Geophysical characterization of the Seu d'Urgell basin

Final Master Project for the Reservoir Geology and Geophysics Master

Author: Sergio Andrés Arévalo Ospina; Tutors: Macau Albert, Ph.D.; Andrés Juvenal, Ph.D.; Piña Perla, Ph.D.

Abstract

This work presents the geophysical characterization of the Seu d'Urgell sedimentary basin, located in the Catalan Oriental Pyrenees. The main objectives of this study are the definition of the basin geometry and the estimation of the neogene sediments thickness infill. To accomplish this, the combination of geophysical methods (ambient seismic noise and gravimetry) has been applied. H/V spectral ratio technique was applied to the ambient seismic noise, which gives the fundamental frequency of the soil, and allows the estimation of the thickness of the sedimentary infill and the estimation of the basement depth. The gravimetry method aims to obtain the Bouguer and residual anomalies maps. Finally, the integration of the geophysical data was carried out through 2D modeling, which reflects the consistency between the estimated bedrock depth through seismic ambient noise data and the gravity models. Results show an asymmetric (two-level) basement structure in the Alàs subbasin, where the minimum altitude is 455 masl. Regarding the thickness of the infill sediments, a maximum thickness of 256 m is obtained in the Alàs subbasin, while the maximum thickness in the Bellestar subbasin is 123 m. Furthermore, the results show the influence of the north fault on the subbasin geometry.