2012 Fall Meeting
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Cite abstracts as **Author(s) (2012), Title, Abstract xxxxx-xxxx presented at 2012 Fall Meeting, AGU, San Francisco, Calif., 3-7 Dec.**

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HR: 1340h
AN: V53E-2885 *Poster*
TI: First in-situ sensing of volcanic gas plume composition at Boiling Lake (Dominica, West Indies)
AU: *Di Napoli, R
EM: *rossella.dinapoli@unipa.it*
AF: *DiSTeM, Palermo, Italy*
AU: Aiuppa, A
EM: *alessandro.aiuppa@unipa.it*
AF: *DiSTeM, Palermo, Italy*
AU: Allard, P
EM: *pallard@ipgp.fr*
AF: *IPGP, Paris, France*
AB: Dominica, a small Caribbean island between Martinique (to the South) and Guadeloupe (to the North), is, because of the high number of potentially active volcanic centres, one of the most susceptible sites to volcanic risk in the Lesser Antilles arc. Seven major volcanic centres, active during the last 10ka, are considered likely to erupt again, and one of these is the Valley of Desolation volcanic complex. This is an area of 0.5 km2, located in on SW Dominica, where a number of small explosion craters, hot springs, bubbling pools and fumaroles testify for vigorous and persistent hydrothermal activity. Two main phreatic explosions have been documented in historical time (1880 and 1997), and the most likely centre of future activity is the Boiling Lake, a nearby high-T volcanic crater lake produced by an undated phreatic/phreato-magmatic explosion. Hot (80 to 90°C) and acidic (4-6) waters normally characterize the steady-state activity of the lake, whereby which vigorous gas upwelling in the lake's centre feeds a persistent steaming plume. Stability of the Boiling Lake has occasionally been interrupted in the past (since 1876) by crises, the most recent in 2004, involving rapid draining of the lake and changes in water temperature and pH, likely as a result of drastic decrease of hydrothermal fluid input into the lake. While the chemical and isotopic composition of the lake waters is well characterised, there are no compositional data available for the gas plume leaving the lake, due to inherent difficulties in direct gas sampling. Here, we present the results of the first direct measurements of the Boiling Lake's plume, performed by using the MultiGAS technique in February 2012. We acquired 0.5 Hz time-series of H2O, CO2, H2S and SO2 plume concentrations, which were seen to peak (with maximum background-corrected concentrations of 3680, 101 and 25 ppm for respectively H2O, CO2 and H2S) during phases of visible increase in lake outgassing. SO2 was virtually absent in the plume. From the concentration data, the characteristic CO2/H2S (5.2±0.4) and H2O/CO2 (31.4±6) volatile ratios in the Boiling lake's atmospheric plume were derived. This reveals similar C to S signature for Boiling lake and Valley of Desolation (for which we also obtained data using the same technique), likely indicative of common source reservoir. The Boiling lake's plume is far more H2O-rich than the Valley of Desolation gas, suggesting that a significant fraction of in-plume H2O in the former originates from re-evaporation of the lake water itself. Our data here provide a first compositional baseline for quiescent volcanic gas

emissions at Boiling Lake, and may form the basis to stimulate emerging geochemical monitoring programs in the area.
DE: [8400] VOLCANOLOGY
DE: [8430] VOLCANOLOGY / Volcanic gases
SC: Volcanology, Geochemistry, and Petrology (V)
MN: 2012 Fall Meeting

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