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Gas geochemistry and soil CO2 flux in active volcanic areas, China
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Changbaishan intra-plate volcano and Tengchong hydrothermal area are two of the active volcanic areas in China. In order to better understand current status of magma/hydrothermal activities of the Changbaishan intra-plate volcano and Tengchong hydrothermal area, we have conducted the soil gas survey and bubbling gas sampling from hot springs around the Tianchi crater lake and Rehai geothermal area.

In Changbaishan volcano, the results show that CO_2 is the major component gas for most samples. The maximum value of helium isotopic ratio of 5.8 R_A (where R_A = $^3He/^4He$ in air) implies more than 60% of helium is contributed by mantle component, while carbon isotope values fall in the range of -5.8 to -2.0 ‰ (vs. PDB), indicating magmatic source signatures as well. Nitrogen dominated samples, 18Dawgo, have helium isotopic ratio of 0.7 R_A and carbon isotope value of -11.4 ‰, implying the gas source might be associated with regional crustal components beneath 18Dawgo. The first-time systematic soil CO_2 flux measurements indicate the flux is ca. 22.8 g m^{-2} day^{-1} and 6.8 g m^{-2} day^{-1} at the western and southern flank of Changbaishan, which is at the same level as the background value in the Tatun Volcano Group (24.6 g m^{-2} $day^{-1)}$, implying that Changbaishan may not be as active as TVG.

In Tengchong hydrothermal area, the preliminary results show that CO_2 is the major component gas for most samples. The helium and carbon isotopic ratio fall in the range of 0.5 R_A to 3.5 R_A and -4.7 to -1.6 ‰ (vs. PDB), respectively. We also analyzed the hot springs water. The δD and δ^{18}O values fall in the range from -59.8 to 84.6 ‰ and -6.20 to -12.38 ‰ (vs. SMOW), respectively. Rehai has the highest helium isotopic ratio of 3.5 R_A, which implies ca. 40% of helium is mantle-derived. The δD and δ^{18}O results implied the water in this area was affect by primary magmatic water. Nevertheless, samples from Banglazhang and Shihchiang hydrothermal areas show much lower helium isotopic ratio of 0.8 R_A and 0.5 R_A, respectively. It suggests that the local tectonic setting plays an important role for the gas degassing in this area.