

Reevaluating the global CO₂ emission from subaerial volcanism: an additional insight

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During the last two decades, scientists have paid attention to CO₂ volcanic emissions and its contribution to the global C budget. Excluding MORBs as a net source of CO₂ to the atmosphere, the global CO₂ discharge from subaerial volcanism has been estimated by Morner and Etiope, 2002, in about 300 Mtyr and this rate accounts for both visible, plume and fumaroles, and non-visible, diffuse, volcanic gas emanations. However, CO₂ emissions from volcanic lakes were not considered to estimate the global CO₂ discharge from subaerial volcanoes. A recent study by Perez et al., 2011, on global CO₂ emission from volcanic lakes had been estimated about 117 Mtyr, being 94 Mtyr reported as deep seated CO₂. In order to improve the information on the global diffuse CO₂ emission estimated by Morner and Etiope, 2002, about 50 Mtyr, an extensive research on diffuse CO₂ emissions from subaerial volcanoes worldwide has been performed after evaluating the results of 287 diffuse CO₂ emission surveys from 83 volcanic systems situated at 23 different countries and volcanic regions. The estimated diffuse CO₂ emission at each survey has been normalized by the study area. Statistical-graphical analysis of the data showed three overlapping geochemical populations. The background mean is 2.6 tkm²d and represents 28.4 per cent of the total data. Peak population showed a mean of 901.4 tkm²d and represented 38.0 per cent of the data, and an intermediate group showed a mean of 74.4 tkm²d and represented 33.6 per cent of the data. Taking into account a the geometric mean of the normalized CO₂ emission rates for each population, b the average of the study area for each population, c the fraction of the three overlapping geochemical populations, and d the number of active subaerial volcanoes in the world, about 1400; the global diffuse CO₂ emission from subaerial volcanism could be estimated about 829 Mtyr of which 436 Mtyr could be reported as deep seated CO₂. This study highlights the importance of a deeper revision of the actual global CO₂ discharge from subaerial volcanism since a new estimate of 780 Mtyr, 250 Mtyr from visible emissions plus 94 Mtyr from volcanic lakes plus 436 Mtyr from diffuse emissions, could be considered. Morner and Etiope, G. Global Plan. Chang, 33, 185 203, 2002. Perez et al., Geology, 39, 235 238, 2011.