

Pierre AMATO
CNRS CR1 Researcher (INEE) – HDR
Atmospheric Microbiology - Aerobiology
41yo



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Google Scholar profile: <https://scholar.google.fr/citations?user=8xrqo7EAAAAJ&hl=fr&oi=ao>
ResearchGate profile: https://www.researchgate.net/profile/Pierre_Amato

Current Research Interest:

I am currently investigating microbial biodiversity in the atmosphere (aerosols, clouds and precipitations), including community structure and function, variability and environmental drivers. The goals are to better comprehend microbial dispersion, survival/maintenance and their impacts on physicochemical processes. I use microbial ecology approaches along with climatology and analytical chemistry tools. I develop in particular aspects of bioaerosol research including air sampling in remote sites and molecular profiling (-omics).

I currently supervise two PhD theses:

- ✓ **Raphaëlle Peguilhan** (defence expected in 2022) aims at **investigating clouds and aerosols using metatranscriptomics and metagenomics** for better characterizing the role of clouds in microbial ecology: are clouds oases for life in the atmosphere?
- ✓ **Christelle Ghaffar** (defence expected in 2022; co-supervision with M. Brigante, ICCF) aims at studying **the fate of nitrogen compounds in the atmosphere in interaction with photochemical and biological processes**.

Main content:

- Habilitation (HDR, « *L'Ecosystème Atmosphérique* », 2017) ;
- Responsible for the « Axe Transverse Chimie pour l'Environnement » (31 researchers) at ICCF ;
- Representative of ICCF at the « Fédération de Recherche en Environnement » FR3467 ;
- Member of the Scientific Evaluation Panel CNRS EC2CO AT « MICROBIOME » ;
- PI or co-PI in national and international projects (ANRs MOPGA, PRCI et PRC, NSERC, FEDER, EC2COs, etc) ;
- Organization of international congresses (EMEC, ATMOCHEMBIO, MicrobAERO) ;
- 47 publications in peer-reviewed journals ; 7 book chapters ;
- 11 invited conferences ;
- Vulgarization (BIOFUTUR, Microbes, Assoc. H2O, etc) ;
- Edition of the international book « *Microbiology of Aerosols* » (2017, Wiley) ;
- Associated Editor in the journal *Frontiers in Microbiology* (Open Access) ;
- Supervision of postdoctorates (3), PhD students (2), Master 2 (3), Master 1 (11), DUT (2), BTS (2).

Education and research experience:

- 2002 **Master degree** “Biology of Populations and Ecosystems” – Clermont-Fd (France)
2003 **Master degree** “Climate and Physico-Chemistry of the Atmosphere” – Clermont-Fd/Grenoble, France
2006 **PhD thesis** “The microbial communities of cloud water: implication in cloud chemistry” – SEESIB/LaMP-OPGC, Clermont-Fd, France.
2008-2009 **Postdoctorate** “Microbial activity in ice” – Louisiana State University, Baton Rouge, LA (USA) (Dr Brent Christner’s research group).
2009-2010 **Postdoctorate** “Interactions between landscape, microclimate, and dynamics of microbial populations of plants” – INRA EMMAH/UPV Avignon, France (Dr Dominique Courault and Cindy Morris’ research groups).
2010-current **Researcher at CNRS** (Institut Ecologie et Environnement INEE), ICCF, Clermont-Fd, France
2017 **Habilitation Thesis** « The atmospheric Ecosystem”, Clermont-Fd, France.

Local responsibilities:

- 2016 – ... Member of the conseil d’unité BIOMETA
2017 – ... Member of the conseil d’UFR ICCF
2017– ... Member of the comité scientifique ICCF
2019 – ... Animateur de l’Axe Environnement de l’ICCF

Expertise/evaluation/reviewing :

- 2017-... **Member of the scientific evaluation panel of** CNRS EC2CO *MICROBIOME*.
2019-... **Member of the scientific evaluation panel** TNA (TransNational Access EUROCHAMP-2020 project).
Regularly: Evaluation of PhD theses (5 ; France, Danemark), scientific projects (France, USA, Autriche, Chili, Danemark, Islande, Europe); publications (AtmosChemPhys, Biogeosci, EnvironSciTechnol, FEMSMicrobiolEcol, Frontiers, JAerosSci, PNAS, SciRep, etc).

Editorial activity:

- 2017 **Editor of the book** “*Microbiology of Aerosols*”, Delort & Amato (eds), Wiley (**2017**), 320 pp. Print ISBN: 9781119132288 ; Online ISBN: 9781119132318 ; DOI: 10.1002/9781119132318.
2017-2018 **Guest Associate Editor** of the Research Topic “*The Atmospheric Microbiota*” in *Frontiers in Microbiology*, section Extreme Microbiology.
<http://journal.frontiersin.org/researchtopic/6455/the-atmospheric-microbiota>
2019 – ... **Associate editor** in *Frontiers in Microbiology*, section Extreme Microbiology.
2020 **Guest Editor** of the Special Issue “*Microbial Ecology in the Atmosphere*”, journal *Diversity* https://www.mdpi.com/journal/diversity/special_issues/Microbial_Ecol

Recent and on-going participation to research projects:

- 2020-2024 NSERC ANTIBIOTIQUE (Canada)** programme « Discovery Frontiers »: “Antimicrobial resistance genes in bioaerosols in Canadian arctic, rural, and urban environments: sources, profiles, transport and fate” **PI C. Duchaine** (Univ. Laval, Canada) (1000 k\$). **P. Amato : Participant** (10% ETP). *Analyses microbiologiques, bioinformatique, traitement de données, communication des résultats.*
2019-2022 PRC METACLOUD Intégration du métabolisme microbien dans la chimie des nuages : des omiques au modèle (470 k€). **PI AM. Delort** (ICCF, Clermont-Fd), Co-Pis JC. Portais (LISBP, Toulouse), F. Bringel (GMGM Strasbourg), L. Deguillaume (LaMP/OPGC, Clermont-Fd). **P.**

- Amato : Responsable de tâche** (14% ETP). *Analyses microbiologiques, gestion des expérimentations omiques, traitement de données, communication des résultats.*
- 2019-2022 ANR PRC BIOMAIDO** Bio-physicochimie des nuages tropicaux au Mt Maïdo (La Réunion): processus et impacts sur la formation des aérosols organiques secondaires (498 k€). **PI M. Leriche** (LA, Toulouse); Co-PIs A. Colomb (FRE, Clermont-Fd), P. Tulet (LACy, La Réunion), S. Houdier (IGE Grenoble), M. Vaitilingom (LaRGE, Guadeloupe), F. Burnet (CNRM, Toulouse). **P. Amato : Participant** (10% ETP). *Analyses microbiologiques, encadrement stagiaire, traitement de données, bioinformatique, communication des résultats.*
- 2019-2020 Fondation Air Liquide** “What about plastic pollution in the atmosphere?” (100 k€, 2 ans). **PI A. Ter Halle** (IMRCP, Toulouse), **P. Amato : responsable scientifique ICCF** (15% ETP). *Gestion locale du projet, développement instrumental, échantillonnages, analyses chimiques et microbiologiques, traitement de données, communication des résultats.* **Autre-co-PI** : P. Deixonne (E7C, Sète).
- 2019-2020 CNRS EC2CO MicrobiEN « BAPS »** Microorganismes photosynthétiques de l’atmosphère – Diversité et activité (40 k€, 2 ans). **PI C. Jousse** (ICCF, Clermont-Fd). **P. Amato : participant** (20% ETP). *Echantillonnage, analyses (cytométrie en flux, séquençage ADN haut débit), encadrement de stagiaire, traitement de données, communication des résultats.*
- 2018-2022 ANR Make Our Planet Make Again “MOBIDIC”**: Modeling Biologically Driven Processes in Clouds (1529 k€ sur 4 ans dont salaires 2 thèses + 60 mois postdoc). **PI B. Ervens. Co-PIs P. Amato** (19% ETP). *Gestion locale du projet, développement expérimental et conceptuel, analyses, encadrement thèse et postdoc, communications.* **Autre-co-PI**: A.M. Delort (ICCF Clermont-Fd, France).
- 2018 Projet FRE « Identification des déterminants environnementaux de la distribution spatiale des bactéries glaciogènes & impacts sur les risques de dommages gélifs des plantes »** (5 k€, 1 an). **PI G. Charrier** (INRA Clermont Fd PIAF). **P. Amato : responsable scientifique ICCF.** *Gestion locale du projet, analyses (profils glaciogènes et cytométrie en flux), traitement de données, communication des résultats.*
- 2018 Projet FRE « MOPS »** : Microorganismes photosynthétiques atmosphériques (5 k€, 1 an). **PI C. Jousse** (ICCF). **P. Amato : participant.** *Analyses (cytométrie en flux, séquençage ADN haut débit), encadrement de stagiaire, traitement de données, communication des résultats.*
- 2016-2019 ANR PRC “INHALE”** Investigation of the Atmosphere as a Real Ecosystem (428,3 k€ total sur 4 ans, dont 68,8 k€ pour la Fédération de Recherche en Environnement (FRE), dont 8 mois de postdoc M. Mourguy). **PI A. Dommergue** (IGE Grenoble); **P. Amato : responsable scientifique FRE** (20% ETP). *Gestion locale du projet, organisation des prélèvements et des échantillons, encadrement de postdoc analyses métabolomiques, traitement des données, communication des résultats, organisation des réunions, rapports.* **Autre co-PI** : C. Larose (AMPERE Lyon, France).
- 2016-2019 Projet PRISMA (Suède): “Impacts on the Glaciation of Clouds from Biogenic Aerosols Simulated Numerically»** **PI V. Phillips** (Lund Univ., Suède). **P. Amato: responsable scientifique ICCF.** *Conseil et expertise sur les expérimentations, analyses de profils glaciogènes, analyses biologiques.*
- 2014-2017 ANR PRC « BIOCAP »** Impacts biologiques et photochimiques sur la capacité oxydante du nuage (528 k€ sur 4 ans). **PI G. Mailhot** (ICCF, Clermont-Fd), Co-Pis AM. Delort (ICCF, Clermont-Fd), L. Deguillaume (LaMP/OPGC, Clermont-Fd), G. Sarthou (LEMAR, Brest). **P. Amato : participant** (10% ETP). *Analyses microbiologiques d’échantillons atmosphériques.*
- 2015-2017 ANR PRCI-DFG “CHLOROFILTER”** Impact of microbial communities on atmospheric chloromethane (461,7 k€ total sur 3 ans, dont 101,5 k€ pour la Fédération de Recherche en Environnement (FRE), dont 1 an de postdoc bioinformatique L. Besaury). **PI F. Bringel** (GMGM Strasbourg, France); **P. Amato : responsable scientifique FRE** (20% ETP). *Gestion locale du projet, développement expérimental, encadrement postdoc et stagiaires, prélèvements, conduite des analyses, traitement des données, communication des résultats, organisation des*

réunions et rapports. Autres co-PIs : F. Keppler (ORCA Heidelberg, Germany), S. Kolb (ZALF Munchenberg, Germany).

2014-2015 Projet CNRS EC2CO MicrobiEN-BIOHEFECT « W2RUSE Evaluation des risques liés aux virus entériques de l'homme émis dans l'atmosphère à proximité des sites de traitement ou de réutilisation d'eaux usées », (51.7 k€, 2 ans) PI D. Courault (INRA Avignon). P. Amato : responsable scientifique ICCF (20% ETP). Gestion locale du projet, développement expérimental, collecte d'aérosols, nuages et précipitations, analyses microbiologiques, gestion des échantillons, traitement de données, communication des résultats. Autres Co-PIs : I. Albert (Mét@RISK, Paris), H. Wortham (LCE AMU, Marseille), A. Fraisse (ANSES, Maisons-Alfort).

2014-2015 CNRS EC2CO MicrobiEN « FONCOMIC » Etude du Fonctionnement des Communautés Microbiennes des nuages par approche métatranscriptomique (39 k€, 2 ans). **PI P. Amato** (50% ETP). *Gestion locale du projet, développement expérimental, échantillonnages, analyses, communication.*

2013-2014 CNRS EC2CO MicrobiEN « BIOCAP » Interactions complexes de Fer-Microorganismes dans les nuages. Impact sur la transformation de la matière organique (42.5 k€, 2 ans). **PI AM. Delort** (ICCF Clermont-Fd, France), **co-Pis** G. Mailhot (ICCF, Clermont-Fd), L. Deguillaume (LaMP/OPGC, Clermont-Fd), G. Sarthou (LEMAR, Brest). **P. Amato : participant** (10% ETP). *Echantillonnages, analyses, communication.*

2009-2012 ANR PRCI-DFG "BIOCLOUDS" Biological aerosol particles in the atmosphere and their impact on clouds (95 k€ ICCF, 4 ans). **PI A. Flossmann** (LaMP, Clermont-Fd, France); Co-PIs AM. Delort (ICCF, Clermont-Fd, France), C. Morris (INRA UPV, Avignon, France), O. Möhler (KIT, Karlsruhe, Germany), T. Koop (Bielefeld University, Bielefeld, Germany). **P. Amato : participant** (10% ETP). *Gestion et analyses des expérimentations en chambre à nuage, analyses biologiques, traitement de données, communication.*

Supervision activity :

➤ **Scholars:**

- 2011 **Alexis Pireyre** : Master 1 Microbiologie : Génome, Ecologie et Biotechnologies, mention Biologie et Environnement (UBP Clermont-Fd). *Identification des souches des nuages par PCR et BLAST.*
- 2012 **Laura Hueyt** : Master 1 Microbiologie : Génome, Ecologie et Biotechnologies, mention Biologie et Environnement (UBP Clermont-Fd). *Développement d'un milieu sélectif pour les Sphingomonas et isolement de souches de l'environnement pour comparaison 16S avec les souches des nuages.*
- 2013 avec C. Jousse ICCF et C. Delattre Polytech' **Marine Klee** : Master 1 Microbiologie : Génome, Ecologie et Biotechnologies, mention Biologie et Environnement (UBP Clermont-Fd). *Recherche et caractérisation des EPS produits par les microorganismes des nuages.*
- 2014 **Benjamin Chicot** : Master 1 Microbiologie : Génome, Ecologie et Biotechnologies, mention Biologie et Environnement (UBP Clermont-Fd). *Etude de la variabilité à court terme des caractéristiques microbiologiques des nuages et des aérosols au sommet du puy de Dôme.*
- 2015 **Anaïs Charton** : Master 1 Microbiologie : Génome, Ecologie et Biotechnologies, mention Biologie et Environnement (UBP Clermont-Fd). *Développement d'une méthode d'échantillonnage haut-débit des bioaérosols.*
- 2015 **Benjamin Penaud** Master 1 Analyse et Modélisation des données (UBP Clermont-Fd). *Analyse de la diversité structurale et fonctionnelle des communautés microbiennes des nuages.*
- 2016 **Maxime Aguès** BTS Biotechnologies 2eme année (le Puy de en Velay). *Mesures de concentrations en noyaux glaçogènes biologiques dans les précipitations et les aérosols.*

- 2016 **Elodie Peghaire** Master 1 Microbiologie : Génome, Ecologie et Biotechnologies, mention Biologie et Environnement (UBP Clermont-Fd). *Etude de la variabilité de la concentration en noyaux glaçogènes biologiques dans les précipitations.*
- 2016 **Alain Dretz** Master 1 Microbiologie : Génome, Ecologie et Biotechnologies, mention Biologie et Environnement (UBP Clermont-Fd). *Bactéries méthylothropes dans l'atmosphère.*
- 2017 **Glwadys Pouzet** Master 1 Microbiologie : Génome, Ecologie et Biotechnologies, mention Biologie et Environnement (UCA Clermont-Fd). *Etude statistique de la variabilité de la concentration en noyaux glaçogènes biologiques dans les précipitations.*
- 2017 **Antoine Perreux** Master 1 Microbiologie : Génome, Ecologie et Biotechnologies, mention Biologie et Environnement (UCA Clermont-Fd). *Etude des limitations nutritionnelles des microorganismes dans l'atmosphère.*
- 2018 **Glwadys Pouzet** Master 2 Microbiologie : Génome, Ecologie et Biotechnologies, mention Biologie et Environnement (UCA Clermont-Fd): *Caractérisation de l'activité estérase des communautés microbiennes atmosphériques.*
- 2018 **Florence Correa** Master 1 Microbiologie : Bioprocédés microbiens (UCA Clermont-Fd). *Exploration du transport et de la biodiversité des microorganismes photosynthétiques dans l'atmosphère.*
- 2019 avec C. Jousse ICCF **Christelle Ghaffar** Master 2 Structural and Functional Biochemistry (UPS Toulouse III). *Etude métabolomique de la réponse au mercure chez la bactérie P. syringae 32b-74.*
- 2019 avec Association Iodysseus (Eric Defert) **Camille Fagot (informel)** 2^{ème} année IUT Génie Biologique (Aix-Marseille Univ.). *Étude des émissions et de la propagation aérienne d'Emiliania huxleyi depuis les blooms.*
- 2019 avec B. Eyheraguibel ICCF **Margot Ramoger** 1^{ère} année BTS Analyses Biologiques et Biotechnologies (Le Puy en Velay). *Développement d'une méthode de détection, quantification et tri des microparticules de plastique à partir d'un pigment bactérien, et applicabilité à l'environnement.*
- 2019 Coencadrement G. Charrier INRA **Marie Fontenelle** 2^{ème} année DUT Génie Biologique (Univ Lyon I). *Identification des déterminants environnementaux de la distribution spatiale des bactéries glaçogènes et impacts sur les risques de dommages gélifs des plantes.*
- 2020 **Thomas Charpentier**, Master 2 Microbiologie Clermont Fd. Coencadrement Laurent Deguillaume LaMP/OPGC. *Caractérisation de la biodiversité des nuages sur l'île de La Réunion.*

➤ **PhD**

- 2010-2013 **Muriel Mourguy-Joly**: *Interaction microorganismes-nuage: activité glaçogène et survie* (co-supervision with A.M. Delort ICCF and L. Deguillaume LaMP)
- 2019-2022 **Raphaëlle Peguilhan**: *Clouds as atmospheric oases for microorganisms* (ANR MOPGA MOBIDIC).
- 2019-2022 **Christelle Ghaffar**: *Sources, fate and impact of amino-acids in the atmosphere* (CPER ISEA-SYMBIOSE; co-supervision 50% M. Brigante ICCF)

➤ **Postdocs**

- 2016-2017 **Muriel Joly** (ANR INHALE project)
- 2016-2017 **Ludovic Besaury** (ANR CHLOROFILTER project)
- 2019-2020 **Florent Rossi** (CNRS INC – aside ANR MOPGA project)

Public and vulgarization activity:

➤ **Active contributions**

- Since 2010 (Yearly) **Animation « Cours d'eau d'H₂O »** at the Maison des Sports of Clermont-ferrand (France): presentation of microbes from clouds, Ice Nucleation Activity, etc to scholars; 2 days each year. <http://www.association-h2o.com/coursdo/2006/coursaccueil.htm>.
- 2010 **Animation « Village des sciences »** at the centre Jaude of Clermont-ferrand, for the « Fête de la science ». 21-22 October 2010.
- 2011 **Animation** toward scholars of the Centre Médical Infantile of Romagnat (63, France).
- 2012 **Article Amato, P. (2012)**. Clouds provide atmospheric oases for microbes. *Microbe* 7, 3, 119-123. <http://www.microbemagazine.org/index.php/02-2012-home/4547-clouds-provide-atmospheric-oases-for-microbes>
- 2014 **Conference Amato, P.** « *Les nuages : oasis de l'atmosphère* ». Cycle de Conférences du Muséum Henri Lecoq ; Clermont-Ferrand.
- 2015 **Article Amato, P. (2015)** « *Des nuages bien vivants* » *Biofutur* n°371. <http://biofutur.revuesonline.com/article.jsp?articleId=35518>
- 2016 **Conference Amato P. /Jousse C.** « *La vie dans les nuages* ». Café-lecture « Les Augustes », Clermont-Ferrand.
- 2017 **Conference Amato, P.** « *Les nuages : oasis de l'atmosphère* ». Cycle de Conférences de l'ADASTA (Association pour le Développement Scientifique et Technique en Auvergne) ; Clermont-Ferrand.
- 2018 **Article Amato, P. (2018)** : « *Les nuages : oasis de l'atmosphère* ». *Auvergne Sciences* 90, 2-11, 2018.
- 2018 **Conference Amato, P. /Ervens, B.** à la Maison de Site au sommet du puy de Dôme pour la Fête de la Science.

➤ **Interviews/related articles/mentions**

- 2008 **Interview P. Amato** “*When Life Goes Cloudy*” - **The New York Times**.
- 2008 **Interview P. Amato** “*Nuages : les bactéries y fabriquent glace et pluie*” - **Le Figaro.fr**
- 2008 **Interview P. Amato** “*Quand les bactéries font pleuvoir*” - **Futura Sciences**
http://www.futura-sciences.com/fr/news/t/biologie-1/d/quand-les-bacteries-font-pleuvoir_14824/
- 2008 **Interview P. Amato** “*Fast Draws: in the clouds*” - **CBS Sunday Morning**.
<http://www.cbsnews.com/video/watch/?id=4275974n>
- 2011 **Interview P. Amato** about microbes in the atmosphere - **Science News**
http://sciencenews.org/view/generic/id/74739/title/Germy_with_a_chance_of_hail
<http://news.softpedia.com/news/Microorganisms-Influence-the-Weather-202148.shtml>
- 2013 & 2015 **Reportage Vidéo du vendredi - CNRS Images “Aspirateur à nuages”** ;
<http://www.cnrs.fr/fr/science-direct/video/video.html>
http://videotheque.cnrs.fr/index.php?urlaction=doc&id_doc=4056
http://www.lemonde.fr/sciences/video/2015/03/13/ces-microbes-qui-font-vivre-les-nuages_4593119_1650684.html
<https://lejournal.cnrs.fr/videos/ces-microbes-qui-font-vivre-les-nuages>
- 2016 **Interview P. Amato** - *Nautilus Magazine (Nautil.us)*. <http://nautil.us/issue/37/currents/the-surprising-importance-of-stratospheric-life>.
- 2018 **Interview P. Amato** - pour *Iodysseus.org* *Comment le “peuple des nuages” fait la pluie et le beau temps* ». 5 octobre 2018. <https://www.iodysseus.org/rencontre-avec-pierre-amato-microbiologiste-de-latmosphere/>
- 2019 **Interview K. Dillon** (Rutgers University) after ASM 2019 meeting (SanFrancisco)
https://www.the-scientist.com/news-opinion/clouds-and-rain-carry-a-menagerie-of-photosynthetic-microbes-66041?utm_campaign=TS_DAILY%20NEWSLETTER_2019&utm_source=hs_email&utm_medium=email&utm_content=74022993&hsenc=p2ANqtz-9s_9qeHPI5WeOSLYHDQvClfcAvF5WXluXGWBcg_J6W1t2ngaB5245szKlyl3ome2L6OY-4z2ZPZmvKAbNHToolt4QdDQ&hsmi=74022993

Organization of scientific meetings:

- 2011 Member of the organizing committee: 12th European Meeting on Environmental Chemistry (**EMEC12**), Clermont-Ferrand, France, 7-10th December 2011.
- 2013 Member of the international scientific board: 5th Polar and Alpine Microbiology Conference (**PAM 5**), Big Sky, Montana, USA, 8-12th September 2013.

- 2013 Member of the organizing committee: Colloque national "Microbiologie des Aérosols" (**MicrobAERO 2013**), La Bourboule, France, 7-10th October 2013.
- 2013 Chairman of the session « Air » of the colloque **BiomInnov** "La biologie Moléculaire Appliquée à l'Environnement et au service de l'innovation industrielle", Romainville, 9 December 2013.
- 2017 Member of the organizing committee: International Conference "Atmospheric Chemical and Biological Processes: Interactions and Impacts (**ATMOCHEMIO 2017**)", Clermont-Fd, France, 19-21th June 2017.
- 2018 Member of the organizing committee European Meeting on Environmental Chemistry, Royat, France, 3-6th December 2018 (**EMEC19**).

Articles published in international scientific journals

47 research articles/ 7 book chapters

➤ Books and book chapters

- Bringel, F., Besaury, L., **Amato, P.**, Kröber, E., Kolb, S., Keppler, F., Vuilleumier, S. and Nadalig, T. (2019) Methyloprophs and methyloproph populations for chloromethane degradation. In "Methyloprophs and methyloproph communities", Chistoserdova, L. (eds), Caister Academic Press, pp. 276, ISBN: 978-1-912530-04-5.
- Frölich-Nowoisky, J., **Amato, P.**, Renard, P., Brisebois, E., and Duchaine (2017). Quantification and characterization of bioaerosols (offline techniques). In "Microbiology of aerosols", 2017, Wiley, Editors: A.-M. Delort, P. Amato, Chapter 1.1, pp. 3-21.
- Amato, P.**, Brisebois, E., Draghi, M., Duchaine, C., Frölich-Nowoisky, J., Huffman, J.A., Mainelis, G., Robine, E., and Thibaudon, M. (2017). Sampling techniques. In "Microbiology of aerosols", 2017, Wiley, Editors: A.-M. Delort, P. Amato, Chapter 1.2, pp. 23-48.
- Amato, P.**, Brisebois, E., Draghi, M., Duchaine, C., Frölich-Nowoisky, J., Huffman, J.A., Mainelis, G., Robine, E., and Thibaudon, M. (2017). Main Biological aerosols, specificities, abundance and diversity. In "Microbiology of aerosols", 2017, Wiley, Editors: A.-M. Delort, P. Amato, Chapter 1.3, pp. 49-82.
- Delort, A-M, Vaïtilingom M., Joly, M., **Amato, P.**, Wirgot, N., Lallement, A., Sancelme, M., Matulova M., Deguillaume, L. (2017). Clouds: a transient and stressing habitat for microorganisms. In "Microbial ecology of extreme environments", Chénard, C. and Lauro, F. (eds), Springer International Publishing, pp 215-245. DOI: 10.1007/978-3-319-51686-8_10.
- Amato, P.** (2013). Energy metabolism at low-temperature and frozen conditions in cold adapted microorganisms. In "Cold-adapted microorganisms", Yumoto, I. (eds), Caister Academic Press, pp. 226, ISBN 978-1-908230-26-3.
- Delort A-M., **Amato P.**, Sancelme M. and Laj P. (2011). Do microorganisms play a role in cloud chemistry? In Ed: B. Clot, P. Comtois and B. Escamilla-Garcia. *Aerobiological Monographs - Towards a comprehensive vision*. MeteoSwiss (CH) and University of Montreal (CA), Montreal, Canada. ISBN 978-2-8399-0466-7, Vol. 1, 133-153.

➤ **Articles in peer-reviewed international scientific journals**

- 47- Tignat-Perrier, R., Dommergue, A., Thollot, A., Magand, O., Amato, P., Joly, M., Sellegri, K., Vogel, T., and Larose, C. (2020). Seasonal shift in airborne microbial communities. *Sci. Tot. Environ.* 716, 137129. <https://doi.org/10.1016/j.scitotenv.2020.137129>
- 46- Ervens, B.* and Amato, P.* (2020). The global impact of bacterial processes on carbon mass, *Atmos. Chem. Phys.*, 20, 1777–1794. <https://doi.org/10.5194/acp-20-1777-2020>
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Poster presentation

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