

Combining Burial Histories and Sedimentary Basin Rotations

Donald Campbell^{1,2}, L.A. Lawver², L.M. Gahagan², and M.K.Horn³

¹Jackson School of Geosciences, Department of Geological Sciences ; ²Jackson School of Geosciences, Institute for Geophysics; ³Horn & Associates.

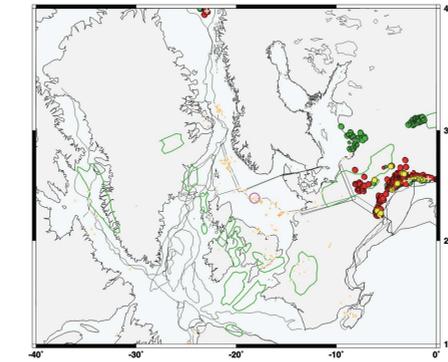
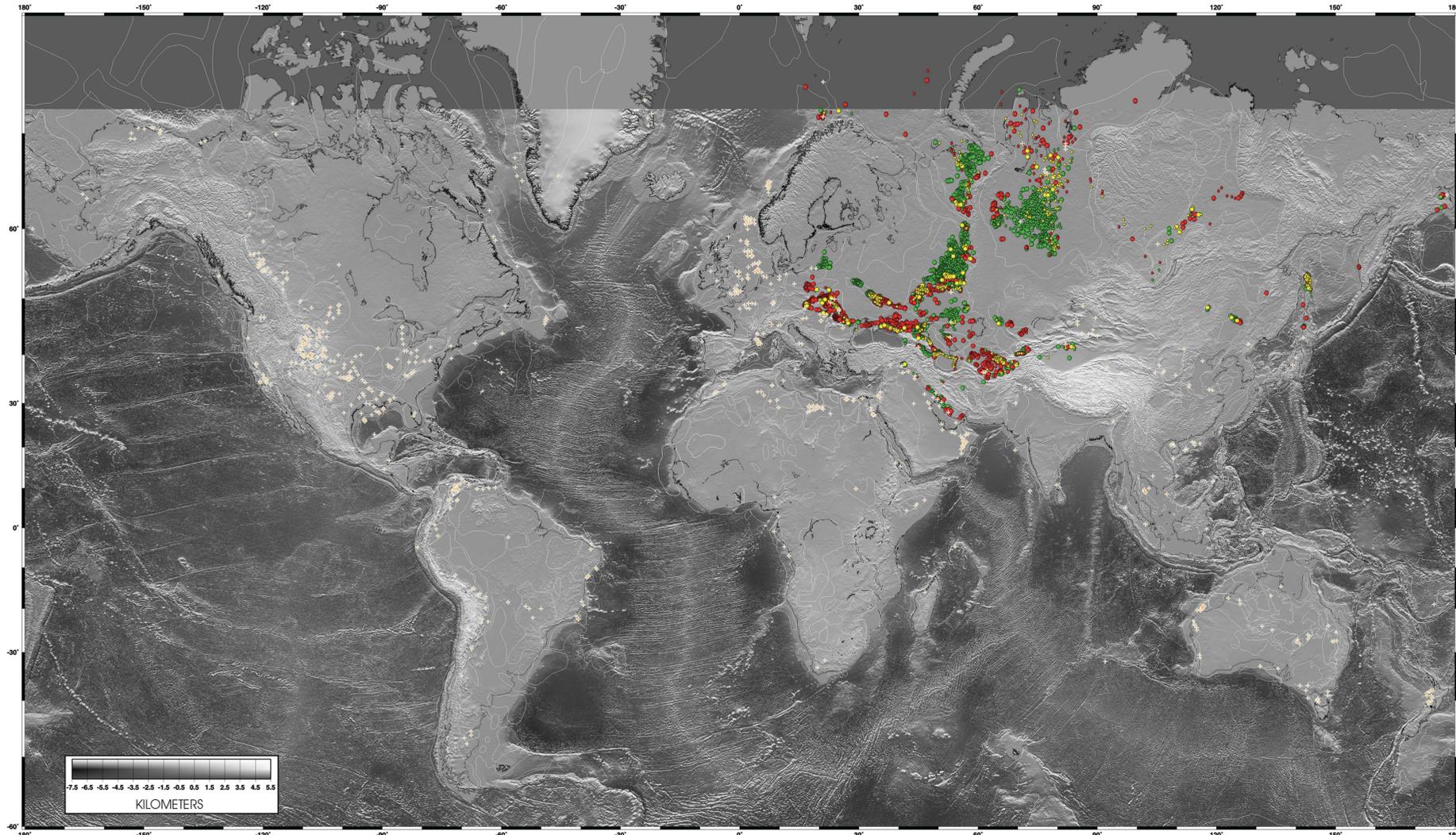
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Abstract:

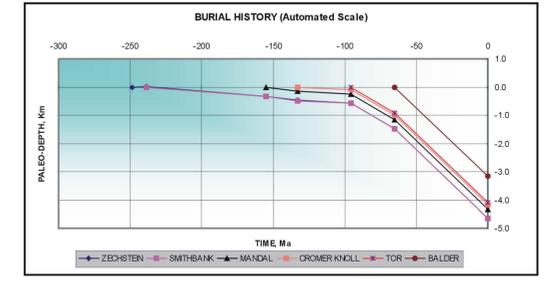
The PLATES project is an industry supported endeavor with the objectives of modeling past and present plate movements; applying geographical, geological and geophysical data to plate models; and using models to examine geological problems of global and regional extent. PLATES reconstructions are built around a comprehensive database of finite-difference poles of rotation, derived both from extensive plate motion research at UTIG using the PLATES interactive plate modeling software, and from published studies. The project maintains an up-to-date oceanic magnetic and tectonic database, continuously adding new paleomagnetic, hot spot, geological and geophysical data to extend the span and accuracy of global plate reconstructions. I am involved in updating the PLATES database and have created many reconstructions using the database and plate movement model. Recently, a dataset consisting of 845 burial history case studies was made available to us by Mike Horn. This dataset includes: Oil generation tables; vitrinite reflection calculations; references; thermal histories; natural fracture predictions; simultaneous fracture prediction, oil generation calculations; standardized location maps; and basin and sedimentary province classification. We have chosen to incorporate the thermal and burial histories into the PLATES database in order to create reconstructions that not only include paleogeographic data, but also the added dimensions of paleodepths and temperatures. Adding this information to a tectonic reconstruction gives a representation of what conditions and events a sedimentary basin has been exposed to. The detail and applications are expanded by adding additional data such as USGS oil and gas well data. The well data includes location and type of product, oil, gas, and condensate, and covers much of the world. Synthesizing this data into a coherent picture allows us to view both conditions of formation and results.

Acknowledgements:

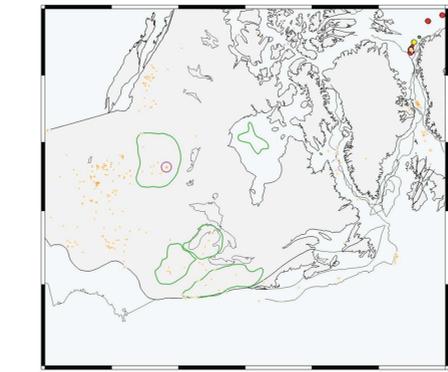
Well-sites and rock outcrop sites shown as orange crosses are from Horn & Co., "A Graphic Encyclopedia of Burial Histories" (CD-Rom). Well-sites shown as red, green, orange circles are from the USGS Open-File Report 97-470E. Reconstructions are from the PLATES Project. Topography in the large location map is from Smith and Sandwell, 1997.



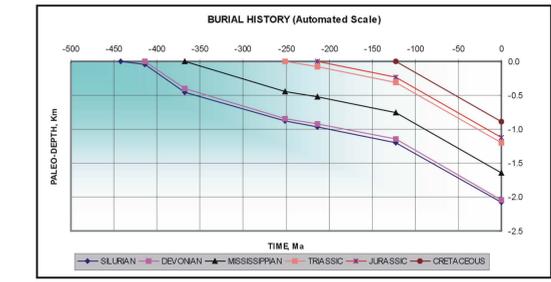
245 Ma, Early Triassic. North Sea



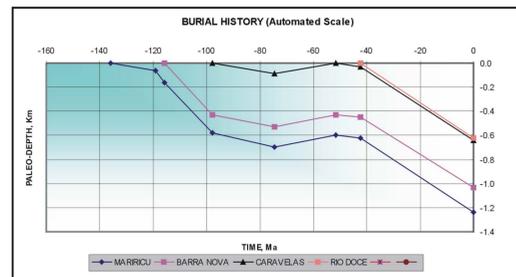
Burial history curve for the well site shown as an orange cross within a purple circle.



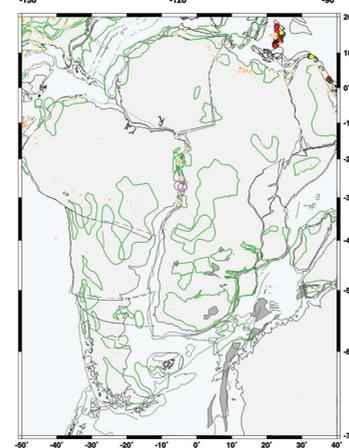
420 Ma, Early Devonian. Laurentia (N. America)



Burial history curve for the well site shown as an orange cross within a purple circle within the Williston Basin.

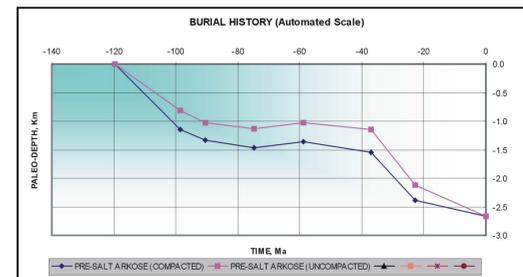


Burial history curve for the well site shown as an orange cross within a purple circle (leftmost circle). This site is on the South American plate.



140 Ma, Earliest Cretaceous.

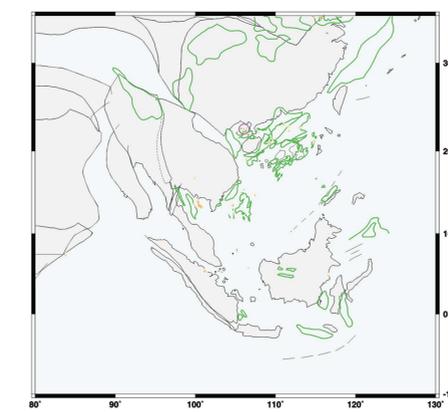
Opening of the South Atlantic. Gray regions are large igneous provinces. Green outlines are basins.



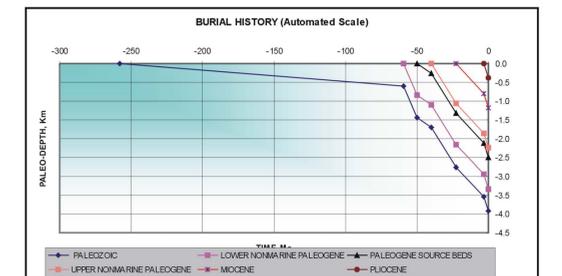
Burial history curve for the well site shown as an orange cross within a purple circle (rightmost circle). This site is on the African plate.

Key:

- Green outlines = basin outlines
- orange crosses = well sites and rock outcrops
- Green circles, large = oil well sites
- Green circles, small = oil & gas well sites
- Red circles, large = gas well sites
- Red circles, small = gas and condensate well sites
- Yellow circles, large = gas and oil well sites



40 Ma, Middle Eocene. Gulf of Tonkin



Burial history curve for the well site shown as an orange cross within a purple circle within the Gulf of Tonkin, south of China.