"THE LUMINESCENCE DATING OF SEDIMENTARY DEPOSITS - A STATE OF THE ART OF THE MOST USED METHODS AND STRATEGIES FOR SAMPLING"

CONFERENCIA IMPARTIDA POR EL DR. PEDRO CUNHA

(UNIVERSIDADE DE COIMBRA)

Abstract

Optically Stimulated Luminescence (OSL) dating is a technique for measuring the time elapsed since sedimentary grains (e.g. quartz or feldspars) were last exposed to daylight. The luminescence signal starts to accumulate in the grains after burial, due to ionizing radiation arising from the decay of ^{238}U, ^{232}Th and ^{40}K present in the sediment. Dividing the burial dose by the environmental dose rate (Gy/ka) gives the luminescence age of the sediment. The major drawback of the most light-sensitive part of the quartz OSL signal is that it saturates usually at 200 to 120Gy. That limits the age range to 170 to 50ka if we are dating beach or aeolian sands (with dose rates 1.2 to to 2.4Gy/ka) and to 71 to 17 ka if we are dating river sands or clays (2.8 to 7Gy/ka). However, measuring K-feldsparusing a post-IR IRSL SAR protocol, saturation is at ca. 1000-1100Gy and we can obtain ages (not minimal) up to ca. 760ka of beach/aeolian sands (>1.4 Gy/ka) and up to ca. 400ka of fluvial sands (>2.5Gy/ka). Luminescence dating is crucial to support stratigraphic, geomorphological, tectonic, paleoclimatic, palaeoenvironmental and archaeological studies.The most used methods and sampling strategies will be discussed.

Lecturer

Associate Professor with Agregation in Geology – Earth Sciences Department, University of Coimbra, Portugal. Director of the Sedimentology Laboratory – Univ. Coimbra.

Undertaking research on Stratigraphy, Sedimentology, Geomorphology and Neotectonics. On the last 6 years also got expertise in Luminescence dating (OSL and IRSL). Research has been made on diversified sedimentary records covering from the Upper Jurassic to the Quaternary and a wile range of environments (fluvial to marine). This research has involved participation and leading of research projects funded by Portuguese and international projects, examining fluvial/coastal/tectonic geomorphology, sedimentology and long-term landscape development in Iberia and North Africa.

Published in a range of international scientific journals (e.g. Cretaceous Research, Marine Geology, Episodes, Geomorphology, Proc. Geol. Assoc., Quaternary Geochronology, Quaternary International) and Books (e.g. *Special Publication of the International Association of Sedimentologists, Springer*).

Publications: 90 papers in scientific journals & book publications; 166 Proceedings & conference abstracts.

Senior Researcher and the Coordinator of the Research Line 3 “Sedimentary Systems, Hydrodynamics and Global changes” in the IMAR - Marine and Environmental Research Centre.

Professor Pedro Cunha is skilled in preliminary sampling and laboratory preparation OSL and IRSL dating, working with the NLL (Nordic Laboratory for Luminescence Dating). Currently working with our group PALEOQ for experimental dating Pleistocene deposits older than 300 Ka and Holocene, extreme age for dating method.