

Monday, March 26, 2018

**New Location**

Live Oak Room • Norris Conference Center • 816 Town and Country Blvd #210  
Social Hour 5:30–6:30 p.m.  
Dinner 6:30–7:30 p.m.

**Cost: \$40 Preregistered members; \$45 non-members/walk-ups**

**To guarantee a seat, pre-register on the HGS website & pre-pay by credit card.**

**Pre-registration without payment will not be accepted.**

**Walk-ups may pay at the door if extra seats are available.**

*If you are an Active or Associate Member who is unemployed and would like to attend this meeting, please call the HGS office for a discounted registration cost. We are also seeking members to volunteer at the registration desk for this and other events.*

# HGS International Dinner Meeting

**Kurt Rudolph**  
Rice University and  
University of Houston

## Tectonic Forcing and Sedimentary Cyclicity: Impact on Petroleum System Elements

Sequence stratigraphy is an observationally-based method for interpreting sedimentary cyclicity. Stacking patterns of progradation, retrogradation, aggradation and degradation are related to the balance of sediment accommodation versus sediment supply. While often related to eustasy, accommodation is also controlled by tectono-subsidence (**Figure 1**). Based on over 50 global examples, regional subsidence and uplift rates are usually greater than rates of sea level rise / fall for durations greater than about one million years. Thus, the larger scale patterns of sedimentary cyclicity are related to tectonics in many basins.

Another important aspect of active tectonics is, unlike eustasy, it is spatially variable. For example, while basins may be subsiding adjacent areas may be uplifted (such as rift flanks in extensional basins or orogenic belts in foreland basins). This often drives basin differentiation, variations in sediment supply, development of silling / interior drainage and steepening of the depositional profile (**Figure 2**).

Tectono-subsidence controls on large sequence development and petroleum system play elements are illustrated by examples in the Western Interior U.S., North Slope Alaska, Western Siberia Basin, North Sea and East Natuna-Sarawak Basin.

Many of the world's most important petroleum source rocks (and regional seals) are associated with tectonic events which differentiated the basin and increased subsidence rates. This can result in marine transgressions (leading to condensed intervals / concentration of organic matter), steepening of the profile

(enhancing upwelling / productivity), and basin restriction (enhancing the potential for anoxia / preservation). Another important aspect is tectonic steepening of the depositional profile created by differential subsidence and/or uplift. This enhances the potential for submarine fan development, especially as subsidence wanes. Periods of decreased subsidence (or uplift) are associated with strongly progradational / degradational stratigraphic intervals. The resultant lowstands are a means of bypassing sands into the basin and are potentially reservoir-prone intervals (**Figure 3**). ■

### Biographical Sketch

**KURT RUDOLPH** received a BS in Geology from Rensselaer Polytechnic Institute and an MA in Geology from the University of Texas. He began his career as an Exploration Geologist with Unocal in 1978, then joined Exxon Production Research in 1981. Kurt held a variety of positions in Exxon/ExxonMobil, including Chief Geoscientist from 2002–2015, retiring in April 2015. He was a co-recipient of the Wallace Pratt Award for the best AAPG Bulletin paper for 1992 and the AAPG-SEG Distinguished Lecturer for 2001–2002. Kurt was the AAPG Michael Halbouty Lecturer for 2007 and received best paper award from the Rock Mountain Association of Geologists in 2015. He is currently an Adjunct Professor at Rice University and the University of Houston. His interests include stratigraphy, seismic interpretation, and regional geology.



## A Summary of Accommodation Controls

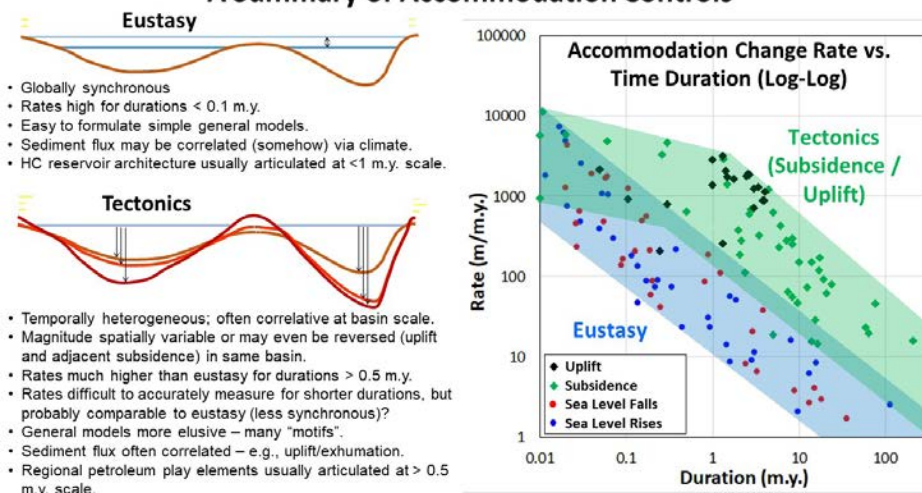


Figure 1

## West Siberia Basin: Geohistory Analysis

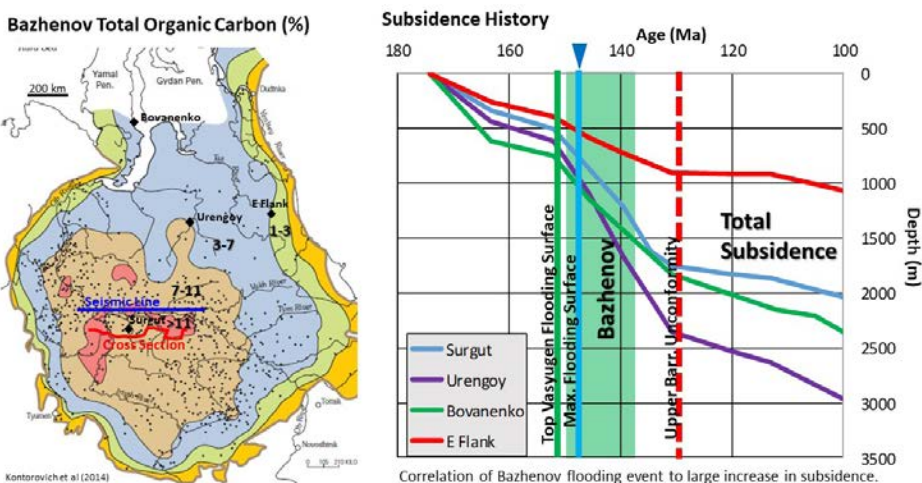


Figure 2

## West Siberia Basin, Russia

3<sup>rd</sup> largest global petroleum province.  
Primary oil source rock is Tithonian Bazhenov.  
Bazhenov occurs at major downlap surface below Neocomian clinoforms.

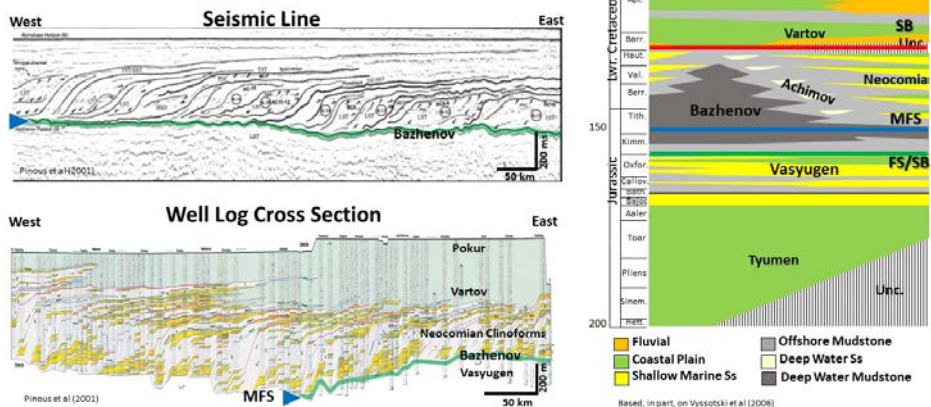


Figure 3