

Book Reviews

Cenozoic Foreland Basins of Western Europe

Geological Society Special Publication 134; A. Mascle, C. Puigde Fabregas, H.P. Luterbacher and M. Fernandez (Eds.), ISBN 8-623-19015-0, £70 (members £39; AAPG £42)

This Special Publication is one of three resulting from the Integrated Basin Studies (IBS) Project supported by the European Commission Joule 2 programme. Two companion volumes have been published as special publications by the Geological Society and deal with ‘Mediterranean extension basins within the Alpine orogen’ and the ‘Dynamics of the Norwegian margin’.

Foreland basins are significant habitats for large hydrocarbon reserves. Sadly the foreland basins of Western Europe do not contain world class oil and gas fields. That said, the foreland basins of Europe are well understood both in terms of their architecture and tectonic history, thus providing many useful analogues of the subsurface of foreland basins worldwide.

The foreland basin module of the IBS project examined the interaction between tectonics and sedimentation during orogenesis as well as the detailed sequence architecture of the basin infill. Specific study objectives included tectonic loading and its effects, cyclic sedimentation and its link to episodic tectonism, and the contentious question of tectonic versus sea level controls on sequence stratigraphy.

Three foreland basin and foldbelts, the Guadalquivir Basin (Betic orogen), the Ebro Basin (Pyrenean orogen) and the Molasse Basin (Alpine orogen) were selected for detailed study and the book is divided into sections on this basis with an additional section on numerical modelling of the foreland basins. The three main sections are preceded by a useful introduction that summarises and discourses the main results of the project. There is also a comprehensive and helpful index.

The first section of the book consists of six papers on the Guadalquivir and Ebro foreland basins of Spain. While the subjects addressed by these papers are somewhat mixed, explorationists will find the papers dealing with the evolution of the Guadalquivir Basin, tectonic evolution of SE Pyrenean foreland basin and fluid flow in the latter basin, useful case studies.

By contrast, papers dealing with the French Western Alps are mainly focused towards thrusting and inversion. I was surprised that the paper on the restoration of the Digne

Thrust system made no mention of wells drilled in the area. A companion paper provides excellent documentation and analysis of the tectonics of the nearby Barreme Basin. Another very thorough paper based on field observation and analogue modelling experiments analyses thin skinned inversion in the Sub Alpine chains. A last paper, based on integrated use of well and seismic data, documents shortening of the marine molasses (foreland basin) sequence in the Geneva area.

The latter paper overlaps with the section dealing with the Swiss, German and Austrian Molasse Basin. The paper dealing with structural relationships between the Alps and Jura and the evolution of the Swiss Molasse Basin is a classic that should be required reading for students, as well as explorers in fold belts and foreland basins. The more contentious subject of eustatic versus tectonic control on foreland basin fill is discussed with reference to the SE German molasse in a paper that makes very effective use of well and seismic data; unsurprisingly tectonics is seen as the major control on transgressive–regressive cycles. Of more interest to oil explorationists is the reservoir analogue modelling study of tidal sediments that utilises the HERESIM software of the Institut Francais du Petrole. The final paper presents a useful overview of the hydrocarbon habitat of the Molasse foreland basin in Austria where almost all the hydrocarbons have been found, to date, in the Alpine foreland basin.

A set of papers dealing with various aspects of numerical modelling of foreland basins comprises the final section. Two papers deal firstly with generic modelling of stratigraphy and secondly with more detailed simulation of growth fold strata. The final paper offers a first attempt at modelling flexure of the German–Austrian molasse basin using an elastic plate model with some success.

This book should be required reading for university researchers involved in foreland basins and fold belts. Several key papers noted above are major contributions to the subject. Explorationists, will find these papers useful, as well as those dealing more directly with the hydrocarbon habitat of foreland basins in Western Europe.

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