

List of research activities

2015

CEREA



CEREA - Centre d'Enseignement et de Recherche en Environnement Atmosphérique

Atmospheric Environment Center

École des Ponts ParisTech & EDF R&D

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Director: Christian Seigneur
Deputy director: Luc Musson-Genon
Deputy director: Marc Bocquet

Staff: 35 (as of 31 December 2015)

LABORATORY STAFF

Permanent research staff and faculty

- **ANGOT Guillaume**, EDF R&D, Research engineer
- **BOCQUET Marc**, École des Ponts ParisTech, Senior research scientist (ICPEF) and Professor, HDR
- **CARISSIMO Bertrand**, EDF R&D, Senior research scientist and Associate professor, HDR
- **DUPONT Éric**, EDF R&D, Research engineer
- **MUSSON-GENON Luc**, EDF R&D, Research engineer (IGPEF)
- **ROUSTAN Yelva**, École des Ponts ParisTech, Research scientist (CR1)
- **SARTELET Karine**, École des Ponts ParisTech, Research scientist (CR1), HDR
- **SEIGNEUR Christian**, École des Ponts ParisTech, Director and Professor, HDR

External collaborators

- **MALLET Vivien**, Inria, Research scientist (CR1)
- **ZHANG Yang**, North Carolina State University, USA, Professor
- **WANG Yiguo**, University of Bergen, Post-doc

Post-doctoral scientists

- **BAUDET Laurent**, École des Ponts ParisTech
- **CHAHINE Ali**, École des Ponts ParisTech
- **GAO Zhenlan**, École des Ponts ParisTech
- **GIRAULT Laëtitia**, École des Ponts ParisTech
- **KIM Youngseob**, École des Ponts ParisTech
- **NSIR Rémy**, École des Ponts ParisTech
- **QUEREL Arnaud**, École des Ponts ParisTech

Ph.D. students

- **ABDALLAH Charbel**, École des Ponts ParisTech, ED SIE
- **BAHLALI Meissam**, EDF R&D, ED SIE
- **CHEN Ruiwei**, École des Ponts ParisTech, ED SIE
- **CHRIT Mounir**, École des Ponts ParisTech, ED SIE
- **DAVIAU-PELLEGRIN Noëlie**, EDF R&D, ED SIE
- **DESCHAMPS Stéphanie**, École des Ponts ParisTech, ED SIE
- **FILLION Anthony**, École des Ponts ParisTech, ED SIE
- **HAUSSAIRE Jean-Matthieu**, École des Ponts ParisTech, ED SIE
- **MAKKE Laurent**, École des Ponts ParisTech, ED SIE
- **MAJDI Marwa**, École des Ponts ParisTech, ED SIE
- **RAFFORT Valentin**, École des Ponts ParisTech, ED SIE
- **THOREY Jean**, Inria & EDF R&D, ED Sciences Mathématiques Paris Centre
- **THOURON Laëtitia**, École des Ponts ParisTech, ED SIE
- **WEI Xiao**, EDF R&D, ED SIE
- **ZHU Shupeng**, École des Ponts ParisTech, ED SIE

Interns

- **MAAHANE Yassine**, EDF R&D
- **FARCHI Alban**, École des Ponts ParisTech
- **PINON Juliette**, École des Ponts ParisTech
- **WU You** (EDF R&D Chine), École des Ponts ParisTech

Engineers, administrative staff, and technicians

Engineers

- **BRESSON Raphaël**, EDF R&D, Engineer
- **DEMENGEL Dominique**, EDF R&D, Engineer
- **DORÉ Sylvain**, École des Ponts ParisTech, Engineer
- **GILBERT Éric**, EDF R&D, Engineer
- **LEFRANC Yannick**, EDF R&D, Engineer
- **LEGORGEU Carole**, École des Ponts ParisTech, Engineer
- **WENDUM Denis**, EDF R&D, Engineer

Administrative staff

- **DEHLINGER Véronique**, École des Ponts ParisTech

Technicians

- **FAUCHEUX Aurélien**, École des Ponts ParisTech
- **MOQUILLON Morgane**, EDF R&D
- **ROZBORSKI Sébastien**, EDF R&D

RESEARCH

Publications

Articles in peer-reviewed international journals

- **Fallah Shorshani, M., C. Seigneur**, L. Polo Rehn, H. Chanut, Y. Pellan, J.-L. Jaffrezo, A. Charron, M. André. Atmospheric dispersion modeling near a roadway under calm meteorological conditions, *Transp. Res. Part D.*, **34**, 137-154 (2015), doi:10.1016/j.trd.2014.10.013.
- **Fallah Shorshani, M.**, M. André, C. Bonhomme, **C. Seigneur**. Modelling chain for the effect of road traffic on air and water quality: Techniques, current status and future prospects, *Environ. Model. Softw.*, **64**, 102-123 (2015), doi:10.1016/j.envsoft.2014.11.020.
- **Kim, Y., K. Sartelet**, J.-C. Raud, P. Chazette. Influence of an urban canopy model and PBL schemes on vertical mixing for air quality modeling over Greater Paris, *Atmos. Environ.*, **107**, 289-306 (2015), doi:10.1016/j.atmosenv.2015.02.011.
- **Cherin, N., Y. Roustan, L. Musson-Genon, C. Seigneur**. Modelling atmospheric dry deposition in urban areas using an urban canopy approach, *Geosci. Model Dev.*, **8**, 893-910 (2015), doi:10.5194/gmd-8-893-2015.
- **Couvidat, F., K. Sartelet**. The Secondary Organic Aerosol Processor (SOAP) model: a unified model with different ranges of complexity based on the molecular surrogate approach, *Geosci. Model Dev.*, **8**, 1111-1138 (2015), doi:10.5194/gmd-8-1111-2015.
- **Chahine, A.**, P. Matharan, **D. Wendum, L. Musson-Genon, R. Bresson, B. Carissimo**. Modelling atmospheric effects on performance and plume dispersal from natural draft wet cooling towers, *J. Wind Eng. Ind. Aerodyn.*, **136**, 151-164, 2015, doi:10.1016/j.jweia.2014.11.007.
- **Zysk, J., Y. Roustan**, A. Wyrwa. Modelling of the atmospheric dispersion of mercury emitted from the power sector in Poland, *Atmos. Environ.*, **112**, 246-256 (2015), doi:10.1016/j.atmosenv.2015.04.040.
- He, J., Y. Zhang, T. Glotfelty, R. He, R. Bennartz, J. Rausch, **K. Sartelet**. Decadal simulation and comprehensive evaluation of CESM/CAM5.1 with advanced chemistry, aerosol microphysics, and aerosol-cloud interactions, *J. Adv. Model. Earth Syst.*, **7**, 110-141 (2015), doi:10.1002/2014MS000360.
- **Bocquet, M.**, H. Elbern, H. Eskes, M. Hirtl, R. Žabkar, G.R. Carmichael, J. Flemming, A. Innes, M. Pagowski, J.L. Pérez-Camacho, P.E. Saide, R. San Jose, M. Sofiev, J. Vira, A. Baklanov, C. Carnevale, G. Grell, **C. Seigneur**. Data assimilation in atmospheric chemistry models: current status and future prospects for coupled chemistry meteorology models, *Atmos. Chem. Phys.*, **15**, 5325-5358 (2015), doi:10.5194/acp-15-5325-2015.
- **Zhu, S., K. Sartelet, C. Seigneur**. A size-composition resolved aerosol model for simulating the dynamics of externally mixed particles: SCRAM (v 1.0), *Geosci. Model Dev.*, **8**, 1595-1612 (2015), doi:10.5194/gmd-8-1595-2015.
- **Waked, A.**, C. Afif, **C. Seigneur**. Assessment of source contributions to air pollution in Beirut, Lebanon: comparison of source-based and tracer-based modeling approaches, *Air Qual. Atmos. Health*, **8**, 495-505 (2015), doi:10.1007/s11869-014-0298-z.
- Di Biagio C., L. Doppler, C. Gaimoz, N. Grand, G. Ancellet, J.-C. Raut, M. Beekmann, A. Borbon, **K. Sartelet**, J.-L. Attié, F. Ravetta, P. Formenti. Continental pollution in the Western Mediterranean Basin: vertical profiles of aerosol and trace gases measured over the sea during TRAQA 2012 and SAFMED 2013, *Atmos. Chem. Phys.*, **15**, 9611-9630 (2015), doi:10.5194/acp-15-9611-2015.

- **Thorey, J.**, V. Mallet, C. Chaussin, L. Descamps, P. Blanc. Ensemble forecast of solar radiation using TIGGE weather forecasts and Helioclim database, *Solar Energy*, **120**, 232-243 (2015), doi:org/10.1016/j.solener.2015.06.049.
- **Bocquet, M.**, P.N. Raanes, A. Hannart. Expanding the validity of the ensemble Kalman filter without the intrinsic need for inflation, *Nonlin. Processes Geophys.*, **22**, 645-662 (2015), doi:10.5194/npg-22-645-2015.
- **Raffort, V., Y. Kim**, L. Donnat, C. Juery, **C. Seigneur**, O. Duclaux. Development of a plume-in-grid model for evaluation of particulate matter contribution of industrial point and volume sources: application to refinery sources in the Paris region, *Int. J. Environ. Pollut.*, **57**, 238-248 (2015), doi.org/10.1504/IJEP.2015.074508.
- **Quérel, A., Y. Roustan**, D. Quélo, J.-P. Benoit. Hints to discriminate the choice of wet deposition models applied to an accidental radioactive release, *Int. J. Environ. Pollut.*, in press (2015).
- Garcia Vivanco, M., F. Couvidat, **C. Seigneur**, M. Jang, M. Santiago, B. Bessagnet. Evaluation of some SOA formation schemes for the oxidation of anthropogenic gases against experiments in two outdoor chambers, *Int. J. Environ. Pollut.*, in press (2015).

Articles in other journals

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Books

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International conference proceedings

- **Wei X., E. Dupont, B. Carissimo, E. Gilbert, L. Musson-Genon**: Near-Field Pollutants Dispersion in a Stratified Surface layer: Comparison of Numerical Study and Field Measurements of SIRTA. 34th International Technical Meeting on Air Pollution Modeling and its Application. 4-8 May 2015, Montpellier, France.
- Defossez A., **E. Dupont, R. Bresson**, G. Boutonnet: CFD modeling of wind flows in complex terrain taking into account the atmospheric stability. EWEA conference, 17-20 November 2015, Paris.
- Herrmann H., S. Barbouchi, **E. Dupont, Y. Lefranc**, R. Krishnamurthy, M. Boquet, C. Dall'Ozzo, J. Grenier: Evaluation of wind speed uncertainty estimated with a scanning Doppler Lidar inside and outside the wake of a turbine. EWEA conference, 17-20 November 2015, Paris.
- Defossez A., **E. Dupont, R. Bresson**, C. Dall'Ozzo, S. Barbouchi, H. Herrmann, R. Krishnamurthy, M. Boquet: Comparison of wind turbine wake numerical simulation with scanning lidar measurements. EWEA conference, 17-20 November 2015, Paris.
- Barbouchi S., **E. Dupont**: Modelling methodologies to estimate annual energy production of offshore wind farms. Wind Power Forum, 21-22 April 2015, London.

National conference proceedings

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International conference oral and poster presentations

- **Seigneur, C.** Modeling the impacts of on-road traffic on air and water pollution: pros and cons of dynamic and spatially-distributed approaches, Labex Week 2015 – Modeling and Urban Dynamics, Second international scientific event of Urban Futures, 19-23 January 2015, Champs-sur-Marne, France.
- Baklanov, A., H. Schlünzen, S. Joffre, P. Suppan, J. Baldasano, D. Brunner, M. Gauss, R. Forkel, S. Galmarini, **C. Seigneur**, X. Kong, EuMetChem team. Online coupled meteorology-chemistry modelling: review of current status and further opportunities, Symposium on Coupled Chemistry-Meteorology/Climate Modelling: Status and Relevance for Numerical Weather Prediction, Air Quality and Climate Research, 23-25 January 2015, Geneva, Switzerland.
- **Haussaire, J.-M., M. Bocquet, Y. Roustan, C. Seigneur.** Application of the iterative ensemble Kalman smoother to a reduced-order air quality model, European Geosciences Union General Assembly 2015, 12-17 April 2015, Vienna, Austria.
- Baklanov, A., H. Schlünzen, S. Joffre, P. Suppan, J. Baldasano, D. Brunner, M. Gauss, R. Forkel, S. Galmarini, **C. Seigneur**, X. Kong, EuMetChem team. Seamless meteorology-chemistry modelling: status and relevance for numerical weather prediction, air quality and climate research, European Geosciences Union General Assembly 2015, 12-17 April 2015, Vienna, Austria.
- Afif, C., A. Borbon, T. Salameh, C. Abdallah, A. Waked, S. Sauvage, J.-F. Doussin, P. Formenti, **K. Sartelet, C. Seigneur**, N. Locoge. TRANSEMED: Transport, emissions and mitigation in the Middle East – A focus on Beirut, 21st Lebanese Association for the Advancement of Science International Science Conference, “Horizon 2020: Advances in Sciences and Technology”, 15-17 April 2015, Beirut, Lebanon.
- Waked, A., C. Afif, P. Formenti, J. Brioude, I. El-Haddad, T. Salameh, A. Borbon, S. Sauvage, J.-F. Doussin, N. Locoge, **C. Seigneur**. Source apportionment of PM in Beirut, Lebanon: A comparison of source-based and tracer-based modelling approaches, ChArMEX-TRANSEMED Workshop on “High air pollution in the East Mediterranean: Open issues on emissions, mitigation and health effects”, 14-16 September 2015, Istanbul, Turkey.
- **Chrit, M., Sartelet, K., Debevec, C., Sciare, J., Pey, J., Marchand, N.** Model/measurements comparisons of aerosol concentrations and precursors over the Mediterranean sea during Charmex summer campaigns. International Technical Meeting on Air Pollution Modelling and its Application, 4-8 May 2015, Montpellier, France.
- **Zhu, S., Sartelet, K.** Modelling of externally-mixed particles in the atmosphere. International Technical Meeting on Air Pollution Modelling and its Application, 4-8 May 2015, Montpellier, France.
- **Chrit, M., Sartelet, K., Sciare, J., Pey, J., Marchand, N.** Model/measurements comparisons of aerosol concentrations and properties over the Mediterranean sea during Charmex summer campaigns. Mistral International Conference, 20-22 October 2015, Marseille, France.
- **Wang, Y, Sartelet, K., Bocquet, M., Chazette P., Sicard, M., D'Amico, G., Léon, J.F., Alados-Arboledas, L., Amodeo, A., Augustin, P., Bach, J., Belegante, L., Biniatoglou, I., Bush, X., Comerón, A., Delbarre, H., García-Vízcaíno, D., Guerrero-Rascado, J.L., Hervo, M., Iarlori, M., Kokkalis, P., Lange, D., Molero, F., Montoux, N., Muñoz, A., Muñoz, C., Nicolae, D., Papayannis, A., Pappalardo, G., Preissler, J., Rizi, V., Rocadenbosch, F., Sellegri, K., Wagner, F., and Dulac, F.** Improving aerosol forecast in air quality models by assimilation of lidar measurements: a demonstrator during

Charmex. Mistral International Conference, 20-22 October 2015, Marseille, France.

- Sciare, J., Gros, V., Dulac, F., Kalogridis, C., Hamonou, E., Bonsang, B., Nicolas, J.B., Pont, V., Lambert, D., Mallet, M., Sauvage, S., Michoud, V., Locoge, N., Debevec, C., Tison, E., Bourriane, T., Roberts, G., **Sartelet, K.**, Beekmann, M., Borbon, A.. Original results on source apportionment and properties of organic compounds in the Mediterranean atmosphere. Mistral International Conference, 20-22 October 2015, Marseille, France.
- **Bocquet, M.**, A low-order coupled chemistry meteorology model for testing advanced data assimilation schemes, Workshop on Data Assimilation in the Sciences, Fudan University, 23-26 March 2015, Shanghai, China.
- **Bocquet, M., J-M. Haussaire**, A low-order coupled chemistry meteorology model for testing data assimilation schemes, Part I, Theoretical aspects of ensemble DA for the Earth system, 5-10 April 2015, School of Physics, Les Houches, France.
- **J-M. Haussaire, Bocquet, M.**, A low-order coupled chemistry meteorology model for testing data assimilation schemes, Part II, Theoretical aspects of ensemble DA for the Earth system, 5-10 April 2015, School of Physics, Les Houches, France.
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- **Haussaire, J.-M., M. Bocquet, Y. Roustan, C. Seigneur.** Application of the iterative ensemble Kalman smoother to a reduced-order air quality model, European Geosciences Union General Assembly 2015, 12-17 April 2015, Vienna, Austria.
- **Bocquet, M.**, Theoretical developments in data assimilation, with reference to chemical data assimilation, 26th IUGG general assembly 2015, 1 July 2015, Prague, Czech Republic.
- **Bocquet, M.**, Localization and the iterative ensemble Kalman smoother (with relevance to 4DEnVar systems), Avenue meeting, Cerfacs, 7 July 2015, Toulouse, France.
- **Bocquet, M.**, Localization and the iterative ensemble Kalman smoother (with relevance to 4DEnVar systems), NERSC, 6 August 2015, Bergen, Norway.
- **Bocquet, M.**, Localization and the iterative ensemble Kalman smoother (with relevance to 4DEnVar systems), Dynamic Days, 8 September 2015, Exeter, United-Kingdom.
- **Bocquet, M.**, Localization and the iterative ensemble Kalman smoother, 22 October 2015, Physics Department, University of California, San Diego, USA.
- **Bocquet, M.**, Localization and the iterative ensemble Kalman smoother (with relevance to 4DEnVar systems), 28 October 2015, University of Maryland, College Park, USA.
- **Bocquet, M.**, Localization and the iterative ensemble Kalman smoother (with relevance to 4DEnVar systems), 15 December 2015, AGU Assembly, San Francisco, USA.
- **Bocquet, M., Haussaire, J.-M.** A Low-order Coupled Chemistry Meteorology Model for Testing Online and Offline Advanced Data Assimilation Schemes, 15 December 2015, AGU Assembly, San Francisco, USA.

National conference oral and poster presentations

- Martin, L., **C. Seigneur.** La maitrise de rejets atmosphériques, EDF Forum de la R&D, 18 September 2015, Ecole Polytechnique, Palaiseau, France.
- **Seigneur, C.** Modélisation de la pollution atmosphérique, Rencontres thématiques de la chimie, « L'apport du numérique dans l'industrie chimique : de la conception à la production », 12-13 November 2015, Ecole nationale supérieure de chimie de Rennes, Rennes, France.

- Ars, S., G. Broquet, C. Yver Kwok, **Y. Roustan**, L. Wu. Quantification of methane fluxes from industrial sites using a combination of a tracer release method and a Gaussian model, Les journées nationales méthane, 10-11 March 2015, Espace CNES, Paris, France.
- **Roustan, Y.** Éléments d'analyse de la pollution de l'air en zone urbaine fournis par la modélisation numérique. Journées Transport et Déplacements du RST, 22-24 June 2015, CEREMA DT Méditerranée, Aix-en-Provence, France.

Workshop organization

- **Bocquet, M.**, Theoretical aspects of ensemble data assimilation for the Earth system, 5 - 10 April 2015, Les Houches, France.

Committee activities

Editorial boards

- **Bocquet M.**, Associate Editor, "Quartely Journal of the Royal Meteorological Society"
- **Musson-Genon L.**, Scientific Committee, « Pollution Atmosphérique »

International conference committees

- **Dupont E.**, Review committee of the EWEA (European Wind Energy Association) conference 2015.

National conference committees

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Conference session chairs

- **Bocquet, M.**, Session JM4: Data Assimilation in Geophysical Sciences, 26th IUGG general assembly 2015, 1 July 2015, Prague, Czech Republic.

Scientific committees

- **Bocquet M.**, Scientific committee, European Center for Scientific Computing (CERFACS).
- **Bocquet M.**, Co-chair: Scientific Committee of the "Mathematical and numerical methods" (MANU) activity of the research program, "Les enveloppes fluides et l'environnement" (LEFE) of the National Institute of Earth and Space Science (INSU).
- **Bocquet M., C. Seigneur**, Management Committee, Pierre-Simon Laplace Institute (IPSL).
- **Bocquet M.**, Prix André Prud'homme Committee of the Meteorology and Climate Society.
- **Bocquet M.**, Chair of the HCERES evaluation committee of the SUC, CERFACS & CNRS joint laboratory, 7-8 January 2015, Toulouse, France.

- **Demengel D., E. Dupont, Y. Roustan, C. Seigneur**, Council, EFLUVE Observatory (Observatoire des sciences de l'univers ; Enveloppes fluides : de la ville à l'exobiologie).
- **Dupont E., L. Musson-Genon**, Scientific Committee, "Site instrumental de recherche par télédétection atmosphérique" (SIRTA).
- **Dupont E., Musson-Genon L., Seigneur C.**, Scientific Committee OSU EFLUVE.
- **Sartelet K.**, Scientific Committee of the "Atmospheric Chemistry" (CHAT) activity of the research program "Les enveloppes fluides et l'environnement" (LEFE) of the National Institute of Earth and Space Science (INSU).
- **Seigneur C.**, General Assembly of the Air Quality Agency for the Paris Region (AIRPARIF).
- **Seigneur C.**, Management Committee of the Earth System Science and Environmental Management Domain, COST Action ES-10-04, "European framework for online integrated air quality and meteorological modelling".
- **Seigneur C.**, Scientific Committee of the Copernicus program of the Ministry of Ecology, Sustainable Development, and Energy (Copernicus-MDD).
- **Seigneur C.**, Scientific and Steering Committee of the Excellence Laboratory (Labex) "Urban Futures".

Thesis committees (other than Cerea theses)

- **Carissimo, B., C. Seigneur**. Ph.D. thesis, Hervé Gamet, « Caractérisation expérimentale de l'écoulement de la dispersion autour d'un obstacle bidimensionnel », Ecole Centrale de Lyon, 10 February 2015.
- **Seigneur C.** Ph.D. thesis, Vincent Lemaire, « Modélisation de l'aérosol organique – Impact sur la pollution longue-distance en Europe », Université Paris-Est Créteil Val-de-Marne, 9 July 2015.
- **Seigneur C.** Ph.D. thesis, Julien Trincal, « Modélisation du comportement de l'iode dans l'atmosphère », Université de Lille 1 & CEA, 30 October 2015.
- **Bocquet, M.**, Ph.D. thesis, Sammy Metref "Assimilation de données pour les problèmes non-Gaussiens. Méthodologie et applications à la biogéochimie marine", Université de Grenoble, Grenoble, France, 27 November 2015.
- **Sartelet K.**, Ph.D. thesis, Emmanuel Mathe, « Comportement des radiocontaminants dans les confinements d'un réacteur à neutrons rapides refroidi au sodium en situation accidentelle », Université de Lille 1 & IRSN, 17 October 2014.
- **Sartelet K.**, Ph.D. thesis, Alexandre Berger, « Modélisation multi-échelle de la composition chimique des aérosols : impacts des processus physico-chimiques des nuages sur la formation des aérosols organiques secondaires », Université de Toulouse, 25 November 2014.

HDR committees

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EDUCATIONAL ACTIVITIES

Teaching

École des Ponts ParisTech

- **Carissimo B.**, MECA 1, Mécanique des fluides (Fluid mechanics).
- **Seigneur C., L. Musson-Genon**, POLU1, Environnement atmosphérique et qualité de l'air (Atmospheric environment and air quality).
- **Roustan Y.**, Pollution atmosphérique (Air pollution), Master Transports et développement durable (TRADD).
- **Bocquet M.**, Introduction à l'assimilation de données (Introduction to data assimilation), Master Océan, atmosphère, climat et observations spatiales (OACOS).
- **Roustan Y.**, Modélisation de la pollution atmosphérique (Mathematical modeling of air pollution) Master Science et génie de l'environnement (SGE).
- **Seigneur C.**, Pollution atmosphérique et aérocontamination (Air pollution and contamination), Master Science et génie de l'environnement (SGE).

Other Masters

- **Seigneur C.**, "Chemistry of air pollution", Master: Sciences et Techniques de l'Environnement Urbain (STEU), École Centrale de Nantes.
- **Seigneur C., B. Carissimo**, "Atmospheric dispersion", Master: Project Management for Environmental and Energy Engineering (PM3E), École des Mines de Nantes.

École Nationale des Travaux Publics de l'État

- **Roustan Y.**, Qualité de l'air et santé (Air quality and Health).

DISSEMINATION ACTIVITIES

Public communications

- **Seigneur C.** Expert Panel Participant, « Qualité de l'air en Île-de-France » (Air quality in Île-de-France), meeting of the Créteil local group of *Europe Ecologie Les Verts* (EELV), Créteil, France, 10 February 2015.