

# List of research activities

2019

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: Pietro Bernardara**

**Deputy director: Marc Bocquet**

**Deputy director: Martin Ferrand**

**LABORATORY STAFF**

*Staff: 42 (as of 31 December 2019)*

### Permanent research staff and faculty

BERNARDARA Pietro, EDF R&D, Director  
BOCQUET Marc, École des Ponts Paris Tech, Senior Researcher (ICPEF) and Professor, HDR  
FERRAND Martin, EDF R&D, Research engineer  
ANGOT Guillaume, EDF R&D, Research engineer  
CARISSIMO Bertrand, EDF R&D, Senior Researcher and Associate Professor, HDR  
DEFOSSEZ Arièle EDF R&D, Research engineer  
DUPONT Éric, EDF R&D, Research engineer  
FARCHI Alban, École des Ponts Paris Tech, Researcher, Research au 01/09/2019  
ROUSTAN Yelva, École des Ponts Paris Tech, Researcher (CR1)  
SARTELET Karine, École des Ponts Paris Tech, Researcher (DR2), HDR

### Post-doctoral scientists

DIALLO Mouhamet, École des Ponts Paris Tech  
GENGEMBRE Cyril, École des Ponts Paris Tech  
FLAGEUL Cédric, École des Ponts Paris Tech  
KUZNETSOV Konstantin, École des Ponts Paris Tech  
LANNUQUE Victor, École des Ponts Paris Tech  
MESSINA Palmira, École des Ponts Paris Tech  
RAFFORT Valentin, École des Ponts Paris Tech

### Ph.D. students

ASMAR Léa, EDF R&D, ED SIE  
DEFFORGE Cécile, EDF R&D, ED SIE  
DUMONT-LE-BRAZIDEC Joffrey, IRSN & École des Ponts Paris Tech, ED SIE  
FARCHI Alban, École des Ponts Paris Tech,  
FILLION Anthony, École des Ponts Paris Tech and CERFACS, ED SIE  
GALANTE-AMINO Hector, EDF R&D, ED SIE  
LUGON Lya, École des Ponts Paris Tech, ED SIE  
MALARTIC Quentin, École des Ponts Paris Tech  
WANG Zhizhao, École des Ponts Paris Tech ED SIE  
SARICA Thibault, École des Ponts Paris Tech ED SIE  
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### Interns

GAYE Ousseynou, École des Ponts Paris Tech  
LEMMOUCHI Farouck, École des Ponts Paris Tech  
MAISON Alice, École des Ponts Paris Tech

### Engineers

BRESSON Raphaël, EDF R&D, Engineer  
DEMENGEL Dominique, EDF R&D, Engineer  
DUTREY Clémentine, École des Ponts Paris Tech  
BEAUCHENE Christian, École des Ponts Paris Tech Engineer  
KIM Youngseob, École des Ponts Paris Tech  
LEFRANC Yannick, EDF R&D, Engineer  
QUEMENER Aurélie, École des Ponts Paris Tech Engineer  
WENDUM Denis, EDF R&D, Engineer

### Administrative staff

PERIAC Lydie, École des Ponts Paris Tech

### Technicians

FAUCHEUX Aurélien, École des Ponts Paris Tech  
JOURNOUD Patrice, École des Ponts Paris Tech

## Articles in peer-reviewed international journals

1. **A. Farchi** and **M. Bocquet**. *On the efficiency of covariance localisation of the ensemble Kalman filter using augmented ensembles*. *Front. Appl. Math. Stat.*, 5, 3, 2019, doi:10.3389/fams.2019.00003.
2. P. Raanes, **M. Bocquet**, and A. Carrassi. *Adaptive covariance inflation in the ensemble Kalman filter by Gaussian scale mixtures*. *Q. J. R. Meteorol. Soc.*, 145, 53-754, 2019, doi:10.1002/qj.3386
3. S. Metref, A. Hannart, J. Ruiz, **M. Bocquet**, A. Carrassi, and M. Ghil. *Estimating model evidence using ensemble-based data assimilation with localization - The model selection problem*. *Q. J. R. Meteorol. Soc.*, 145, 1571–1588, 2019, 10.1002/qj.3513.
4. **M. Bocquet** and **A. Farchi**. *On the consistency of the perturbation update of local ensemble square root Kalman filter*. *Tellus A*, 71, 1-21, 2019, 10.1080/16000870.2019.1613142.
5. **M. Bocquet**, J. Brajard, A. Carrassi and L. Bertino. *Data assimilation as a learning tool to infer ordinary differential equation representations of dynamical models*, 26, 143-162, 2019, 10.5194/npg-26-143-2019.
6. **C. L. Defforge**, **B. Carissimo**, **M. Bocquet**, **R. Bresson**, and P. Armand. *Improving CFD atmospheric simulations at local scale for wind resource assessment using the iterative ensemble Kalman smoother*, *J. Wind. Eng. Ind. Aerod.*, 189, 243-257, 2019, 10.1016/j.jweia.2019.03.030.
7. L. I. Diaz-Isaac, T. Lauvaux, **M. Bocquet**, and K. J. Davis. *Calibration of a multi-physics ensemble for estimating the uncertainty of a greenhouse gas atmospheric transport model*, *Atmos. Chem. Phys.*, 19, 5695-5718, 2019, 10.5194/acp-19-5695-2019.
8. T. Lauvaux, L. I. Díaz-Isaac, **M. Bocquet**, and N. Boussez *Diagnosing spatial error structures in CO<sub>2</sub> mole fractions and XCO<sub>2</sub> column mole fractions from atmospheric transport*. *Atmos. Chem. Phys.*, 19, 12007-12024, 2019, 10.5194/acp-19-12007-2019.
9. O. Saunier, D. Didier, A. Mathieu, O. Masson, and **J. Dumont Le Brazidec**. *Atmospheric modeling and source reconstruction of radioactive ruthenium from an undeclared major release in 2017*. *PNAS*, 116, 24991-25000, 2019, 10.1073/pnas.1907823116.
10. C. Colas, **M. Ferrand**, J.-M. Hérard, J.-C. Latché, and E. Le Coupanec. *An implicit integral formulation to model inviscid fluid flows in obstructed media*, *Computers & Fluids*, 188, 136-163, 2019, 10.1016/j.compfluid.2019.05.014.
11. **C. Flageul**, I. Tiselj, S. Benhamadouche, and **M. Ferrand**. *A Correlation for the Discontinuity of the Temperature Variance Dissipation Rate at the Fluid-Solid Interface in Turbulent Channel Flows*, *J Flow, Turbulence and Combustion*, 103, 175-201, 2019, 10.1007/s10494-019-00008-0

12. T. Fonty, **M. Ferrand**, A. Leroy, A. Joly, D. Violeau, *Mixture model for two-phase flows with high density ratios: A conservative and realizable SPH formulation*, International Journal of Multiphase Flow, 111, 158-174, 2019, [10.1016/j.ijmultiphaseflow.2018.11.007](https://doi.org/10.1016/j.ijmultiphaseflow.2018.11.007).
13. **K. Nsir**, **K. Sartelet**, **R. Bresson**, and **L. Musson-Genon**, *Three dimensional computational fluid dynamics modeling of sodium oxide aerosol atmospheric dispersion from indoor sodium fire*. J. Aerosol Sci., 137, 2019, 105433, doi:[10.1016/j.jaerosci.2019.105433](https://doi.org/10.1016/j.jaerosci.2019.105433).
14. **M. Majdi**, **K. Sartelet**, GM. Lanzafame, F. Couvidat, **Y. Kim**, M. Chrit, M., and S. Turquety. *Precursors and formation of secondary organic aerosols from wildfires in the Euro-Mediterranean region*. Atmos. Chem. Phys., 19, 5543-5569, 2019, doi:[10.5194/acp-19-5543-2019](https://doi.org/10.5194/acp-19-5543-2019).
15. **Y. Kim**, **K. Sartelet**, and F. Couvidat *Modeling the effect of non-ideality, dynamic mass transfer and viscosity on SOA formation in a 3-D air quality model*. Atmos. Chem. Phys., 19, 2019, 1241-1261, doi:[10.5194/acp-19-1241-2019](https://doi.org/10.5194/acp-19-1241-2019).
16. **M. Majdi**, S. Turquety, **K. Sartelet**, C. Legorgeu, L. Menut, and **Y. Kim** *Impact of wildfires on particulate matter in the Euro-Mediterranean in 2007: sensitivity to some parameterizations of emissions in air quality models*. Atmos. Chem. Phys., 19, 785-812, 2019, doi:[10.5194/acp-19-785-2019](https://doi.org/10.5194/acp-19-785-2019).
17. **ML. Bahlali**, **E. Dupont**, and **B. Carissimo**, *Atmospheric dispersion using a Lagrangian stochastic approach: Application to an idealized urban area under neutral and stable meteorological conditions*. Journal of Wind Engineering & Industrial Aerodynamics, 193, 2019, doi:[10.1016/j.jweia.2019.103976](https://doi.org/10.1016/j.jweia.2019.103976).
18. F. Raoult, S. Lacour, **B. Carissimo**, F. Trinquet, A. Delahaye, and L. Fournaison, *CFD water spray model development and physical parameter study on the evaporative cooling*, Applied Thermal Engineering, 149, 960-974, 2019, doi:[10.1016/j.applthermaleng.2018.12.063](https://doi.org/10.1016/j.applthermaleng.2018.12.063).
19. **L. Thouron**, **Y. Kim**, **B. Carissimo**, **C. Seigneur**, and B. Bruge, *Intercomparison of two modeling approaches for traffic air pollution in street canyons*, Urban Climate, 27, 163-178, 2019, doi:[10.1016/j.uclim.2018.11.006](https://doi.org/10.1016/j.uclim.2018.11.006).
20. G. Ciarelli, M. R. Theobald, M. G. Vivanco, M. Beekmann, W. Aas, C. Andersson, R. Bergström, A. Manders-Groot, F. Couvidat, M. Mircea, S. Tsyro, H. Fagerli, K. Mar, **V. Raffort**, **Y. Roustan**, M.-T. Pay, M. Schaap, R. Kranenburg, M. Adani, G. Briganti, A. Cappelletti, M. D'Isidoro, C. Cuvelier, A. Cholakian, B. Bessagnet, P. Wind and A. Colette. *Trends of inorganic and organic aerosols and precursor gases in Europe: insights from the EURODELTA multi-model experiment over the 1990–2010 period*. Geosci. Model Dev., 12, 4923-4954, 2019, [10.5194/gmd-12-4923-2019](https://doi.org/10.5194/gmd-12-4923-2019).
21. P.-Y. Foucher, P. Déliot, L. Poutier, O. Duclaux, **V. Raffort**, **Y. Roustan**, B. Temime-Roussel, A. Durand and H. Wortham. *Aerosol Plume Characterization From Multitemporal Hyperspectral Analysis*. IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing, 12, 2429-2438, 2019, [10.1109/JSTARS.2019.2905052](https://doi.org/10.1109/JSTARS.2019.2905052).

22. J. Ching, D. Aliaga, G. Mills, V. Masson, L. See, M. Neophytou, A. Middel, A. Baklanov, C. Ren, E. Ng, J. Fung, M. Wong, Y. Huang, A. Martilli, O. Brousse, I. Stewart, X. Zhang, A. Shehata, S. Miao, X. Wang, W. Wang, Y. Yamagata, D. Duarte, Y. Li, J. Feddema, B. Bechtel, J. Hidalgo, **Y. Roustan**, **Y. Kim**, H. Simon, T. Kropp, M. Bruse, F. Lindberg, S. Grimmond, M. Demazure, F. Chen, C. Li, J. Gonzales-Cruz, B. Bornstein, Q. He, A. Hanna, E. Erell, N. Tapper, R. K. Mall and D. Niyogi. *Pathway using WUDAPT's Digital Synthetic City tool towards generating urban canopy parameters for multi-scale urban atmospheric modeling*. Urban Climate, 28, 100459, 2019, 10.1016/j.uclim.2019.100459.
23. M. R. Theobald, M. G. Vivanco, W. Aas, C. Andersson, G. Ciarelli, F. Couvidat, K. Cuvelier, A. Manders, M. Mircea, M.-T. Pay, S. Tsyro, M. Adani, R. Bergström, B. Bessagnet, G. Briganti, A. Cappelletti, M. D'Isidoro, H. Fagerli, K. Mar, N. Otero, **V. Raffort**, **Y. Roustan**, M. Schaap, P. Wind and A. Colette. *An evaluation of European nitrogen and sulfur wet deposition and their trends estimated by six chemistry transport models for the period 1990–2010*. Atmos. Chem. Phys., 19, 379-405, 2019, 10.5194/acp-19-379-2019.

## Books

1. **C. Seigneur**. Air Pollution, Concepts, Theory, and Applications, Cambridge University Press, 2019.

## Expert report

1. M. André, JM. André, A. Charron, L. Gagnepain, C. Honoré, S. Moukhtar, and **K. Sartelet** *Particules de l'air ambiant extérieur - Impact sur la pollution atmosphérique des technologies et de la composition du parc de véhicules automobiles circulant en France*, ANSES Report, July 2019, <https://www.anses.fr/fr/system/files/AIR2014SA0156Ra-Emission.pdf>

## International conference oral presentations

1. **M. Bocquet**, **J.-M. Haussaire**, **Y. Roustan**, O. Saunier, and A. Mathieu. *Uncertainty quantification of pollutant source retrieval: comparison of Bayesian methods with application to the Chernobyl and Fukushima Daiichi accidental releases of radionuclides*, ECMWF informal seminar, January 7, 2019, Reading, United-Kingdom. [invited]
2. A. Carrassi, P. Ailliot, **M. Bocquet**, M. Lucini, L. Mitchell, T. Miyoshi, M. Pulido, P. Raanes, P. Tandeo, S. Vannitsem, and Y. Zhen. *Model error in geophysical data assimilation - Some ideas*, International Symposium on Data Assimilation, January 23, 2019, Riken, Kobe, Japan. [invited]
3. **M. Bocquet**, J. Brajard, A. Carrassi, and L. Bertino. *Data-driven inference of the ordinary differential equation representation of a chaotic dynamical model using data assimilation*, LEFE-MANU/PNTS workshop IA & Océan-Atmosphère-Climat, February 6, 2019, IMT Atlantique, Campus de Rennes, France.

4. A. Carrassi, C. Grudzien, and **M. Bocquet**. *Data Assimilation for Chaotic Geophysical Dynamics - An Overview*, European Geosciences Union General Assembly 2019, April 7-12, 2019, Vienna, Austria. [Invited]
5. O. Pannekoucke, S. Ricci, R. Ménard, **M. Bocquet**, and O.Thual. *Parametric Kalman filter : toward an alternative to the EnKF?*, European Geosciences Union General Assembly 2019, April 7-12, 2019, Vienna, Austria. [Invited]
6. J. Brajard, **M. Bocquet**, A. Carrassi, and L. Bertino. *Combining Data Assimilation and Machine Learning to emulate a numerical model from noisy and sparse observations*, European Geosciences Union General Assembly 2019, April 7-12, 2019, Vienna, Austria.
7. **A. Farchi** and **M. Bocquet**. *On the efficiency of covariance localisation of the ensemble Kalman filter using augmented ensembles*, European Geosciences Union General Assembly 2019, April 7-12, 2019, Vienna, Austria.
8. **M. Bocquet**, J. Brajard, A. Carrassi, and L. Bertino. *Data-driven inference of the ordinary differential equation representation of a chaotic dynamical model using data assimilation*, European Geosciences Union General Assembly 2019, April 7-12, 2019, Vienna, Austria.
9. A. Carrassi, **M. Bocquet**, and O. Talagrand. *Data assimilation in the geosciences - An Overview*, European Geosciences Union General Assembly 2019, April 7-12, 2019, Vienna, Austria.
10. P. N. Raanes, G. Evensen, S. Stordal, **M. Bocquet** and A. Carrassi. *Ensemble Kalman filter – Frequently asked questions*. Seminar at IRIT, February 21, 2019, Toulouse, France.[invited]
11. A. Carrassi, **M. Bocquet**, and L. Bertino. *Brief review of data assimilation methods, with examples from marine bio-geochemistry applications*. NPOP workshop, March 27, 2019, Plymouth, UK. [Invited]
12. **J. Dumont Le Brazidec**, **M. Bocquet**, O. Saunier, and **Y. Roustan**. *MCMC methods applied to the reconstruction of the autumn 2017 <sup>106</sup>Ru atmospheric contamination source term*, HARMO-19, June 3-6, 2019, Bruges, Belgium.
13. **C. L. Defforge**, **B. Carissimo**, **M. Bocquet**, **R. Bresson**, and P. Armand. *Data assimilation at local scale to improve CFD simulations of dispersion around industrial sites and in urban neighbourhoods*, HARMO-19, June 3-6, 2019, Bruges, Belgium.
14. L. Bertino, A. Carrassi, and **M. Bocquet**. *Data assimilation in the geosciences. An overview*. Short Course on Data Assimilation - OceanPredict19, May 9, 2019, Halifax, Canada. [invited]
15. **M. Bocquet**, J. Brajard, A. Carrassi, and L. Bertino. *Data assimilation as a deep learning tool to uncover the dynamics of models*, Seminar at the ECMWF, April 29, 2019, Reading, United-Kingdom. [invited]
16. **M. Bocquet**, et al.. *On the impact of dynamics on ensemble data assimilation*, Keynote speech at SIAM Dynamical Systems '19, May 23, 2019, Snowbird, Utah, USA. [invited]
17. **M. Bocquet**, J. Brajard, A. Carrassi, and L. Bertino. *Data assimilation as a deep learning tool to uncover the dynamics of models*, Global Challenge Science Week, Data science for the future, June 3, 2019, Grenoble, France. [invited]



18. **M. Bocquet** and **A. Farchi**. *On the consistency of local ensemble Kalman filters based on covariance tapering*, Seminar at IGE, June 4, 2019, Grenoble, France. [Invited]
19. **A. Farchi** and **M. Bocquet**. *On the efficiency and consistency of covariance localisation in the EnKF*, EnKF workshop 2019, June 3-5, 2019, Voss, Norway.
20. J. Brajard, **M. Bocquet**, A. Carrassi, and L. Bertino. *Combining data assimilation and machine learning to emulate a numerical model from noisy and sparse observations*, EnKF workshop 2019, June 3-5, 2019, Voss, Norway.
21. A. Carrassi, **M. Bocquet**, et al.. *Model error in geophysical data assimilation. Some (older and new) ideas*, EnKF workshop 2019, June 3-5, 2019, Voss, Norway.
22. **M. Bocquet**, J. Brajard, A. Carrassi, and L. Bertino. *Data-driven inference of the ordinary differential equation representation of a chaotic dynamical model using data assimilation*, ICCS19, June 12, 2019, Faro, Portugal. [Refereed contribution]
23. **M. Bocquet** and **A. Farchi**. *On the consistency of local ensemble Kalman filters based on covariance tapering*, ICIAM 2019, July 16, 2019, Valencia, Spain.
24. **M. Bocquet** and **A. Farchi**. *On the consistency of local ensemble Kalman filters based on covariance tapering*, AIP 2019, July 12, 2019, Grenoble, France.
25. J. Brajard, A. Carrassi, **M. Bocquet**, and L. Bertino. *Connections and correspondence between data assimilation and machine learning to emulate a numerical model*, Machine learning for Weather and Climate Modelling, September 2-5, 2019, Oxford, United Kingdom.
26. A. Carrassi, M. Tondeur, S. Vannitsem, and **M. Bocquet**. *On temporal scale separation in coupled data assimilation with the ensemble Kalman filter*. Workshop Big Data, Data Assimilation and Uncertainty Quantification, Institut Henri Poincaré, November 12-15, 2019, Paris, France. [invited]
27. C. Grudzien, **M. Bocquet**, and A. Carrassi. *On the numerical integration of the Lorenz-96 model, with scalar additive noise, for benchmark twin experiments*. Workshop Big Data, Data Assimilation and Uncertainty Quantification, Institut Henri Poincaré, November 12-15, 2019, Paris, France. [invited]
28. **A. Farchi**, and **M. Bocquet**. *Efficiency and Consistency of covariance localisation in the ensemble Kalman filter*. Workshop Big Data, Data Assimilation and Uncertainty Quantification, Institut Henri Poincaré, November 12-15, 2019, Paris, France.
29. **M. Bocquet**, J. Brajard, A. Carrassi, and L. Bertino. *Data-driven reconstruction of chaotic dynamics using data assimilation and machine learning*. Workshop Big Data, Data Assimilation and Uncertainty Quantification, Institut Henri Poincaré, 12-15 November 2019, Paris, France. [invited]
30. C. Grudzien, **M. Bocquet**, and A. Carrassi. *On the numerical integration of the Lorenz-96 model, with scalar additive noise, for benchmark twin experiments*. Nevada Chapter of the American Statistical Association 2019 Fall Symposium, October 19, 2019, Reno, Nevada, USA. [invited]



31. **C. L. Defforge, B. Carissimo, M. Bocquet, R. Bresson**, and P. Armand. *Improving CFD atmospheric simulations at local scale for air pollution modelling using data assimilation*. 37<sup>th</sup> ITM conference. September 27-23, 2019, Hamburg, Germany.
32. **C. L. Defforge, B. Carissimo, M. Bocquet, R. Bresson**, and P. Armand. *Improving CFD atmospheric simulations at local scale for wind resource assessment using data assimilation*. Wind Energy Science Conference, June 17-20, Cork, Ireland.
33. **M. Bocquet**, J. Brajard, A. Carrassi, and L. Bertino. *Data-driven reconstruction of chaotic dynamics using data assimilation and machine learning*. Workshop Extreme events applied to climate sciences, November 27-29, 2019, LSCE, Saclay, France. [invited]
34. T. Fonty, **M. Ferrand**, A. Leroy, and D. Violeau. *A first air entrainment SPH model using a two-phase mixture formulation*. In Proceedings of the 14th International SPHERIC Workshop, June 25-27, 2019, Exeter, United Kingdom.
35. T. Fonty, **M. Ferrand**, A. Leroy, and D. Violeau. *Air entrainment modeling using a Lagrangian accurate numerical model for high-density ratio two-phase mixtures*. In Proceedings of the 10th International Conference on Multiphase Flow, May 19-24, 2019, Rio de Janeiro, Brazil.
36. **C. Beauchêne, M. Ferrand, C. Flageul, Y. Lefranc**, Pr M. Mimoun, J.-F. Wald. *Prototype of an airlock without doors: Easing daily care and preventing external contamination*. 18th European Burns Association Congress, September 5, 2019, Helsinki, Finland.
37. C. Colas, **M. Ferrand**, J.-M. Hérard, J.-C. Latché and E. Le Coupanec, *Integral Formulation for Fluid Flow in Congested Media Modelling*. ICIAM, July 15-19, 2019, Valencia, Spain.
38. **K. Sartelet**, *Multi-scale modeling of air quality*, The Workshop on Air Quality and Climate Research Across Scales, CRIEPI, July 30, 2019, Tokyo, Japan. [invited]
39. **K. Sartelet**, *Influence des émissions du trafic routier sur la qualité de l'air*. 23<sup>ème</sup> Congrès de Pneumologie de Langue Française, January 23-25, 2019, Marseille, France. [invited]
40. M. André, **K. Sartelet**, S. Moukthar, J.M. André and M. Redaelli. *Main Diesel, Petrol or electric vehicles: what choice for improving urban air quality? A simulation plate-form and case study*, 23rd International Transport and Air Pollution Conference May 15-17, 2019, Thessaloniki, Greece.
41. **L. Lugon, k. Sartelet, y. Kim**, J. Vigneron, O. Chrétien. *Multi-scale gas-phase pollutants in Paris city using Street-in-Gris model*. Air Pollution Conference Brazil, 4th CMAS South America, July 22-24, 2019, Brazil.
42. **K. Sartelet, L. Lugon, F. Lemmouchi, M. Zhang, Y. Kim, Y. Roustan**. *Overview on Current Development and Application of SinG model*. The 2nd SinG Modeling Symposium, 25 June 25, 2019, Champs-sur-Marne, France.
43. **L. Lugon, K. Sartelet, Y. Kim**, J. Vigneron, O. Chrétien. *Multi-scale Modeling of Gas-Phase Pollutant over Paris*. The 2nd SinG Modeling Symposium, 25 June 25, 2019, Champs-sur-Marne, France.

44. F. Couvidat, **Y. Kim, K. Sartelet**, *SSH-aerosol, a “plug and play” aerosol formation model*. 27th GLOREAM Workshop, Apr 1-3, 2019, Norrköping, Sweden.
45. O. Duclaux, **V. Raffort**, P. Y. Foucher, **Y. Roustan**, A. Armengaud, H. Wortham, C. Juery. *Complementarity of models (CTM-PinG and Lagrangian) to reproduce full chemistry in refinery plumes*. Air & Waste Management Association conference on Air Quality Models, 19-21 mars 2019, Durham, USA.
46. O. Duclaux, **V. Raffort**, P.-Y. Foucher, **Y. Roustan**, A. Armengaud, H. Wortham, C. Juery. *Use of Polyphemus Plume in Grid model to reproduce the full chemistry and physics of Particulate matter in industrial plumes. Applications and validation for Refinery during the TEMMAS project “Teledetection, Measure, Modeling of Atmospheric pollutants on industrial Sites”*. 19th International Conference on Harmonisation within Atmospheric Dispersion Modelling for Regulatory Purposes, HARMO-19, June 3-6, 2019, Bruges, Belgium.

### International conference poster presentations

1. **J. Dumont Le Brazidec, M. Bocquet**, O. Saunier, and **Y. Roustan**. *MCMC methods applied to the reconstruction of the autumn 2017  $^{106}\text{Ru}$  atmospheric contamination source term*. European Geosciences Union General Assembly 2019, April 7-12, 2019, Vienna, Austria.
2. O. Saunier, **J. Dumont Le Brazidec**, D. Didier, **M. Bocquet**. *Inverse modelling method for source reconstruction: application to the selenium detection event in May 2019*, ERPW 2019. October 14-18, 2019, Stockholm, Sweden.
3. J. Brajard, **M. Bocquet**, A. Carrassi and L. Bertino. *Connections between data assimilation and machine learning to emulate a numerical model*. Climate Informatics 2019, October 2-4, École Normale Supérieure, Paris, France.
4. **J. Dumont Le Brazidec, M. Bocquet**, O. Saunier, and **Y. Roustan**. *MCMC methods applied to the reconstruction of the autumn 2017  $^{106}\text{Ru}$  atmospheric contamination source term*. Data Science Summer School (DS<sup>3</sup>) 2019, June 24-29, 2019, Paris, France.
5. **M. Diallo, Y. Roustan** and **E. Dupont**. *Extrapolating wind field at hub height from synthetic aperture radar (SAR) and ensemble of weather and research forecast (WRF) wind estimates*. WindEurope Offshore 2019, 26-28 November 2019, Copenhagen, Denmark.

### National conference oral

1. **M. Bocquet**. *L'assimilation de données pour les géosciences. Définition, état des lieux et perspectives*. AerospaceLab Conference, ONERA, November 7, 2019, Palaiseau, France. [invited]

2. I. Coll, K. **Sartelet**, **B. Carissimo** *Modélisation multi-échelle de la qualité de l'air urbaine*. Journée IPSL « La ville sous influences anthropiques et naturelles : un environnement au cœur des processus chimiques et physiques de l'atmosphère », February 19, 2019, Paris, France.
3. **Y. Roustan**, F. Meleux, pour les consortiums des projets POLQA, Amp'Air, NUAGE et Ammon. *Amélioration de la représentation des émissions agricoles liées aux épandages et des modèles de qualité de l'air afin d'évaluer les stratégies d'abattement*. Colloque Agriculture et Qualité de l'Air, 21-22 mars 2019, Paris, France.

## Patent, software filing

- **K. Sartelet**, **Y. Kim (CEREA)**, Couvidat F (INERIS), submission of the software SSH-aerosol v1.0 to “Agence de Protection des Programmes”.

## Committee activities

### Editorial boards

- **M. Bocquet**, Associate Editor, “Quarterly Journal of the Royal Meteorological Society”.
- **M. Bocquet**, Associate Editor, “Foundations of Data Science”, journal of the AIMS.
- **M. Bocquet**, Guest Editor, for the topic *Data Assimilation of Nonlocal Observations in Complex systems* of “Frontiers in Applied Mathematics and Statistics”.
- **K. Sartelet**, Guest Editor, for the special issue *Air quality research at street level* of the journals “Atmospheric Chemistry and Physics” and “Geophysical Model Development”.

### Conference organization

- A. Carrassi, **M. Bocquet**, and O. Talagrand. *Data assimilation in the geosciences - An Overview*, European Geosciences Union General Assembly 2019, April 7-12, 2019, Vienna, Austria.
- C. Grudzien, **M. Bocquet**, and A. Carrassi.. *MS172 Data and Dynamics: Dynamical Systems Techniques in Data Assimilation - Part I and Part II*, minisymposia at SIAM Dynamical Systems '19, May 23, 2019, Snowbird, Utah, USA.
- A. Carrassi and **M. Bocquet**. workshop *Big Data, Data Assimilation and Uncertainty Quantification* at Institut Henri Poincaré, 12-15 November 2019, Paris, France.

## Conference session chairs

- **M. Bocquet.** Chair of day 2, morning. workshop “Big Data, Data Assimilation and Uncertainty Quantification” at Institut Henri Poincaré, 12-15 November 2019, Paris, France.
- **B. Carissimo.** Chair of session : Modelling air dispersion and exposure to accidental releases. HARMO-19, June 3-6, 2019, Bruges, Belgium

## Scientific committees

- **M. Bocquet,** Scientific committee, European Center for Scientific Computing (CERFACS).
- **M. Bocquet, P. Bernardara,** Management Committee, Pierre-Simon Laplace Institute (IPSL).
- **M. Bocquet,** Prix André Prud’Homme Committee of the Meteorology and Climate Society.
- **K. Sartelet,** Scientific committee of DIM QI<sup>2</sup>.
- **K. Sartelet,** Co-animation of the “Atmospheric Composition” Committee, Pierre-Simon Laplace Institute (IPSL).
- **E. Dupont,** Scientific Committee, "Site instrumental de recherche par télédétection atmosphérique" (SIRTA).
- **Y. Roustan,** Scientific Committee, OSU EFLUVE.

## Thesis committees

1. **M. Bocquet,** Chair of the Jury and Referee, PhD, Oliver Guillet, “Modélisation des corrélations spatiales d’erreurs d’observation en assimilation de données variationnelle. Etude sur des maillages non structurés”, University of Toulouse, February 8, 2019.
2. **M. Bocquet,** Referee, PhD, Thi Tuyet Trang Chau, “Non-parametric methodologies for reconstruction and estimation in nonlinear state-space models”, Université Bretagne-Loire, Rennes, February 26, 2019.
3. **M. Ferrand,** Guest, PhD, Clément Colas, “Formulation intégrale implicite pour la modélisation d’écoulements fluides en milieu encombré”, Université d’Aix-Marseille, Marseille, November 14, 2019.
4. **M. Ferrand,** Guest, PhD, Thomas Fonty, “ Modélisation de l’entraînement d’air dans l’eau avec la méthode SPH”, Université Paris Est, Chatou, Octobre 24, 2019.
5. **K. Sartelet,** Referee, PhD, Alvaro Martinez, « Contribution des composés organiques volatils (COVs) provenant des émissions des véhicules aux aérosols organiques secondaires (AOS) et à la pollution urbaine. », Université de Lyon, March 2019.

6. **B. Carissimo**, Referee PhD Pierre Alexandre Joulin, « Modélisation à fine échelle des interactions entre parcs éoliens et météorologie locale », Université de Toulouse, Décembre 2019
7. **B. Carissimo**, Referee PhD Houlga Belgacem, « Génération d'un squelette informé et application à l'étude aérodynamique de la forme urbaine », Université de Nantes, Décembre 2019

## HdR committees

1. **K. Sarcelet**, Examinee, HdR, Agnès Borbon, «Le carbone organique gazeux troposphérique : composition, sources et devenir », Université Clermont Auvergne, March 1, 2019.

## Defended theses and HDR (CEREA)

1. **A. Fillion**, “Méthodes variationnelles d'ensemble et optimisation variationnelle pour les géosciences”, Université Paris-Est, March 28, 2019.
2. **C. Defforge**, “Assimilation de données pour des applications micro-météorologiques avec le modèle de mécanique des fluides Code\_Saturne”, Université Paris-Est, October 14, 2019.
3. **A. Farchi**, “Localisation des méthodes d'assimilation de données d'ensemble”, Université Paris-Est, November 21, 2019.

## Teaching

### École des Ponts ParisTech

- **M. Bocquet**, V. Mallet, **C. Defforge**, O. Talagrand, L. Berre, and E. Cosme. Introduction to data assimilation, NUM2.2, Master 2 MOCIS and Master 2 WAPE, about 25 hours. January-March 2019.
- **M. Bocquet**. Overview of geophysical data assimilation. Pre-school at IESC - IHP trimester *The mathematics of climate and the environment*, 3-hour lecture. September 9-13, 2019, Cargèse, Corsica. [invited]
- **M. Bocquet**. series of lecture on *big data, data assimilation and uncertainty quantification* in the IHP trimester *The mathematics of climate and the environment*. 3x2-hour lectures. October 28 - November 8, Institut Henri Poincaré, Paris, France. [invited]
- **M. Ferrand**, Mécanique des fluides incompressibles - 1 (2ème année École des Ponts, 6x3-hour lectures).
- **M. Ferrand**, Mécanique des fluides incompressibles - 2 (2ème année École des Ponts, 6x3-hour lectures).

- **M. Ferrand**, Mécanique des fluides incompressibles (1ere année École des Ingénieurs de la Ville de Paris, 9x3-hour lectures).
- **K. Sartelet**, Pollution photochimique, les particules (2<sup>ème</sup> année École des Ponts, module « Environnement atmosphérique et qualité de l'air », 3 hours lecture), March 2019.
- **Y. Roustan, K. Sartelet**, M. Camredon, A. Coman, I. Coll. *Modélisation de la pollution atmosphérique* » master SGE (M2 Air, Paris Diderot -UPEC –ENPC, 11 hours lecture).
- **B. Carissimo**, David Pollack, **Cécile Defforge**, Introduction à la météorologie - (1ère année Ecole des Ponts, 6x3-hour lectures + project).
- **Y. Roustan**, M. André, F. Anfosso-Lédée, T. Hermitte. *Externalité des transports* master TraDD (ParisTech -Fondation Renault, 6 hours lecture).
- **Y. Roustan**. *Pollution de fond et impacts écologiques des activités humaines*, cycle de conférence EGEDD.

#### École Nationale des Travaux Publics de l'État

- **Y. Roustan**, A.-L. Badin. *Qualité de l'air et santé*, 3e année cycle ingénieur.

#### Outreach

- P. Dandin, **M. Bocquet**, et al. . *Quelques défis scientifiques actuels en météorologie* , in La Jaune et la Rouge, 747, September 2019.

#### Visiting Scientists

- **I. Ouarma** University of Ouagadougou, Ouagadougou, Burkina Faso.
- **C. Lin** *Heat Island and air pollution mitigation*, University of Tokyo.