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Conference Paper · April 2022

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EGU General Assembly 2022

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Vulnerability of aquifers on volcanic islands: the case of La Palma and El Hierro (Canary Islands, Spain)

Juan C. Santamarta¹, Noelia Cruz-Pérez², Jesica Rodríguez-Martín³, Miguel Ángel Marazuela⁴, Rosana Álvarez-Vázquez⁵, and Alejandro García-Gil⁶

¹Departamento de Ingeniería Agraria y del Medio Natural. Universidad de La Laguna (ULL). Spain (jcsanta@ull.es)

²Departamento de Ingeniería Agraria y del Medio Natural. Universidad de La Laguna (ULL). Spain (ncruzper@ull.edu.es)

³Departamento Técnicas y Proyectos en Ingeniería y Arquitectura. Universidad de La Laguna (ULL). Spain

(jrodrima@ull.edu.es)

⁴Centre for Microbiology and Environmental Systems Science, University of Vienna, Althanstrasse 14 UZAll, Vienna, Austria (mamarazuela@outlook.com)

⁵Elitoral Estudios de Ingeniería Costera y Oceanográfica SLNE, Edificio Polivalente II - Parque Científico Tecnológico, 35017, Gran Canaria. Spain. (ralvarez@elitoral.es)

⁶Geological Survey of Spain (IGME-CSIC), C/ Ríos Rosas 23, 28003 Madrid, Spain. (a.garcia@igme.es)

The outermost regions of Europe are nine: Guadeloupe, French Guiana, Martinique, Mayotte, Reunion and Saint Martin (France), the Canary Islands (Spain), the Azores and Madeira (Portugal). These regions enrich the EU economically, culturally and geographically, hosting 80% of its biodiversity. However, due to their remoteness and other unique features, they pose challenges for their development. The particular case of the Canary Islands will be developed in the framework of the European H2020 project Arsinoe, where the hydrological cycle and agriculture in the Canary archipelago will be studied in El Hierro and La Palma. These two islands have been selected for the following reasons: i) El Hierro is a pioneer in presenting a self-sufficient energy model (La Gorona del Viento project) and is rich in groundwater, this being the most used water resource on the island; ii) La Palma has been selected because it is an island rich in groundwater (in fact, it is the only island in the Canary archipelago that does not have desalination plants) and where agriculture is very important (especially tropical crops such as banana, mango, avocado, etc.) and, due to the volcanic eruption that began in September 2021, the situation of the aquifer is uncertain, something that is worrying since La Palma depends on groundwater resources to guarantee the water demand of agriculture, local population and tourism. The effect of the eruption on the vulnerability of the aquifer of La Palma is still unknown, so it is desired to study in depth the effects on the aquifer in quantitative and qualitative terms therefore, ARSINOE will focus on the ecological transition and vulnerability of aquifers in volcanic islands and will put further efforts to the primary production including agriculture, forestry, fisheries and aquaculture, water management and clean energy infrastructure. ARSINOE will take into account the interdependence between water and agriculture. The agricultural sector is the largest water user in the Canary Islands, where wine, potatoes and tomatoes are the main exports. Therefore, greater sustainability within the water sector (through the water footprint and the carbon

footprint) will positively affect the agricultural sector and, therefore, the water and energy situation of the archipelago. But aquifers of both islands are also at risk due to other circumstances, specifically those derived from climate change: greater saline intrusion (due to rising sea levels), losses in freshwater inputs (due to decreased rainfall), changes in physico-chemical conditions of all water bodies... All these effects will be studied on both islands, through the ARSINOE Project, and from a local point of view.