List of research activities

2014

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: 34 (as of 31 December 2014)

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
- **HERLIN Isabelle,** Inria, Senior research scientist (DR2)
- **HUOT Étienne,** Inria, Université de Versailles Saint-Quentin-en-Yvelines , Associate professor
- **MALLET Vivien,** Inria, Research scientist (CR1)
- **MUSSON-GENON Luc,** EDF R&D, Research engineer (IGPEF)
- **ROUSTAN Yelva,** École des Ponts ParisTech, Research scientist (CR2)
- **SARTELET Karine,** École des Ponts ParisTech, Research scientist (CR1), HDR
- **SEIGNEUR Christian,** École des Ponts ParisTech, Director and Professor, HDR

External collaborators

- **BÉRÉZIAT Dominique,** Université Pierre-et-Marie-Curie, Associate professor, HDR
- **ZHUK Sergey,** IBM Research Dublin, Ireland, Research scientist
- **ZHANG Yang,** North Carolina State University, USA, Professor

Post-doctoral scientists

- **CHAHINE Ali,** École des Ponts ParisTech
- **GAO Zhenlan**
- **GIRARD Sylvain,** Inria/IRSN
- **GIRAULT Laëtitia,** École des Ponts ParisTech
- **QU Yongfeng,** École des Ponts ParisTech
- **QUÉREL Arnaud,** École des Ponts ParisTech
- **WANG Yiguo,** École des Ponts ParisTech
- **YAN Nicolas,** École des Ponts ParisTech

Ph.D. students

- **ABDALLAH Charbel,** École des Ponts ParisTech, ED SIE
- **BAUDIN Paul,** Inria, ED Sciences Mathématiques Paris Centre
- **CHEN Ruiwei,** École des Ponts ParisTech, ED SIE
- **CHERIN Nicolas,** 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
- **DURAISAMY Venkatesh,** EDF R&D, ED SIE
- **FALLAH SHORSHANI Masoud,** IFSTTAR, ED SIE
- **HAUSSAIRE Jean-Matthieu,** École des Ponts ParisTech, ED SIE
- **LEPOITTEVIN Yann,** Inria, ED Sciences Mathématiques Paris Centre
- **LOIZEAU Vincent,** EDF R&D, ED SIE
- **MAKKÉ Laurent,** École des Ponts ParisTech, ED SIE

- **RAFFORT Valentin,** École des Ponts ParisTech, ED SIE
- **THOREY Jean,** Inria, ED Sciences Mathématiques Paris Centre
- **THOURON Laëtitia,** École des Ponts ParisTech, ED SIE
- **WEI Xiao,** EDF R&D, ED SIE
- **WINIAREK Victor,** École des Ponts ParisTech, ED SIE
- **ZHU Shupeng,** École des Ponts ParisTech, ED SIE

Interns

- **CHRIT Mounir,** Inria
- **DAYABZEG Saïd,** Inria
- **DEBEVEC Cécile,** École des Ponts ParisTech
- **JIANG Yao,** EDF R&D
- **JONCQUEZ Thibaut,** École des Ponts ParisTech
- **SAMAR RAHALI Lina,** EDF R&D
- **SOKENG Marius,** Inria

Engineers, administrative staff, and technicians

Engineers

- **BRESSON Raphaël,** EDF R&D, Engineer
- **CLAUDE Nicolas,** Inria, Engineer
- **DEMENGEL Dominique,** EDF R&D, Engineer
- **DORÉ Sylvain,** École des Ponts ParisTech, Engineer
- **DREVET Jérôme,** École des Ponts ParisTech, Engineer
- **FROGER David,** Inria, 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
- **GAUDECHOUX Nathalie,** Inria

Technicians

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

RESEARCH

Publications

Articles in peer-reviewed international journals

- Badosa, J., J. Wood, P. Blanc, C.N. Long, L. Vuilleumier, **D. Demengel,** M. Haeffelin. Solar irradiances measured using SPN1 radiometers: uncertainties and clues for development, *Atmos. Meas. Tech.*, **7**, 4267-4283, doi: 10.5194/amt-7-4267-2014.

- Baklanov, A., K. H. Schlünzen, P. Suppan, J. Baldasano, D. Brunner, S. Aksoyoglu, G. Carmichael, J. Douros, J. Flemming, R. Forkel, S. Galmarini, M. Gauss, G., Grell, M. Hirtl, S. Joffre, O. Jorba, E. Kaas, M. Kaasik, G. Kallos, X. Kong, U. Korsholm, A. Kurganskiy, J. Kushta, U. Lohmann, A. Mahura, A. Manders-Groot, A. Maurizi, N. Moussiopoulos, S. T. Rao, N. Savage, **C. Seigneur**, R.S. Sokhi1, E. Solazzo, S. Solomos, B. Sørensen, G. Tsegas, E. Vignati, B. Vogel, Y. Zhang. Online coupled regional meteorology chemistry models in Europe: current status and prospects, *Atmos. Chem. Phys*., **14**, 317-398 (2014), doi:10.5194/acp-14-317-2014.

- **Bocquet, M.**, P. Sakov. An iterative ensemble Kalman smoother, *Q. J. Royal Meteor. Soc.*, **140**, 1521-1535 (2014), doi:10.1002/qj.2236.

- Debry, E., **V. Mallet**, Ensemble forecasting with machine learning algorithms for ozone, nitrogen dioxide and PM_{10} on the Prev'Air platform, *Atmos. Environ*, **91**, 71-84 (2014), doi:10.1016/j.atmosenv.2014.03.049.

- **Fallah Shorshani, M.**, C. Bonhomme, G. Petrucci, M. André, **C. Seigneur**. Road traffic impact on urban water quality: a step towards integrated traffic, air and stormwater modelling, *Environ. Sci. Pollut. Res*., **21**, 5297-5310 (2014), doi:10.1007/s11356-013-2370-x.

- Filippi, J.-F., **V. Mallet**, B. Nader. Representation and evaluation of wildfire propagation simulations, *Int. J. Wildland Fire*, **23**, 46-57 (2014), doi:10.1071/WF12202.

- Girard, S., I. Korsakissok, **V. Mallet**, Screening sensitivity analysis of a radionuclides atmospheric dispersion model applied to the Fukushima disaster, *Atmos. Environ*., **95**, 490-500 (2014), doi.org/10.1016/j.atmosenv.2014.07.010.

- Gray, M., C. Petit, S. Rodionov, **M. Bocquet**, L. Bertino, M. Ferrari, T. Fusco. Local ensemble transform Kalman filter, a fast non-stationary control law for adaptive optics on ELTs: theoretical aspects and first simulation results, *Optics Express*, **22,** 20894-20913 (2014), doi:10.1364/OE.22.020894.

- **Kim, Y., C. Seigneur**, O. Duclaux. Development of a plume-in-grid model for industrial point and volume sources: application to power plant and refinery sources in the Paris region, *Geosci. Model Dev*., **7**, 569–585 (2014), doi:10.5194/gmd-7-569-2014.

- **Lecœur, È, C. Seigneur**, C. Pagé, L. Terray. A statistical method to estimate $PM_{2.5}$ concentrations from meteorology and its application to the effect of climate change, *J. Geophys. Res*., **119**, 3537-3585 (2014), doi:10.1002/2013JD021172.

- **Loizeau, V.**, P. Ciffroy, **Y. Roustan, L. Musson-Genon**, Identification of sensitive parameters in the modelling of SVOC reemission from soils to the atmosphere, *Sci. Total Environ*., **493**, 419-431 (2014), doi:10.1016/j.scitotenv.2014.05.136.

- Mouzourides, P., A. Kyprianou, M.J. Brown, **B. Carissimo**, R. Choudhary, M. K.-A. Neophytou. Searching for the distinctive signature of a city in atmospheric modeling: Could the Multi-Resolution Analysis (MRA) provide the DNA of a city?, *Urban Climate*, **10**, 447-475 (2014), doi:10.1016/j.uclim.2014.04.001

- Petrucci, G., M.-C. Gromaire, **M. Fallah Shorshani**, G. Chebbo, Non-point source pollution of urban stormwater runoff: a methodology for source analysis, *Environ. Sci. Pollut. Res*., **21**, 10225-10242 (2014), doi:10.1007/s11356-014-2845-4.

- **Waked, A.**, C. Afif; P. Formenti; S. Chevaillier; I. El-Haddad; A. Borbon; J.-F. Doussin; **C. Seigneur**. Characterization of organic tracer compounds in $PM_{2.5}$ at a semi-urban site in Beirut, Lebanon, *Atmos. Res.,* **143**, 85-94 (2014), doi:10.1016/j.atmosres.2014.02.006.

- **Wang, Y., K.N. Sartelet, M. Bocquet**, P. Chazette. Modelling and assimilation of lidar signals over Greater Paris during the MEGAPOLI summer campaign, *Atmos. Chem. Phys*., **14**, 3511-3532 (2014), doi:10.5194/acp-14-3511-2014.

- **Wang, Y., K. N. Sartelet, M. Bocquet**, P. Chazette, M. Sicard, G. D'Amico, J. F. Léon, L. Alados-Arboledas, A. Amodeo, P. Augustin, J. Bach, L. Belegante, I. Binietoglou, X. Bush, A. Comerón, H. Delbarre, D. García-Vízcaino, J. L. Guerrero-Rascado, M. Hervo, M. Iarlori, P. Kokkalis, D. Lange, F. Molero, N. Montoux, A. Muñoz, C. Muñoz, D. Nicolae, A. Papayannis, G. Pappalardo, J. Preissler, V. Rizi, F. Rocadenbosch, K. Sellegri, F. Wagner, F. Dulac. Assimilation of lidar signals: application to aerosol forecasting in the Mediterranean Basin, *Atmos. Chem. Phys*., **14**, 12031–12053 (2014), doi:10.5194/acp-14-12031-2014.

- **Wei, X., E. Dupont, B. Carissimo, E. Gilbert, L. Musson-Genon**. A preliminary analysis of measurements from a near-field pollutants dispersion campaign in a stratified surface layer, *Int. J. Environ. Pollut*., **55**, 184-191 (2014), doi:10.1504/IJEP.2014.065923.

- **Winiarek, V., M. Bocquet, N. Duhanyan, Y. Roustan**, O. Saunier,.A. Mathieu. Estimation of the caesium-137 source term from the Fukushima Daiichi nuclear power plant using a consistent joint assimilation of air concentration and deposition observations. *Atmos. Environ*., **82**, 268-279, (2014), doi:10.1016/j.atmosenv.2013.10.017.

- **Zhang, X., L. Musson-Genon, B. Carissimo, É. Dupont, M. Milliez**, On the influence of a simple microphysics parameterization on radiation fog modeling: a case study during ParisFog, *Boundary-Layer Meteor*., **151**, 293-315 (2014), doi:10.1007/s10546-013-9894-y.

Articles in other journals

- **M. Bocquet.** La prévision numérique du temps. *Technologie,* **192**: 48-51, May-June 2014.

Books

- Advanced Data Assimilation for Geosciences, É. Blayo, **M. Bocquet**, E. Cosme, L.F. Cugliandolo, eds., 584 pp., Oxford University Press, Oxford, UK (2014).

International conference proceedings

- Couvidat, F., M.G. Vivanco, **C. Seigneur**, B. Bessagnet. Modeling SOA formation from the oxidation

anthropogenic precursors in an outdoor chamber, 16th International Conference on Harmonisation within Atmospheric Dispersion Modelling for Regulatory Purposes, 8-11 September 2014, Varna, Bulgaria.

- **Kim, Y., V. Raffort**, L. Donnat, C. Juery, **C. Seigneur**, O. Duclaux. Development of a plume-in-grid model for evaluation of particulate matter contribution of an industrial site: application to refinery sources in the Paris region, 16th International Conference on Harmonisation within Atmospheric Dispersion Modelling for Regulatory Purposes, 8-11 September 2014, Varna, Bulgaria.

- **Roustan, Y.,** I. Coll, **N. Yan,** A. Quemener, A. Elessa. Analysis and comparison of two models response to an emissions abatement scenario, 16th International Conference on Harmonisation within Atmospheric Dispersion Modelling for Regulatory Purposes, 8-11 September 2014, Varna, Bulgaria.

- **Quérel, A., Y. Roustan,** D. Quélo, J.-P. Benoit. Hints to discriminate the choice of wet deposition models applied to an accidental radioactive release, 16th International Conference on Harmonisation within Atmospheric Dispersion Modelling for Regulatory Purposes, 8-11 September 2014, Varna, Bulgaria.

National conference proceedings

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International conference oral and poster presentations

- Baklanov, A., H. Schluenzen, S. Joffre, P. Suppan, J. Baldasano, D. Brunner, M. Gauss, A. Maurizi, **C. Seigneur**, X. Kong. Coupled meteorology-chemistry models: needs and benefits for numerical weather prediction, air quality and climate communities, World Weather Open Science Conference, Montreal, Canada, 16-21 August 2014.

- Garcia-Vivanco, M., F. Couvidat, M. Santiago, **C. Seigneur**, M. Jang, B. Henderson, B. Bessagnet, Evaluation of different SOA schemes using experiments in two outdoor chambers, European Geosciences Union General Assembly, Vienna, Austria, 28 April-2 May 2014.

- **Zhu, S., K. Sartelet, C. Seigneur**. Modeling of externally mixed particles in the atmosphere, European Geosciences Union General Assembly, Vienna, Austria, 28 April-2 May 2014.

- Mathieu, O. Saunier, D. Didier, I. Korsakissok, **V. Winiarek, M. Bocquet**. Source term assessment of the Fukushima nuclear accident: a sensitivity analysis. 16th HARMO conference, Varna, Bulgaria, 8-11 September 2014.

- **Bocquet, M**., Sakov P., Joint state and parameter estimation with an iterative ensemble Kalman smoother, 9th EnKF workshop, Bergen, Norway, 22-24 June 2014.

- **Bocquet, M**., Sakov P., An iterative ensemble Kalman smoother for Filtering High Dimensional Complex Systems, Filtering High Dimensional Complex Systems, Warwick, UK, 30 July 2014.

- Gray, M., Petit, C., Rodionov, S., **Bocquet, M.,** Bertino, L., Ferrari, M., Fusco, T. Local Ensemble Transform Kalman Filter, a fast non-stationary control law for adaptive optics on ELTs, conference SPIE “Astronomical Telescope – Instrumentation”, Montreal, Canada, June 2014.

- **Wei, X., Dupont, E., Carissimo, B., Gilbert E., Musson-Genon, L.,** Turbulence measurements for a near-field pollutants dispersion campaign in a stratified surface layer, Paper presented at 21th Symposium on Boundary Layers and Turbulence, Leeds, UK, 9-13 June 2014.

- **Makké, L., Carissimo, B., Musson-Genon, L.,** A fast method to compute Three-Dimensional

Infrared Radiative Transfer in non scattering medium, 14th Atmospheric Radiation Conference/Anthony Slingo Symposium, Boston, USA, 7-11 July 2014.

- **Makké, L., Carissimo, B., Musson-Genon, L.,** A fast approach to compute Infrared Radiative Transfer in non scattering medium, European Geosciences Union General Assembly, Vienna, Austria, 28 April-2 May 2014.

- **Daviau, N., Carissimo, B.,** Implementation of a building model in a CFD software to refine the simulation of energetic exchanges between the buildings and the urban atmosphere, Toward Integrated modeling of Urban Systems, Lyon, France, 15-17 October 2014.

National conference oral and poster presentations

- Lemaire, V., I. Coll, F. Couvidat, B. Bessagnet, **C. Seigneur**. Modélisation et évaluation de l'oligomérisation, Atelier de Modélisation de l'Atmosphère, Toulouse, France. 20-22 January 2014.

- **Haussaire, J.-M., Bocquet, M., Roustan, Y., Seigneur, C**., Application du lisseur de Kalman d'ensemble itératif à un modèle de qualité de l'air d'ordre réduit, Colloque national sur l'assimilation de données LEFE-MANU, Toulouse, France, 1-3 December 2014.

- **Bocquet, M.**, Mathematical methods in geophysical data sassimilation ; two concrete examples in air quality, Synthèse de l'Atelier de Réflexion Prospective MathsInTerre, Paris, France, 7 January 2014.

- **Bocquet, M., Herlin, I**., Overview of the Clime team, SAMA meeting, Ecole Normale Supérieure, Paris, France, 7 February 2014.

- **Bocquet, M.**, Sakov, P., **Haussaire, J.-M.,** An iterative ensemble Kalman smoother, Colloque national sur l'assimilation de données LEFE-MANU, Toulouse, France 1-3 December 2014.

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

- **Seigneur, C.**, Organizing committee of the Symposium on Coupled Chemistry/Meteorology-Climate Modelling, 23-25 February 2015, World Meteorological Organization, Geneva.

National conference committees

- **Bocquet, M.,** Colloque national sur l'assimilation de données LEFE-MANU, Toulouse, France, 1-3 December 2014.

Conference session chairs

- **Bocquet, M**., Ensemble session, Colloque national sur l'assimilation de données LEFE-MANU, Toulouse, France, 1-3 December 2014

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.**, Prix André Prud'homme committee of the Météo and Climate Society.
- **Demengel D., E. Dupont, I. Herlin, 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, K. Sartelet**: Scientific Committee, "Site instrumental de recherche par télédétection atmosphérique" (SIRTA).
- **Dupont E.**, Musson-Genon L., Seigneur C. : Scientific Committee OSU EFLUVE.
- **Herlin I.,** Scientific Council of the High Council for Strategic Education and Research in France (CSFRS)
- **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.** National Funding Commission (CNA) for climate, air and energy of the Agency for Environment and Energy Management (ADEME).
- **Seigneur C.** Scientific Advisory Committee of Interagency Research Program for Improved Local Air Quality (PRIMEQUAL).
- **Seigneur C.,** Scientific Committee of the Chronic Risk Division (DRC) of the National Institute of Industrial Environment and Risk (INERIS).
- **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)

- **Seigneur C.** Ph.D. thesis, Hervé Petetin, « Aérosol fin dans une mégalopole européenne : Simulation des sources », Université Paris-Diderot, 10 February 2014.
- **Seigneur C.** Ph.D. thesis, Thérèse Salame, « Sources d'émission du carbone organique gazeux à Beyrouth », Université de Lille 1 & Université Saint-Joseph de Beyrouth, 14 November 2014.
- **Bocquet M**., PhD thesis, Benjamin Ménétrier, « Utilisation d'une assimilation d'ensemble pour modéliser des covariances d'erreur d'ébauche dépendantes de la situation météorologique à l'échelle convective », Université de Toulouse, France, 3 July 2014.
- **Bocquet M**., PhD thesis, Nabil Ben Salem, « Modélisation directe et inverse de la dispersion atmosphérique en milieux complexes », Ecole Centrale de Lyon, France, 17 septembre 2014.
- **Bocquet M**., PhD thesis, Yin Yang, « Study of Variational Ensemble Methods for Image Assimilation », Université de Rennes 1, France, 16 décembre 2014.
- **Bocquet M**., PhD thesis, Antoine Berchet, « Quantification des émissions de méthane en Sibérie par inversion atmosphérique à la méso-échelle » Université de Versailles Saint Quentin en Yvelines, France, décembre 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., V. Mallet**, **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., V. Mallet,** Introduction à l'assimilation de données (Introduction to data assimilation), Master Océan, atmosphère, climat et observations spatiales (OACOS).
- **Bocquet M., L. Musson-Genon, B. Carissimo, J.-M. Haussiare, V. Mallet, Y. Roustan, D. Wendum,** Environment and Society, Master Nuclear Energy.

- **Roustan Y., Seigneur C., V. Mallet,** 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.

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.** Interview by Judith Grimaldi, "Pic de pollution", *Le Journal*, 13h30, France 24 Télévision, 14 March 2014.

- **Seigneur C,** Expert Panel Participant, « Intégrer de l'air dans les PCET : pourquoi et comment ? » (Incorporation of air quality in local climate/energy plans), Colloque National Plans Climat Énergie Territoriaux, Strasbourg, France, 30 September 2014.

- **Winiarek V., Bocquet M.,** Fukushima : de la radioactivité dans l'air, 2014. *Mathématiques de la planète Terre*, 9 January 2014, http://www.breves-de-maths.fr/fukushima-de-la-radioactivite-dans-lair/

- **Bocquet M., Kookhan R.,** Quand modèles numétiques et mesures ne sont pas sur la même longueur d'onde, 2014, *Mathématiques de la planète Terre*, 7 January 2014, http://www.breves-de-maths.fr/quand-modeles-numeriques-et-mesures-ne-sont-pas-sur-la-meme-longueur-donde/