

Hot Enough for Ya? Compilations of Heat Flow Values and Source Rock Data Along the Western Central Atlantic Margin*

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Search and Discovery Article #30170 (2011)

Posted June 30, 2011

*Adapted from e-poster presentation at AAPG Annual Convention and Exhibition, Houston, Texas, USA, April 10-13, 2011

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Abstract

An ongoing project (CARUMBA) is recompiling public domain information to assess hydrocarbon potential of the western Central Atlantic margin (WCAM) from Nova Scotia to Cuba. A half-dozen DSDP-ODP wells contained asphalt, bitumen or recorded shows of thermogenic gas suggesting unrecognized hydrocarbon potential. During our aggregation of published source rock data from primarily Mesozoic intervals of these wells, and information from industry wells, we found a similar need to compile heat flow measurements. Four sources comprising about 350 heat flow values provided a basis for regional contours across the shelf into abyssal depths. Comparisons of source potential, heat flow and the CARUMBA sediment thickness calculations allowed us to target areas for further research.

Better potential lies south of the Kane Fracture Zone (KFZ), which runs from Cape Hatteras in the western Atlantic to the northern boundary of Mauritania on the conjugate margin. We see reduced but adequate merit along the US margin north of the KFZ with source potential evident in ODP wells 105 and 603B plus industry wells on the Great Stone Dome of the Baltimore Canyon area. Sediment thickness and heat flow values in the latter area suggest that maturity of oil-prone Cretaceous intervals is a concern.

Hot Enough for Ya?

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and

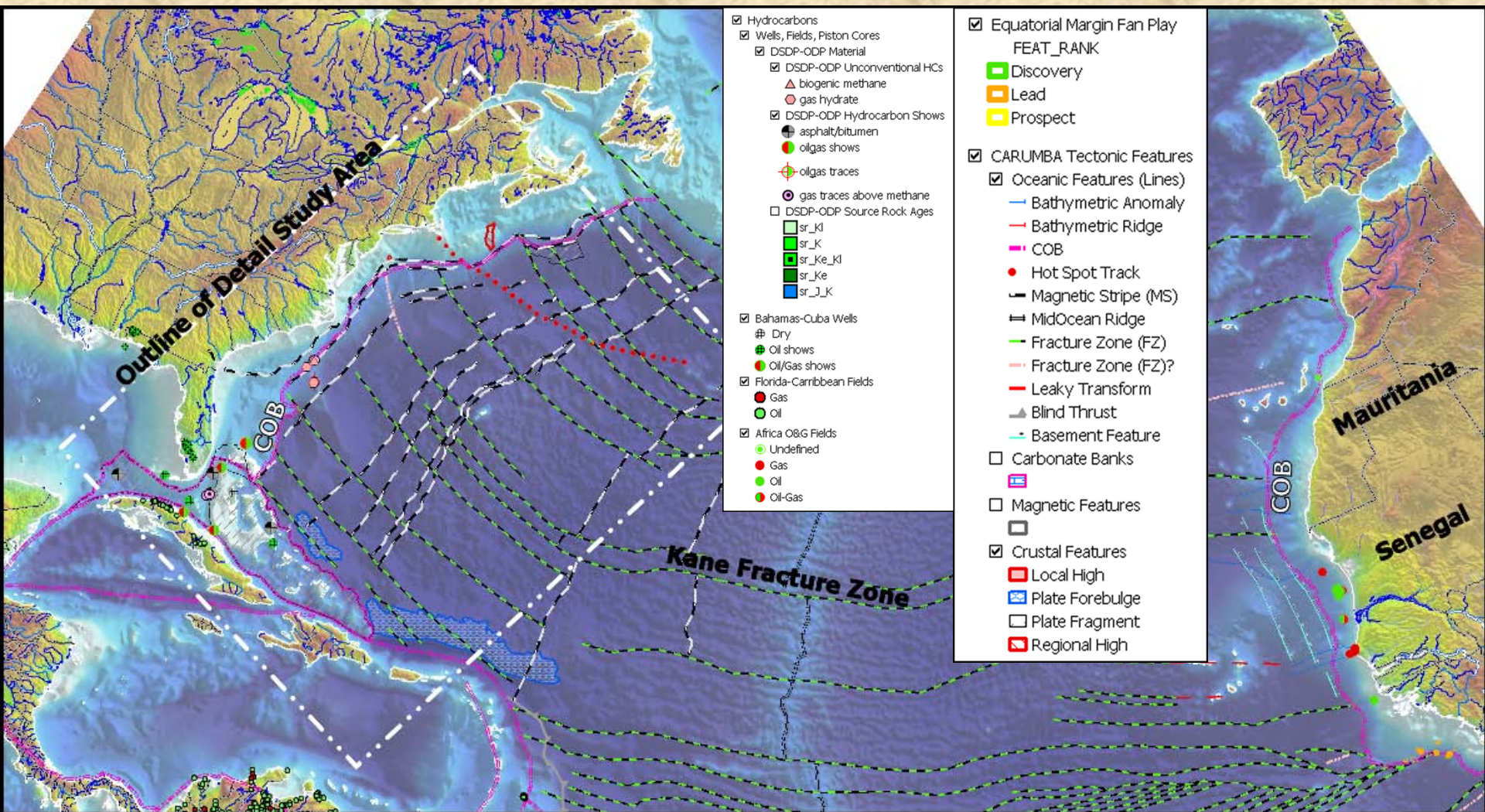
Janice Christ, Consultant



Assessing HC Potential of the Western Central Atlantic Margin (Nova Scotia to Cuba)

- Evaluation project for US MMS (now BOEMRE)
- Regional data presented at CACM, Halifax, Aug 2008
- Industry and DSDP/ODP wells had poorly catalogued data relative to hydrocarbon potential
- Source rocks reviewed at AAPG ICE, 2010

Tectonic Setting of Study Area

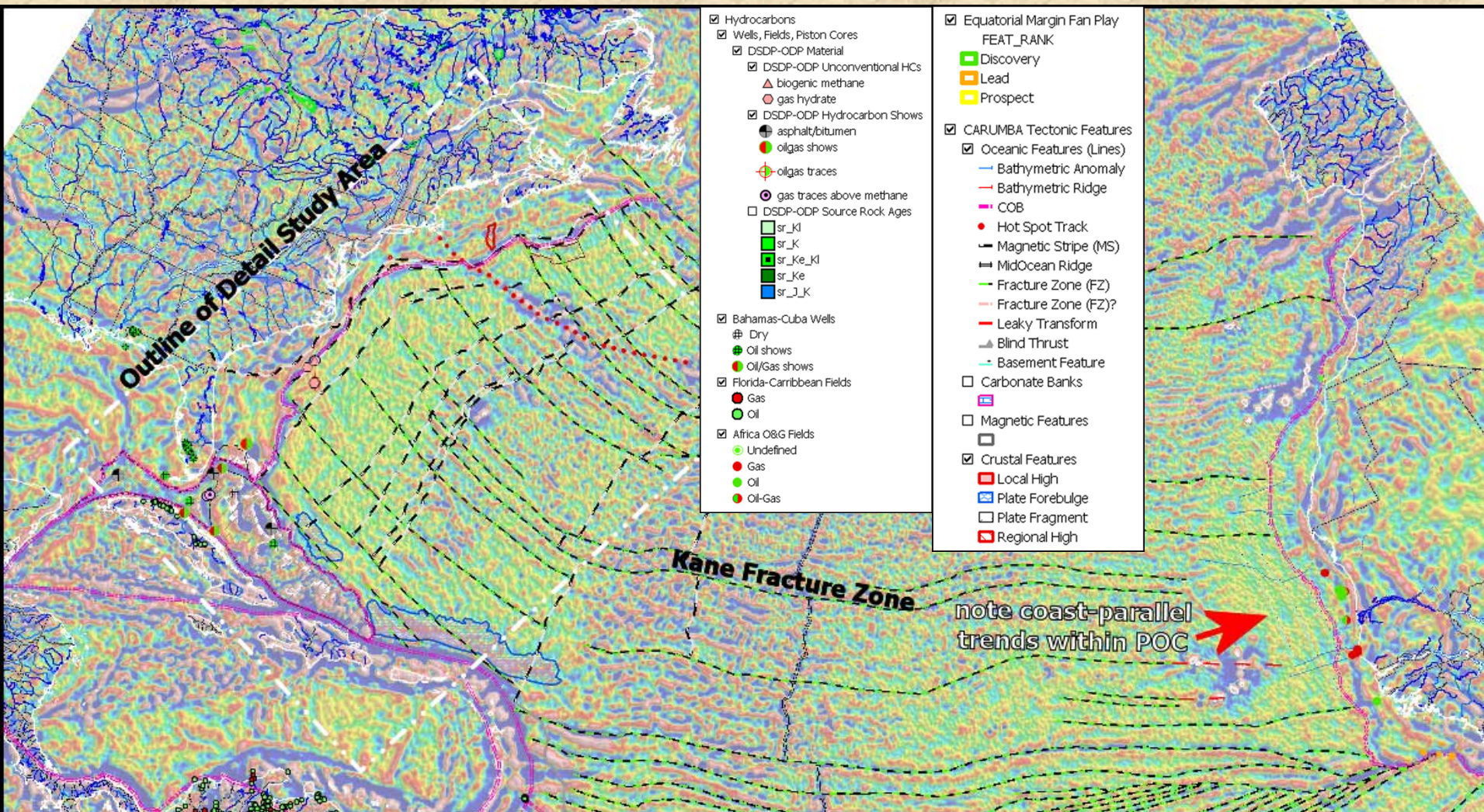


Hydrocarbon points, Oceanic Features overlaid on Topography/Bathymetry (DEM); *after CARUMBA, 2010*

Scattered Hydrocarbon Evidence

- Six DSDP/ODP wells saw asphalt, bitumen or shows of thermogenic gas
- We aggregated source rock (mainly Mz) data from ODP & industry wells
- needed heat flow (HF) data which was scattered and uncalibrated
- This ePoster presents our HF gathering, calibration attempts and analysis

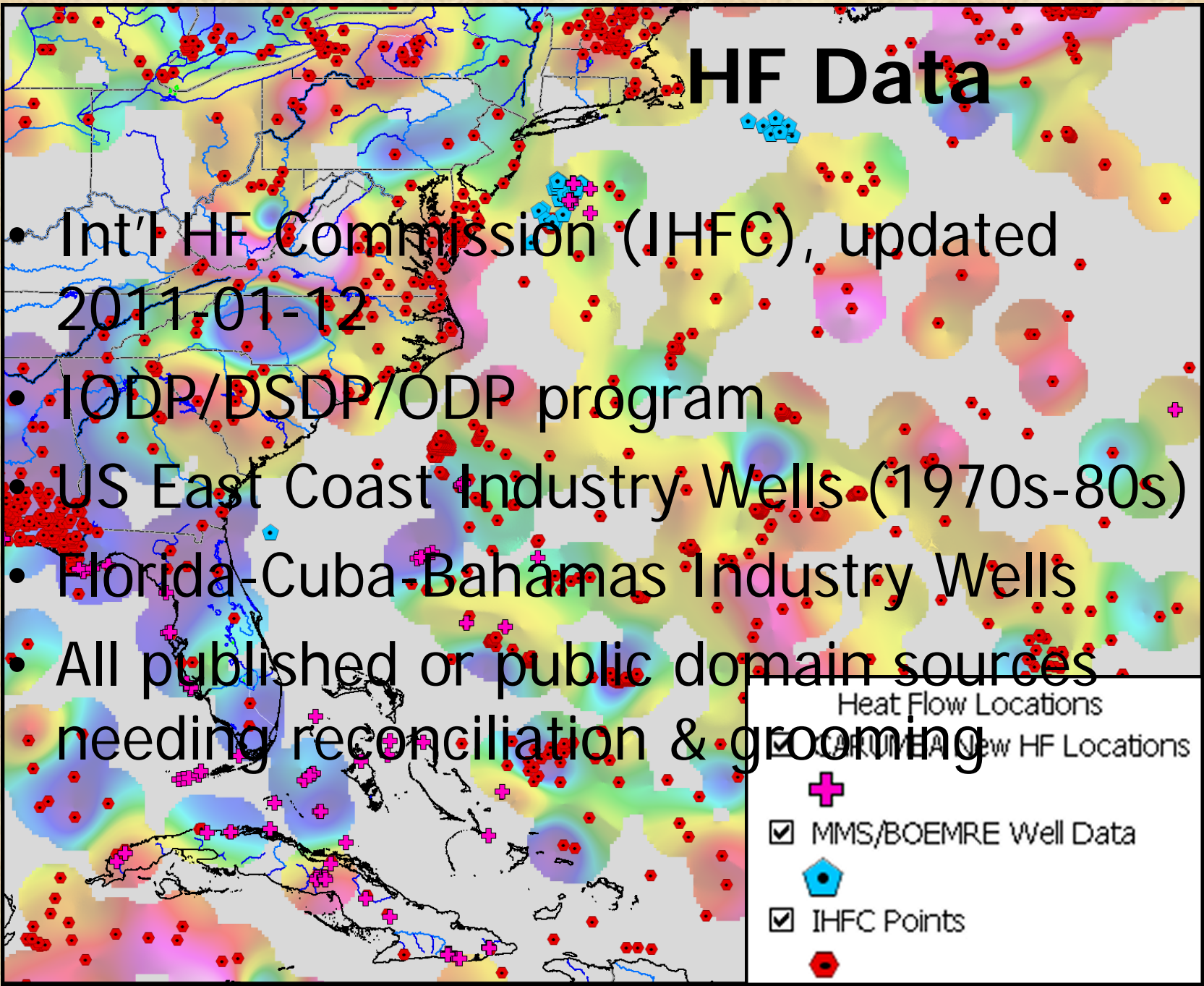
Study Area Gravity: Note COB, FZs



Note prominent COB along US margin. Along conjugate NW African margin (with discoveries), Proto-Oceanic Crust (POC) shows 3 coast-parallel trends, suggesting rifting asymmetry with ? influence on HF. Subtle inherited topo may also have restricted circulation, concentrating TOC.

HF Data

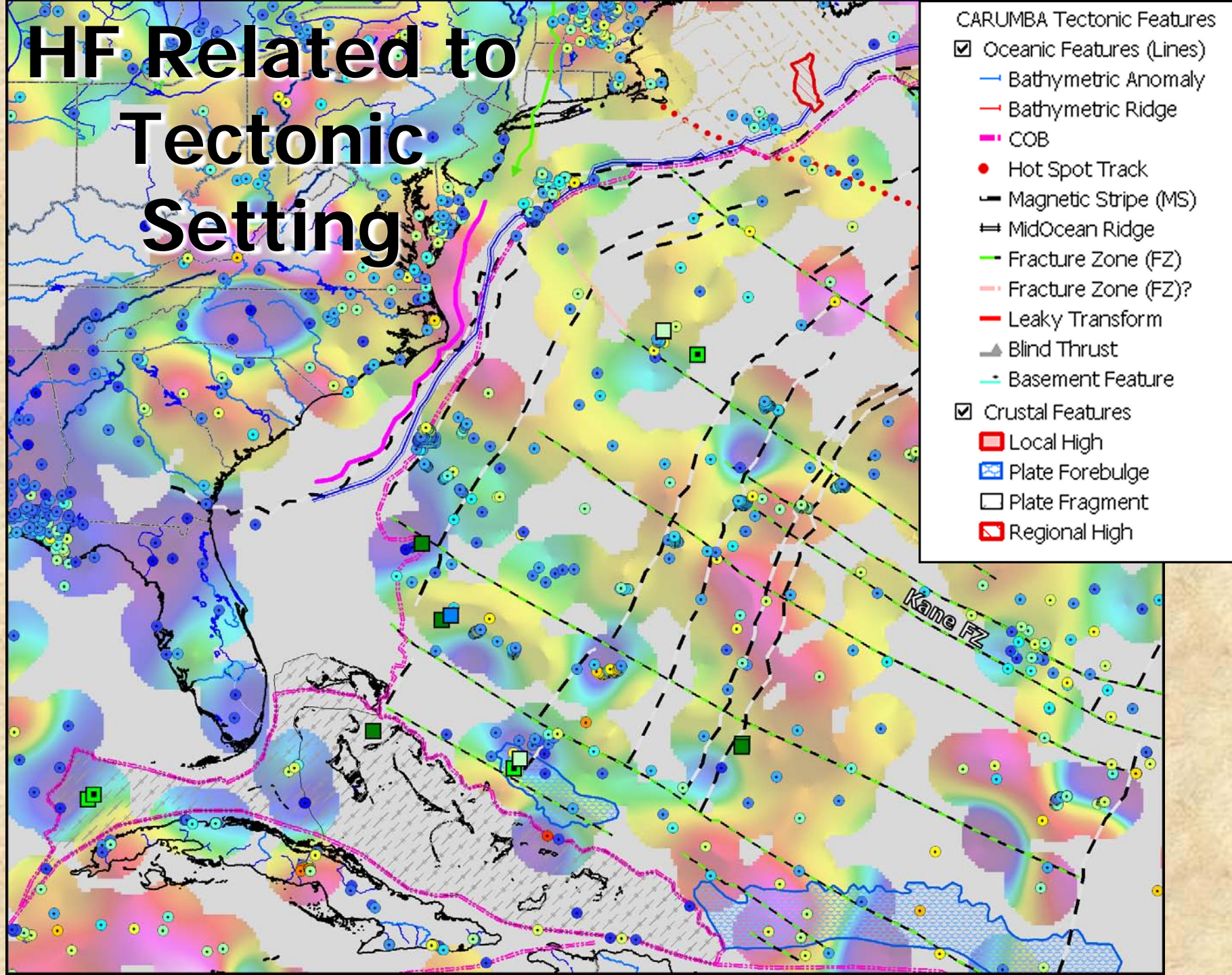
- Int'l HF Commission (IHFC), updated 2011-01-12
- IODP/DSDP/ODP program
- US East Coast Industry Wells (1970s-80s)
- Florida-Cuba-Bahamas Industry Wells
- All published or public domain sources needing reconciliation & grooming



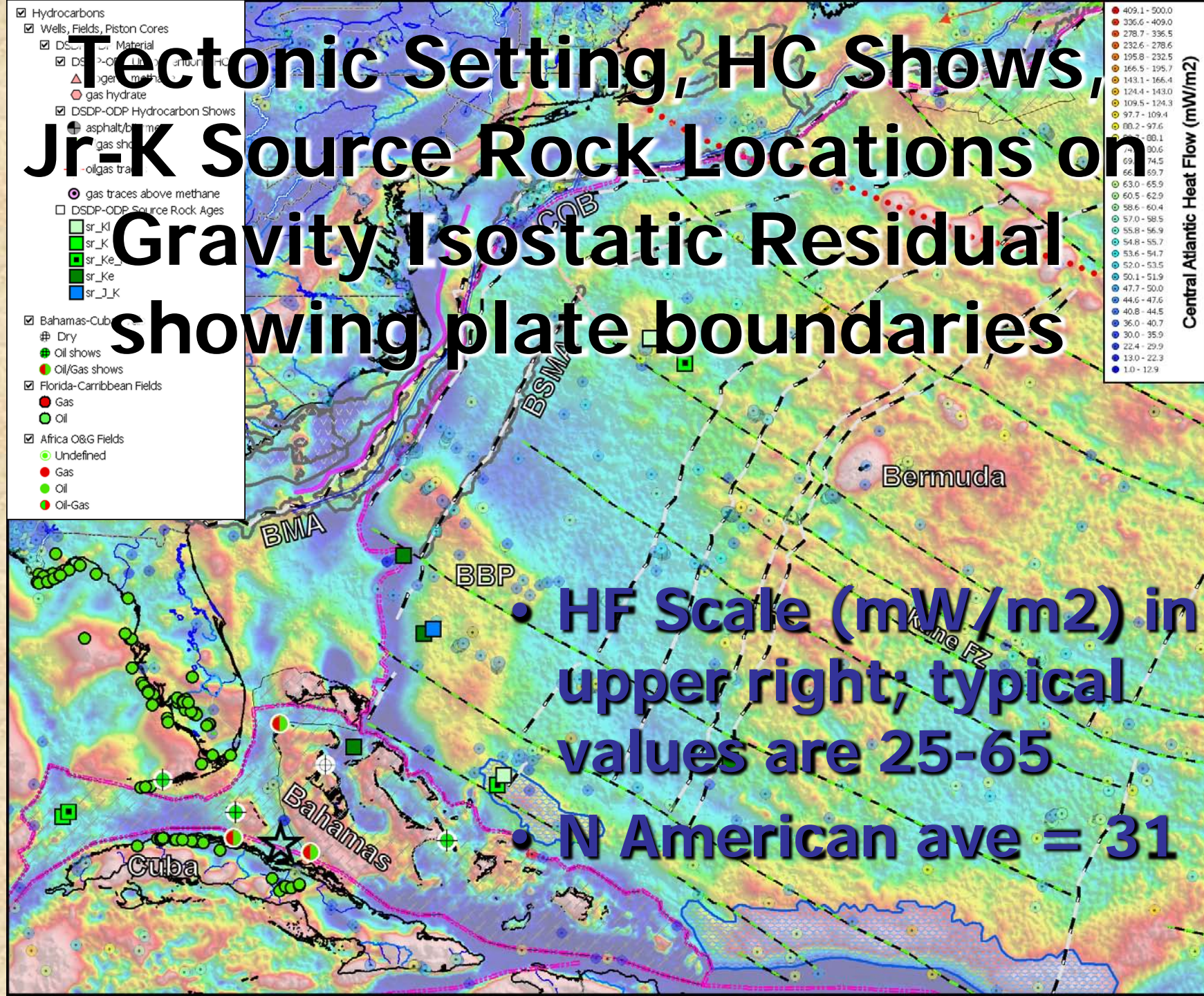
Compilation Steps

- 65+ wells for US East Coast, Fla-Bahamas had unstabilized bottom-hole temp (BHT) or stated geothermal gradient (GG)
- accept BHT; use published seafloor temp; assume bulk thermal conductivities of 2.3 (or 0.91 over oceanic crust)
- our values in line with IHFC
- data gaps remain along Fla-Carolina shelves, central Bahamas

HF Related to Tectonic Setting

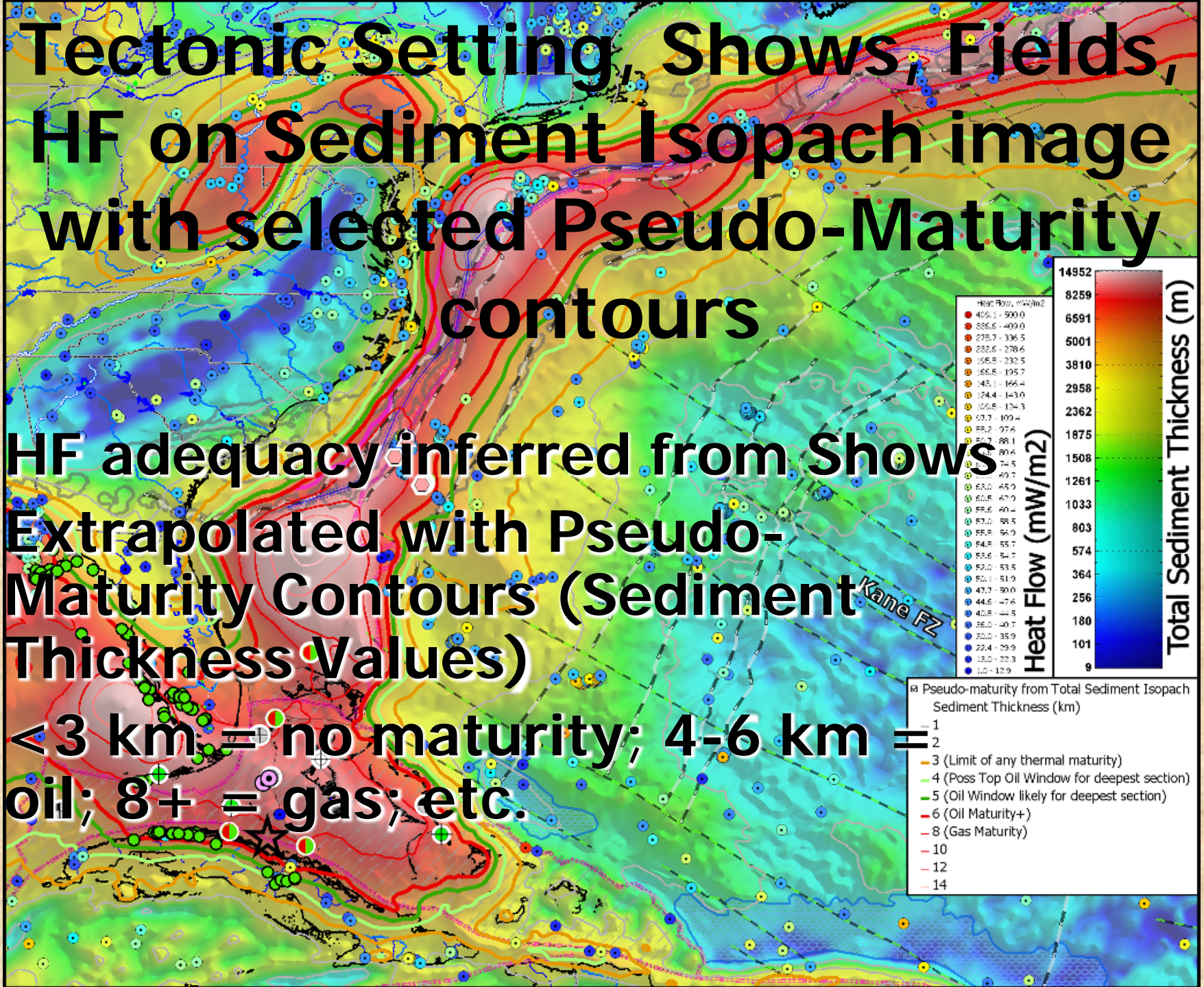


Tectonic Setting, HC Shows, Jr-K Source Rock Locations on Gravity Isostatic Residual showing plate boundaries



Tectonic Setting, Shows, Fields, HF on Sediment Isopach image with selected Pseudo-Maturity contours

- HF adequacy inferred from Shows
- Extrapolated with Pseudo-Maturity Contours (Sediment Thickness Values)
- < 3 km = no maturity; 4-6 km = oil; 8+ = gas; etc.



Conclusions & Future Work

- for average thermal conductivity, **HF adequacy relates to sediment thickness**
- all shows locate within 4 km isopach which extends seaward to Blake Spur Magnetic Anomaly - **large area of possible HC maturity**
- GG values require calibration; actual thermal conductivities should be modeled to revise HF values

Inferences on Where to Explore

- conjugate NW Africa basins work but Fla-Cuba-Bahamas tectono-strat regime differs
- find seals for carbonate banks to improve retention of heat and hydrocarbons
- consider deepwater carbonate fan plays where HF is high enough and clastic provenances are unfeasible

Thank You

The authors gratefully acknowledge
hours of fruitful discussions with

Paul J Post, BOEMRE

(Bureau of Ocean Energy Management,
Regulation and Enforcement)