



XII International Symposium on Antarctic Earth Sciences ISAES 2015

13 – 17 July 2015, Goa Marriott Resort & Spa

ABSTRACTS

Organizers



Sponsors

www.isaes2015goa.in





S09 – 288: ANTPAS - Antarctic Permafrost, Soils and Periglacial Environments

Hydrogeological Research in the Machu Picchu Peruvian Antarctic Scientific Station: Preliminary Results

Ng, W.¹; Masías, P.¹; Ramos, D.¹; Cerpa, L.¹; Peña, F.¹; Morales-Reyna, M.¹; Torres, D.¹

Instituto Geológico Minero y Metalúrgico – INGEMMET Av. Canadá 1470. San Borja. Lima – Perú¹

Machu Picchu Peruvian Antarctic scientific station is a research installation on King George Island, South Shetland Islands (Antarctic Peninsula), was founded in 1988, as temporal scientific base, and it's open in austral summer.

In January and February 2014, INGEMMET hydrogeological preliminary studies conducted around the Peruvian base to identify an aquifer. Our work was focused to perform a hydrogeological classification of materials by surface mapping, make subsurface explorations (through four piezometers) and take underground and surface water samples, for identify a potential aquifer body.

This year during the ANTAR XXIII expedition, we start the Project: “Hydrogeology of Machu Picchu aquifer, hydroclimatic implications”. These studies pretend know the characteristics of the aquifer, hydrochemical and isotopic characteristics of groundwater and new prospects for improvement and implementation of the project for the next two years. With the certainty that there is groundwater, we perform the following activities: clean and deeper the old piezometers, install temperature sensors within these piezometers, and collect water samples.

Machu Picchu aquifer is a detrital aquifer. Superficially, it is composed of glacial, alluvial, marine, fluvial, alluvial fluvial and alluvial glacial deposits. Preliminary studies show three horizons. The Horizon 1 (more superficial) consists of cover material with sandy gravel with blocks of different sizes, from 0.05 m in alluvial-fluvial deposits to 1 m in glacial deposits. The Horizon 2 (intermediate) presents silty sandy gravel, silty gravel and sandy silty gravel with thickness of 0.16 m to 0.95 m. The Horizon 3 consists in sandy gravel interbedded with fine levels up to coarse sand lenses, this horizon is wet, saturated and stores groundwater. Our wells have not reached the base level of 3th horizon.

In the last expedition groundwater was confirmed in 6 installed piezometers. These level is not static, along the ANTAR XXII expedition level fell between 0.01 and 0.10 m per day, because there extraction of groundwater by rustic well for use in the Peruvian station. Also the data shows the direction of groundwater flow, which is generally from south to north (Ng, 2014). The chemical characteristics of groundwater, show that these Na-Ca-SO₄, Ca-SO₄ and Na-Cl, with smaller conductivities than 550.0 µS/cm.

Machu Picchu aquifer consists of a permeable material, is semi-confined aquifer and stores groundwater, and that by a controlled appropriate exploitation can supply to the Machu Picchu Peruvian station.