

# Gwendal Rivière, CNRS Research scientist

Birth date : 19th of July 1974 in Brest.

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## Diplomas

**January 2012** **Habilitation thesis** (University Toulouse III).

Title : Dynamics of mid-latitude cyclones and their role in the general circulation of the atmosphere.

**1999 - 2002** **PhD Thesis** (University Paris VI) at Laboratoire de Météorologie Dynamique (Ecole Normale Supérieure, Paris, France).

Title : Local dynamics of perturbation growth in quasigeostrophic flows and predictability.

Advisors : Drs. Lien Hua and Patrice Klein.

**Award “Prix Prud’homme 2004”** received from the Société Météorologique de France in december 2004 for this PhD work.

**1998 - 1999** **Master of Science (University Paris VI)** in meteorology, oceanography and environment (DEA).

**1995 - 1998** **Engineering degree from Ecole Polytechnique.**

Majors : (i) fluid mechanics, (ii) meteorology.

## Research positions

**2014 - now** **CNRS scientist position** at Laboratoire de Météorologie Dynamique - Ecole Normale Supérieure (Paris, France).

**2006 - 2013** **CNRS scientist position** at Centre National de Recherches Météorologiques (CNRM-GAME) (CNRS and Météo-France, Toulouse, France).

**2004 - 2005** **Postdoctoral position at GFDL** (Princeton University, USA).

**2002 - 2003** **Postdoctoral position at CNRM-GAME** (Toulouse, France).

## Teaching

**2012 - now** **Teaching in dynamical meteorology** (master in geosciences) at Ecole Normale Supérieure (Paris). Course on general circulation of the atmosphere.

**2009 - 2013** **Teaching in dynamical meteorology** (master in ocean, atmosphere and continental surfaces) at University Paul Sabatier and Ecole Nationale de la Météorologie (Toulouse).

## Publications list

**33** in Peer-reviewed international journals ; **20** as a main author.

- Shaw T., M. Baldwin, E. Barnes, R. Caballero, C. Garfinkel, Y.-T. Hwang, C. Li, P. O’Gorman, **G. Rivièrè**, I. Simpson and A. Voigt, 2016 : Storm track processes and the opposing influences of climate change. *Nature Geoscience*, in press.
- **Rivièrè G.**, L. Robert, F. Codron, 2016 : A short-term negative eddy feedback on mid-latitude jet variability due to planetary wave reflection. *J. Atmos. Sci.*, in press.
- Coronel, B., D. Ricard, **G. Rivièrè** and P. Arbogast, 2016 : Cold-conveyor-belt jet, sting jet and slantwise circulations in idealized simulations of extratropical cyclones. *Q. J. R. Meteorol. Soc.*, 182, 1781-1796.
- **Rivièrè G.** and M. Drouard, 2015 : Dynamics of the Northern Annular Mode at weekly time scales. *J. Atmos. Sci.*, 72, 4569-4570.
- **Rivièrè G.** and M. Drouard, 2015 : Understanding the contrasting North Atlantic Oscillation anomalies of the winters of 2010 and 2014. *Geo. Res. Lett.*, 42, 6868–6875, doi :10.1002/2015GL065493.
- Coronel, B., D. Ricard, **G. Rivièrè** and P. Arbogast, 2015 : Role of moist processes in the tracks of idealized mid-latitude surface cyclones. *J. Atmos. Sci.*, 72, 2979-2996.
- Drouard, M., **G. Rivièrè**, and P. Arbogast, 2015 : The link between the North Pacific climate variability and the North Atlantic Oscillation via downstream propagation of synoptic waves. *J. of Climate*, 28, 3957-3976.
- **Rivièrè G.**, P. Arbogast and A. Joly, 2015 : Eddy kinetic-energy redistribution within winstorms Klaus and Friedhelm. *Q. J. R. Meteorol. Soc.*, 141, 925-938. doi :10.1002/qj.2412
- **Rivièrè G.**, P. Arbogast and A. Joly, 2015 : Eddy kinetic-energy redistribution within idealized extratropical cyclones using a two-layer quasigeostrophic model. *Q. J. R. Meteorol. Soc.*, 141, 207-223. doi :10.1002/qj.2350.
- Michel, C. and **G. Rivièrè**, 2014 : *Sensitivity of the position and variability of the eddy-driven jet to different SST profiles in an aquaplanet general circulation model.* *J. Atmos. Sci.*, 71, 349-371.
- Drouard, M., **G. Rivièrè**, et P. Arbogast, 2013 : *The North Atlantic Oscillation response to large-scale atmospheric anomalies in the Northeast Pacific.* *J. Atmos. Sci.*, 70, 2854-2874.
- **Rivièrè, G.**, J.-B. Gilet, et L. Oruba, 2013 : *Understanding the regeneration stage undergone by surface cyclones crossing a mid-latitude jet in a two-layer model.* *J. Atmos. Sci.*, 70, 2832-2853.
- Oruba, L., G. Lapeyre, et **G. Rivièrè**, 2013 : *On the poleward motion of midlatitude cyclones in a baroclinic meandering jet.* *J. Atmos. Sci.*, 70, 2629-2649.
- **Rivièrè, G.**, P. Arbogast, G. Lapeyre, et K. Maynard, 2012 : *A potential vorticity perspective on the motion of a mid-latitude winter storm.* *Geo. Res. Lett.*, 39, L12808.
- Michel, C., **G. Rivièrè**, L. Terray et B. Joly 2012 : *The dynamical link between surface cyclones, upper-tropospheric Rossby wave breaking and the life cycle of the Scandinavian blocking.* *Geo. Res. Lett.*, 39, L10806.
- Oruba, L., G. Lapeyre et **G. Rivièrè**, 2012 : *On the northward motion of midlatitude cyclones in a barotropic meandering jet.* *J. Atmos. Sci.*, 69, 1793-1810.
- Michel, C. et **G. Rivièrè**, 2011 : *The link between Rossby wave breakings and weather regimes*

*transitions*. J. Atmos. Sci., 68, 1730-1748.

- Lainé, A., G. Lapeyre et **G. Rivière**, 2011 : *A quasi-geostrophic model for moist storm-tracks*. J. Atmos. Sci., 68, 1306-1322.
- **Rivière, G.**, 2011 : *A dynamical interpretation of the poleward shift of the jet streams in global warming scenarios*. J. Atmos. Sci., 68, 1253-1272.
- **Rivière, G.**, 2010 : *The role of Rossby wave-breaking in the West Pacific teleconnection*. Geo. Res. Lett., 37, L11802.
- **Rivière, G.**, A. Lainé, G. Lapeyre, D. Salas-Mélia et M. Kageyama, 2010 : *Rossby wave breaking and the North Atlantic Oscillation in PMIP2 simulations of the Last Glacial Maximum and pre-industrial climates and in ERA40 reanalysis*. J. of Climate, 23, 2987-3008.
- **Rivière, G.**, P. Arbogast, K. Maynard et A. Joly, 2010 : *The essential ingredients leading to the explosive growth stage of the European wind storm "Lothar" of Christmas 1999*. Q. J. R. Meteorol. Soc., 136, 638-652.
- Gilet, J-B., Plu M., **Rivière, G.**, 2009 : *Nonlinear baroclinic dynamics of surface cyclones crossing a zonal jet*. J. Atmos. Sci., 66, 3021-3041.
- **Rivière, G.**, 2009 : *Effect of latitudinal variations in low-level baroclinicity on eddy life cycles and upper-tropospheric wave-breaking processes*. J. Atmos. Sci., 66, 1569-1592.
- Lainé, A., M. Kageyama, D. Salas-Mélia, A. Voldoire, **G. Rivière**, G. Ramstein, S. Planton, S. Tyteca et J. Y. Peterschmitt, 2009 : *Northern hemisphere storm-tracks during the Last Glacial Maximum in the PMIP2 Ocean-Atmosphere coupled models : energetic study, seasonal cycle, precipitation*. Clim. Dyn., 32, 593-614.
- **Rivière, G.**, 2008 : *Barotropic regeneration of upper-level synoptic disturbances in different configurations of the zonal weather regime*. J. Atmos. Sci., 65, 3159-3178.
- **Rivière, G.** et I. Orlanski, 2007 : *Characteristics of the Atlantic storm-track eddy activity and its relation with the North Atlantic Oscillation*. J. Atmos. Sci., 64, 241-266.
- **Rivière, G.** et A. Joly, 2006b : *Role of the low-frequency deformation field on the explosive growth of extratropical cyclones at the jet exit. Part II : baroclinic critical region*. J. Atmos. Sci., 63, 1982-1995.
- **Rivière, G.** et A. Joly, 2006a : *Role of the low-frequency deformation field on the explosive growth of extratropical cyclones at the jet exit. Part I : barotropic critical region*. J. Atmos. Sci., 63, 1965-1981.
- **Rivière, G.** et B. L. Hua, 2004 : *Predicting areas of sustainable error growth in quasigeostrophic flows using perturbation alignment properties*. Tellus, 56A, 441-455.
- **Rivière, G.**, B. L. Hua, et P. Klein, 2004 : *Perturbation growth in terms of baroclinic alignment properties*. Q. J. R. Meteorol. Soc., 130, 1655-1673.
- **Rivière, G.**, B. L. Hua, et P. Klein, 2003 : *Perturbation growth in terms of barotropic alignment properties*. Q. J. R. Meteorol. Soc., 129, 2613-2635.
- **Rivière, G.**, B. L. Hua, et P. Klein, 2001 : *Influence of the  $\beta$ -effect on nonmodal baroclinic instability*. Q. J. R. Meteorol. Soc., 127, 1375-1388.

## Other publications

- **Rivière, G.**, 2005 : Prévisibilité des écoulements atmosphériques et océaniques aux latitudes tempérées. *La Météorologie*, 8ème série, 51, 23-36.

## Books / chapters of books / monographs / reports

- **Rivière, G.**, 2012. *Dynamique des dépressions des latitudes tempérées et leur rôle dans la circulation générale de l'atmosphère*. Habilitation thesis report. Université Toulouse III - Paul Sabatier. (159 pages).
- **Rivière, G.** , 2002. *Dynamique locale de la croissance des perturbations dans les écoulements quasigéostrophiques et prévisibilité*. PhD thesis report. Laboratoire de Météorologie Dynamique, Ecole Normale Supérieure, Paris (201 pages).
- **Rivière, G.** , 1999. *Instabilité généralisée d'écoulements océaniques et atmosphériques dans le cadre du modèle de Phillips*. Master report. océanologie, météorologie et environnement (38 pages).

## Student supervision

### PhD students

Loic Robert (UPMC, Paris) ; Filipa Varino (Univ. Paul Sabatier, Toulouse) ; Benoit Coronel (Univ. Paul Sabatier, Toulouse ; defended in 2015) ; Marie Drouard (Univ. Paul Sabatier, Toulouse ; defended in 2014) ; Ludivine Oruba (UPMC, Paris ; defended in 2012) ; Clio Michel (INP, Toulouse ; defended in 2012) ; Jean-Baptiste Gilet (Univ. Paul Sabatier, Toulouse ; defended in 2009).

### Postdocs

Alexandre Lainé (2008-2009)

### Masters

Rémi Pellerej (2014, Univ. Bretagne Occidentale) ; Loic Robert (2013, UPMC) ; Ségolène Berthou (2012, UPMC) ; Emmanuel Demael (2012, ENM, Univ. Paul Sabatier) ; Stéphane Beck (2011, Univ. Paul Sabatier) ; Clio Michel (2009, Univ. Paul Sabatier) ; Ludivine Oruba (2009, Univ. Paul Sabatier) ; Maiwenn Perrin (2008, Univ. Paul Sabatier) ; Lorraine Manlay (2007, Univ. Paul Sabatier) ; Jean-Baptiste Gilet (2006, ENM, Univ. Paul Sabatier) ; Gaelle Ouzeau (2008, master 1, Univ. Paul Sabatier) ; Katy Pol and Lorraine Manlay (2006, master 1, Univ. Paul Sabatier).

## Research management

- **President of scientific committee CNRS/INSU/LEFE/IMAGO** since 2015 and **member** since 2012. Goal : evaluation of proposals submitted to LEFE programme.
- **Convenor of the EGU dynamical meteorology session** from 2010 to 2015.
- **Member elected of ICDM-IAMAS** (international commission in dynamical meteorology of the International Association of Meteorology and Atmospheric Sciences) since 2015.
- **Member elected at the LMD council** since 2014.

## Project coordination

- **Principal investigator (PI) of two CNRS/INSU/LEFE projects** : "EPIGONE : Excitation, Propagation, et Impact du Guide d'Ondes Nord-Atlantique" (2010-2012) and "F-NAWDEX : French - North Atlantic Waveguide Downstream Impact Experiment" (2015-2017)
- **(Co)-PI of the French component of the international field campaign NAWDEX** (North Atlantic Waveguide Downstream Impact Experiment ; Septembre-Octobre 2016) : participation in the science plan (<http://www.nawdex.org/>), coordinator of the IPSL funding project "Ground-based-NAWDEX", (Co)-decision maker of the French Falcon aircraft flight tracks during NAWDEX.
- **(Co)-PI of the young grant ANR project "ENVISTORM** (Rôle de l'environnement (humidité, déformation) sur le cycle de vie et la variabilité des tempêtes)" from 2006 to 2009.