

## **Changes in the redox and acid-base properties of the seawater due to the hydrothermal emissions of the Tagoro submarine volcano**

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The character reduced and acid of the emissions associated to the Tagoro submarine volcano allowed to detect the anomalies related with changes in the chemical potential and the proton concentration using ORP and pH sensors, respectively. Detailed surveys of the volcanic edifice were carried out between 2014 and 2016 using several CTD-pH-ORP tow-yo studies, localizing the ORP and pH changes, which were used to obtain surface maps of anomalies. Moreover, meridional tow-yos were used to calculate the amount of volcanic CO<sub>2</sub> added to the water column. The inputs of CO<sub>2</sub> along multiple sections combined with measurements of oceanic currents produced an estimated volcanic CO<sub>2</sub> flux =  $6.0 \cdot 10^5 \pm 1.1 \cdot 10^5$  kg d<sup>-1</sup> which increases the acidity above the volcano by ~20%.

In order to investigate the temporal variability of the system, CTD-pH-ORP yo-yo studies were also conducted that included discrete sampling for carbonate system parameters and total dissolved Fe(II), TDFe(II). Important anomalies in both pH<sub>T</sub> and TDFe(II) were observed from these studies. The increased in the TDFe(II) concentrations and the low associated pH<sub>T</sub>, that decrease the rate of oxidation of Fe(II), may be acting as an important fertilization event in the seawater around the volcano at the Island of El Hierro providing optimal conditions for the biological regeneration of the area.

Fe(II) oxidation kinetic studies were also undertaken in order to analyze the effects of the seawater properties in the proximities of the volcano on the oxidation rate constants and t<sub>1/2</sub> (half-life time) of ferrous iron.