Geophysical Research Abstracts
Vol. 19, EGU2017-16225, 2017
EGU General Assembly 2017

Gamma-radiation monitoring in post-tectonic biotitic granites at Celorico da Beira

Filipa Domingos (1), Susana Barbosa (2), Alcides Pereira (1), and Luís Neves (1)

(1) CEMUC, University of Coimbra, Coimbra, Portugal (lipa_domingos@hotmail.com), (2) INESC TEC - INESC Technology and Science, Porto, Portugal

Despite its obvious relevance, the effect of meteorological variables such as temperature, pressure, wind, rainfall and particularly humidity on the temporal variability of natural radiation is complex and still not fully understood. Moreover, the nature of their influence with increasing depth is also poorly understood. Thereby, two boreholes were set 3 m apart in the region of Celorico da Beira within post-tectonic biotitic granites of the Beiras Batolith. Continuous measurements were obtained with identical gamma-ray scintillometers deployed at depths of 1 and 6 m during a 6 month period in the years of 2014 and 2015. Temperature, relative humidity, pressure, rainfall, wind speed and direction were measured at the site, as well as temperature and relative humidity inside the boreholes, with the aim of assessing the influence of meteorological parameters on the temporal variability of gamma radiation at two distinct depths. Both time series display a complex temporal structure including multiyear, seasonal and daily variability. At 1 m depth, a daily periodicity on the gamma ray counts time series was noticed with daily maxima occurring most frequently from 8 to 12 p.m. and daily minima between 8 and 12 a.m.. At 6 m depth, maximum and minimum daily means occurred with approximately a 10 h lag from the above. Gamma radiation data exhibited fairly strong correlations with temperature and relative humidity, however, varying with depth. Gamma radiation counts increased with increasing temperature and decreasing relative humidity at 1 m depth, while at a 6 m depth the opposite was recorded, with counts increasing with relative humidity and decreasing with temperature. Wind speed was shown to be inversely related with counts at 6 m depth, while positively correlated at 1 m depth. Pressure and rainfall had minor effects on both short-term and long-term gamma radiation counts.