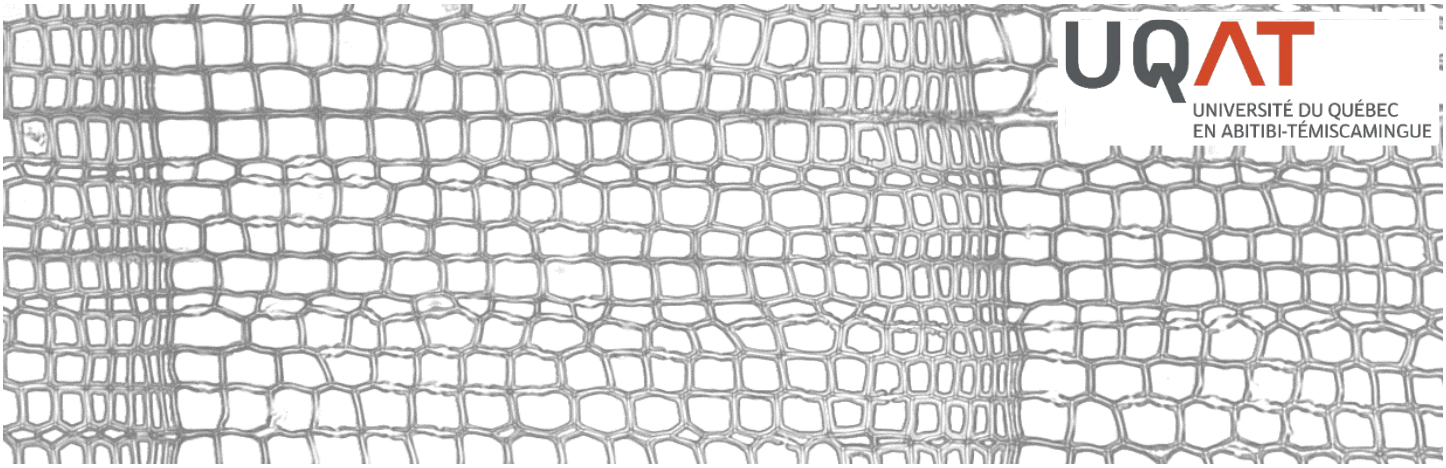

NEW PHD POSITION IN PALEOECOLOGY AND QUANTITATIVE WOOD ANATOMY

Tree-ring anatomy of subfossil woods to study the climate variability of the Quebec boreal region

Posting date: August 2021

We are looking for a student for a PhD project on boreal forest dynamics and climate variability. During the last decade, our research group developed an important network of tree-ring chronologies using black spruce subfossil trees (well-preserved tree logs) collected in lakes of the boreal forest of Quebec. This network has been classified as one of the most robust in the world for climate studies. The resulting chronologies cover two millennia and have already allowed preliminary temperature reconstructions for the Quebec boreal region, as well as reconstructions of the past fire history at the stand level. Up to now, our studies were based on the analysis of traditional tree-ring traits, such as ring width, density, and stable isotopes of tree-ring cellulose.

Our reconstructions show an alternation of colder periods with reduced tree growth (for example following the largest volcanic eruptions of the last two millennia) and of warmer periods with sustained growth of spruce trees (for example between 650 and 750 AD and during the last decades). However, these interpretations need to be further refined with additional data. The PhD student will analyze tree-ring anatomical traits on subfossil woods to obtain complementary information and improve paleoecological interpretations.

Objectives and methodology: The main objective of the PhD project will be to exploit the potential of tree-ring anatomy of subfossil wood to improve dendroclimatic reconstructions and ecophysiological understanding. The student will implement multiple chronologies of tree-ring anatomical traits with distinct environmental sensitivity and that span key periods of the last two millennia in order to improve regional climate reconstructions for the Quebec boreal region. Intra-annual analysis of tree-ring anatomical traits will also be performed to better discriminate past seasonal changes in humidity and temperature and their impact on tree functioning. In addition to analyses on already collected samples, the student will participate to field campaigns in remote boreal regions to acquire additional subfossil woods and improve the replication of the chronologies.

Keywords: Paleoclimatology; Paleoecology; Dendrochronology; Anatomical traits; Tree functioning.

Hosting laboratory: The student will be based at the Forest Research Institute (Institut de recherche sur les forêts; IRF; https://www.uqat.ca/programmes/irf/) at the Amos campus of the UQAT, under the supervision of Fabio Gennaretti (http://bit.ly/2TTGTLB). The Forest Research Institute is a dynamic, multicultural, and international institute, which provides a quality environment for students to develop research. The institute includes 13 professors and more than 60 graduate students working on a wide range of topics such as modelling, silviculture, genetics, biodiversity, ecophysiology, remote sensing, and sustainable forest management. The student will be a member of the Centre for Forest Research (Centre d'étude de la forêt; CEF; www.cef-cfr.ca), and of the Abitibi Regional County Municipality ecology research group (GREMA). Amos is an expanding campus with state-of-the-art infrastructures and a dynamic student life (https://destinationamos.com/page/1191356).

Position requirements: We are looking for a student with a master's degree in ecology or forestry and experience in quantitative wood anatomy. The student must be able to work with autonomy, curiosity, rigour and motivation within a multidisciplinary team. He/she should be willing to carry out fieldwork and laboratory analyses. He/she should also have good team spirit and excellent writing skills. A driving license and scientific communication skills are an asset.

Main supervisor: Fabio Gennaretti (UQAT).

Project collaborators: Dominique Arseneault (UQAR), Etienne Boucher (UQAM), Sergio Rossi (UQAC), Marco Carrer (University of Padova).

Study program: PhD program with specialisation in forest ecology, University of Quebec in Abitibi-Temiscamingue (Université du Québec en Abitibi-Témiscamingue; UQAT; https://www.uqat.ca/recherche/doctorat-sur-mesure/).

Registration date: As soon as possible.

Financial support: Scholarship of 21 000 $/year over three years.

Information: Send your application in a single pdf containing a curriculum vitae, a cover letter, academic transcripts, and contact details for three references to Fabio Gennaretti (fabio.gennaretti@uqat.ca). Review of applications will continue until the position is filled.