
- [Speciale Università \(TEF Channel\) - May 24, 2017](#)
- TG2 (RAI) 22/04/2022, La ricerca Italiana in Artico

Professional Service

- 2019 Evaluator for BSF - United States – Israel Binational Science Foundation
- 2018-2022 – Member of the Steering Committee of the AMIS project funded by the Dipartimenti di Eccellenza (2018-2022) programme of MUR.

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- 2018 - Italian delegate to Arctic Science Ministerial, Berlin 2018
 - 2018, 2017 - Erasmus+ Staff mobility - University of Potsdam (Germany).
 - 2014-2020 – Associate Researcher to Istituto della Scienze dell’Atmosfera e del Clima (ISAC-CNR).
 - 2011-2023 Researcher under the Italian Arctic Campaign in Ny Alesund (Svalbard);
 - 2015 Italian representative at the Panel of Experts of Belmont Forum (Washington DC, NSF) for the theme "Arctic Observing and Research Sustainability".
 - 2015-2017 Member of the Steering Committee of the Italian Aerosol Society.
 - 2015 Evaluator for the National Science Centre of Poland.
 - 2013-2019 – Delegate for Quality assurance of DCBB, University of Perugia.
 - 2012 Chair of PM2012, the Fifth National meeting of the Italian Aerosol Society (Perugia, 16-18, May 2012);
 - 2009-present: Referee for PRIN, FIRB and SIR projects.
 - 2012-present: Referee for the VQR (2004-2010;2011-2014) Italian system.
 - 2009-present Operator of the WGMS (World Glacier Monitoring Service)
 - 2007 Lecturer at the Master in "Simulacion de Processos Moleculares" Universidad Autonoma de Madrid, Spain;
 - 2005 Chair of the Congress Water Dimers and Weakly Interacting Species in the Modeling of Atmosphere, CECAM Workshop, Lyon, 25-27 April 2005
 - 2004 Visiting professor, Osaka University, Japan;
 - 2001 Lecturer at the INFM National School, Universita di Napoli "Federico II", Napoli.
 - 1998 Member of Istituto Nazionale per le Fisica della Materia (INFM);

Scientific projects coordination (Principal Investigator PI or Unit Coordinator UC)

- 2024-2026 - **PRIMAR** - Potential Role of Sea Ice change in controlling Mercury in coastal Antarctic Areas, funded by MIUR through **PNRA 2022** programme, **UC**
- 2023-2025 - **SnowMed** - Apennine snow cover in the Mediterranean climate region: multi-sensor data, observations, modeling and trend analysis, **PRIN 2022, UC**
- 2023-2025 **Transfer** - TRansport and circulation of Anthropogenic and Natural compounds in the Svalbard Fragile EnviRonment: an integrated approach, **Progetti Ricerche in Artico** (PRA INFRA 2021)
- 2022-2024 A multidisciplinary design approach to the study of climate and climate warming and its scientific, economic, and social impact on the Central Mediterranean continent, Funded by Fondo Ricerca di Ateneo esercizio 2021 (UNIPG). **PI**
- 2021-2023 **BC14** - Fossil fuel contribution to Black Carbon deposition on Svalbard Glaciers, **Svalbard Strategic Grant**, (SSG, NRC), **UC**
- 2020-2022 – **SMIVIA** – Snow-coverage Modeling, Inversion and Validation using multi-mission multi-frequency Interferometric SAR in central Apennine, bando **ASI** (DC-UOT-2019-017) **UC**
- 2021-2023 **ECOROADS** Barriere innovative per la mitigazione dell’inquinamento acustico e chimico generato dalle strade, PON (MIUR) **UC**
- 2019 – **BC-HOR** - Spatial Distributions of Black Carbon and Mineral Dust in Air and Snow Surface Layers on the Hornsund Glaciers, Principal investigator, **INTERACT EU** project, Funded by H2020 (Grant Agreement No. 730938). **PI**
- 2018-2022 - **AMIS** – Progetto Dipartimenti di Eccellenza (MIUR). Coordinator of the Traces Lab. **PI**
- 2018-2020 – **BC-3D** – *Spatial Distribution of Black Carbon and Mineral Dust in Air and Snow Surface Layers upon Svalbard Glaciers* – Principal Investigator – project. N. 283466, funded by the Norwegian Research Council, through the **Svalbard Strategic Grant** (SSG) programme. **PI**
- 2017-2019 – **SIDDARTA** – *Source Identification of (mineral) Dust to AntaRcTicA* - Local unit Coordinator, funded by MIUR through **PNRA 2016** programme.
- 2016 – **SINERGIA** - *Fillobiorisanamento: utilizzo delle interazioni piante-batteri come strumento innovativo per il trattamento biologico di inquinanti volatili per la sicurezza negli impianti produttivi* - Local Unit Coordinator – funded by INAIL through the **BRIC** programme. **UC**
- 2015 - **AGAP**: Atmospheric Gondola for Aerosol Profiling – Principal Investigator – supported by the CNR, UNIPG and CICCI campaign. **PI**
- 2014-2015 – *Biodiversity and biomagnification in lepidoptera: effects of atmospheric deposition and soil*

nature – Principal Investigator – funded by ARPA Umbria. **PI**

- 2013-2014: *Coupling of climatic system components and physical, chemical and biological processes at the interface in the Arctic* – Progetto Bilaterale (MAE) PGR00168 (2013-2014) - Italia-Korea. **UC**
- 2012-2015: **PMETRO** - *Particulate matter monitoring in real time by means of a mobile station*. Principal Investigator - funded by ARPA Umbria, Regione dell'Umbria and Comune di Perugia. **PI**
- 2008-2015 - Air quality: Source apportionment of particulate matter in urban environment in Umbria – Principal Investigator - Funded by and in collaboration with ARPA Umbria **PI**
- 2009-2010 *Aerosol vertical profile by tethered balloon over the cities of Terni, Milano and Merano*, Principal Investigator - funded by Fondazione Cassa di Risparmio di Terni e Narni and EURAC (Bolzano); **PI**
- 2009 *Realization of a high altitude air quality monitoring station for the study of transnational pollutants transport*, Principal Investigator - funded by the Fondazione Cassa di Risparmio di Perugia; **PI**
- 2008-2012: *Chemical and morphological characterization of particulate matter in Umbria*, funded by Regione Umbria. **PI**
- 2005: *Structure and dynamics of species of atmospheric interest of relevance for Greenhouse effect and global warming*, Principal Investigator - Galileo Project, Italian-France Coordinated action. **PI**

Project participation as researcher

I participated as researcher to several national COFIN/PRIN (1997, 1998, 1999, 2001, 2003, 2004, 2005, 2008) and FIRB (2001), **PNRA (STEAR, 2018)**, **PRA (BETHANYA, 2018)**, PURS and PAIS (2000, 2002) projects. I also participated as researcher to the following EU projects:

- 2000-2003: *Generation, characterization and Reaction Dynamics of Multiply Charged Ions*. EU Training and Mobility of researcher (TMR) project.
- 1996–1999: *Potential Energy Surfaces for Molecular Spectroscopy and Dynamics* - EU Training and Mobility of researcher (TMR) project [Contract no. ERB-FMRX-CT96-0088]
- 1993-1996 : *Structure and Reactivity of Molecular Ions* - EU Human capital and Mobility Network (HCM) project - Contract no. CHRX-CT93-0150]

Teaching activity

- Biogeochimica (2018-present)
- Chimica e Chimica Applicata (1993-2018);
- Chimica dell'Atmosfera (2009-2011);
- Radiochimica (2008);
- Rischio Chimico (2008-2009);
- Tecniche Strumentali per le Scienze Ambientali (2015-present);
- Chimica Ambientale (2015-present)

I'm affiliated to the PhD School of Chemistry of Perugia and to the **National PhD school in Polar Sciences**. I was the supervisor of various Ph.D. thesis in Chemistry, Physics and Biology and more than 50 undergraduate thesis in Chemistry, Physics and Environmental Engineering.

Memberships

Member of the Italian Aerosol Society (IAS), of Associazione Italiana di Chimica per Ingegneria (AICIng), Italian Chemical Society (SCI), Accademia Nazionale delle Scienze detta dei XL.

Selected recent publication on Atmospheric Chemistry and Polar research fields

David Cappelletti, Zilvinas Ezerinskas, Justina Sapolaite, Laurynas Bucinskas, Bartłomiej Luks, Adam Nawrot, Catherine Larose, Paolo Tuccella, Jean Charles Gallet, Stefano Crocchianti, Federica Bruschi, Beatrice Moroni, Andrea Spolaor, Long-range transport and deposition on the Arctic snowpack of nuclear contaminated particulate matter, **Journal of Hazardous Materials**, 452, 131317 (2023).

David Cappelletti, Chiara Petroselli, David Mateos, Marcos Herreras, Luca Ferrero, Niccolo Losi, Asta Gregoric, Claudia Frangipani, Gianandrea La Porta, Michael Lonardi, D.G. Chernov, Alena Dekhtyareva *Vertical profiles of black carbon and nanoparticles pollutants measured by a tethered balloon in Longyearbyen (Svalbard islands)* **Atmospheric Environment**, 290, 119373 (2022).

Bertinetti, Stefano and Bolea-Fernandez, Eduardo and Malandrino, Mery and Moroni, Beatrice and Cappelletti, David and Grotti, Marco and Vanhaecke, Frank, *Strontium isotopic analysis of environmental microsamples by inductively coupled plasma - tandem mass spectrometry* **Journal of Analytical Atomic Spectrometry**, 37, 103 (2022).

Paola Gravina, Bartolomeo Sebastiani, Federica Bruschi, Chiara Petroselli, Beatrice Moroni, Roberta Selvaggi, Enzo Goretti, Matteo Pallottini, Alessandro Ludovisi, David Cappelletti, *Sources and trends of trace elements and polycyclic aromatic hydrocarbons in a shallow lake in the Mediterranean area from sediment archives of the Anthropocene* **Environmental Science and Pollution Research** (2022).

Federica Bruschi, Beatrice Moroni, Chiara Petroselli, Paola Gravina, Roberta Selvaggi, Massimo Pecci, Andrea Spolaor, Paolo Tuccella, Edoardo Raparelli, Jacopo Gabrieli, Giulio Esposito, Pinuccio D'Aquila, David Cappelletti *Chemical characterisation of natural and anthropogenic inputs of dust in the seasonal snowpack (2017–2020) at Calderone Glacier (Gran Sasso d'Italia)* **Environmental Chemistry**, (2022).

Chiara Petroselli, Elena Montalbani, Gianandrea La Porta, Stefano Crocchianti, Beatrice Moroni, Chiara Casagrande, Elisa Ceci, Roberta Selvaggi, Bartolomeo Sebastiani, Isabella Gandolfi, Andrea Franzetti, Ermanno Federici, David Cappelletti, *Characterization of long-range transported bioaerosols in the Central Mediterranean*, **Science of The Total Environment**, 763, 143010 (2021).

Lisa J. Beck, Nina Sarnela, Heikki Junninen, Clara J. M. Hoppe, Olga Garmash, Federico Bianchi, Matthieu Riva, Clemence Rose, Otso Perakyla, Daniela Wimmer, Oskari Kausiala, Tuija Jokinen, Lauri Ahonen, Jyri Mikkila, Jani Hakala, Xu-Cheng He, Jenni Kontkanen, Klara K. E. Wolf, David Cappelletti, Mauro Mazzola, Rita Traversi, Chiara Petroselli, Angelo P. Viola, Vito Vitale, Robert Lange, Andreas Massling, Jakob K. Nøjgaard, Radovan Krejci, Linn Karlsson, Paul Zieger, Sehyun Jang, Kitack Lee, Ville Vakkari, Janne Lampilahti, Roseline C. Thakur, Katri Leino, Juha Kangasluoma, Ella-Maria Duplissy, Erkki Siivola, Marjan Marbouti, Yee Jun Tham, Alfonso Saiz-Lopez, Tuukka Petaja, Mikael Ehn, Douglas R. Worsnop, Henrik Skov, Markku Kulmala, Veli-Matti Kerminen, Mikko Sipilä *Differing mechanisms of new particle formation at two Arctic sites*. **Geophysical Research Letters**, 48, e2020GL091334 (2021).

Ferrero, L., Cappelletti, D., Busetto, M., Mazzola, M., Lupi, A., Lanconelli, C., Becagli, S., Traversi, R., Caiazza, L., Giardi, F., Moroni, B., Crocchianti, S., Fierz, M., Mocnik, G., Sangiorgi, G., Perrone, M. G., Maturilli, M., Vitale, V., Udisti, R., and Bolzacchini, E. *Vertical profiles of aerosol and black carbon in the Arctic: a seasonal phenomenology along 2 years (2011-2012) of field campaigns*, **Atmospheric Chemistry and Physics**, 16, 12601–12629 (2016)

D. Cappelletti, R. Azzolini, L. Langone, S. Ventura, A. Viola, S. Aliani, V. Vitale, E. Brugnoli *Environmental changes in the Arctic: an Italian perspective*, **Rendiconti Lincei** 27 1-6 (2016)

Selected publication on previous research topics

D. Cappelletti, E. Ronca, L. Belpassi, F. Tarantelli and F. Pirani Revealing charge-transfer effects in gas-phase water chemistry, **Accounts of Chemical Research**, 45 1571–1580 (2012)

V. Aquilanti, E. Cornicchi, M. Moix Teixidor, N. Saendig, F. Pirani, D. Cappelletti, Glory scattering measurement of water-rare-gas interactions: the birth of the hydrogen bond, **Angewandte Chemie**, 44 2356–2360 (2005)

L. Vattuone, A. Gerbi, M. Rocca, U. Valbusa, D. Cappelletti, F. Vecchiocattivi and F. Pirani, Stereodynamical effects in the adsorption of ethylene molecules on metal surface, **Angewandte Chemie**, 43, 5200–5203 (2004).

F. Pirani, D. Cappelletti, M. Bartolomei, V. Aquilanti, M. Scotoni, M. Vescovi, D. Ascenzi, D. Bassi, Orientation of benzene in supersonic expansions probed by IR-laser absorption and by molecular beam scattering, **Physical Review Letters**, 86, 5035–5038 (2001)

D. Cappelletti, F. Vecchiocattivi, F. Pirani, E.L. Heck, and A.S. Dickinson, An intermolecular potential for nitrogen from a multi-property analysis, **Molecular Physics**, 93, 485–499 (1998)

V. Aquilanti, D. Ascenzi, D. Cappelletti, and F. Pirani, Velocity dependence of collisional alignment of oxygen molecules in gaseous expansions, **Nature** 371, 399–402 (1994)

P. Tosi, F. Eccher, D. Bassi, F. Pirani, D. Cappelletti, and V. Aquilanti, Low energy structure in the $\text{Ar}^+ + \text{H}_2$ reaction: role of vibronic levels of the intermediate complex, **Physical Review Letters**, 67, 1254–1257 (1991).

D. Cappelletti, G. Liuti and F. Pirani, Generalization to ion-neutral systems of the polarizability correlations for interaction potential parameters, **Chemical Physics Letters**, 183, 297–303 (1991)

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David Michele Cappelletti

