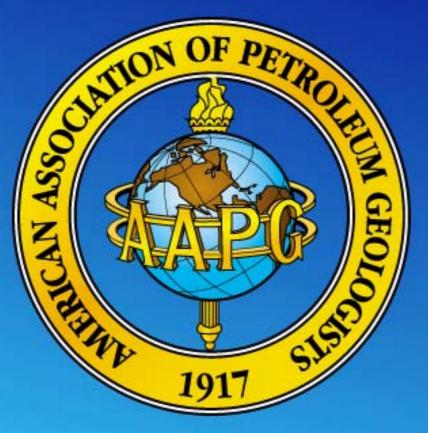
AMERICAN ASSOCIATION OF PETROLEUM GEOLOGISTS

AAPG Foundation Funded



Distinguished Lecture

Examples of salt tectonics from the West African passive margins: Exploration in a major emerging petroleum province

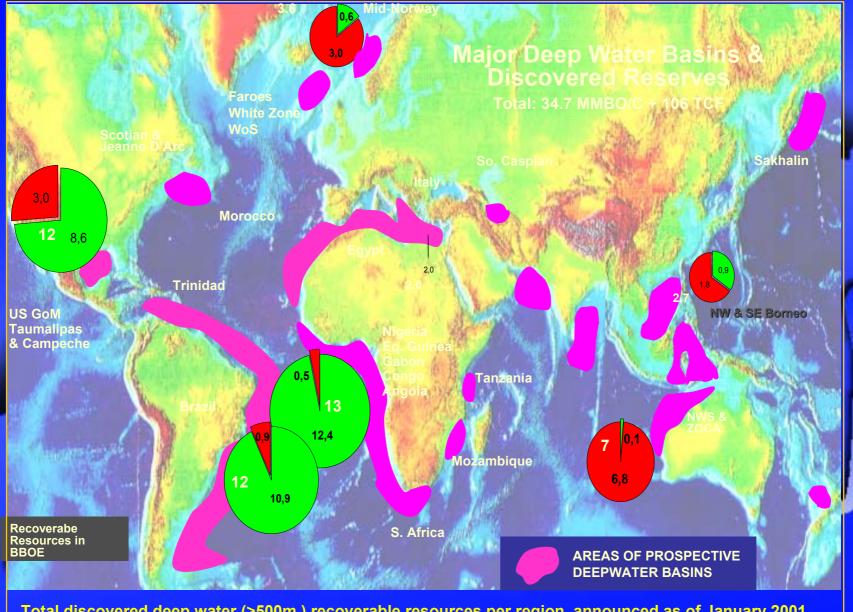
Gabor C. Tari Vanco Energy Company Houston, Texas (c) 2001 The American Association of Petroleum Geologists and Gabor C. Tari.

No slides, figures, text or other matter contained herein may be reproduced without the written permission of both the American Association of Petroleum Geologists and Gabor C. Tari.

OUTLINE

Introduction Morocco/Mauritania Senegal/Guinea Bissau **Equatorial Guinea/Gabon** Congo/Angola **Classification of toe-thrust zones** Syn-rift versus post-rift salt **Exploration implications Conclusions Acknowledgements**



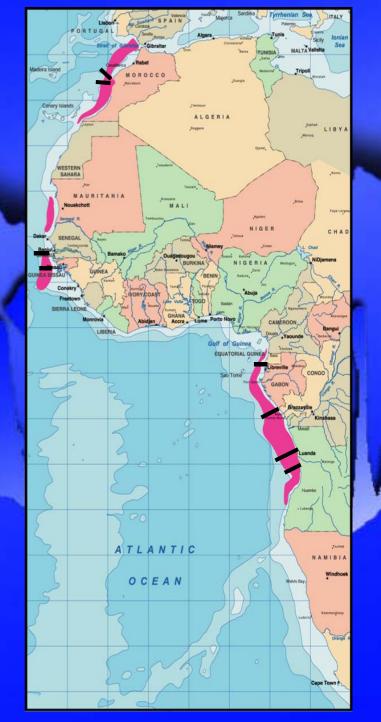


Total discovered deep water (>500m) recoverable resources per region, announced as of January 2001. These resources include producing reserves, those in development, and technically recoverable resources for which development has not been sanctioned. Pettingill and Weimer, in press

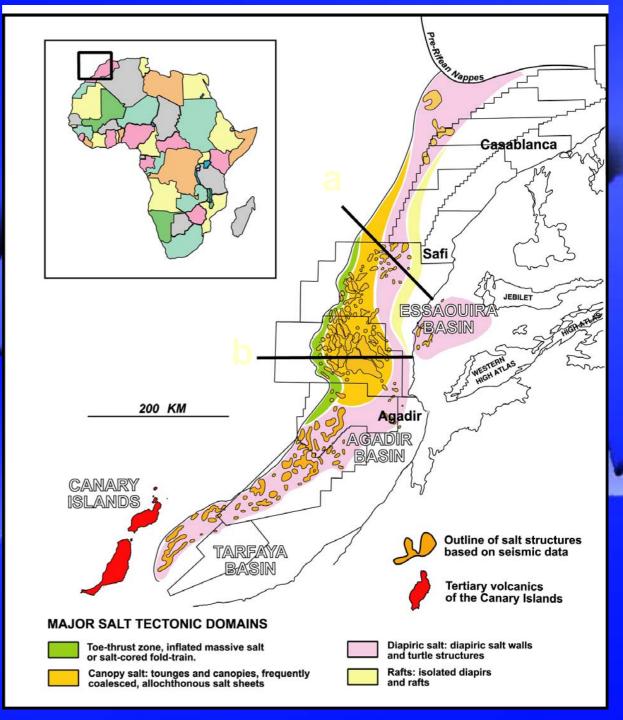
REGIONAL TRANSECTS

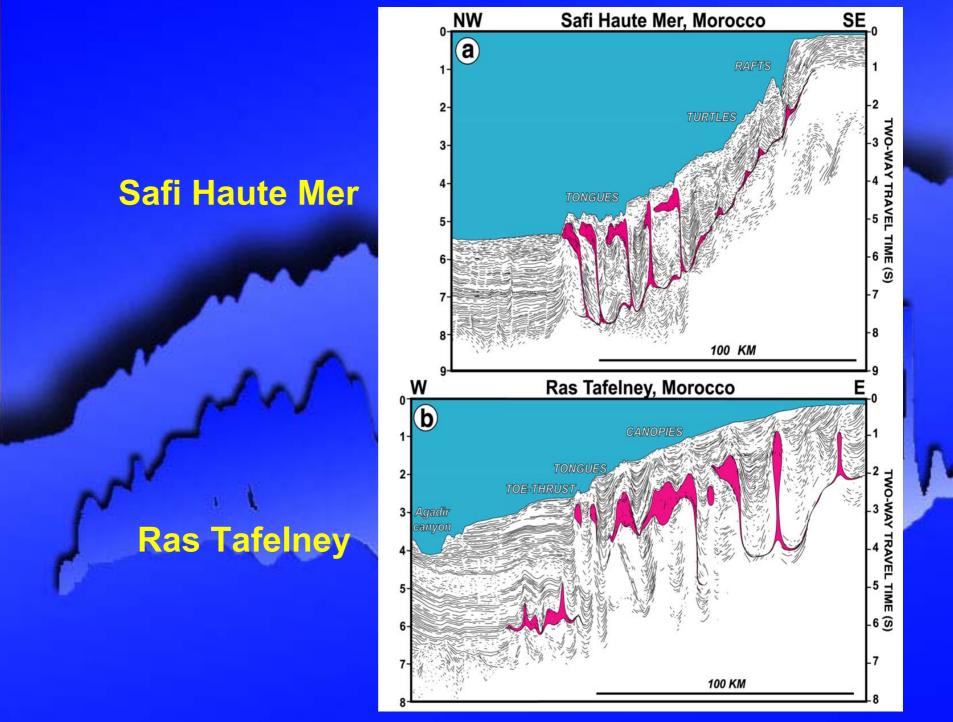
Syn-rift salt basins: Morocco, Mauritania Senegal, the Gambia Guinea Bissau

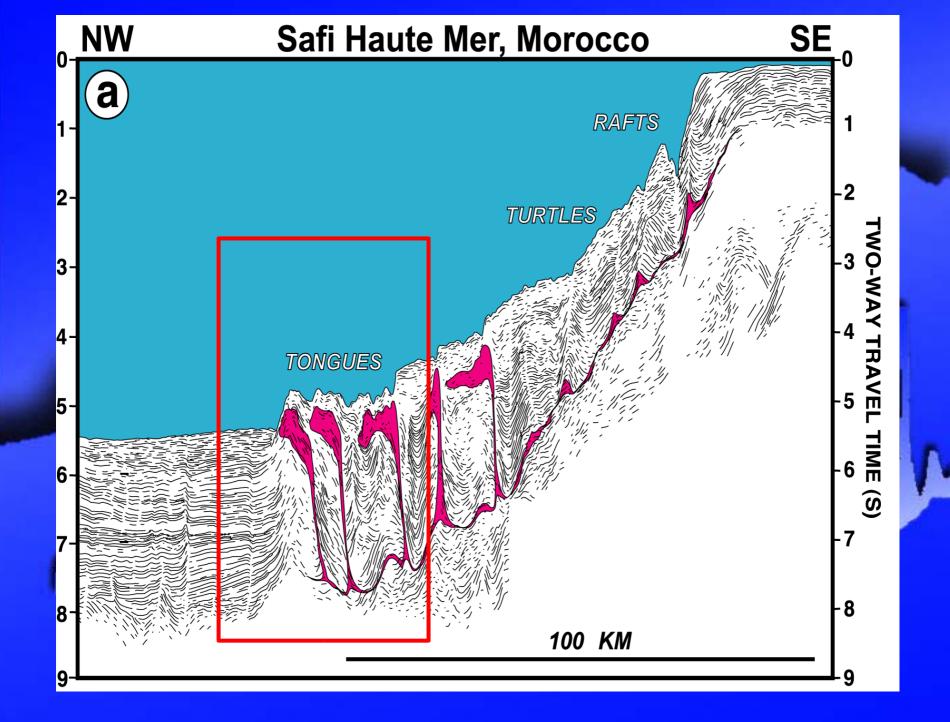
Post-rift salt basins: Cameroon, Equatorial Guinea, Gabon, Congo, Angola

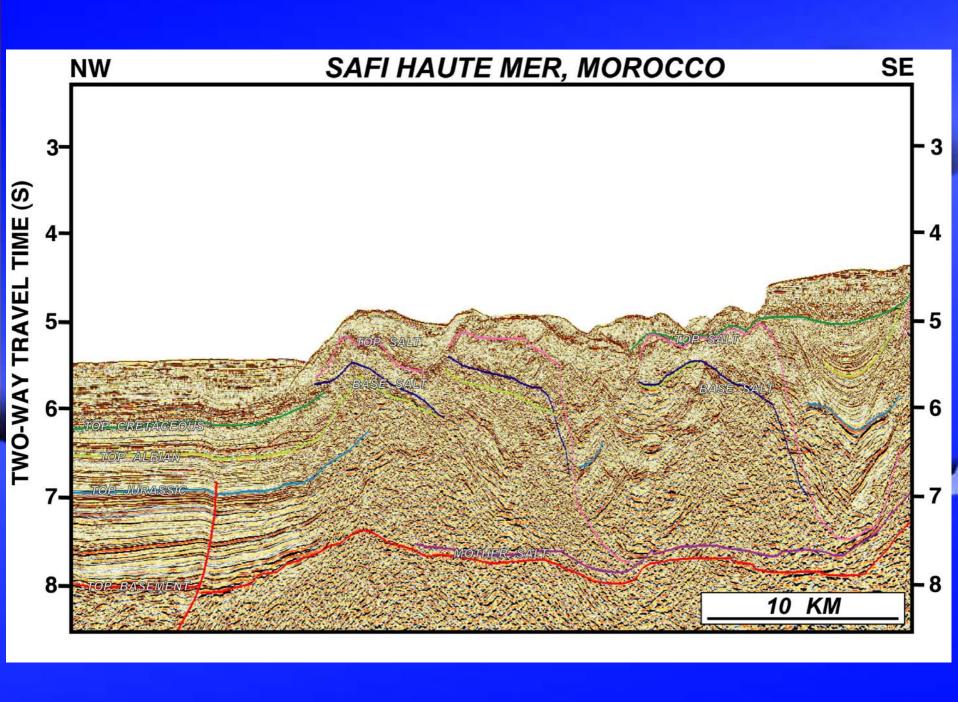


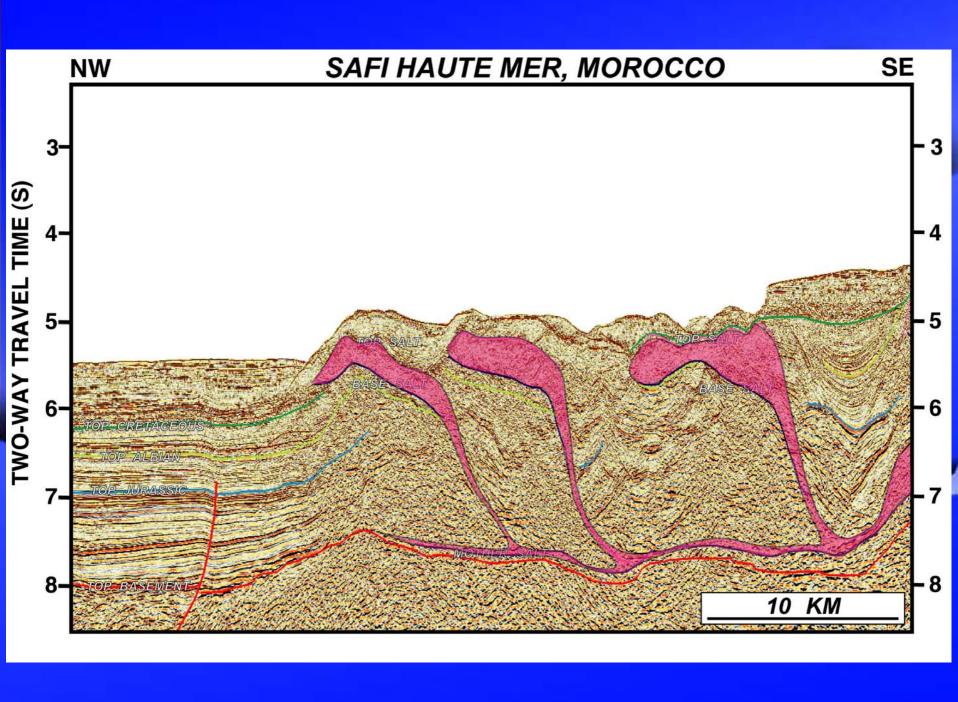
MOROCCO Regional transects

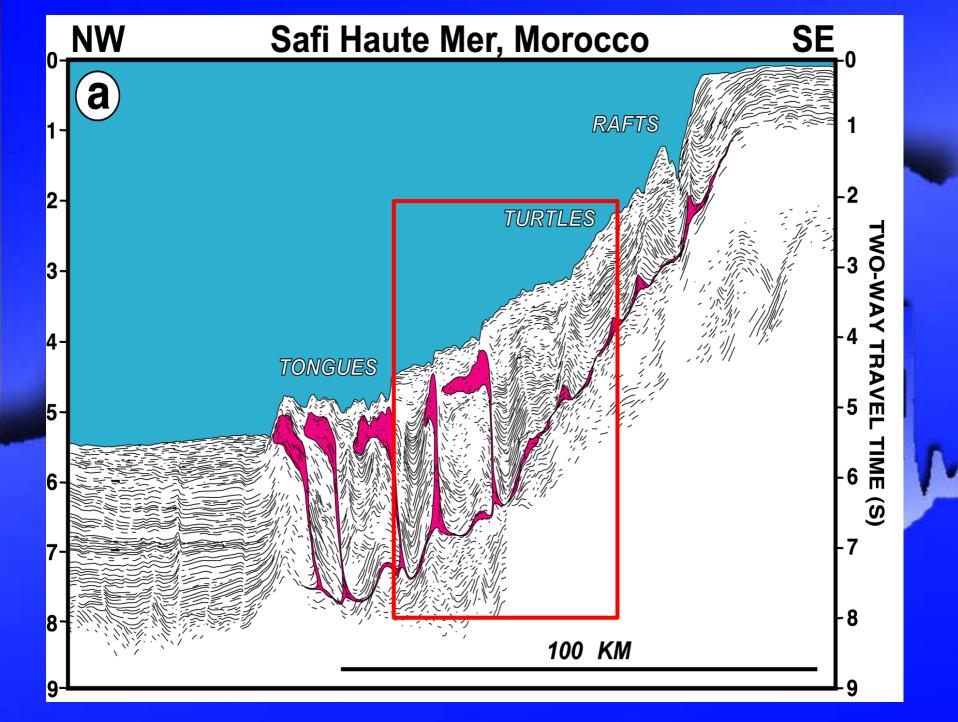


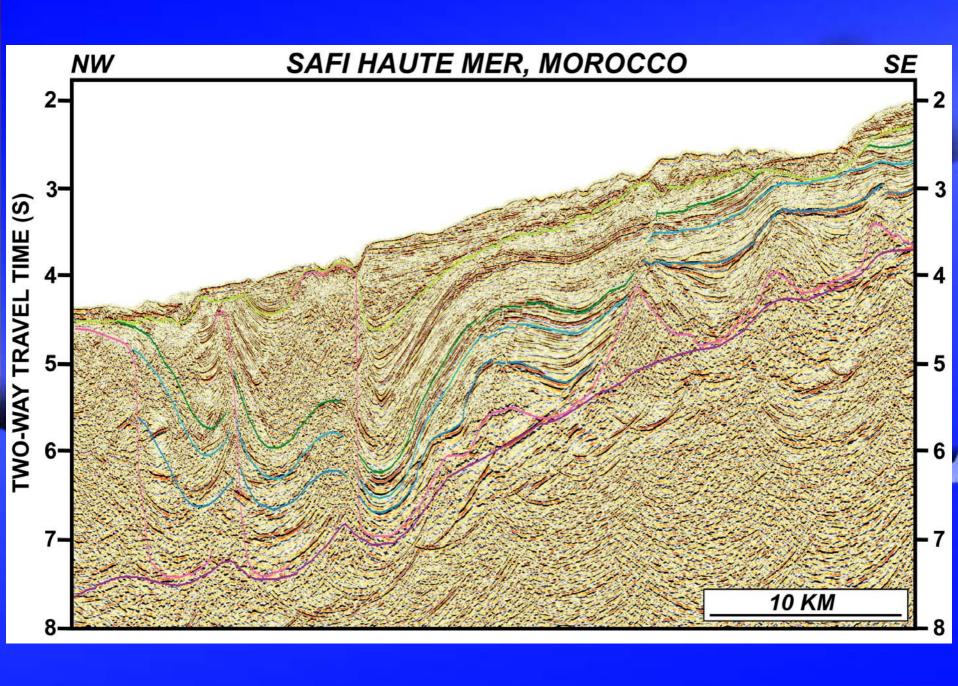


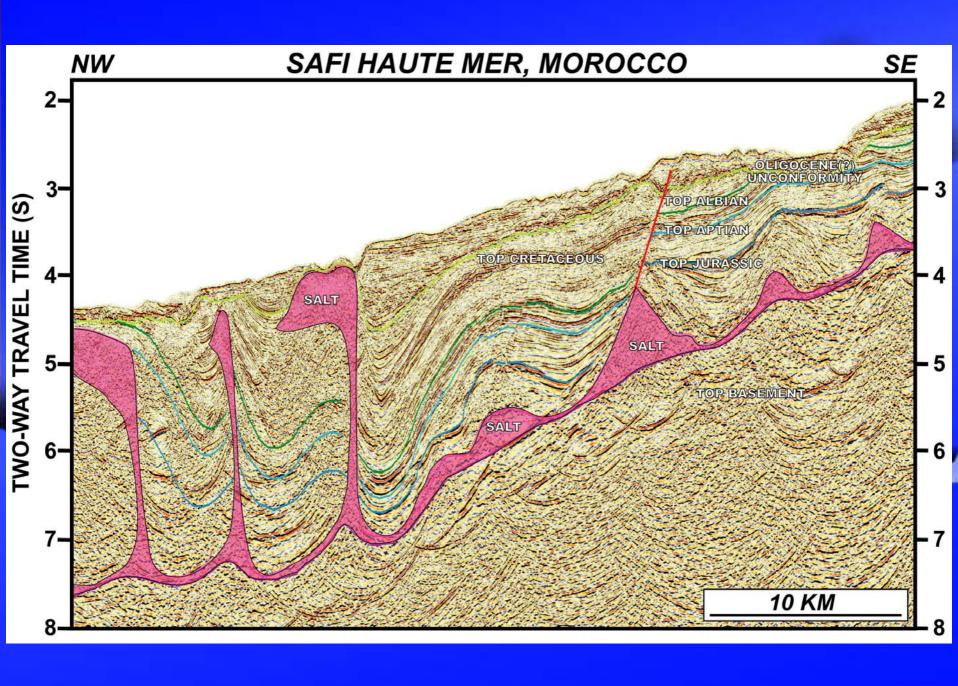


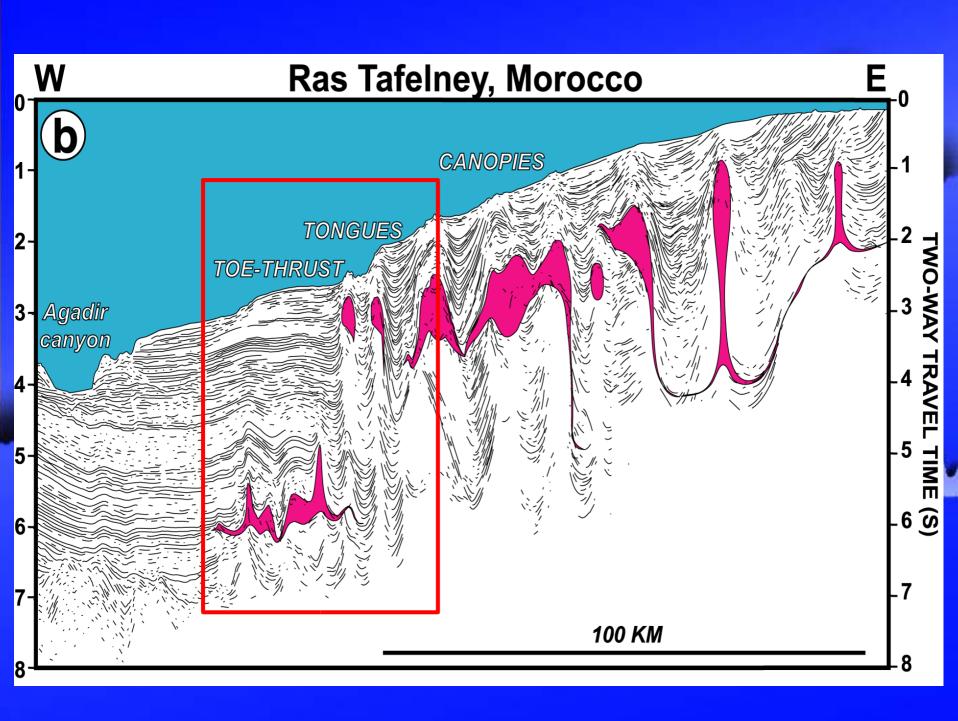


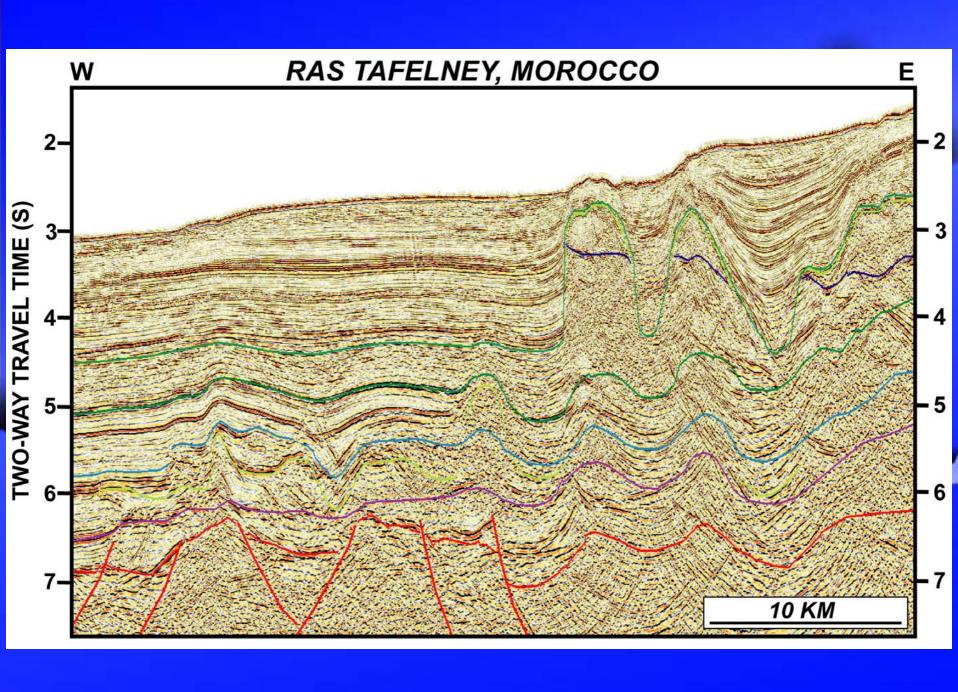


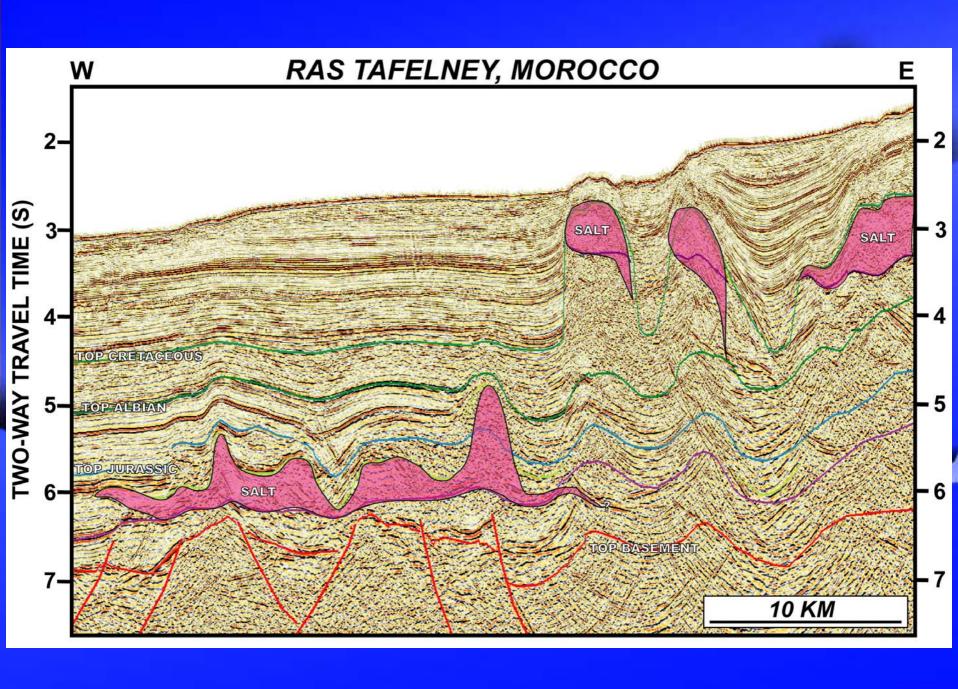


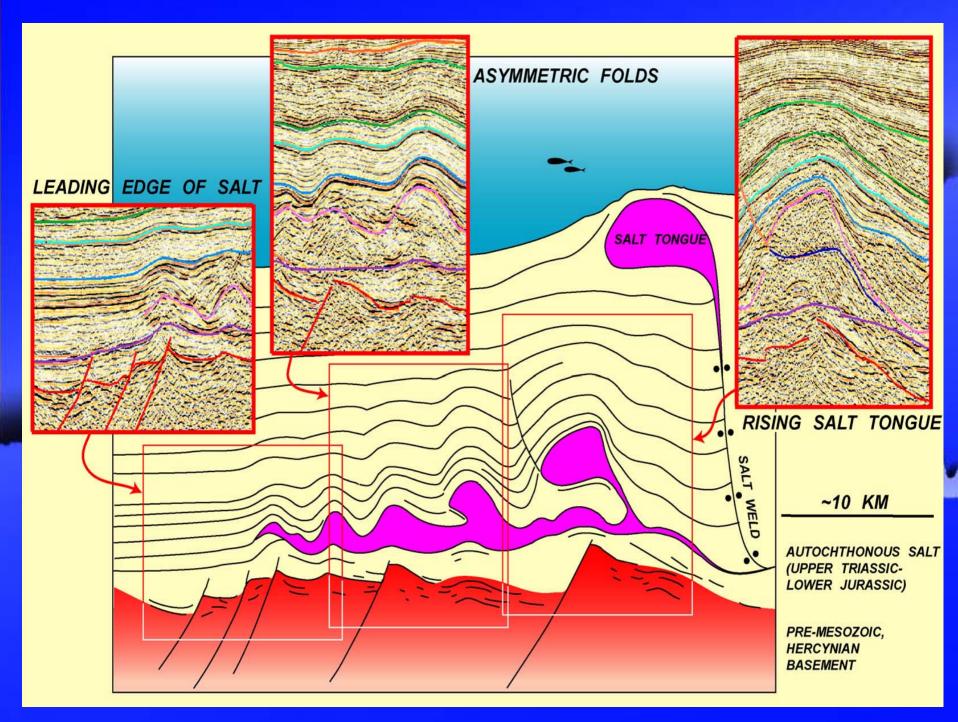


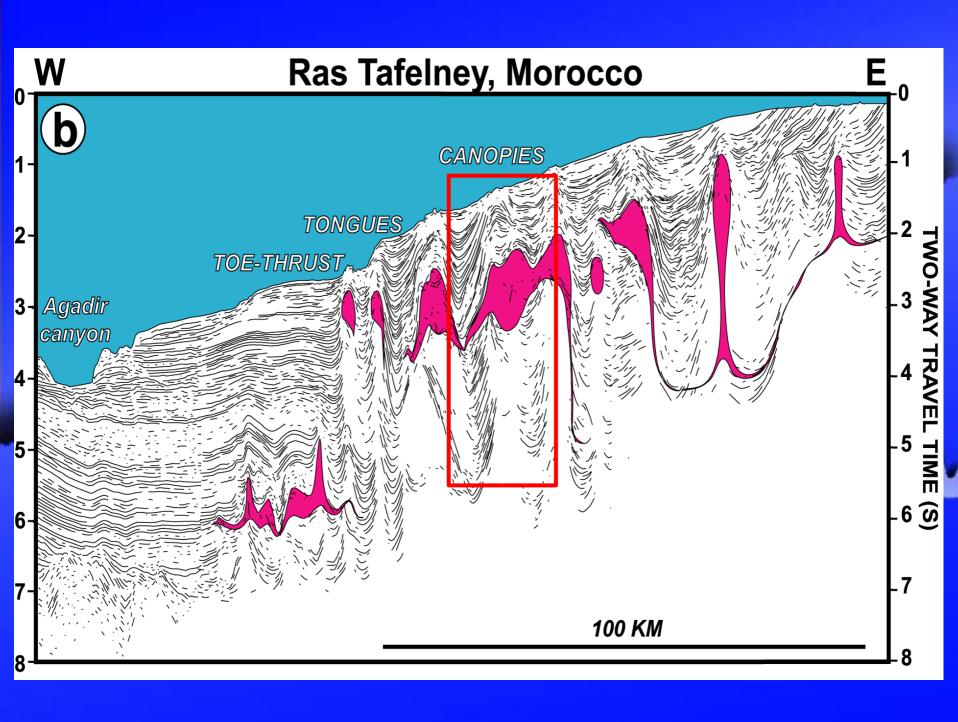


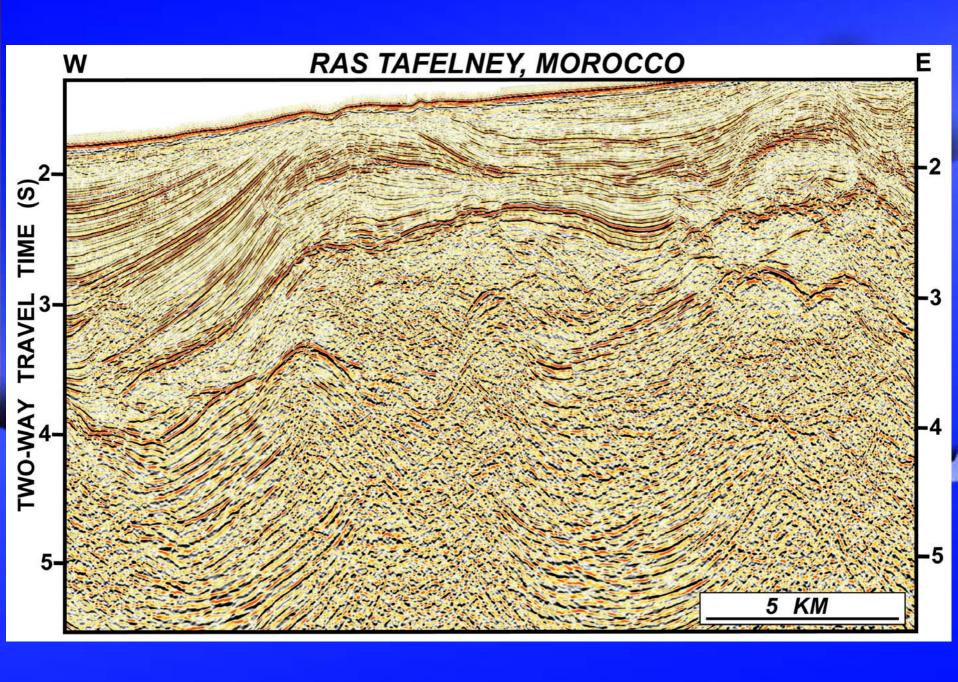


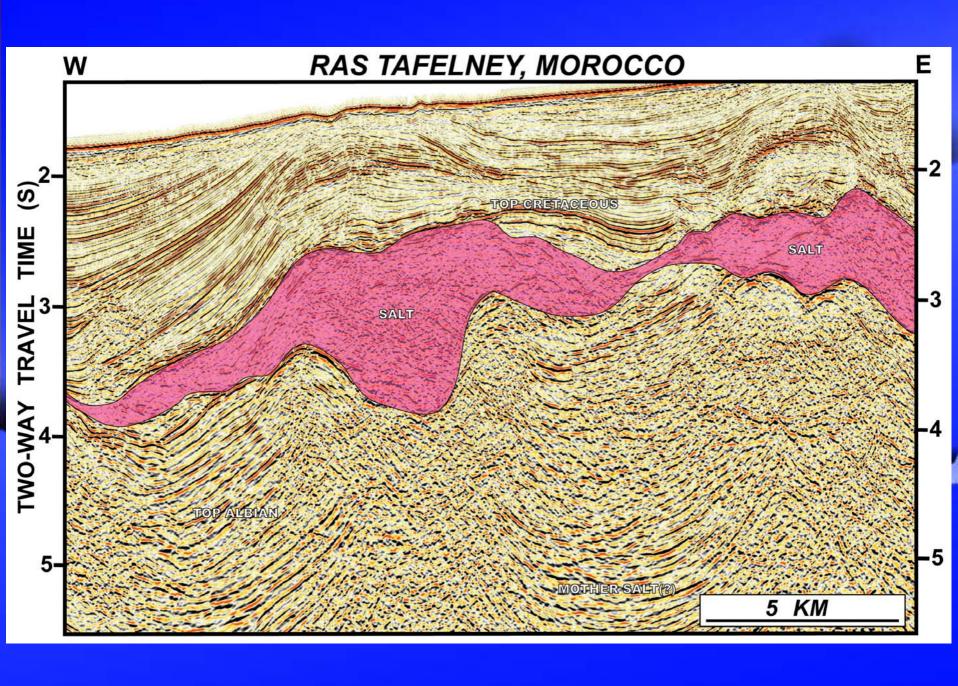






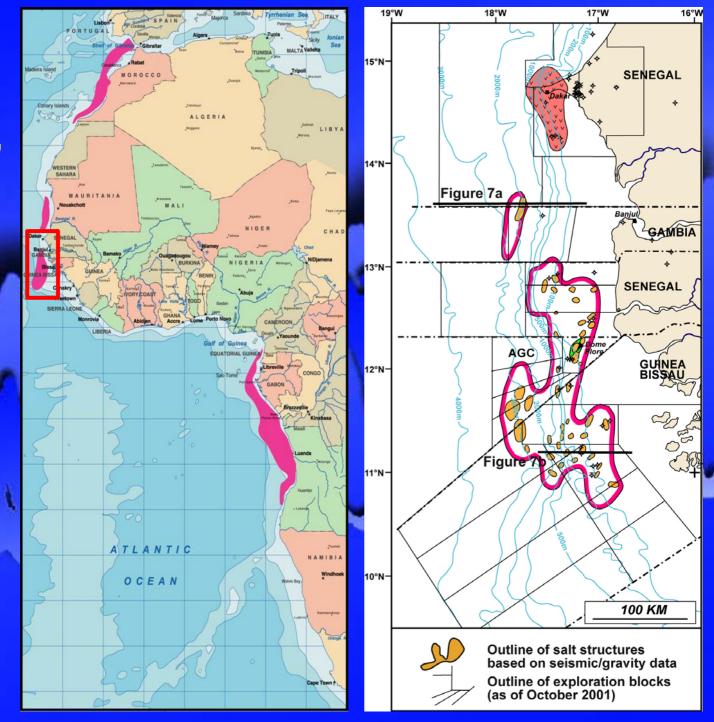






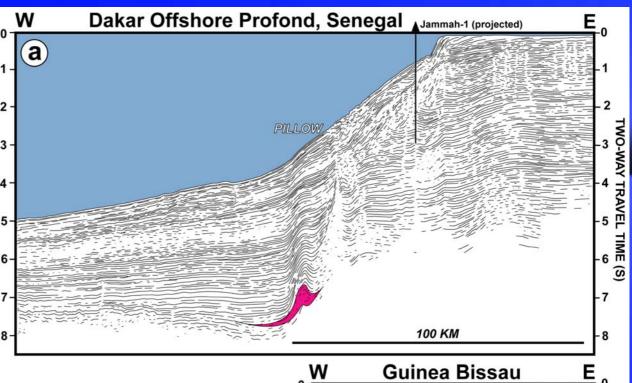
SENEGAL, THE GAMBIA, GUINEA BISSAU

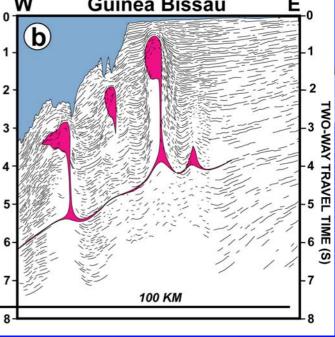
Regional transects

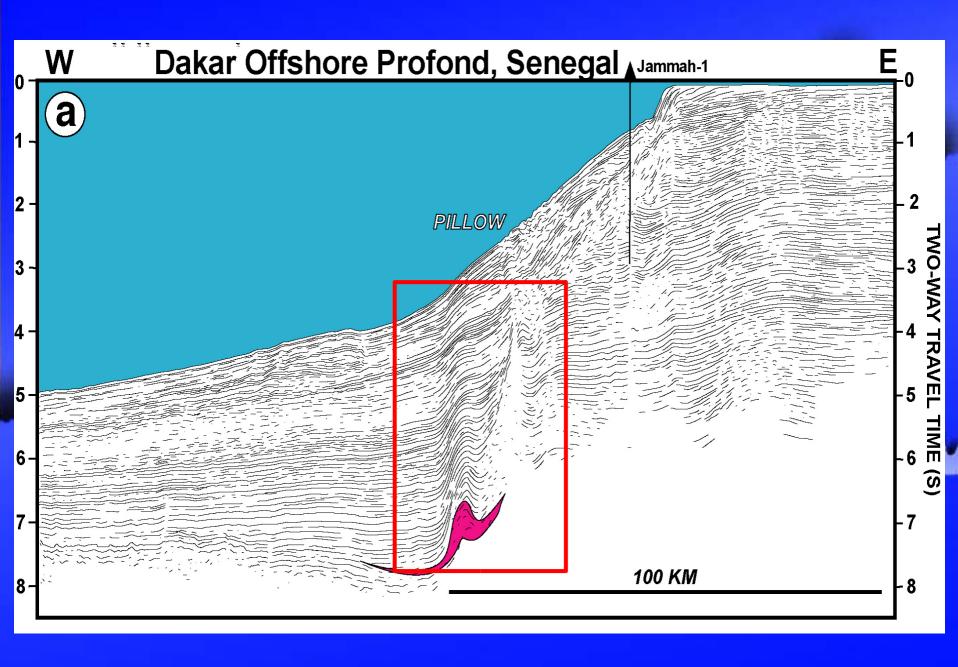


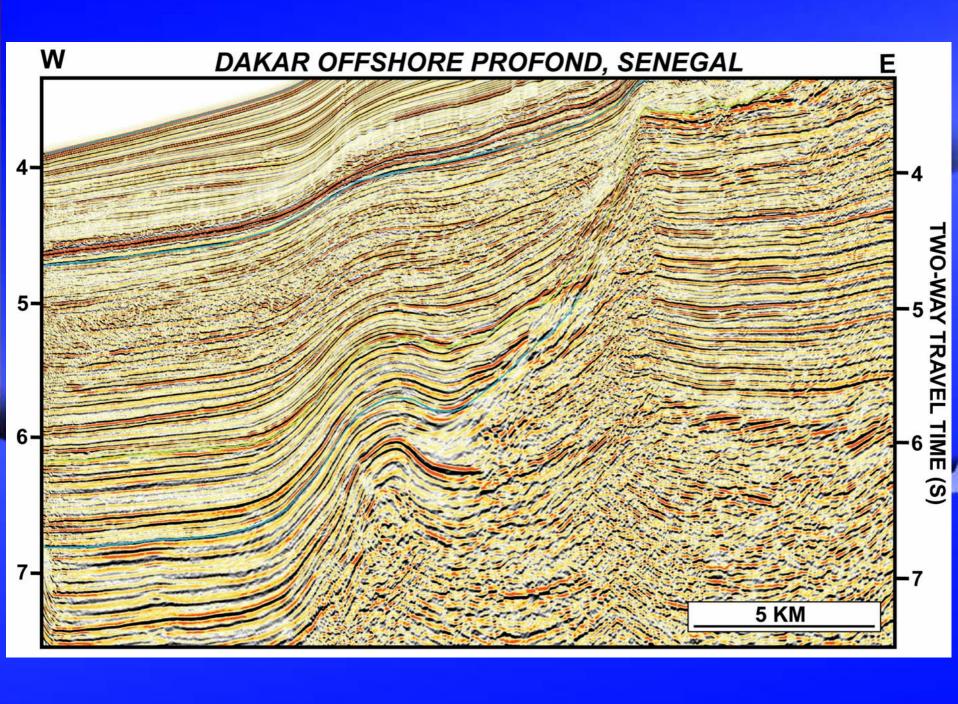
Dakar Offshore Profond

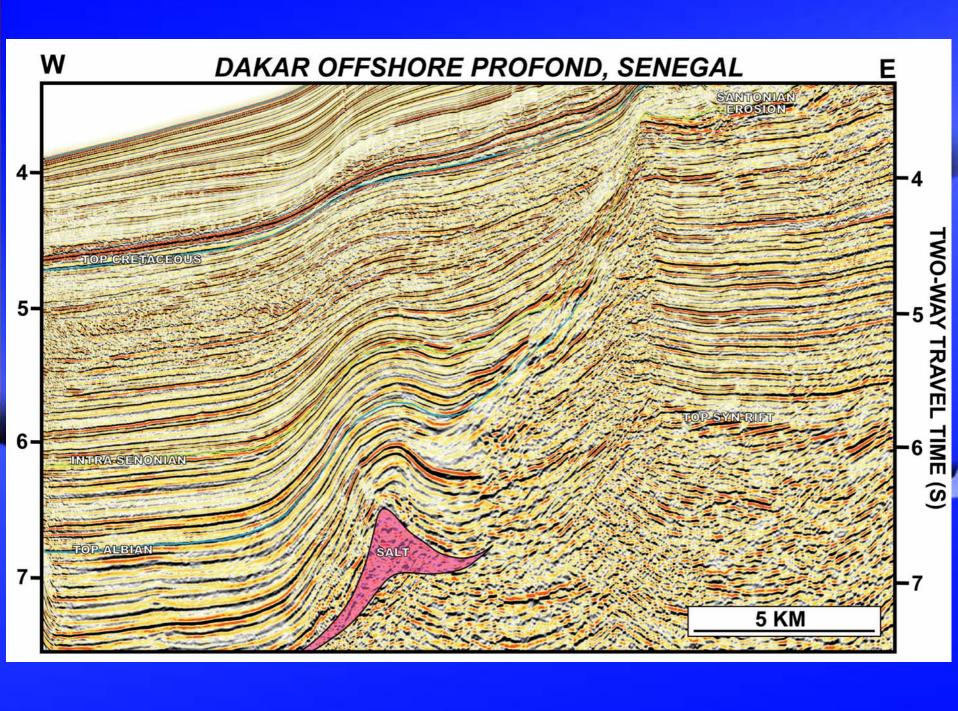
Guinea Bissau





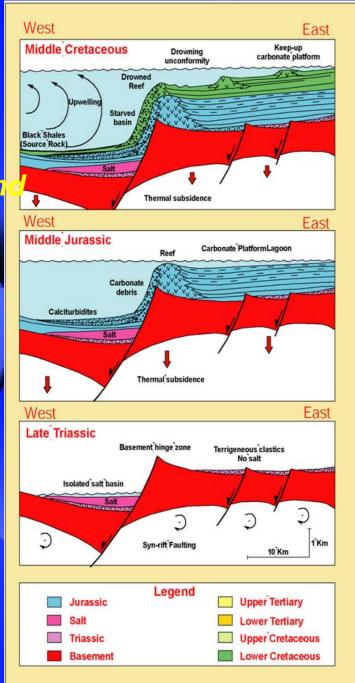


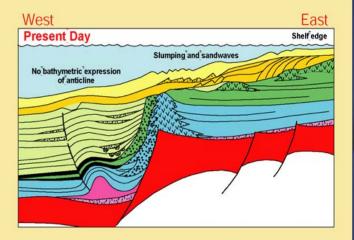


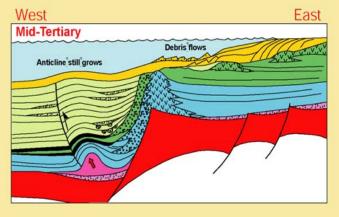


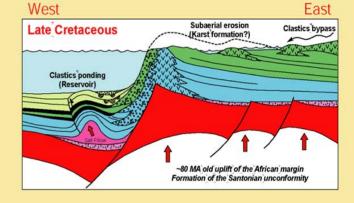
Schematic Restoration

Offshore Profon Dakar, Senegal









REGIONAL TRANSECTS

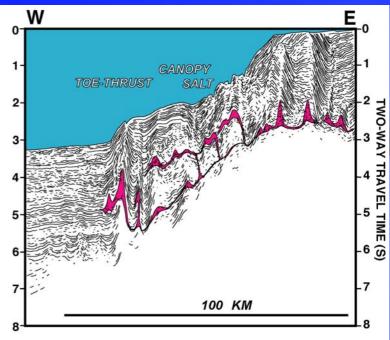
Syn-rift salt basins: Morocco, Mauritania Senegal, the Gambia Guinea Bissau

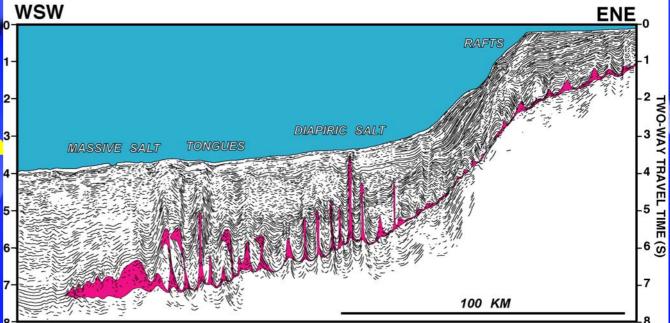
Post-rift salt basins: Cameroon, Equatorial Guinea, Gabon, Congo, Angola





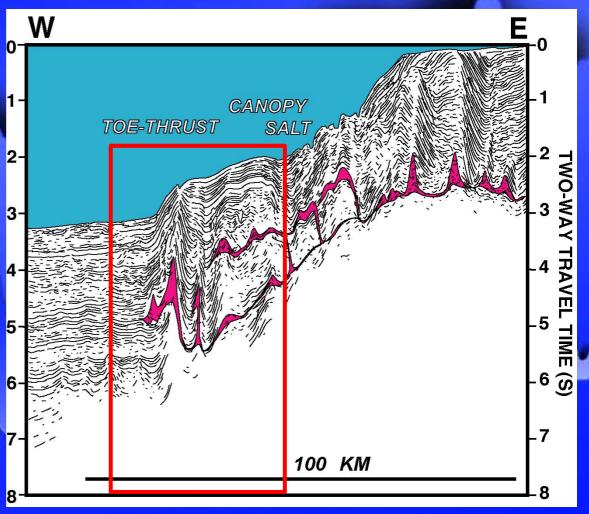
Astrid/Anton Marin³
Gabon

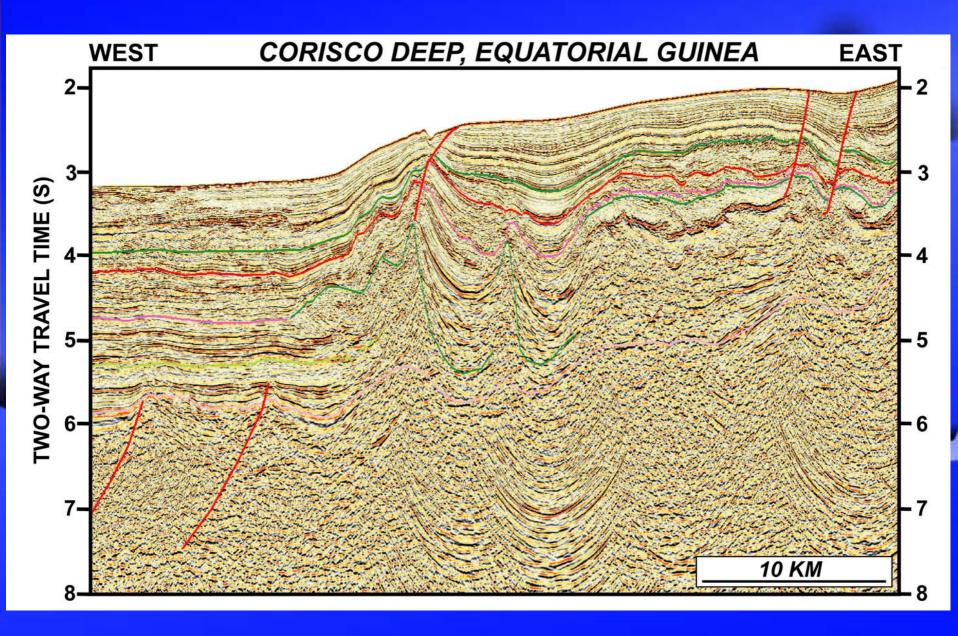


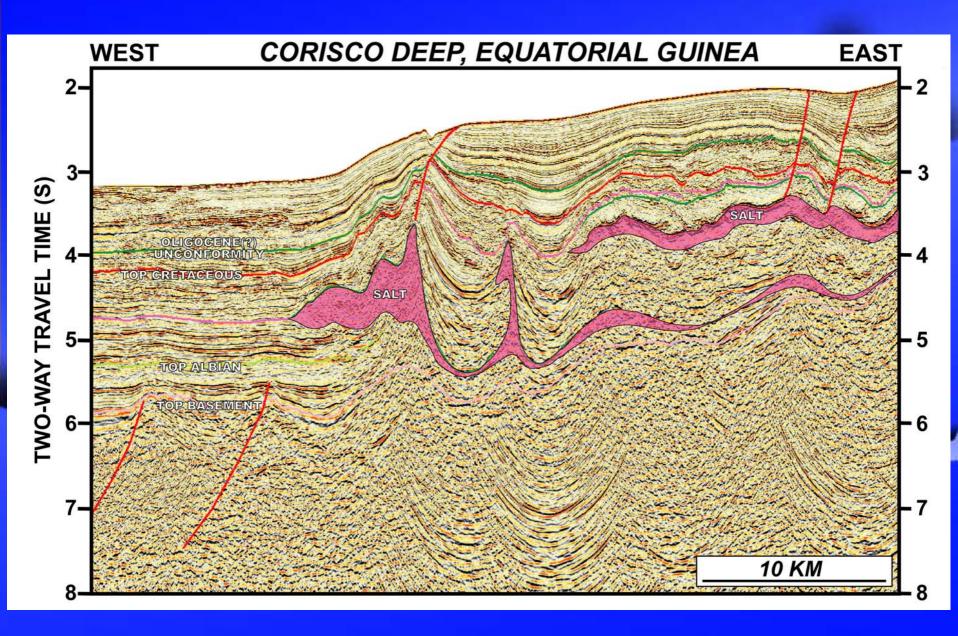


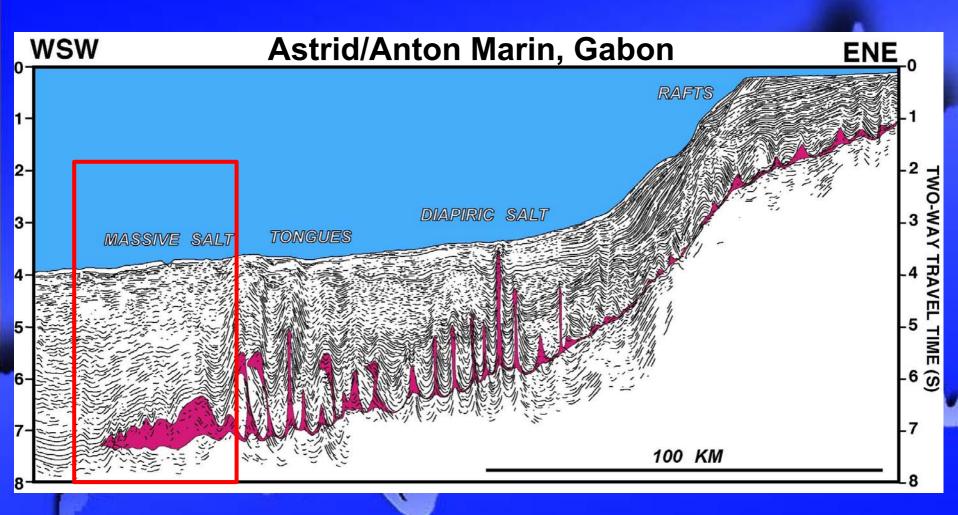
MALI ATLANTIC OCEAN

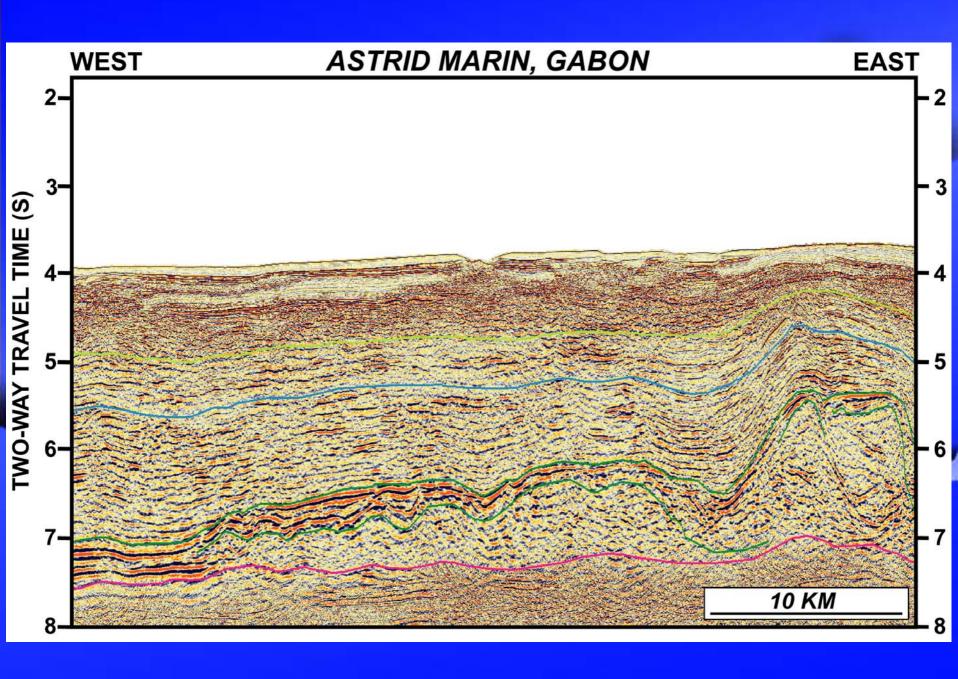
Corisco Deep, Equatorial Guinea

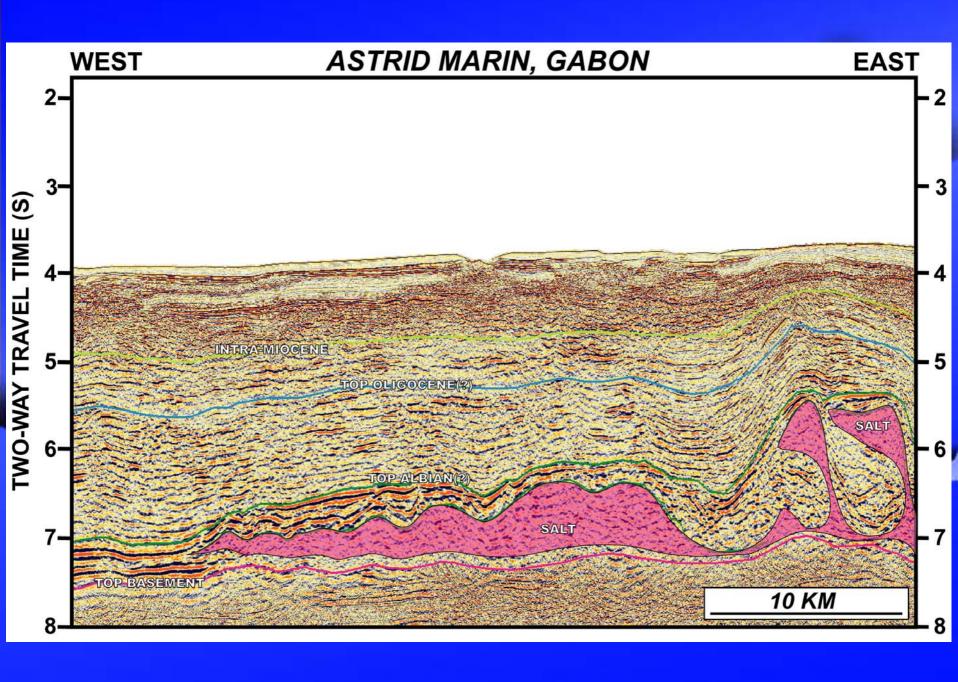




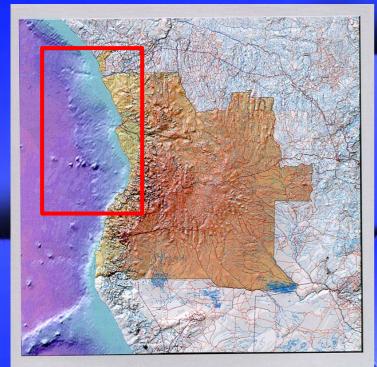








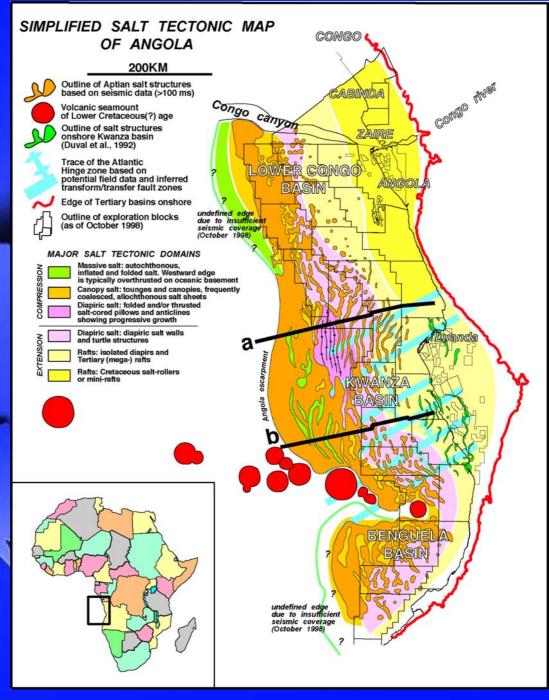
Lower Congo, Kwanza and Benguela basins, Angola

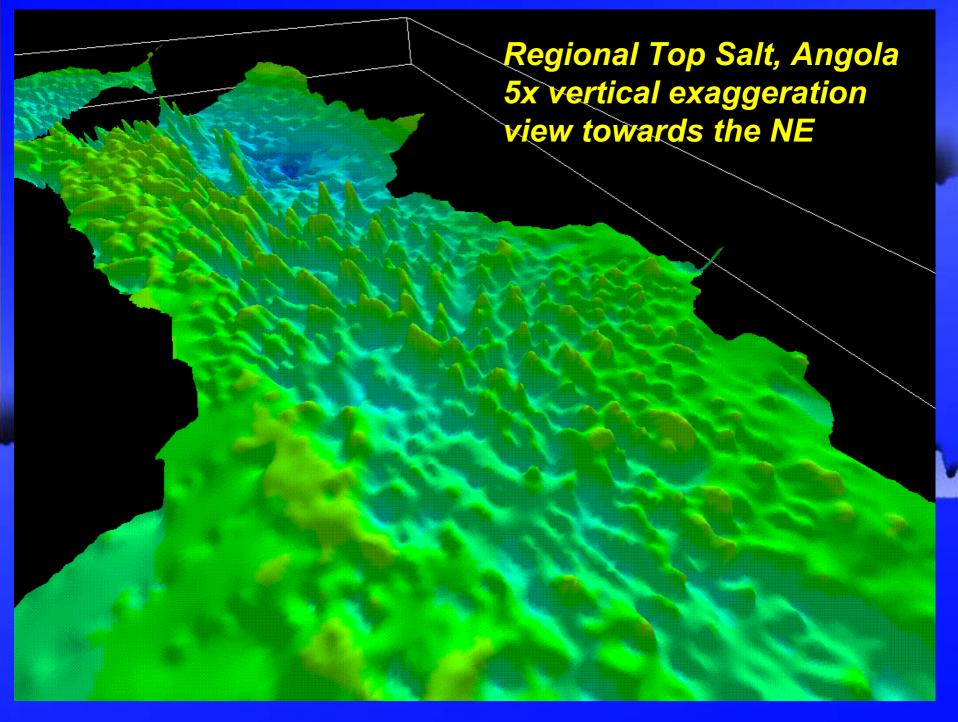


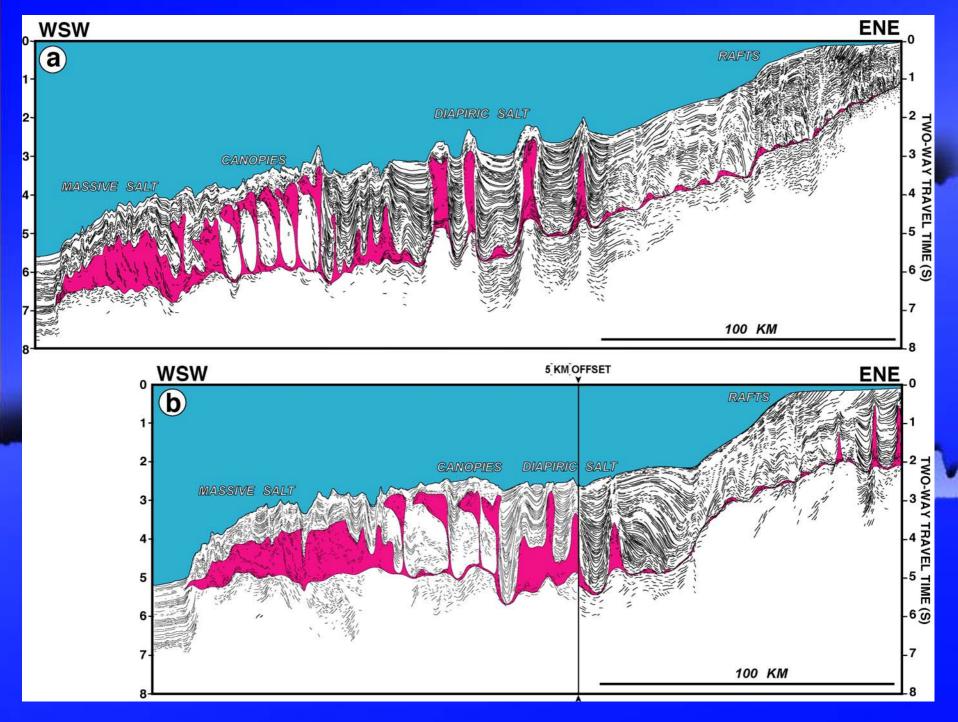
Mapa Topográfice

Angola









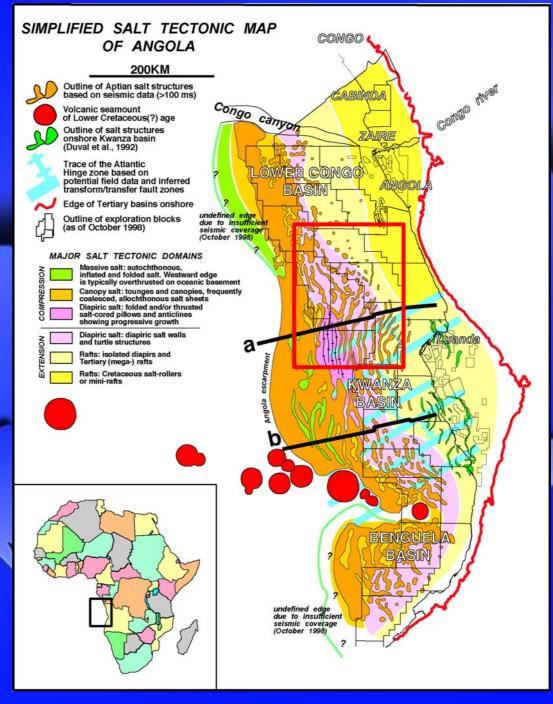
Lower Congo, Kwanza and Benguela basins, Angola



Mapa Topográfico

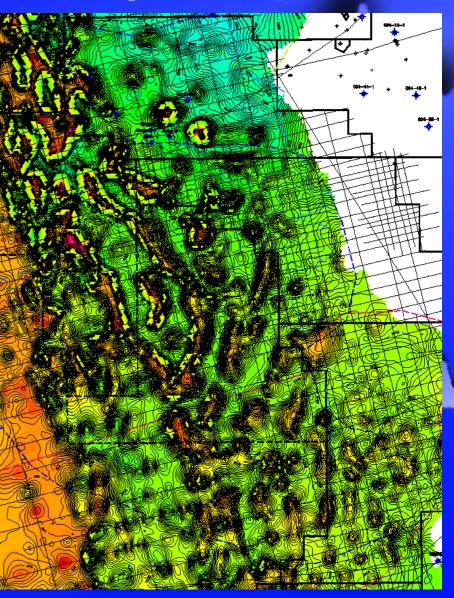
Angola



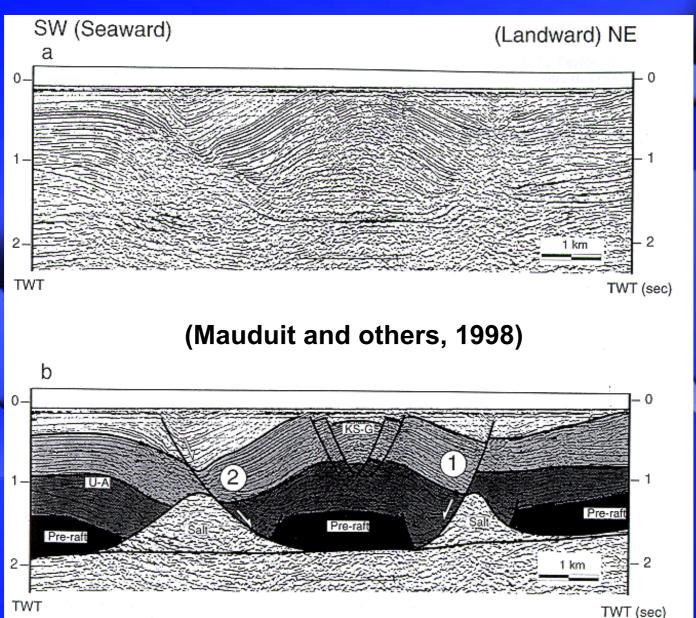


Regional Bathymetry

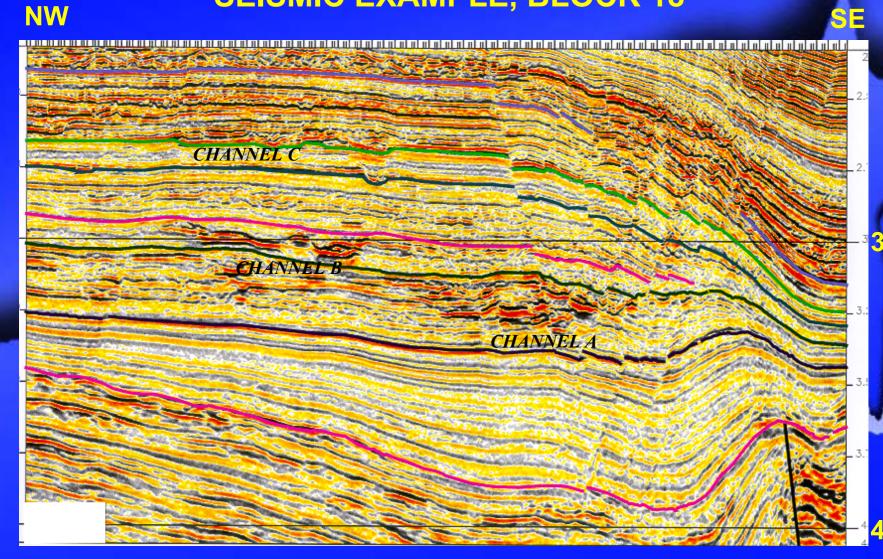
Regional Top Salt

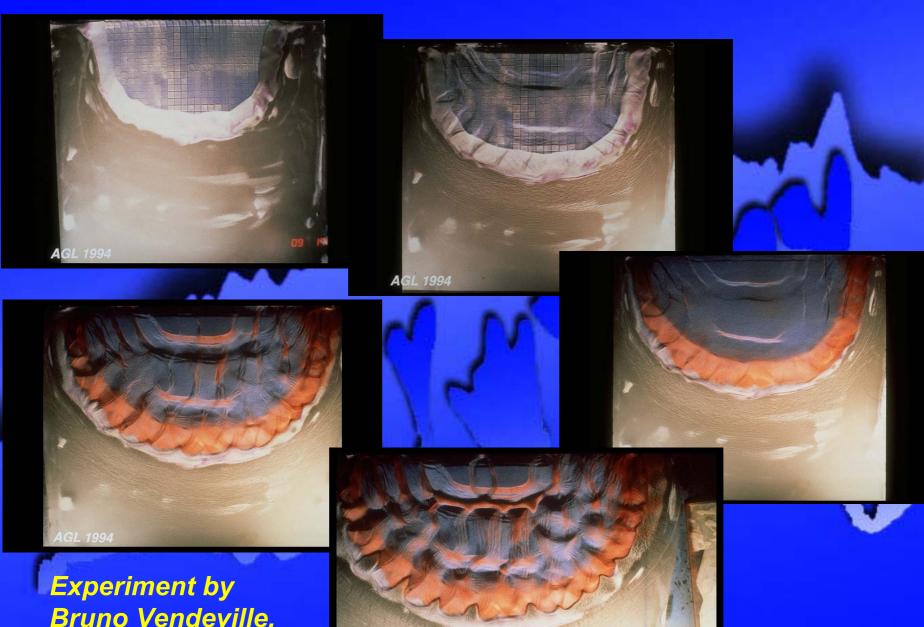


CROSS-SECTIONAL ASYMMETRY IN TURTLE STRUCTURE GROWTH



SEISMIC EXAMPLE, BLOCK 18



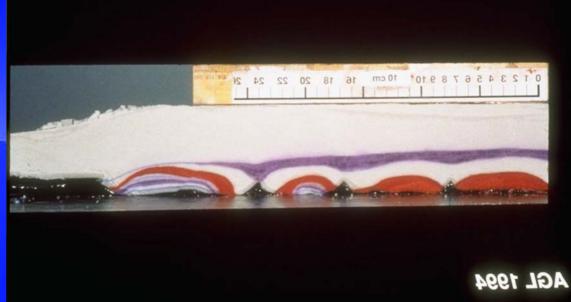


Bruno Vendeville, AGL, Austin, Texas

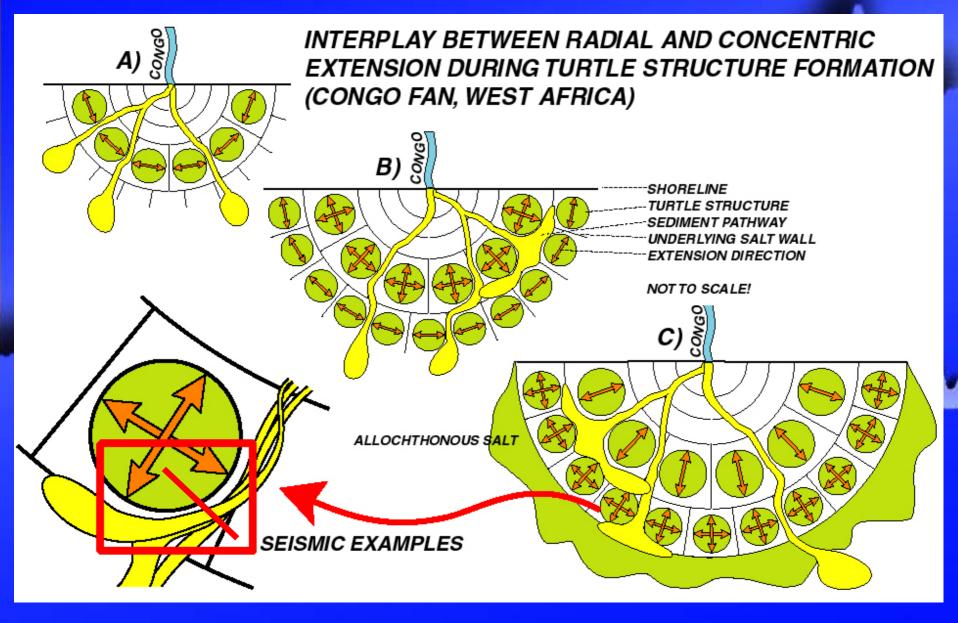




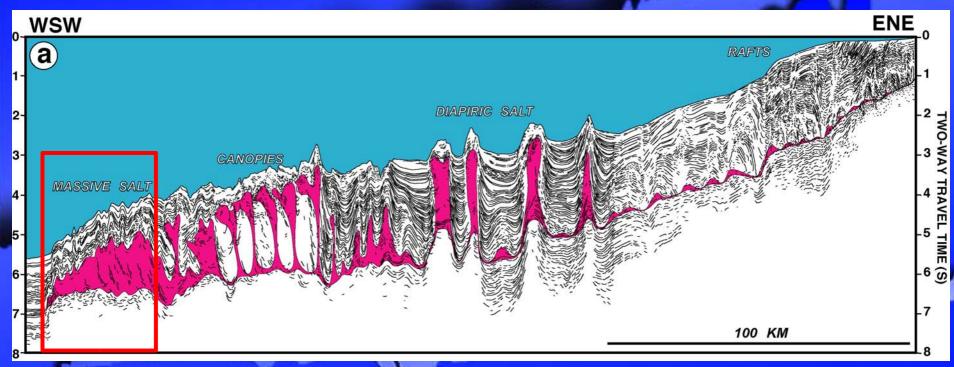
Experiment by Bruno Vendeville, AGL, Austin, Texas

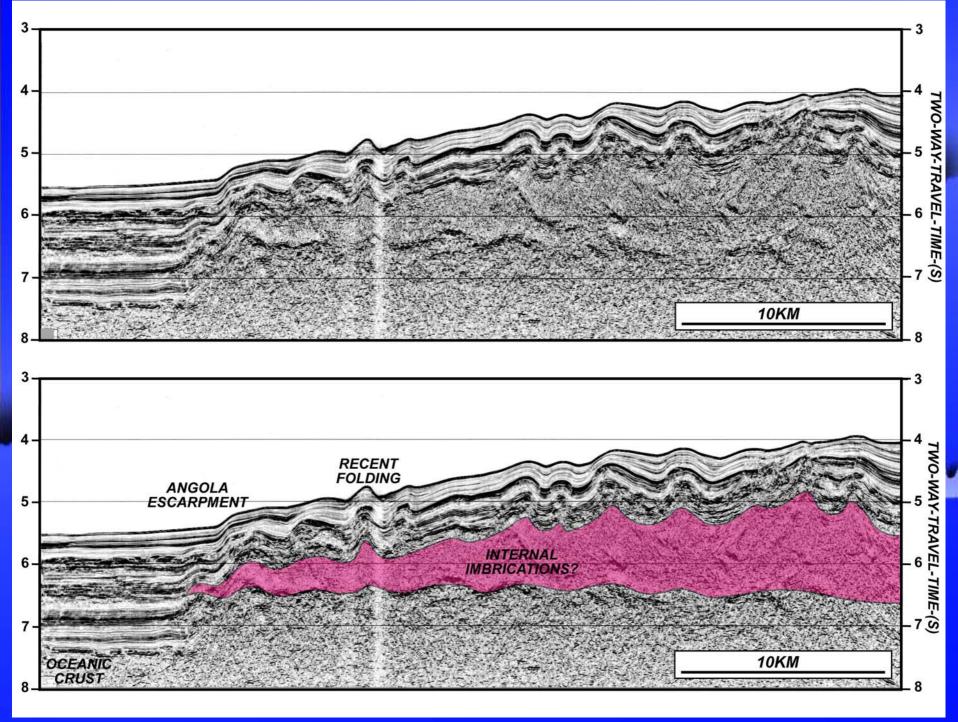


INFLUENCE OF TURTLE STRUCTURE GROWTH ON SEDIMENT DISPERSAL



Lower Congo Basin, Angola



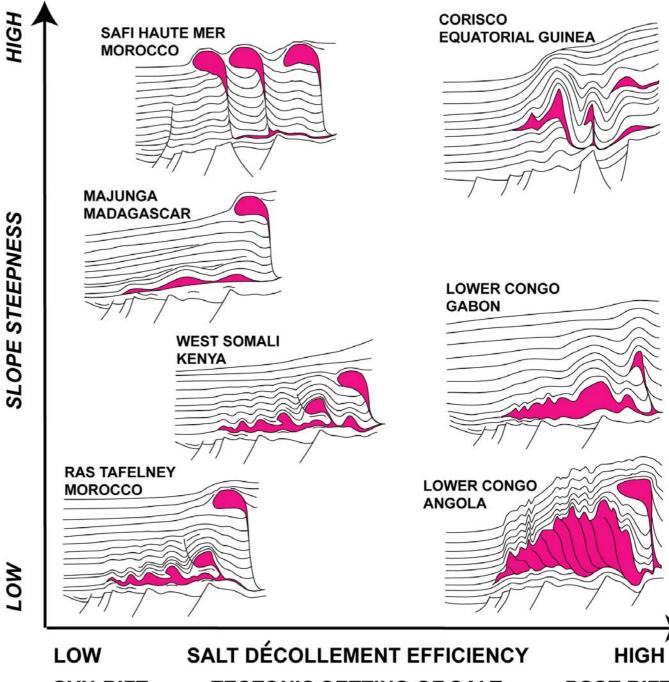


Qualitative classification of toe-thrust zones in **African salt** basins

MOT

SEDIMENTARY LOADING

HIGH

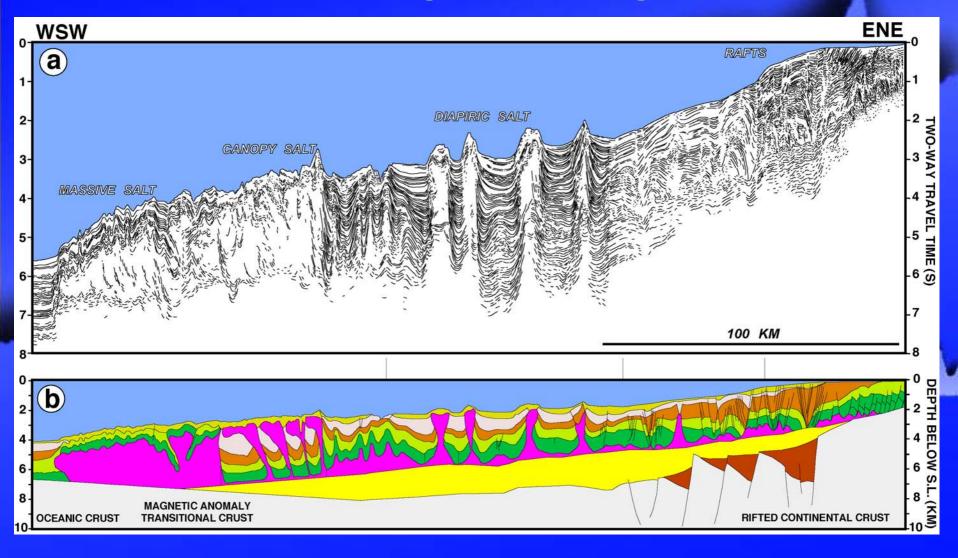


SYN-RIFT

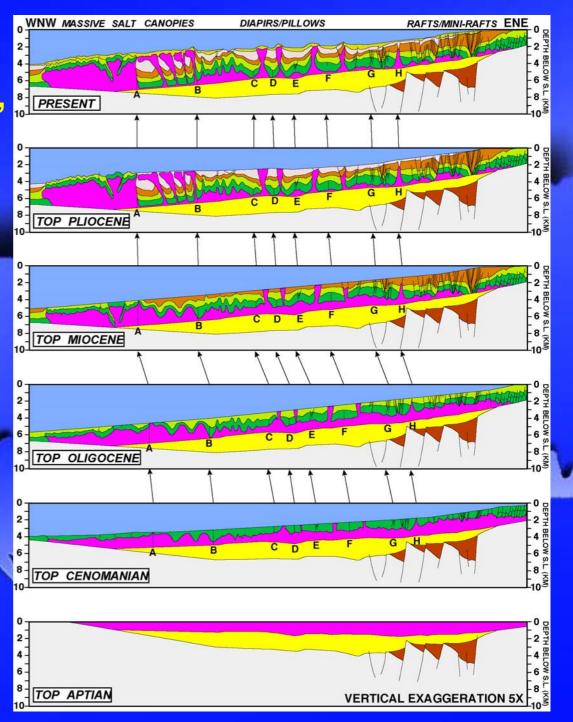
TECTONIC SETTING OF SALT

POST-RIFT

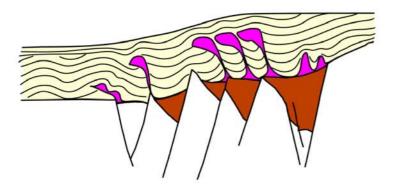
Lower Congo Basin, Angola



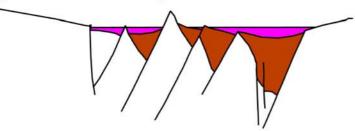
Sequential restoration, Lower Congo Basin, Angola



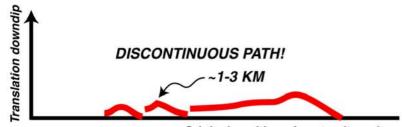
SYN-RIFT SALT Morocco, Senegal, The Gambia, Guinea-Bissau, Guinea *Present-day*



Syn-rift salt deposition



Translation history

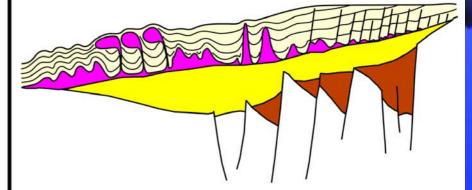


Original position of post-salt markers

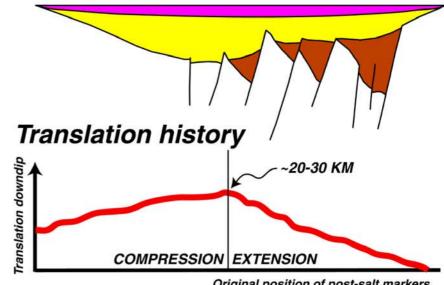
POST-RIFT SALT

Angola, Congo, Gabon, Equatorial Guinea, Cameroon

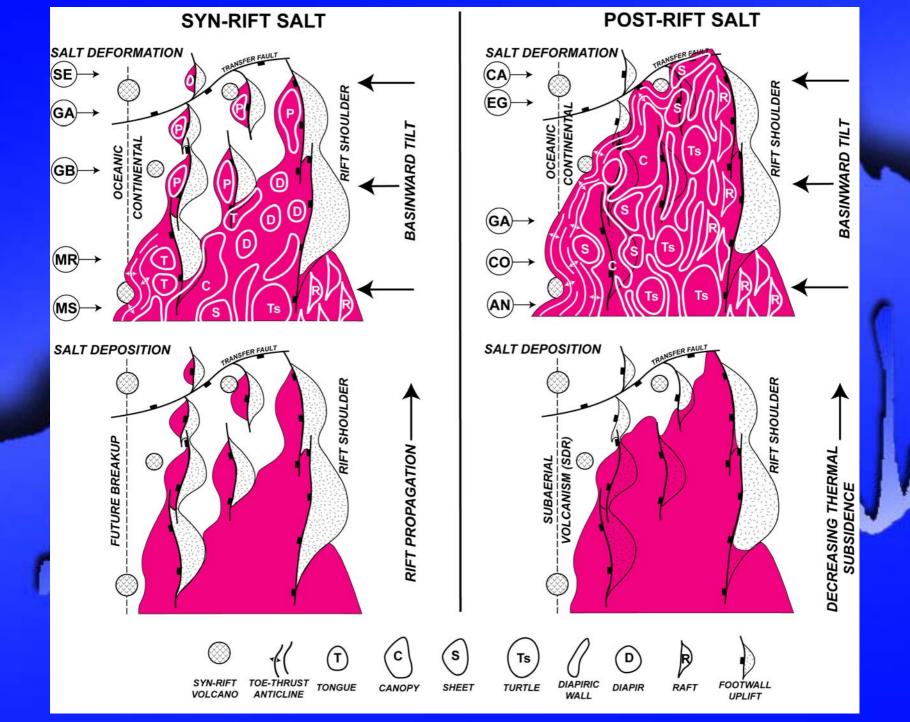
Present-day



Post-rift salt deposition



Original position of post-salt markers



EXPLORATION IMPLICATIONS

- The toe-thrust zone provides very attractive structural targets and generally the fold-train provides the first structures out-of-the-basin where hydrocarbons are generated.
- The toe-thrust zone in a syn-rift salt setting appears to create more dormant structures as opposed to the highly efficient post-rift salt case where the structural traps tend to be redeformed continuously which may lead to the loss of hydrocarbons.
- The salt-cored foldbelt may not always be present and it develops only when the original salt is fairly continuously distributed and the thickness decreases gradually towards the original basinward pinchout.

CONCLUSIONS

- Exploration experience gained in specific salt basins of West Africa may not be directly applicable to other salt basins along the entire passive margin.
- Regional-scale similarities of the salt basins include the progressive complication of salt-related structures basinward, the change from an extensional domain in the shelf to a compressional domain in the slope, and the presence of a toe-thrust zone at the oceanward edge of the basins.
- Regional-scale and perhaps prospect-scale differences are partly attributed to the relative stratigraphic position of the salt in relation to the rifting of the margin.

