

Diffuse CO₂ measurements in Taal Volcano Main Crater from 2008-2012 and record of possible magmatic intrusion event in 2010-2011

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Presented here are diffuse CO₂ emissions data for Taal Volcano Main Crater Lake (MCL) and fumarolic areas within the Main Crater from 2008 to 2012. Baseline total diffuse CO₂ emissions of less than 1000T/D were established for the MCL from 3 campaign-type surveys between April, 2008 to March, 2010. Areas with high diffuse CO₂ emissions within the geothermal field in the Main crater were also identified. Seismicity during this period was within background and no abnormal activity was shown by the volcano. In April, 2010, anomalous seismic activity from the volcano started and the total CO₂ emission from the MCL increased to 2716±54T/D as measured in August, 2010. CO₂ emissions from the ground within the geothermal area in the Main Crater also increased from 10±1 T/D in March 2010 to 36±4 T/D in August 2010. The CO₂ emission from the lake was highest last March, 2011 at 4670±159T/D when the volcano was still showing signs of unrest. This large increase occurred before the highest count of high frequency earthquakes was recorded in May 2011 for this period. Total CO₂ emissions from the MCL then decreased to twice the baseline values from May to June 2011. The increase in CO₂ emissions from the MCL, geothermal area and also emissions from fumarole vents coinciding with increased seismicity during this period may be interpreted as magmatic activity. These were probably the effect of magma intrusions moving from a deep reservoir to a shallower reservoir. This activity however, did not result into an eruption and CO₂ emissions have gone down to below background levels since, as measured in October 2011. There has been other intrusion episodes in Taal identified by previous studies since its last eruption period in 1965-1977.