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COMBINING DIFFERENT TRACERS (CFC-12, ^3H, ^3He, ^4He) TO UNDERSTAND THE HYDROGEOLOGICAL FUNCTIONING OF A SEMICONFINED AQUIFER

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1. INTRODUCTION

Seville and its metropolitan area, with 1.5 million population, has been supplied mainly by surface water. In view of the need to incorporate new resources, the Niebla-Posadas semiconfined aquifer is a strategic reserve of water resources in this area due to its proximity and the quality of its water.

OBJECTIVE: To better understand the hydrogeological processes taking place in an semiconfined aquifer, by jointly interpreting physic-chemical (EC, ORP), chemical compounds (NO_3^-, NH_4^+), isotopic values ($\delta^{13}C$), environmental tracers (CFC-12) and tritium-helium data.

2. GEOGRAPHICAL AND HYDROGEOLOGICAL SETTINGS

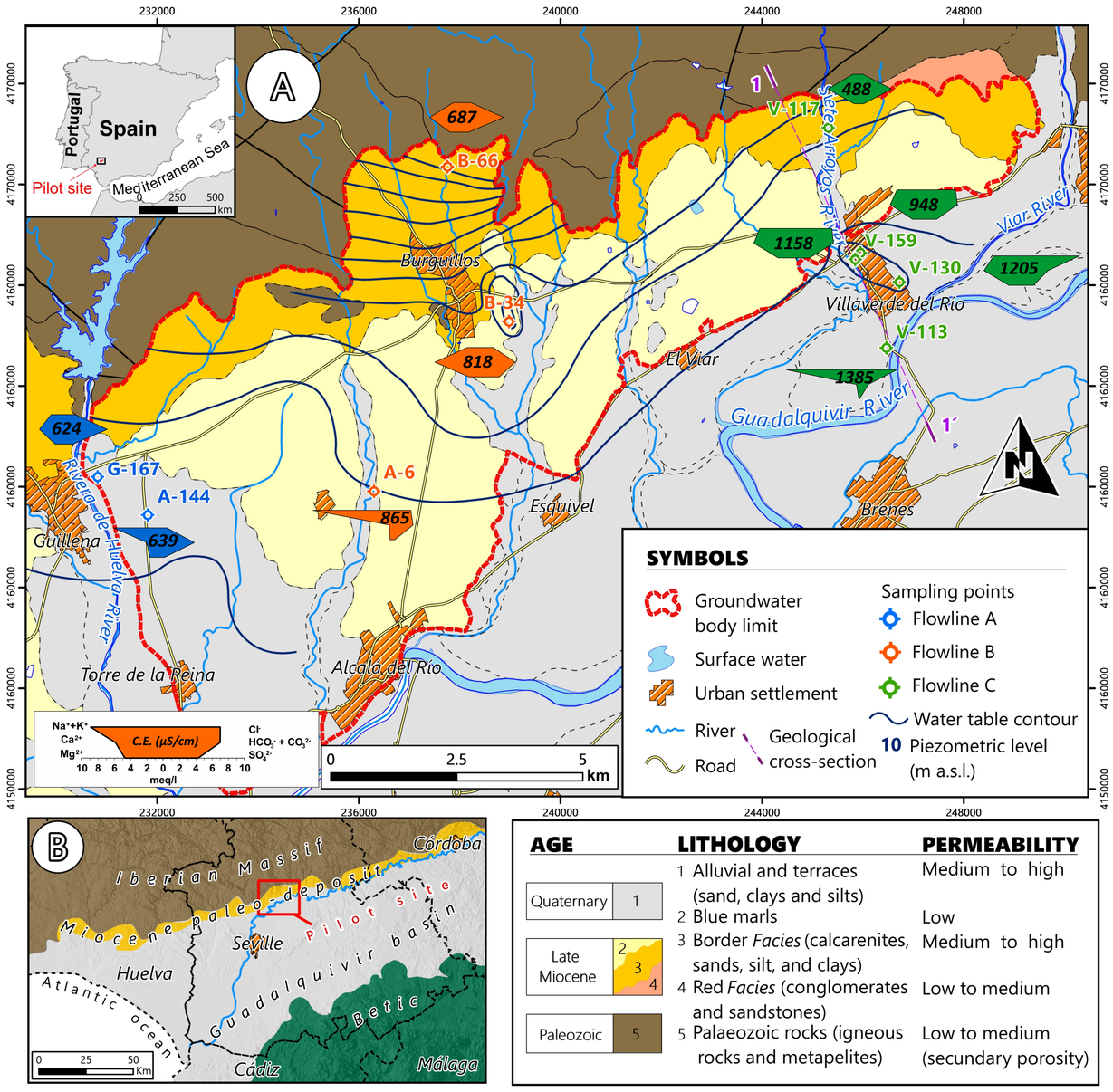

Fig. 1. Geological-hydrogeological sketch of Guillena-Cantillana groundwater body (Niebla-Posadas aquifer) with stiff diagrams from the June 2022 campaign (A) and regional map (B)

3. METHODS

Fig. 2. Methodology applied during the groundwater sampling campaigns carried out and the analysis of water samples taken. Electrical conductivity -EC-; Oxidation Reduction Potential -ORP-

4. RESULTS

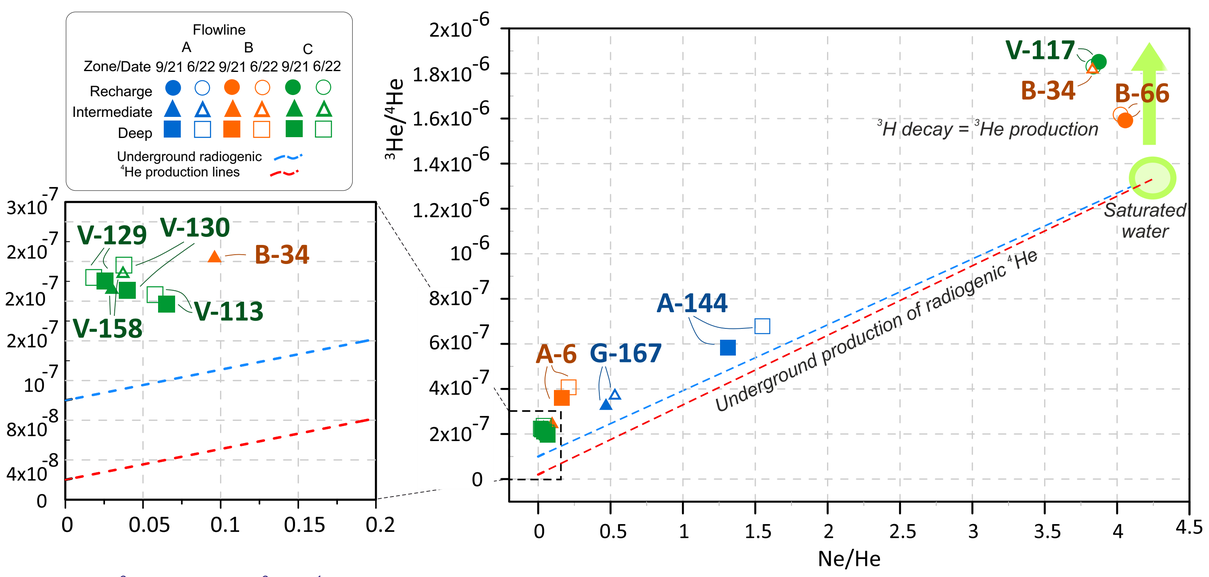

Fig. 3 . $^3Ne/He$ vs $^3He/^4He$ ratios, and representation of the main processes affecting them. Radiogenic He production lines are drawn from equilibrium values (air saturated water) to $^3He/^4He$ ratios of $2 \cdot 10^{-8}$ (Ballentine and Burnard, 2002) and $1 \cdot 10^{-7}$ (Akesson et al., 2015) for infinite radiogenic ^4He contents (red and blue lines,respectively)

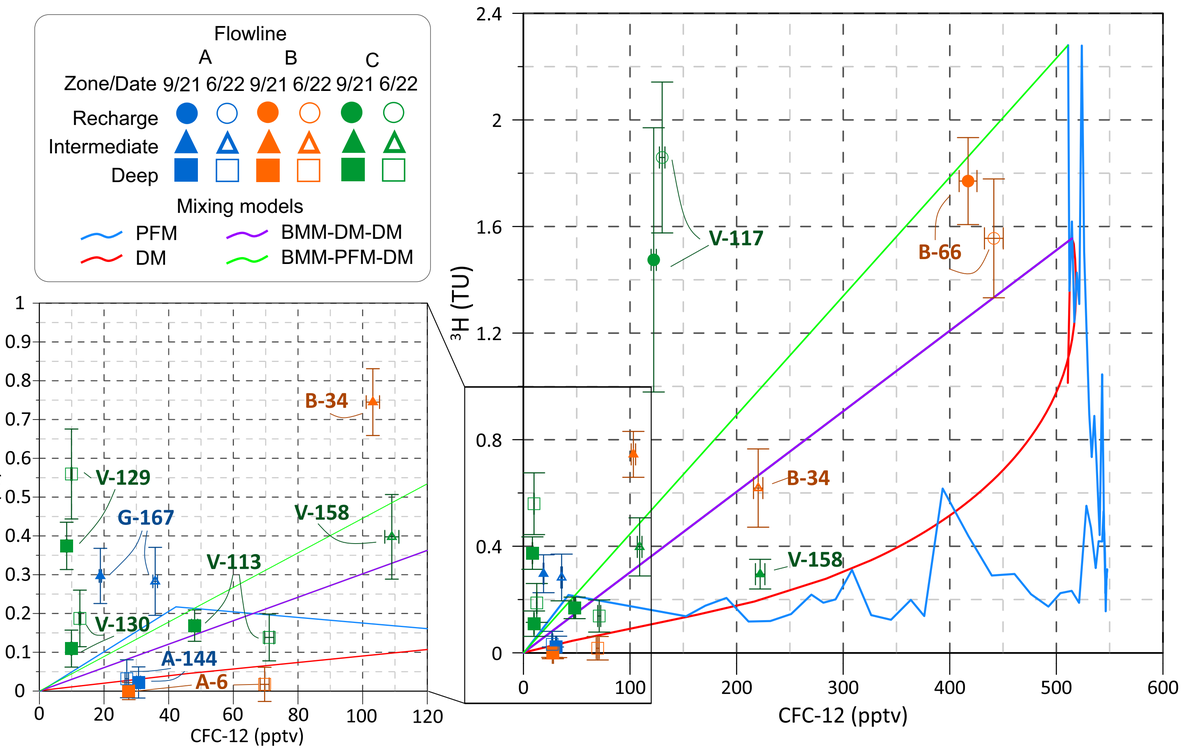

Fig. 4. CFC-12 vs ^3H and representation of differents binary mixing models (BMMs): Piston-Flow Model -PFM-, Dispersion Model -DM-, Binary Mixing Model-Dispersion Model -Dispersion Model -BMM-DM-DM- and Binary Mixing Model-Piston-Flow Model-Dispersion Model -BMM-PFM-DM

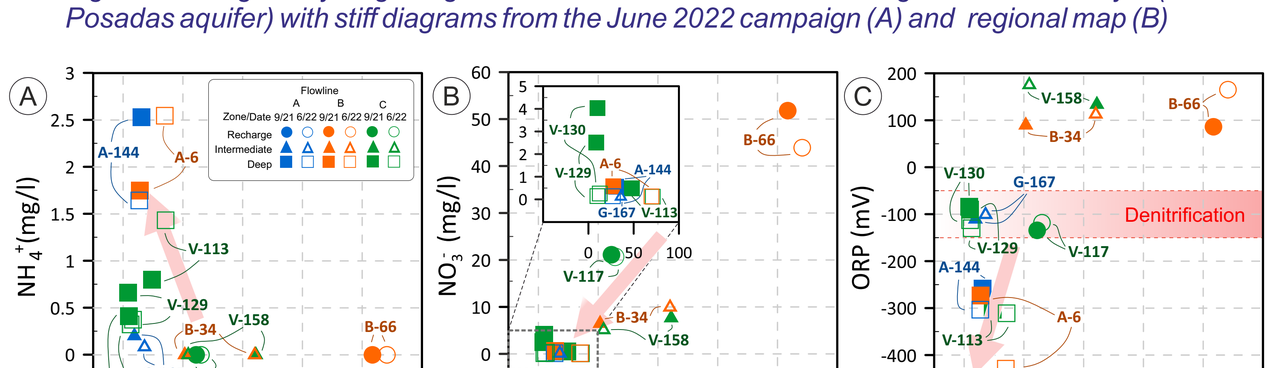

Fig. 5 NH_4^+ vs CFC-12 (A) NO_3^- vs CFC-12 (B) and Oxidation Reduction Potencial (ORP) vs CFC-12 (C)

5. CONCLUSIONS

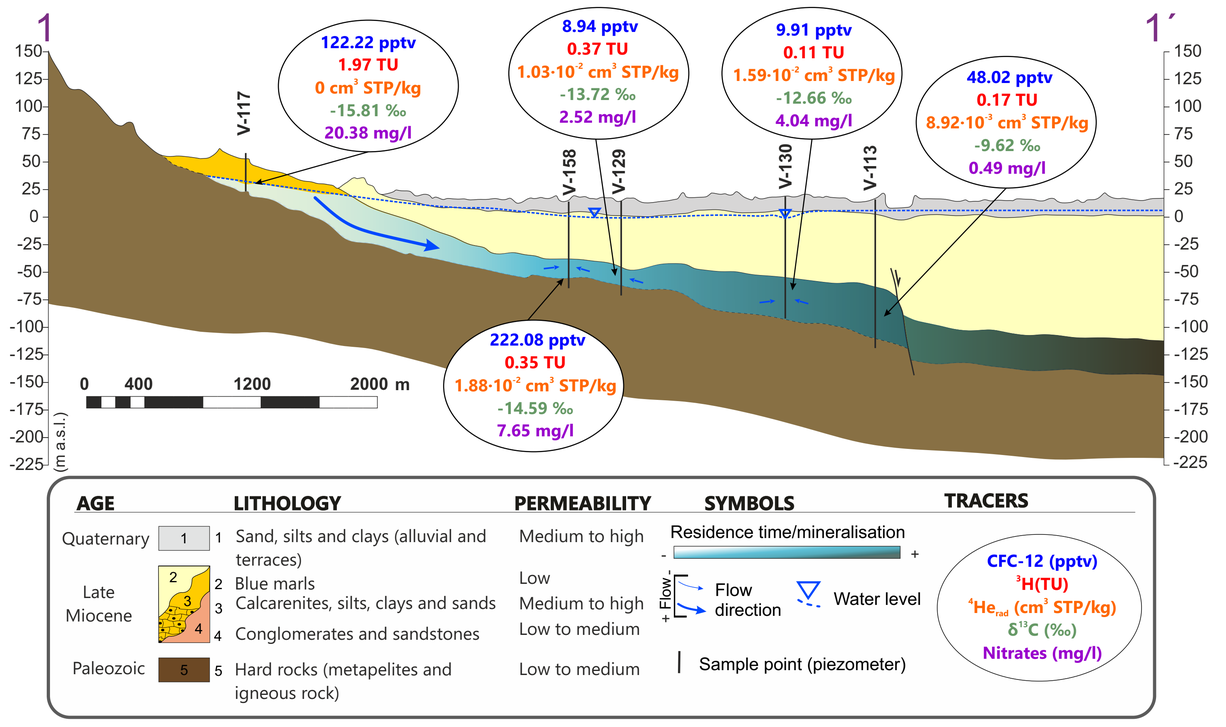

Fig. 6 Hydrogeological conceptual model of the flowline C. The concentrations of different environmental tracers (CFC-12), tritium (^3H),radiogenic helium ($^4He_{rad}$), carbon isotope ($\delta^{13}C$) and nitrates.

6. ACKNOWLEDMENTS

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