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**Subject title: Reconstructing the geodynamic framework of the Cadomian orogeny in Armorica**

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Second Advisor: **BLEIN Olivier, BRGM researcher, o.blein@brgm.fr**

Host lab/ Team: **IPGP- PAMCE Team – UMR7154**

Financing: Doctoral contract with or without teaching assignment

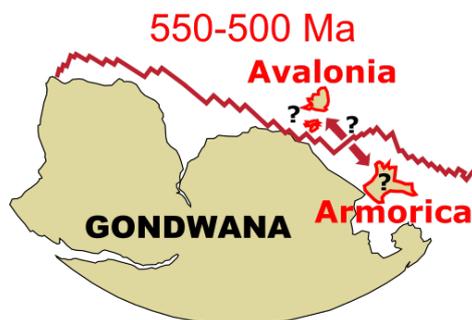
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**Presentation of the subject:**

The Cambrian (539-485 Ma) is a period of intense biological changes associated with large-scale diversification of animals. Such a major shift in life evolution may have been strongly influenced by surficial processes such as weathering and climate forced by the final aggregation of Gondwana. This transition from dispersed to amalgamated paleogeographic state may have also been related to a major reorganization of the underneath convective mantle. Processes occurring along the margins of the newly formed Gondwana are therefore crucial for understanding how the large-scale lithosphere-mantle system has evolved during this critical period of time.

The Armorican Massif is key to understand the evolution of the northern margin of Gondwana. It has recorded three Wilson cycles since the end of the Precambrian, including the Cadomian orogeny that occurred until the Cambrian. The Armorican Massif hosts exceptionally well-preserved lithologies and structures that bear crucial information about the geodynamic history of the Armorican and associated European microcontinents over the last 750 Myrs. It also contains a large amount of metals and industrial minerals. Within this framework, the “Armorican Mineral Systems” project (ArMinSyx) aims at assessing and enhancing our understanding of the mineral resource potential of the Armorican Massif by evaluating the favorable factors associated with its geodynamic evolution and belt architecture.

The PhD position is dedicated to better understand the geodynamic evolution of the microcontinent Armorica along the Gondwanan margin during the end of the Cadomian orogeny 550-500 Myrs ago. The main challenges of this project are associated with the opening



A scenario for the rifting between Armorica and Avalonia along the Gondwanan margin. Modified from Domeier (2016, *Gondwana Research*).

of the Rheic Ocean. Plate kinematics, which involved rifting of multiple microcontinents such as Avalonia from the Armorican/Gondwanan margin, remains unclear. Moreover, this geodynamic

context may have brought favorable conditions, such as tectonic stress and magmatism, for the emplacement of ore deposits within the Armorican Massif.

The goals of the PhD position are to better constrain: (1) the position of Armorica and Avalonia along the Gondwanan margin and (2) the spatial extent of Ediacaran and Cambrian magmatism, which appears concomitant with rifting along the Armorican/Gondwanan margin. This paleogeographic reconstruction will allow ArMinSyx to gain strong insights on the early building of the Armorican Massif, and to evaluate the impact of the associated tectonomagmatic inheritance on its later evolution.

The candidate will conduct a paleomagnetic study on the Cambrian sedimentary and volcanic rocks of the Armorican and Avalonian microcontinents to reconstruct the kinematic evolution of the Gondwanan margin. These data will be supported by U-Pb geochronological studies (absolute age and detrital record) in collaboration with Marc Poujol from Geosciences Rennes, and by geological field mapping in collaboration with Maxime Padel from BRGM. The candidate will also benefit from interaction and discussions with the other members of the ArMinSyx project about geology, geochemistry and tectonics of the Armorican Massif.

The PhD student will be hosted in the PAMCE (PAleoMagnetic, paleoClimate and Environment) team at the Institut de Physique du Globe de Paris (IPGP). Laboratory experiments will be conducted in the paleomagnetic laboratory of IPGP. A solid training in geology and geophysics is required along with good communication skills in English.