things in the basement like myself. The utterly outrageous price is likely to put this book well out of the reach of most workers and, in these days of tight library budgets, I cannot recommend immediate purchase. A pity.

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Pinch of salt

Alsop, G. I., Blundell, D. J. and Davison, I. (editors) 1996. *Salt Tectonics*. Geol. Soc. Spec. Publ. **100**, 310 pp. Price: £66 (£22 for members of the Geological Society).

Special Publication No. 100 of the Geological Society of London is devoted to salt tectonics which has received some attention over the past decade, e.g. special volumes in Tectonophysics (v. 228, 1993) and Marine and Petroleum Geology (v. 9, 1992), by the Geological Society of America (Memoir 177, 1990) and by the AAPG (Memoir 65, 1996). The book is a selection of papers presented at a meeting of the Petroleum and Tectonics Group of the Geological Society on 14–15th September 1994. It consists of 5 parts: (1) An introduction to salt tectonics; (2) 7 papers on outcrop, mine and borehole studies; (3) 5 papers on regional case studies; (4) 5 papers on physical modelling; and (5) 3 papers on numerical and geophysical modelling.

Part 1, *Salt tectonics: some aspects of deformation mechanics*, is an introduction to the complex nature of salt tectonics and summarizes highlights of the papers presented in this volume combined with a selection of papers from the literature.

Papers in Part 2, *Outcrop, mine and borehole studies*, give detailed descriptions of the internal structure and kinematics of mobilized salt and surrounding host rocks. Burliga describes the internal structure and kinematics of the Klodawa salt diapir in Central Poland which is characterized by heterogeneous strain distribution and complex folding in alternations of competent (dolomite, anhydrite and shale) and incompetent layers (salt and potash rocks). Davison *et al.* studied salt diapirs and their host rocks in North-West Yemen. They give a detailed description of the uplift and deformation of surrounding sediments, show proof of an ancient namakier (salt glacier) and currently active diapirism. On p. 33 they show a very scenic picture of the village of Jabal al Milh with a large herd of camels and a normal-faulted mosque. Frumkin uses the age and elevation of a cave (stream) channel in the Sedom Diapir located in the Dead Sea Basin, to determine diapiric rise during the Holocene. He found that the average uplift rate is around 3.5 mm per year but with short periods of accelerated uplift of 4 to 18 mm a year. Major, long term changes in uplift rates seem to occur every 1000–1500 years. Hoyos *et al.* describe an interesting mechanism for initiation of evaporite diapirs in two continental Neogene basins in Central Spain. Shallow anhydrite mounds are hydrated to gypsum and this gives an expansion of up to 61% in volume and lowers the density from 2.9 to 2.2. Note, however, that this mechanism of hydration of anhydrite to gypsum for initiating evaporite diapirs can only take place above around 700 meters depth, as below this depth gypsum is unstable. Sans *et al.* studied the deformation in an evaporite detachment horizon in the external part of the Pyrenean fold-and-thrust belt. They give evidence for shear folding in the evaporites and demonstrate that diapiric and compressional folds are absent. Smith gives an analysis of the deformation of mesoscopic structures in the Permian Boulby Halite in Teeside, North-East England. They are mainly formed by lateral movements in the salt caused by differences in confining pressure. Talbot and Alavi predict a future syntaxis (an offset in orogenic belt between tectonic domains), the Quatar incipient syntaxis, in the Zagros mountain chain of the Alpine–Himalayan Orogen in Iran. The localisation is controlled by the presence to the south-east and absence to the north-west of Hormuz salt on Pre-Cambrian basement. Both domains have Miocene salt but the style of folding and diapirism is very different. Their paper illustrates that salt tectonics may not only play an important role on the style of folding, but also on the scale of an orogenic belt. Personally, I would classify this paper in Part 3, *Regional case studies*.

Papers in Part 3, *Regional case studies*, highlight the large influence of salt on the style of deformation. Buchanan *et al.* use a balanced section restoration technique to unravel the geometric and kinematic evolution of salt structures and their sedimentary host rocks in the North Sea. They demonstrate the presence of three structural provinces: (1) Central Graben with thick-skinned extensional basement faults with large offsets, salt swells and high-amplitude diapirs; (2) Eastern Platform with low amplitude salt swells and no cover rock faults; and (3) Western Platform with low-amplitude salt swells and thin-skinned faults in the cover rocks. Edgell's paper is a summary of salt structures in the entire Persian Gulf Region, e.g. salt walls are localized along basement faults and domes at interacting basement faults. In some cases, the association of salt structues with oil fields is inferred from negative Bouguer gravity anomalies. He reports that 60% of proven recoverable oil reserves in the Persian Gulf Basin are related to salt structures and as the common theme in the paper is hydrocarbon accumulation near salt structures, I miss information on oil source rocks, migration and trapping. For example, the slow rise of diapiric structures and increased thermal anomalies are very important for generating (suitable oil window) and migrating oil. Spathopoulos shows an example of raft tectonics due to thin-skinned extension above a salt layer in the Angola Basin. In the sloping basin, there is extension with listric faults up-dip, but folding with salt diapirs (and possibly also allochtonous salt) down-dip. Raft tectonics is only active in those parts of the basin with a convex upward basement. Stewart *et al.* demonstrate the influence of the thickness of salt layers on cover faulting during thick-skinned extensional faulting in the North Sea. Salt diapirs are initiated at basement faults, and salt controls cover fault reactivation during inversion by regional compression, as the presence of salt prevents reactivated reverse basement faults from propagating through the cover rocks. Zirngast gives a detailed analysis of the development of the Gorleben salt dome in North-West Germany, presently being used for nuclear waste disposal. He uses the increase of sedimentary volume in rim synclines caused by withdrawal of salt to calculate the rise of the diapir. Growth rates show a large variation, the highest during the Late Cretaceous (0.14 mm per year) and much less during the Miocene and Quaternary (minimum of 0.03 mm per year).

Part 4, *Physical modelling*, has three papers on scale models. Alsop models overburden faults formed by diapirism due to down-building. Faults and fracture patterns characteristic for diapirism are formed in the sedimentary host rocks. Koyi analyses the origin of the salt sheets of the Gulf of Mexico using the following models: (1) tabular salt and tabular overburden; (2) tabular salt and wedge-shaped overburden; and (3) wedge-shaped salt and wedge-shaped overburden. His third model confirms that salt sheets are mobilized by differential loading formed by prograding sedimentary wedges. Szatmari *et al.* modelled a large scale extensional structure from the Santos Basin, offshore Brasil.

Part 5, *Numerical modelling*, has three papers on computer models. Cohen and Hardy calculated the effect of differential loading by prograding sedimentary wedges. They found that density inversion is not required but that with viscosity contrast, sufficient thickness of salt and slope could be responsible for the salt movement. Petersen and Lerche show the importance of thermal anomalies around salt structures for hydrocarbon generation. Poliakov *et al.* are the first to model simultaneous brittle faults and viscous flow in the overburden.

In their concluding remarks on p. 9, the Editors indicate that "there are a great deal of unknown aspects of salt tectonics". I agree with this statement and this is also visible in the book as it covers a rather limited scope. The reader will not find an overview of salt tectonics but papers dealing with some aspects of and new ideas on salt tectonics, illustrating the complex interaction of buoyancy, regional tectonics, faulting, sedimentation, etc., controlled by the high viscosity contrast between evaporites and host rocks. Most striking is the relation between extensional/basement faults and localization of diapirs and how salt controls the style of extensional faulting in the cover rocks. I also agree with the Editors that advances can be made in future research using 3D seimics, more realistic modelling materials, viscous/brittle deformation in numerical models (see the paper by Poliakov *et al.*) and detailed outcrop studies.

The book is well organized, has a large number of high quality photographs and illustrations, very few typos (e.g. bouyant on p. 136 instead of buoyant; numbering out of sequence on p. 172). It has a good mix of papers on field studies, regional studies, physical and numerical modelling, but is mainly suited for specialists readers and not for non-specialists. It does not give a complete overview but deals with some aspects of salt tectonics, mainly in extensional tectonic regimes. I can highly recommend it for a geoscience library given the relatively few publications that appear on salt tectonics, but due to the specialist nature of the book and relatively high price for non-members of the Geological Society, only specialist readers may think of buying a personal copy.

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