

## **Seismic and structural geology constraints to the selection of CO<sub>2</sub> storage sites - the case of the onshore Lusitanian basin, Portugal**

Nadine Pereira<sup>1</sup>, Júlio F. Carneiro<sup>2,\*</sup>, Alexandre Araújo<sup>2</sup>, Mourad Bezzeghoud<sup>3</sup>, José Borges<sup>3</sup>,

<sup>1</sup> Tejo Energia, Quinta da Fonte, Edif. D<sup>a</sup> Maria, Piso 2-B, 2770-229 Paço D Arcos, Portugal

<sup>2</sup> Geophysical Centre of Évora and Geosciences Department, Rua Romão Ramalho 59, 7000 Évora, Portugal

<sup>3</sup> Geophysical Centre of Évora and Physics Department, Rua Romão Ramalho 59, 7000 Évora, Portugal

### **ABSTRACT**

The Lusitanian sedimentary basin, in Portugal, has a complex tectonic history and a seismic activity determined by the proximity to the Eurasian – Nubian tectonic plate boundary. Seismic activity and geological structure impose serious constraints to the selection of CO<sub>2</sub> storage sites. This article focuses on the constraints imposed by active seismicity, geological structure and, as a direct consequence of the latter, by the hydrogeology and geothermal framework, to the identification of onshore CO<sub>2</sub> storage sites in deep saline aquifers of the Lusitanian Basin (central and north sectors).

Several active faults and areas of higher seismic hazard have been defined, favouring the selection of storage sites in the northern part of the basin. The halokynetic tectonics, responsible for emplacement of salt domes, constrains the regional groundwater flow system, and suggests that it is unreasonable to consider post-salt reservoirs. In most of the Lusitanian basin the pre-salt Silves Formation is the only reservoir worth considering. Four areas have been selected where the reservoir is at adequate depths, but given the other criteria for site selection, the area designated as S. Mamede strikes as the most interesting one for CO<sub>2</sub> injection.