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Radiant heat flux measurements from Nyiragongo lava lake by ground-based and satellite thermal imagery

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Here we report the first combined radiant heat flux measurements at the Nyiragongo lava lake by ground-based and satellite thermal imagery recorded in March 2012. This is the very first time in which the two kinds of data have been compared at this volcano. Peak temperatures recorded at the molten lava were of ∼1180 K, whereas the lake skin remained always below ∼734 K in areas far from the upwelling zone and below ∼843 K in those proximal to the source region. Ground-based imagery yielded mean radiant heat fluxes between ∼0.80 and 1.10 GW. Consistently, satellite observations showed similar mean values of 1.10 GW. Overall the thermal activity of the lava lake was quite variable along the three days of field measurements at both daily and intra-daily scale. SEVIRI radiant heat fluxes retrieved for the January-June 2012 period revealed fluctuations within the same variability range suggesting that no significant changes of the lava lake area had occurred over the six months. Comparison with previous radiant heat flux estimates showed that our data well agree with the general increasing trend recorded since the reappearance of the lava lake after the last flank eruption in 2002. Considering the danger posed by Nyiragongo to the dense population living on the flanks of the volcano, and taking into account that the two historical effusive eruptions were preceded by increasing radiant heat flux values, we believe that our results represent a valuable contribution to the surveillance of this remote volcano eruptive activity.