Fluxes and genesis of greenhouse gases emissions from typical volcanic-geothermal fields in China

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Deep-seated carbon could be transported from Earth's interior into atmosphere by volcanic activities, which play an important role in geologic carbon degassing and its effects on global climate and environment. In addition to volcanic eruptions, quiescent volcanoes could also release large amounts of magma-derived CO_2 into the atmosphere. Therefore, quantitative studies on evaluating the contribution of volcanic activities to rising of atmospheric CO_2 concentration are critical, especially in the context of global warming. During the past few years, we have estimated the fluxes of greenhouse gases released from typical volcanic-geothermal fields (e.g., Changbaishan, Tengchong, Wudalianchi and Yangbajing) in China using closed chamber method and gas-water chemistry methods. It is indicated that the total flux of greenhouse gases (referring mainly to CO_2) from the studied volcanic fields is ca. 8.13×10^6 t a^{-1}, taking up about 6% of the total CO_2 flux from global volcanoes. Magma-derived volatiles from Pacific tectonic domain (examplied by Changbaishan and Wudalianchi in NE China) and Thethys tectonic domain (examplied by Yangbajing and Tengchong in SW China) display different signatures on flux of greenhouse gases and gas geochemistry. In comparison with those from Pacific tectonic domain, the fluxes of greenhouse gases from volcanic field associated with Thethys tectonic domain are higher. In addition, volcanic gases from Thethys tectonic domain are characterized by higher degree of crustal contribution in mantle source and their trasportaion in crust than those of Pacific tectonic domain, indicating different tectonic settings and mechanisms of magma evolution between oceanic subduction zone and continental subduction zone.