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The Orogen project: a process-driven research program to rethink exploration along fold and thrust belts

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Apart from deep offshore/deep buried targets, a large part of hydrocarbon “yet to find” is located along fold and thrust belts (FTB). Low-price oil context renews the interest of industry on these domains, especially because of their accessibility. However, exploration of FTB is still facing major technical, conceptual and organization challenges among which:
1) Classical seismic methods fail to image entirely FTB owing to the steep dipping geometries as well as complexity of structures. Furthermore, basin modeling requires characterizing the lithospheric structure and composition through time, which is beyond the ability of industry classical approach. Facing this challenge requires developing and integrating new imagery and processing methods along FTB.
2) Contrasted prospectivities are often observed on each side of mountain belts and along strike. This is due to different tectonic, sedimentary, thermal and fluids evolutions of distinctive structural domains before, during and after orogeny. Since all petroleum system parameters are affected by these different evolutions, petroleum plays must be adapted to coherent structural domains. Facing this challenge requires developing a “genetic approach” of FTB to unlock the limits of exploration.
3) Last but not least, academic/institutional research and industrial R&D are not sufficiently inter-connected to efficiently cross-fertilize and address the two former issues.
In this presentation, we will present the project OROGEN, an academic/institutional and industry partnership research program that was set up between CNRS, BRGM and Total to address the above mentioned issues. The project is aimed at combining, improving and developing new approaches to study with the highest temporal and spatial resolutions the evolution of Peri-Iberia orogenic system. OROGEN involves 17 Earth Sciences laboratories, 27 PhDs and Postdocs and tens of scientists for five years. OROGEN focuses on 1) the development, acquisition and integration of 3D passive seismic to measure how valuable it is for FTB imagery; 2) the post-orogenic lives of mountain belts and their basins; 3) the pre- and syn-collisional development of pro- Vs retrowedge orogenic basins from source to sink and considering near- and far-field regions; 4) the influence of rift-related inheritances (structural, compositional, thermal) on orogeny; 5) stress state and P-T path using in-situ and detrital geochronology (outcrops and wells), palaeobarometry, palaeo-thermicity and their impact on rheology, modes of deformation and source to sink evolution.
Beyond the Science, Orogen is also a new way of doing Earth Science Research by combining strenght of organizations as diverse as oil companies (Total), Geological Surveys (e.g. BRGM), public institutions (e.g. CNRS) and Universities.