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Profile

Currently in Post-Doc at the Alfred Wegener Institute Isotopic modeling with GCMs

Water isotopes ($\delta^{18}\text{O}$, δD , ^{10}Be in ice core ^{17}O -excess and tritium)



Work experience



October 2015 - : Post-doctoral position at the Alfred Wegener Institute Centre for Polar and Marine Research (AWI); Bremerhaven, Germany

Subject: Implementation of water stable isotopes in the different modules (atmosphere, ocean, vegetation) of the MPI-ESM model (Max Plank Institute for Meteorology) in the framework of the PalMod initiative ("Paleo Modelling: A national paleo climate modelling initiative").

Supervisor: Martin Werner (AWI). Financed by the BMBF (Federal Ministry of Education and Research, Germany).

Water isotopes modeling in a fully-coupled GCM, programming skills in Fortran and Python, quantitative model - data comparisons, paleoclimate simulations, managing the centralization and the updates of the model.

1 publication as co-author, 3 posters and 1 PICO presentation at international conferences as 1st author.



November 2013 - October 2015: Post-doctoral position at the Laboratoire de Météorologie Dynamique (LMD, Jussieu); Paris-Jussieu, France

Subject: Implementation of tritium in the General Circulation Model LMDZ-iso to inferring the links between the stratospheric air inputs into the lower troposphere, the hydrological cycle and the climate. Supervisors: Camille Risi (LMD), Amaelle Landais (LSCE). Financed by the ERC COMBINISO.

Water isotopes modeling in a GCM, programming skills in Fortran and Python (Matplotlib, Basemap...), comparison model - data (IAEA database, Antarctic traverses...), dynamics of tritium in the hydrological cycle, troposphere - stratosphere exchanges over Antarctica.

3 publications including 2 as 1st author, 3 posters and 2 oral presentations at international conferences as 1st author.



October 2010 - October 2013: PhD at the Laboratoire des Sciences du Climat et de l'Environnement (LSCE); Gif-sur-Yvette, France

Thesis subject: Beryllium-10 flux in Antarctica during the last 800 000 years and interpretation. PhD advisors: Jean Jouzel and Grant Raisbeck. Defended the 07 October 2013.

Chemical extraction of beryllium-10 in ice cores, accelerator mass spectrometry (AMS, CEREGE), statistical analysis of data to extract information on solar activity cycles (Matlab, wavelet), use of the synchronization tool Match Protocol, use of a simple oceanic box-model, study of climate variability in the past using isotopic and magnetic records in ice cores and marine sediments (phase shifts, amplitude and speed of glacial-interglacial changes).

5 publications including 3 as 1st author, 3 posters and 3 oral presentations at international conferences as 1st author.

April 2010 - July 2010: Placement at the Laboratoire des Sciences du Climat et de l'Environnement (LSCE); Gif-sur-Yvette, France

Subject: Determination of isotopic fractionation coefficient of water stable isotopes at very low temperatures. Supervisors: Jean Jouzel et Amaelle Landais.

Laser spectroscopy, mass spectrometry IRMS, study of stable water isotopes at very low temperature (isotopic fractionation).

1 publication as 2nd author.



April 2009 - July 2009: Placement at the Università di Trieste - Dipartimento di Scienze Geologiche, Ambientali e Marine (DiSGAM); Trieste, Italy

Subject: Study of climatic variations in Antarctica during the last glacial period using the stable isotopes of oxygen in the Talos Dome ice core. Supervisor: Barbara Stenni.

Preparation of ice samples and measurements of their oxygen-18 content by mass spectrometry (CO₂-water equilibration method), temperature reconstruction and analysis of fast climate variations.

June 2008 - July 2008: Placement at the Laboratoire des Sciences du Climat et de l'Environnement (LSCE); Gif-sur-Yvette, France

Subject: Determination of residence time of groundwater from the Kerrien sub-basin using the Tritium-Helium-3 method. Supervisors: Philippe Jean-Baptiste et Élise Fourré.

Extraction of tritium from water samples, measurement of tritium by mass spectrometry with the Tritium/Helium-3 method.

Education



October 2013: PhD degree in Earth Science at the Laboratoire des Sciences du Climat et de l'Environnement (LSCE); Gif-sur-Yvette, France - University Paris Sud XI



2008 - 2010: Master degree Physics and Environment - University Paris Sud XI



2005 - 2008: Bachelor's degree in Fundamental Physics - University Paris-Sud XI

Scientific and technical skills

Science et technic:

Water isotopes (¹⁸O, ¹⁷O, D, T) in polar ice cores
Beryllium-10 in the ice
Isotopic modelling in GCMs (General Circulation Models)
Data processing (statistical analysis)
Mass spectrometry

Languages:

French
English (working knowledge)

Informatics:

Office, LaTeX, Igor Pro, Matlab, Python (Matplotlib, Basemap...), Fortran, R

Miscellaneous

Sports and Hobbies

Running, Football, Squash, Swimming, Travel, Ski.

Leisure activities

Cinema, Music (Rock), Reading.

Communications

Publications:

Cauquoin, A., Werner, M. and Lohmann, G. Water isotopes – climate relationships for the mid-Holocene and pre-industrial period with an isotope-enabled version of MPI-ESM, *Clim. Past Discuss.*, doi: 10.5194/cp-2019-72, under review, 2019.

Cauquoin, A. and Risi, C. Importance of the advection scheme for the simulation of water isotopes over Antarctica by general circulation models: a case study for present-day and past climate with LMDZ-iso. *Earth Planet. Sci. Lett.*, under review.

Christner, E., Aemisegger, F., Pfahl, S., Werner, M., **Cauquoin, A.**, Schneider, M., Hase, F., Barthlott, S. and Schädler, G. The climatological footprints of continental surface evaporation, rainout, and sub-cloud processes in δD of water vapor and precipitation in Europe. *J. Geophys. Res. Atmos.*, **123**, 4390-4409, doi:10.1002/2017JD027260, 2018.

Fourré, É., Landais, A., **Cauquoin, A.**, Jean-Baptiste, P., Lipenkov, V. and Petit, J.-R. Tritium records to trace stratospheric moisture inputs in Antarctica. *J. Geophys. Res. Atmos.*, **123**, 3009-3018, doi: 10.1002/2018JD028304, 2018.

Raisbeck, G. M., **Cauquoin, A.**, Jouzel, J., Landais, A., Petit, J.-R., Lipenkov, V. Y., Beer, J., Synal, H.-A., Oerter, H., Johnsen, S. J., Steffensen, J. P., Svensson, A. and Yiou, F. An improved north-nouth synchronization of ice core records around the 41 kyr ^{10}Be peak. *Clim. Past*, **13**, 217-229, doi: 10.5194/cp-13-217-2017, 2017.

Cauquoin, A., Jean-Baptiste, P., Risi, C., Fourré, É. and Landais, A. Modeling the global bomb-tritium transient signal with the AGCM LMDZ-iso: a method to evaluate aspects of the hydrological cycle. *J. Geophys. Res. Atmos.*, **121**, 12,612-12,629, doi:10.1002/2016JD025484, 2016.

Casado, M., **Cauquoin, A.**, Landais, A., Orsi, A., Israel, D., Pangui, E., Landsberg, D., Kerstel, E. and Doussin, J.-F. Experimental determination and theoretical framework of kinetic fractionation at the water vapour - ice interface at low temperature. *Geochim. Cosmochim. Ac.*, **174**, 54-69. doi:10.1016/j.gca.2015.11.009, 2016.

Cauquoin, A., Jean-Baptiste, P., Risi, C., Fourré, E., Stenni, B. and Landais, A. The global distribution of natural tritium in precipitation simulated with an Atmospheric General Circulation Model and comparison with observations. *Earth Planet. Sci. Lett.*, **427**, 160-170. doi:10.1016/j.epsl.2015.06.043, 2015.

Cauquoin, A., Landais, A., Raisbeck, G. M., Jouzel, J., Bazin, L., Kageyama, M., Peterschmitt, J.-Y., Werner, M., Bard, E. and ASTER Team. Comparing past accumulation rate reconstructions in East Antarctic ice cores using ^{10}Be , water isotopes and CMIP5-PMIP3 models. *Clim. Past*, **11**, 355-367, doi:10.5194/cp-11-355-2015, 2015.

Cauquoin, A., Raisbeck, G. M., Jouzel, J., Bard, E. and ASTER Team. No evidence for planetary influence on solar activity 330 000 years ago. *Astron. Astrophys.*, **561**, A132, doi: 10.1051/0004-6361/201322879, 2014.

Cauquoin, A., Raisbeck, G., Jouzel, J. and Paillard, D. Use of ^{10}Be to predict atmospheric ^{14}C variations during the Laschamp excursion: high sensitivity to cosmogenic isotope production calculations. *Radiocarbon*, **56**(1), 67-82, doi:10.2458/56.16478, 2014.

Capron, E., Landais, A., Buiron, D., **Cauquoin, A.**, Chappellaz, J., Debret, M., Jouzel, J., Leuenberger, M., Martinerie, P., Masson-Delmotte, V., Mulvaney, R., Parrenin, F. and Prié, F. Glacial–interglacial dynamics of Antarctic firn columns: comparison between simulations and ice core air- $\delta^{15}\text{N}$ measurements, *Clim. Past*, **9**, 983-999, doi:10.5194/cp-9-983-2013, 2013.

Seminars (1st author):

Cauquoin, A., Werner, M. and Lohmann, G. Water stable isotopes – climate relationships during/ between the pre-industrial and mid-Holocene periods using the fully coupled model MPI-ESM-wiso, PICO, *EGU 2019*, Vienna (Austria), April 2019.

Cauquoin, A., Werner, M. and Lohmann, G. Modeling of water stable isotopes in the fully coupled Earth system model MPI-ESM: current status and perspectives, poster, *EGU 2018*, Vienna (Austria), April 2018.

Cauquoin, A., Werner, M. and Lohmann, G. Modeling of water stable isotopes in the fully coupled Earth system model MPI-ESM: current status and perspectives, poster, *PalMod International Open Science Conference*, Vienna (Austria), April 2018.

Cauquoin, A., Werner, M. and Lohmann, G. Modeling of water stable isotopes in the ECHAM6 atmospheric general circulation model: current status and perspectives, poster, *EGU 2017*, Vienna (Austria), April 2017.

Cauquoin, A., Jean-Baptiste, P., Risi, C., Fourré, É. and Landais, A. Modeling the global bomb tritium transient signal with the AGCM LMDZ-iso: a method to evaluate aspects of the hydrological cycles, oral, *DPG Bremen17*, Bremen (Germany), March 2017.

Cauquoin, A., Jean-Baptiste, P., Risi, C., Fourré, É., Stenni, B. and Landais, A. Implementation of tritium (HTO) in LMDZ-iso: tracing the water cycle and its link with stratospheric air intrusions, oral, *INQUA 2015*, Nagoya (Japan), July 2015.

Cauquoin, A., Landais, A., Raisbeck, G. M., Jouzel, J., Bazin, L., Kageyama, M., Peterschmitt, J.-Y., Werner, M., Bard, E. and ASTER Team. Comparing past accumulation rate reconstructions in East Antarctic ice cores using ¹⁰Be, water isotopes and CMIP5-PMIP3 models, oral, *INQUA 2015*, Nagoya (Japan), July 2015.

Cauquoin, A., Jean-Baptiste, P., Risi, C., Fourré, É., Stenni, B. and Landais, A. Implementation of tritium in the LMDZ-iso General Circulation Model for the study of the relationships between stratospheric air inputs into the lower troposphere, water cycle and climate, poster, *International Symposium on Isotope Hydrology: Revisiting Foundations and Exploring Frontiers (IAEA)*, Vienna (Austria), May 2015.

Cauquoin, A., Jean-Baptiste, P., Risi, C., Fourré, É., Landais, A. and Stenni, B. Implementation of Tritium in the LMDZ-iso General Circulation Model: First Promising Results for the Study of the Relationships Between Stratospheric Air Inputs into the Lower Troposphere in Polar Regions, Water Cycle and Climate, poster, *AGU 2014*, San Francisco (USA), December 2014.

A. Cauquoin, A. Landais, C. Risi, É. Fourré, P. Jean-Baptiste, O. Magand, S. Guillaud, A. Ekaykin, F. Prié, B. Minster and R. Winkler. Reconstruire les variations du climat, du cycle de l'eau et l'apport stratosphérique au cours des 50 dernières années sur le plateau Est Antarctique, poster, *Colloque Q9 AFEQ*, Lyon, March 2014.

Cauquoin, A., Raisbeck, G. M., Jouzel, J., Landais, A., Bard, E. and ASTER Team. Flux de béryllium-10 en Antarctique entre 200 et 800 kyr BP et sa synchronisation avec le signal paléomagnétisme dans les sédiments marins, oral, *SFIS JJC6*, Dunkerque, October 2013.

Cauquoin, A., Raisbeck, G.M., Jouzel, J., Bard E. and ASTER Team. Extended record of ¹⁰Be at EPICA Dome C during the last 800 000 years and its synchronization with geomagnetic paleointensity variations from marine sediments, oral, *EGU 2013*, Vienna (Austria), April 2013.

Cauquoin, A., Raisbeck, G.M., Jouzel, J., Bard, E. and ASTER Team. Study of a highly resolved record of ¹⁰Be from EPICA Dome C during MIS 9 as a proxy of solar variations, poster, *IPICS 2012*, Giens, October 2012.

Cauquoin, A., Raisbeck, G.M., Jouzel, J., Paillard, D. Effects of Laschamp geomagnetic excursion on ¹⁴C production, poster, *Radiocarbon 2012*, Paris, July 2012.

Cauquoin, A., Raisbeck, G.M., Jouzel, J. Effects of Laschamp Excursion on Cosmogenic Isotope Production, poster, *Goldschmidt 2011*, Prague (Czech Republic), August 2011.

Seminars (co-author):

Fourré, É., Touzeau, A., Baroni, M., Landais, A., **Cauquoin, A.**, Servettaz, A., Magand, O., Curran, M., Sültenfuß, Jean-Baptiste, P., Bard, É. and Aster Team. Tritium variability in snow pits from East Antarctica, *27th International Union of Geodesy and Geophysics General Assembly*, Montreal (Canada), July 2019.

Fourré, É., Landais, A., Leroy Dos Santos, C., Prié, F., Goursaud, S., **Cauquoin, A.** and others. Water isotopes recorded in Antarctica ice core cores: beyond past climatic reconstructions, tracers of hydrosphere-atmosphere interactions, *International Symposium on Isotope Hydrology: Advancing the understanding of water cycle processes (IAEA)*, Vienna (Austria), May 2019.

Zhang, X., Barker, S., Knorr, G., Werner, M., **Cauquoin, A.**, Lohmann, G. and Sun, Y. What causes the mid-mid-brunes transition in benthic $\delta^{18}\text{O}$ stack?, *EGU 2019*, Vienna (Austria), April 2019.

Werner, M., Lohmann, G. and **Cauquoin, A.** Assessing LGM changes of the Antarctic and Greenland ice sheets by explicit water isotope diagnostics, *PalMod International Open Science Conference*, Vienna (Austria), April 2018.

Christner, E., Pfahl, S., Scholder-Aemisegger, F., Werner, M., **Cauquoin, A.**, Barthlott, S., Schneider, M., Steen-Larsen, H.-C., Schädler, G. and Kottmeier, C. Modeling stable water isotopes in the Arctic region with COSMO_{iso}, *CLM-Community assembly 2017*, Graz (Austria), September 2017.

Fourré, É., Landais, A., **Cauquoin, A.**, Jean-Baptiste, P. and Petit, J.-R. Tritium records to trace stratospheric moisture inputs in Antarctica with stable water isotopes and other tracers, *EGU 2017*, Vienna (Austria), April 2017.

Christner, E., Pfahl, S., Werner, M., **Cauquoin, A.**, Scholder-Aemisegger, F., Barthlott, S., Schneider, M. and Schädler, G. Modeling of stable water isotopes in Central Europe with COSMO_{iso}, *EGU 2016*, Vienna (Austria), April 2016.

Raisbeck, G. M., Jouzel, J., Yiou, F., **Cauquoin, A.**, Landais, A., Petit, J.-R., Lipenkov, V. Y., Beer, J., Synal, H.-A., Oerter, H., Johnsen, S. J., Steffensen, J. P. and Svensson, A. An improved North-South synchronization of ice core records around the 41 K beryllium-10 peak, *IPICS 2016*, Hobart (Australia), March 2016.

Casado, M., **Cauquoin, A.**, Landais, A., Landsberg, J., Kerstel, E. and Doussin, J.-F. Experimental determination for kinetic fractionation during solid condensation at low temperature and theoretical framework, *EGU 2014*, Vienna (Austria), May 2014.

Capron, E., Landais, A., Buiron, D., **Cauquoin, A.**, Chappellaz, J., Debret, M., Jouzel, J., Leuenberger, M., Martinerie, P., Masson-Delmotte, V., Mulvaney, R., Parrenin, F. and Prié, F. Glacial–interglacial dynamics of Antarctic firn columns: comparison between simulations and ice core air- $\delta^{15}\text{N}$ measurements, *AGU 2013*, San Francisco (USA), December 2013.

Casado, M., Landais, A., Prié, F., **Cauquoin, A.**, Guilbaud, S., Pangui, E., Morales, S., Doussin, J.-F., Landsberg, J., Chelli, B., Uemura, R., Risi, C. Le Fractionnement isotopique à très basse température lors de la condensation solide, *SFIS JJC6*, Dunkerque, October 2013.

Raisbeck, G.M., **Cauquoin, A.**, Jouzel, J., Bard, E. and ASTER Team. Synchronization of the EPICA Dome C ice core with marine sediments from 355-800 ka using proxies of the paleomagnetic field intensity, *IPICS 2012*, Giens, October 2012.