

Variation of volcanic gas composition during transition from crater lake activity to eruption at Aso volcano, Japan

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Aso volcano started eruption at the end of November 2014 from the summit crater after dry up of the hot acid crater lake. We report variation of volcanic gas composition during the transition from a stable crater lake, dry up then to eruption. The lake water volume decrease started in early 2013 and almost dried up at the end of 2013. High temperature gas emission from the center of the crater was observed in early 2014. Continuous ash emission with small scale strombolian eruptions started in November 2014 at the center of the crater. During the quiescent period, acid gases are discharged from the surface of the hot acid crater lake (crater lake gas) and high-temperature fumaroles at the southern rim of the crater (south fumarole). The crater lake gas composition is similar to a typical high-temperature gases with high SO₂ and H₂ contents, suggesting that high-temperature gases continuously supplied to the crater lake. The crater lake gas and the south fumarolic gas have contrasting composition with low and high CO₂/SO₂ ratio, respectively and the contrasting compositions were interpreted as a results of gas-liquid separation in a hydrothermal system. The contrasting CO₂/SO₂ ratios, however, did not change by the transition from the stable crater lake to dry then to the eruption, implying that the contrasting compositions are not the results of the hydrothermal differentiation but imply the existence of two different magmatic gases, likely separated from a magma at different conditions. The stable gas compositions indicate that the degassing conditions remains similar during the activity transition.

Keywords: Volcanic gas, Crater lake, eruption, Aso volcano