

CONCERNS ABOUT THE REUSE OF WASTE WATER - EFFECTS OF MIXTURES OF CHEMICAL SUBSTANCES ON HUMAN HEALTH

José Cabêda¹, Carina Ladeira^{2,3,4}

¹ Portuguese National Republican Guard, Vila Franca de Xira Territorial Detachment, Environmental Protection Nucleus

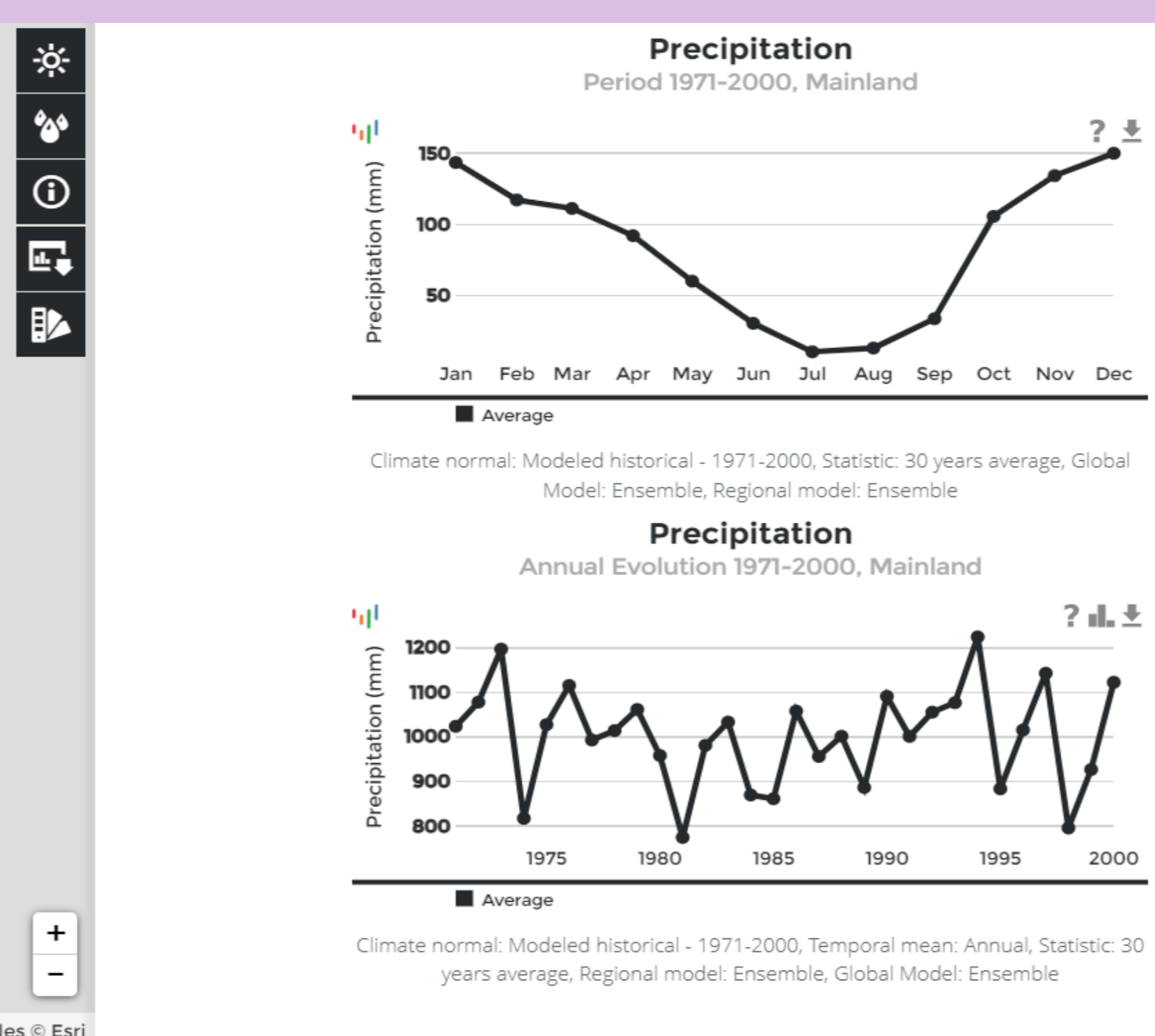
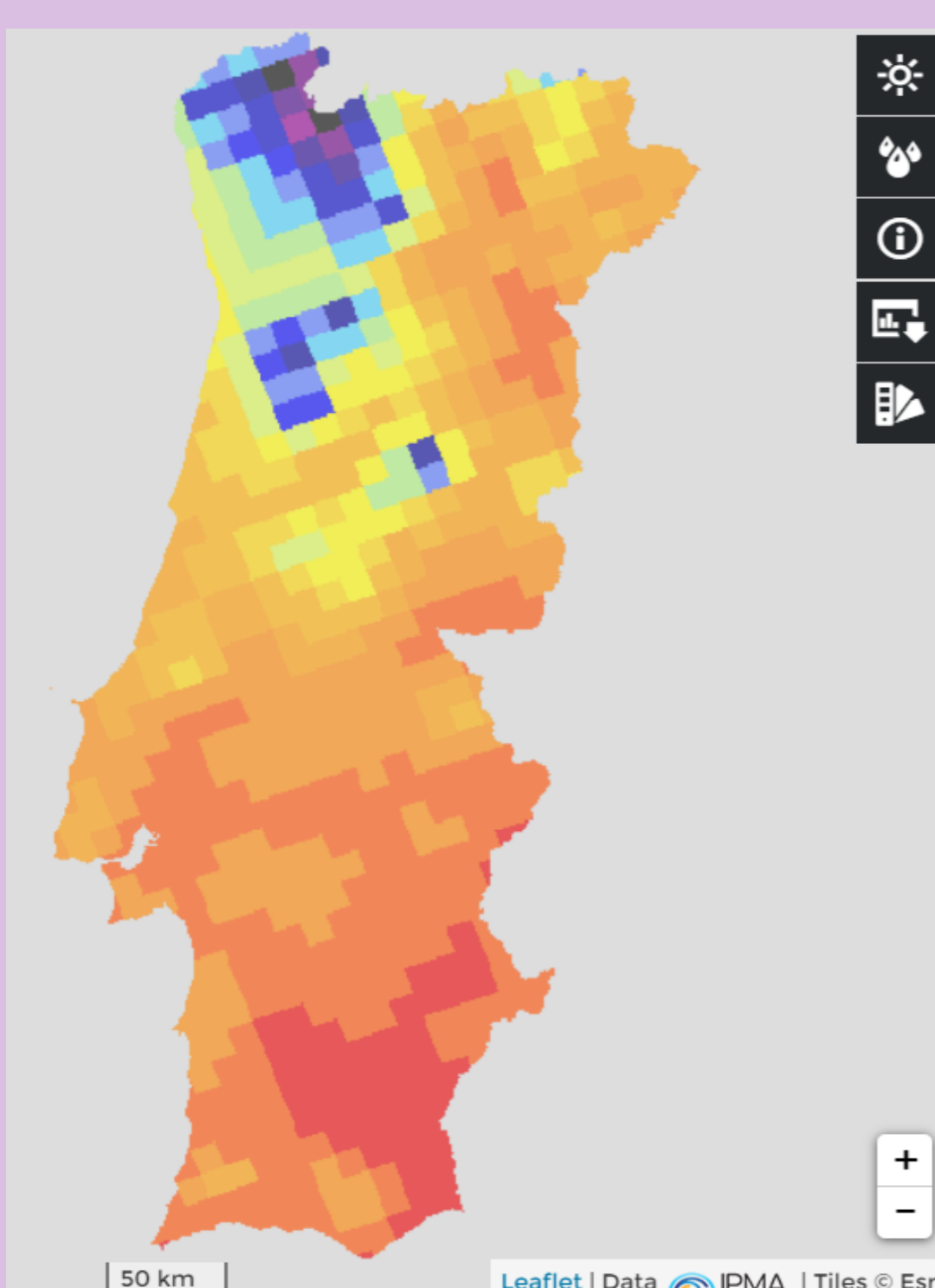
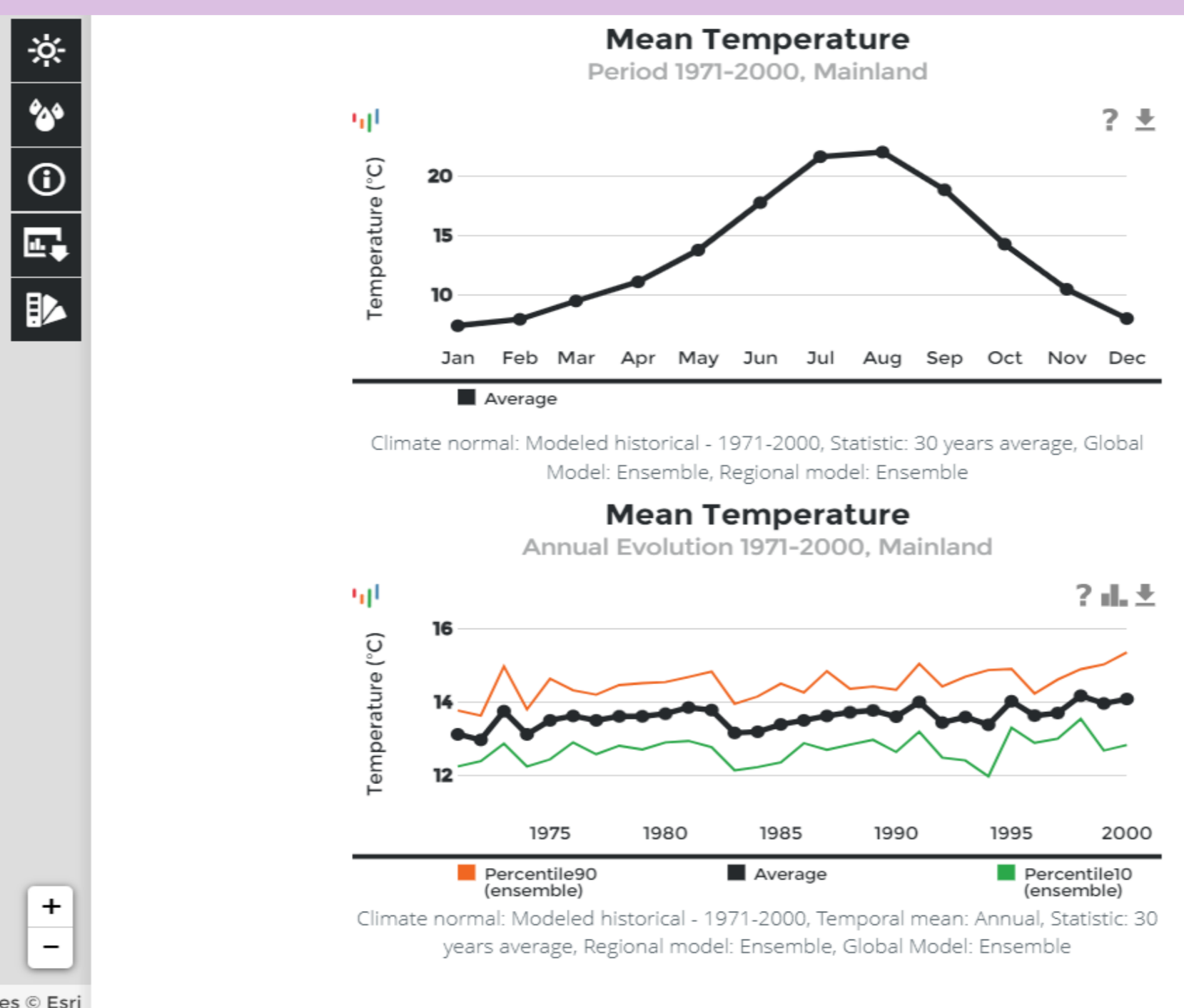
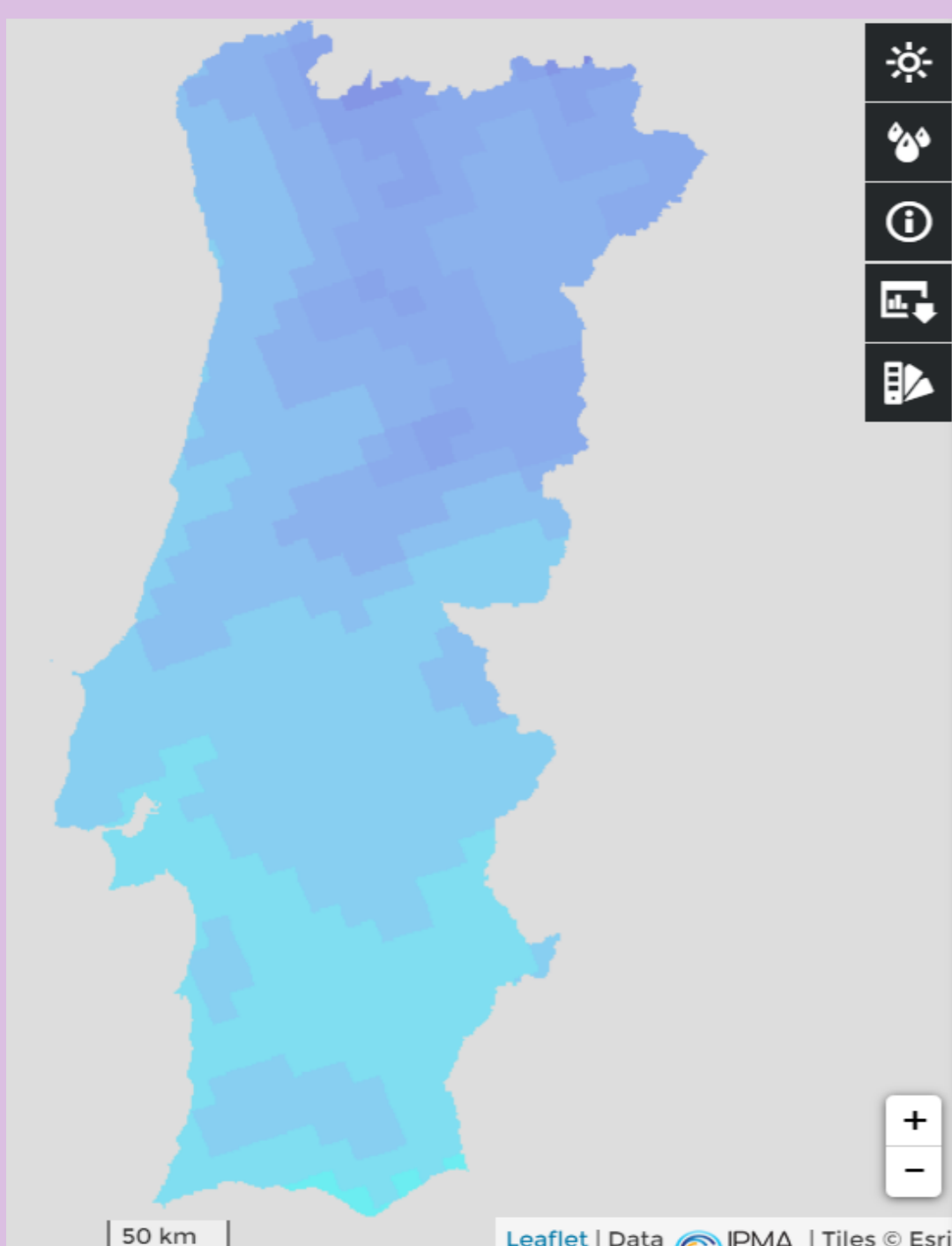
² H&TRC – Health & Technology Research Center, Escola Superior de Tecnologia da Saúde de Lisboa (ESTeSL), Instituto Politécnico de Lisboa

³ NOVA National School of Public Health, Public Health Research Centre, Universidade NOVA de Lisboa, Lisbon, Portugal

⁴Comprehensive Health Research Center (CHRC), Universidade NOVA de Lisboa, Portugal

Due to global warming, the future trend is to adopt good practices in the use of treated wastewater in agriculture, industry and the urban sector, with particular emphasis on arid and sub-arid regions. In the European context, the Southern Mediterranean countries are the most vulnerable and the costs of inaction are significant.

The regulation approved on 13 May 2020 by the **European Parliament** establishes minimum requirements for the **reuse of treated urban wastewater**, with the aim of guaranteeing an alternative water supply. These requirements mainly concern water quality and monitoring, and some member states, such as Portugal, have requirements for water reuse in legislation or in non-regulatory national standards.



PROBLEM

- ✓ Presence of **micropollutants in wastewater**: biocides, pesticides, dermocosmetic products, UV filters, pharmaceuticals, detergents, etc. (ng/L and µg/L).
- ✓ Individual components below the ELVs.
- ✓ Chemical mixtures correspond to **real human exposure scenarios**.

CHALLENGE

- ✓ **Gap in risk assessment of chemical mixtures.**
- ✓ Combined method for analyzing water chemistry and studying potential effects.
- ✓ *In vitro* exposure to extracts isolated from different wastewaters in cell culture.
- ✓ Effects of the chemical mixture: potential genetic damage, effects on immunomodulation, inflammation and other biomarkers.

- ✓ These practices are not commonly adopted in Portugal and maximum values for chemical substances are determined.
- ✓ The effects of a mixture are expected to exceed the effects of the individual substances, through toxicological reactions such as addition, potentiation and synergy.
- ✓ Through the phenomenon of globalization, the supply of these foodstuffs on national markets will be a reality, making foodstuffs routes of exposure to these substances through the food chain.
- ✓ This study proposal has potential in the face of the future challenges of climate change with the consequent reuse of treated wastewater for agricultural and recreational purposes.