International Session (Oral) | Symbol U (Union) | Union

[U-02_28AM2]Particle Geophysics

Convener:*Hiroyuki Tanaka(Earthquake Research Institute, the University of Tokyo), Hiroko Watanabe(RCNS,Tohoku-U), Cristiano Bozza(U-Salerno), Dominique Gibert(IPGParis), William McDonough(U-Maryland), John Learned(U-Hawaii), Chair:Hiroyuki Tanaka(Earthquake Research Institute, the University of Tokyo)

Mon. Apr 28, 2014 11:00 AM - 12:42 PM 419 (4F)

The great success in the imaging of volcanoes with elementary particles called muons (muography) as well as in the detection of neutrinos generated inside the earth (geo-neutrinos) has resulted in observation opportunities completely independent from the capabilities of conventional geophysical methods. By facilitating the future goals and concerns of the geophysical community, ideally shared among the muography observation group, geo-neutrino observation group, and earth scientists through international and interdisciplinary interactions, the aim is to strengthen the evolution of particle geophysics. Various muographical projects have been promoted worldwide, and each international group has been producing valuable results. Concerning geo-neutrino detection, the quantity of radioactive materials generating heat inside the Earth will be recognized via the frequency of geo-neutrino counts. Since this radioactive heat generation reflects the geodynamics and the chemical composition of the building blocks of our planet, improvements to measurement accuracy will likely yield useful geo-scientific information in the near future. With active cooperation between international communities, we aspire to expand the frontiers of earth observation techniques.

11:45 AM - 11:54 AM

△[U02-P03_PG]Introduction about test measurement of the muon detection system for monitoring a groundwater (With some observations)

3-min talk in an oral session

*Akira SANNOMIYA[1], Hiroyuki TANAKA[2], Hiroshi SUENAGA[3], Kouichi SUZUKI[3] (1.Electric Power Development Co., Ltd, 2.Earthquake Research Institute,U of Tokyo, 3.Central Research Institute of EPI)

Keywords:muography, muon detection system, groundwater, test measurement, landslide

The technique to radiographically image the internal structure of gigantic objects by utilizing muon's significant penetration power (muography) enabled us to investigate the internal structure of volcanoes and the city foundation with higher spatial resolution than possible with the conventional techniques.This observation technique is applicable to exploring a large-scale civil engineering structure, the internal state of a base rock, etc. However, feasibility of muographic application to monitoring inside the large-scale civil engineering structure has not confirmed yet. Therefore, we decided to carry out test measurements in order to explore the possibility of muography for monitoring groundwater levels.We are currently investigating the response of the groundwater levels to major rainfall events in the landslide area. We selected this area as an observation area. The measurement was carried out from the inside of a scupper tunnel in the base rock. Our muon detection system consists of plastic scintillator, photomultipliers (PMTs), and a high voltage (HV) power supply.The muography detector was installed to the observation site in August, 2012 and measurement was started on the same date.The result will be compared with the independent measurement results of groundwater levels and soil resistivity in order to quantitatively assess the technological limit of muography.So far, we obtained the preliminary result that showed variations in the penetrating muon intensity; hence the density as a

response of major rain fall events by plotting a moving average of the 48-hour observation time at different time intervals of one hour, two hours, three hours, and six hours. It showed a clear rainfall effect when the time interval is 6 hours. The future prospect includes further case studies for different rainfall-underground water coupling scenarios.