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A new estimate of global CO_2 emissions from volcanoes diffuse degassing, based on MaGa database

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Great interest has recently been placed on quantifying the contribution of diffuse CO_2 degassing from volcanoes and tectonically active regions. To improve our knowledge of the Earth degassing process and to improve the current estimates of global carbon emissions requires the access to data collections and tools to explore and analyse data. The Mapping Gas Emission (MaGa) web-based framework has been developed to collect and share measurements of gas compositions and fluxes from volcanic and tectonic gas emissions. The backend of MaGa stores the data into a spatially referenced relational database system, and standardized web services provide access to the geospatially enabled data for the analysis. MaGa currently contains the location of about 1000 gas emission sites (volcanic plumes, fumaroles, vents and diffuse degassing areas) and about 2000 records including gas flux and gas composition data from about 158 volcanoes. Collaborative actions and researchers' individual initiatives will expand the database as new data can be inserted dynamically by the users through a web interface. Currently, MaGa dataset on diffuse CO_2 degassing includes data from more than 200 degassing areas located in 101 volcanoes, that were investigated with more than 500,000 individual measurements of diffuse CO_2 flux. MaGa dataset has been elaborated here in order to quantify the “typical” CO_2 emission from a volcano diffuse degassing structure. This, coupled with the number of degassing volcanoes, was used to estimate the global volcanic CO_2 diffuse emission. Our results show that diffuse CO_2 degassing significantly contributes to the global CO_2 emission from volcanic systems. Besides this result, data analysis also highlights that increasing the number of investigated volcanoes together with an adequate sampling strategy and design of the CO_2 flux field surveys, a reliable characterization of the deep CO_2 contribution to the total CO_2 flux, are fundamental to improve the estimate and reduce the uncertainties.