Geophysical Research Abstracts
Vol. 17, EGU2015-12313, 2015
EGU General Assembly 2015

3D modelling in salt tectonic context: the *Crocodile* minibasin in Sivas (Turkey)

Pauline Collon (1), Alexandre Pichat (2,3), Charlie Kergaravat (2,3), Arnaud Botella (1,4), Guillaume Caumon (1), Océane Favreau (1), Gaétan Fuss (1), Gabriel Godefroy (1), Marine Lerat (1), Antoine Mazuyer (1), Marion Parquer (1), Julien Charreau (5), Jean-Paul Callot (3), and Jean-Claude Ringenbach (2)

(1) GeoRessources UMR7359, Université de Lorraine - CNRS - CREGU; ENSG, 2 rue du doyen Marcel Roubault, TSA 70605, 54518 Vandoeuvre-lès-Nancy Cedex, France., (2) Total S.A, CSTJF, avenue Larribau, Pau, France., (3) LFC-R, Université de Pau et des pays de l'Adour, avenue de l'Université, Pau, France., (4) INRIA Lorraine - LORIA, Project ALICE, 615, rue du Jardin Botanique, 54600, Villers-lès-Nancy, France., (5) CRPG UMR 7358, Université de Lorraine - CNRS, 15 rue Notre Dame des Pauvres, 54500 Vandoeuvre-lès-Nancy, France.

Impermeable, with a low density and acting as a viscous fluid at the geological time scale, salt plays a unique tectonic role favouring hydrocarbon trap formations. Halokinetic structures are various and difficult to image with classic seismic techniques. Thus, outcrop analogues are precious and sought after. Since the re-interpretation in September 2011 of its evaporite deposits, the Oligo-Miocene basin of Sivas (Turkey) is a new choice analogue for the study of salt tectonic with outstanding outcrops reflecting the variety of salt related structures: minibasins, diapirs, welds... While studying these structures requires an important field work, building 3D models becomes an interesting way to better help understanding the three-dimensional organisation and to further perform numerical simulations (e.g., restoration, potential field measurement campaign simulation). The complex geometries observed in salt tectonic context make these 3D geological models particularly challenging to build, especially when only outcrops data are available.

We focus on the *Crocodile* minibasin (Sivas) and present a modelling strategy using a subtle combination of recently developed techniques. Available data are: a Digital Elevation Model, satellite images and associated interpreted bedding traces on topography, orientation measurements of the strata and a conceptual interpretation. Located on an ancient salt extrusion, this minibasin is filled with lacustrine and sabkha sediments. It is interpreted with a closed synclinal structure on North. On its southern part, a central diapir has risen up, separating two tightened synclinals. The salt surface is modelled first as a triangulated surface using a classical explicit surface patch construction method and a manual post-process mesh improvement. Then, the minibasin sediments are modelled with an implicit approach that considers interfaces as equipotentials of a 3D scalar field. This requires to build a volumetric mesh conformable to the salt surface to consistently disconnect both minibasin parts. This step is performed thanks to a local simplification of the salt surface that consists in replacing pinched parts by an equivalent fault/weld surface. The 3D scalar field is then computed with a Discrete Smooth Interpolation constrained by several information. Those information are weighted consistently with their relative uncertainty. Control points impose locally the scalar field value. They are set on interpreted bedding traces and on a surface located at 5m from the external salt surface boundary to account for the tangency of the sediment deposits in conformable parts of the minibasin. They are completed by constraints on the scalar field gradient orientation using dip measurements and a constant gradient constraint.

The result highlights the remarkable geometry of this salt-tectonic related structure and underlines the usefulness of new modelling methods to ease a more automated generation of such tectonic features.