Curriculum Vitae of Ronan PAUGAM

Nationality: French
Position: Visiting Scholar at the University of Washington
Address: Pacific Wildland Fire Sciences Lab
                 400 N. 34th St, Suite 201
                 Seattle, WA 98103, USA
Email: paugam@uw.edu
url: https://ronanpaugam.github.io/

Professional Background

Mars 2016 - Present	**Visiting Scholar, US Forest Service / University of Washington, Seattle USA.**

- Large Eddy simulation of Fire Plume with the coupled fire-atmosphere model MesoNH-ForeFire
- Airborne Image processing for Fire behaviour metrics, in particular Rate of Spread and flaming residence time calculation
- Airborne Image georeferencing in collaboration with the Canadian Forest Service.
- Development of a methodology for Fire Intensity estimation from small scale fire monitored with low cost UAV.

Oct 2008 - Dec 2015	**Post Doctoral Research Associate, Dept Geography Kings College London (KCL, London,UK)**, supervisor: Prof. Martin Wooster

- Development of a parameterization for wildfire emission injection height estimation in large scale transport model for ECMWF.
- Implementation of mapping methodology to airborne thermal data for derivation of the Fire Radiative Power product.
- Development of a fire scene simulation algorithm and coupling with the Radiative transfer model DART (Cesbio, France) for the simulation of the Fire Radiative Power product.
- Multiple Fieldwork participations with organisation position in several of them.
- Successful Grant application as Co-PI for 3 NERC, 1 ESA and 2 internal KCL projects.
- Master student co-supervision

- Published in refereed journal and presented in international conferences.

Jan 2005 - May 2008	**PhD Student, Ecole Centrale Paris (Chatenay-Malabry, France) and team Aviation Environment of CERFACS (Toulouse, France)**, advisor: Dr. Daniel Cariolle Thesis title: Numerical study of a contrail evolution and its interaction with the atmospheric turbulence. - Large-Eddy simulation of aircraft wake instabilities and atmospheric-contrail interaction. - Published in refereed journal and presented in international conferences.

Studies

Jan 2005 - May 2008	**PhD in Computational Fluid Mechanics** Ecole Centrale Paris and CERFACS.
Sep 2002 - Dec 2004	**Engineering School** Ecole Centrale Paris option Applied Mathematics
Sep 2003 - Sep 2004	**MSc in numerical methods** Ecole Normale Superieure de Cachan
Sep 1998 - June 2002	**BSc, and a Magistere degree in Fundamental Physics** Paris-South University, Centre of Orsay.

Early Research Experiences (internships)

Jun-Oct 2004	research project in oceanography physics, Department of Meteorology - University of Reading (U.K.) Supervisor: Prof David Marshall subject: Study of the Upper Limb of a Closed Ocean Basin in the hypothesis of Basin Modes and Geostrophic Turbulence
Apr-Jul 2002	research project in atmospheric dynamic, Department of Applied Mathematics and Theoretical Physics - University of Cambridge (U.K.) Supervisor: Prof Micheal McIntyre subject: Interaction wave – vortex
Jun-Jul 2001	research project in Fundamental Physics, Laboratoire de l'Accelerateur Lineaire, Paris-South University, Centre of Orsay (France) Supervisor: Pr. Francois Couchot subject: Short-Range Gravitation Forces

Research Projects

Participation as a Co-PI:

NERC small grant	"Determining convective/radiative energy portioning in large scale open fire", NE/J014060/1, £58k
NERC knowledge exchange	"Improving representation of the effects of Biomass Burning Smoke Emissions in a Key UK/European Operational Atmospheric Monitoring and forecasting scheme", NE/I022116/1, £99.5k
ESA	"3D Fire Radiative Power Approach Modelling Approach", ESA ITT 1-6811/11/NL/AF, 249keuro

Participation in Consortium project:

FASMEE	Fire and Smoke Model Evaluation Experiment. Joint Fire Science Program grant. Jan 2016-Apr 2017
SAMBBA	South American Biomass Burning Analysis. NERC consortium grant. Sep 12 – Aug 16
MACC-III	Monitoring Atmospheric Composition and Climate- Interim Implementation. EU H2020, Aug 2014 - Jun 2015
MACC-II	Monitoring Atmospheric Composition and Climate - Interim Implementation. D-Fire sub-project. EU FP7, 2011-2014
QUANTIFY	Quantifying the Climate Impact of Global and European Transport System, EU FP6, 2005-2009

Invited Presentations

Sep 2015:	Meteorology and Climate - Modeling for Air Quality (MAC-MAQ) workshop. Sacramento, US
Oct 2011:	National Institute for Space Research (INPE), visiting researcher, Sao Jose dos Campos, Brazil.

Research Interest and Expertise

- Physical processes of Wildfire, in particular radiation
- Developing coarse/empirically based Radiative Transfer model for large fire.
- Fire Radiation Measurement – Remote Sensing techniques for prescribed burn.
- Meso Scale Atmospheric Dynamics
- Coupling of physical processes and turbulent atmospheric dynamics

Languages

- French: mother tongue
- English: fluent reading and writing

Computer skills

- Scientific programming: Python (opencv, gdal libraries), IDL, Fortran90
- System: Linux (server installation and maintenance)
- Software: Latex, Office package, visualisation tools (tecplot, paraview, ENVI),

List of Publications

Peer-reviewed publications:

1. Sauvage, B., Fontaine, A., Eckhardt, S., Auby, A., Boulanger, D., Petetin, H., **Paugam, R.**, Athier, G., Cousin, J.-M., Darras, S., Nédélec, P., Stohl, A., Turquety, S., Cammas, J.-P., and Thouret, V.: Source attribution using FLEXPART and carbon monoxide emission inventories: SOFT-IO version 1.0, Atmos. Chem. Phys. Discuss., in review, 2017.
2. Johnston, J., Wooster M, **Paugam R.**, Wang X., Lynham T., Johnston L.: Direct estimation of Byram's fire intensity from infrared remote sensing imagery, Inter. J. of Wildland Fire, doi:10.1071/WF16178 2017.
3. Rémy, S., Veira, A., **Paugam, R.**, Sofiev, M., Kaiser, J. W., Marenco, F., Burton, S. P., Benedetti, A., Engelen, R. J., Ferrare, R., and Hair, J. W.: Two global data sets of daily fire emission injection heights since 2003, Atmos. Chem. Phys., 17, 2921-2942, doi:10.5194/acp-17-2921-2017, 2017.
4. Evangeliou, Nikolaos; Zibtsev, S.; Myroniuk, V.; Zhurba, M.; Hamburger, Thomas; Stohl, Andreas; Balkanski, Y.; **Paugam, R.**; Mousseau, T.A.; Møller, A.P.; Kireev, S.I.: Resuspension and atmospheric transport of radionuclides due to wildfires near the Chernobyl Nuclear Power Plant in 2015: An impact assessment. Scientific Reports, Nature, doi:10.1038/srep26062, 2016.
5. **Paugam, R.**, Wooster, M., Freitas, S., and Val Martin, M.: A review of approaches to estimate wildfire plume injection height within large-scale atmospheric chemical transport models, Atmos. Chem. Phys., 16, 907-925, doi:10.5194/acp-16-907-2016, 2016.
6. **Paugam, R.**, Wooster, M., Atherton, J., Freitas, S. R., Schultz, M. G., and Kaiser, J. W.: Development and optimization of a wildfire plume rise model based on remote sensing data inputs -Part 2, Atmos. Chem. Phys. Discuss., 15, 9815-9895, doi:10.5194/acpd-15-9815-2015, 2015. [still in review for acp in Sep 2015]
7. Gonzi, S., Palmer, P. I., **Paugam, R.**, Wooster, M., and Deeter, M. N.: Quantifying pyroconvective injection heights using observations of fire energy: sensitivity of

spaceborne observations of carbon monoxide, Atmos. Chem. Phys., 15, 4339-4355, doi:10.5194/acp-15-4339-2015, 2015.

8. N. Evangeliou, Y. Balkanski, A. Cozic, W. M. Hao, F. Mouillot, K. Thonicke, **R. Paugam**, S. Zibtsev, T. A. Mousseau, R. Wang, B. Poulter, A. Petkov, C. Yue, P. Cadule, B. Koffi, J. W. Kaiser, and A. P. MÃ¸ller. Fire evolution in the radioactive forests of Ukraine and Belarus: future risks for the population and the environment. Ecological Monographs 85:49-72. 2015

9. **Paugam R.**, Wooster, M. J. and Roberts, G, 2013: Use of Handheld Thermal Imager Data for Airborne Mapping of Fire Radiative Power and Energy and Flame Front Rate of Spread, Geoscience and Remote Sensing, IEEE Transactions on , vol.51, no.6, pp.3385,3399

10. Rochoux, M. C., Cuenot, B., Ricci, S., Trouve, A., Delmotte, B., Massart, S., Paoli, R. & **Paugam, R.**: Data assimilation applied to combustion, COMPTES RENDUS MECANIQUE. 341, 1-2, p. 266-276 11 p., DOI: 10.1016/j.crme.2012.10.011 , Jan 2013

11. Val Martin, M., R. A. Kahn, J. A. Logan, **R. Paugam**, M. Wooster, and C. Ichoku, 2012: Space-based observational constraints for 1-D fire smoke plume-rise models, J. Geophys. Res., 117, D22204

12. **Paugam R.** , R. Paoli, and D. Cariolle, 2010: Influence of vortex dynamics and atmospheric turbulence on the early evolution of a contrail, Atmospheric Chemistry and Physics, Vol. 10, pp. 3933-3952.

13. D. Cariolle, D. Caro, R. Paoli, D. Hauglustaine, B. Cuenot, A. Cozic, and **R. Paugam**, 2009: Introduction of non-linear plume chemistry into large scale atmospheric models: application to aircraft emissions, Journal of Geophysical Research, Vol. 114, D19302.

Referenced conference publications:

- Liu, Yongqiang; Kochanski, A; Baker, K; Mell, W; Linn, R; **Paugam, R**; Mandel, J; Fournier, A; Jenkins, M A; Goodrick, S; Achtemeier, G; Hudak, A; Dickson, M; Potter, B; Clements, C; Urbanski, S; Ottmar, R; Larkin, N; Brown, T; French, N; Prichard, S; Watts, A; McNamara, D. 2017. Fire and Smoke Model Evaluation Experiment (FASMEE): Modeling gaps and data needs. In: Proceedings for the 2nd International Smoke Symposium November; 14-17, 2016, Long Beach, California, USA. Missoula, MT: International Association of Wildland Fire. 13 p.

- **R. Paugam**, M. Wooster, G. Papadakis, and M. Schultz: Estimation of the Injection Height of Biomass Burning Emission, Proceeding for the ESA-iLEAPS-EGU joint conference, Frascati, Italy, November 2010

- **R. Paugam**, R. Paoli, D. Cariolle and B. Cuenot: Numerical simulation of aircraft plume evolution using a mesoscale code, Proceedings of the International Conference on Transport, Atmosphere and Climate, Oxford, UK, June 2006.

Main Conference Abstracts

- **R. Paugam**, JP Gastellu-Etchegorry, W Mell, J .Johnston, JB Filippi: Prescribed Burn, Helicopterborne Infrared Imagery, and 3D Plume Model for Synthetic FRP Product Simulation. Earth Observation Submit, Montreal 2017.

- **R. Paugam**, JP Gastellu-Etchegorry, W Mell, J .Johnston, JB Filippi: Modelling Middle Infrared Thermal Imagery from Observed or Simulated Active Fire, AGU Fall Meeting Abstracts, 2016
- **R. Paugam**, M. Wooster, J. Johnston, J.P. Gastellu-Etchegorry: FRP product simulation tools. Numerical Wildfire workshop, Cargese France 2013
- **R Paugam**, M Wooster, J Atherton, S Beevers, N Kitwiroon, JW Kaiser, S Remy, SR Freitas: Wildfire Emission, injection height: Development, Optimization, and Large Scale Impact - AGU Fall Meeting Abstracts, 2013
- **R Paugam**, M Wooster, J Atherton, JW Kaiser, S Freitas: On the parameterization of Injection Height and the use of the MISR plume height project data - Vol. 15, EGU2013-13779, 2013
- **R Paugam**, M Wooster, S Freitas, S Gonzi, P Palmer: Parameterization of Fire Injection Height in Large Scale Transport Model - Vol. 14, EGU2012-8366, 2012
- **R Paugam**, M Wooster, G Papadakis, M Schultz: Estimation of the Injection Height of Biomass Burning Emission - Vol. 13, EGU2011-1097, 2011