

Severe deoxygenation event caused by the 2011 eruption of the submarine volcano Tagoro (El Hierro, Canary Islands)

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Abstract: The shallow, near-shore submarine volcano Tagoro erupted in October 2011 at the *Mar de las Calmas* marine reserve, south of El Hierro island. The injection of lava into the ocean had its strongest episode during November 2011 and lasted until March 2012 (Fraile-Nuez et al., 2012). During this time, *in situ* measurements of dissolved oxygen were carried out, using a continuous oxygen sensor constantly calibrated with water samples. A severe deoxygenation was observed in the area, particularly during October-November 2011, which was one of the main causes of the high mortality observed among the local marine ecosystem (Santana-Casiano et al., 2013). The measured O₂ concentrations were as low as 7.71 µmol kg⁻¹, which represents a -96% decrease with respect to unaffected waters. The oxygen depletion was found in the first 250 m of the water column, with peaks between 70-120 m depth. The deoxygenated plume covered an area of at least 464 km², distributed particularly south and south-west of the volcano, with occasional patches found north of the island. The oxygen levels were also monitored through the following years, during the degassing stage of the volcano, when oxygen depletion was no longer observed. Additionally, during the eruption, an island-generated anticyclonic eddy interacted with the volcanic plume and transported it for at least 80 km (Eugenio et al., 2014), where the O₂ measurements still showed a -8% decrease after mixing and dilution. This feature draws attention to the permanence and transport of volcanic plumes far away from their source and long after the emission.

Key words: Tagoro, submarine eruption, dissolved oxygen, deoxygenation, Canary Islands.

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