Temporal variation of compositions of volcanic gas and hot springs in the Tatun Volcano Group, Taiwan

HSIAO-FEN LEE[1]*, TSANYAO FRANK YANG[2], HSIN-YI WEN[2] AND CHENG-HORNG LIN[1]

[1] Institute of Earth Sciences, Academia Sinica, Taipei, Taiwan. (*correspondence: hf_lee@earth.sinica.edu.tw, lin@earth.sinica.edu.tw)

[2] Department of Geosciences, National Taiwan University, No. 1, Sec. 4, Roosevelt Road, Taipei 10617, Taiwan. (tyyang@ntu.edu.tw, d99224009@ntu.edu.tw)

The Tatun Volcano Group (TVG), where the geothermal and seismic activities are still very strong, is located in the northern Taiwan. In the past decade, gas samples have been collected monthly to analyze the compositions and isotopic ratios. The results show a similar composition as those of low-temperature fumaroles in other parts of the world. H_2O is the major species of these gas samples, and CO_2 is the dominant component after de-watering[1]. The high $^3He/^4He$ ratios (4.7~6.7 R_A) [2,3] indicate a mantle-derived degassing source in origin. The carbon isotopic values of CO_2 also exhibit a magmatic source. Since August 2004, progressive increases of HCl concentration and SO_2/H_2S ratio have been observed at Da-you-keng, the most active hydrothermal area in TVG. These variations are accompanied by rising temperature of fumaroles. From 2006 to 2009, increases of S_{total}/CO_2 ratio have been observed in many fumaroles simultaneously. The H-O isotopic values of condensed water of fumaroles from Da-you-keng and Hsiao-you-keng fall in the range away from the meteoric water line, indicating a magmatic water source. Meanwhile, the rest of data from other fumaroles are similar with previous published data of hot springs[4], which are clearly derived from meteoric water in origin.

To survaillence the potential magmatic activity of TVG, an observatory is established in October 2011. We have been collecting/analyzing the volcanic gas samples regularly, as well as the water samples from two hot springs weekly. Compare with the previous data, no significant variations of the geochemical compositions have been found in the past year until now.

[1] Lee *et al*.. (2008) JVGR, 178, 624-635. [2] Yang *et al*.. (1999) Nuovo Cimento Della Societa Italiana Di Fisica C, 22(3-4), 281-286. [3] Ohba *et al*.. (2010) Appl. Geochem., 25, 513-523. [4] Shieh *et al*.. (1983) Geol. Soc. China Mem., 5,127-140.

Asian monsoon hydrometeorology from TES and SCIAMACHY water vapor isotope measurements and the LMDZ simulations: implications for speleothem climate record interpretation

JUNG-EUN LEE[1*], CAMILLE RISI[2], INEZ FUNG[3] AND JOHN WORDEN[4]

[1]Jet Propolsion Laboratoty, Pasadena, CA, US: jungelee.kim@gmail.com

[2] LMD/IPSL, CNRS, Paris, France: Camille.Risi@lmd.jussieu.fr

[3]Department of Earth and Planetary Science, University of California, Berkeley, CA, US: ifung@berkeley.edu

[4]Jet Propolsion Laboratoty, Pasadena, CA, US: john.r.worden@jpl.nasa.gov

Observations show that heavy oxygen isotope composition in precipitation ($\delta^{18}O_p$) increases from coastal southeastern (SE) China to interior northwestern (NW) China during the wet season, contradicting expectations from simple Rayleigh distillation theory. Here we employ stable isotopes of precipitation and vapor from satellite measurements and climate model simulations to characterize the moisture processes that control Asian monsoon precipitation and relate these processes to speleothem paleoclimate records. We find that $\delta^{18}O_p$ is low over SE China as a result of local and upstream condensation and that $\delta^{18}O_p$ is high over NW China because of evaporative enrichment of ^{18}O as raindrops fall through dry air. We show that $\delta^{18}O_p$ at cave sites over southern China is weakly correlated with upstream precipitation in the core of the Indian monsoon region rather than local precipitation, but it is well-correlated with the $\delta^{18}O_p$ over large areas of southern and central China, consistent with coherent speleothem $\delta^{18}O_p$ variations over different parts of China. Previous studies have documented high correlations between speleothem $\delta^{18}O_p$ and millennial timescale climate forcings, and we suggest that the high correlation between insolation and speleothem $\delta^{18}O_p$ in southern China reflect the variations of hydrologic processes over Indian monsoon region on millennial and orbital timescales. The $\delta^{18}O_p$ in the drier part (north of ~30ºN) of China, on the other hand, has consistently negative correlations with local precipitation and may capture local hydrologic processes related to changes in the extent of the Hadley circulation.

www.minersoc.org
DOI:10.1180/minmag.2013.077.5.12