AAPG Annual Convention
Salt Lake City, Utah
May 11-14, 2003

Leslie B. Magoon[1], Paul G. Lillis[2], Kenneth J. Bird[1], Carolyn Lampe[3], Kenneth E. Peters[1] (1) U.S. Geological Survey, Menlo Park, CA (2) U.S. Geological Survey, Denver, CO (3) IES Integrated Exploration Systems, Jülich, Germany

Alaskan North Slope Petroleum Systems

Seven onshore North Slope petroleum systems are identified and mapped using oil-to-oil and oil-to-source rock correlations, pods of active source rock, and overburden rock packages. To map these systems, we assumed that: a) petroleum source rocks contain >=2 wt. % organic carbon (TOC); b) immature oil-prone source rocks have hydrogen indices (HI) >300 (mg HC/gm TOC); c) the top and bottom of the petroleum (oil plus gas) window occur at vitrinite reflectance values of 0.6 and 1.0% Ro, respectively; and d) most hydrocarbons are expelled within the petroleum window.

Three overburden rock packages controlled the time of expulsion and gross geometry of migration paths: a) a southern package of Early Cretaceous and older rocks structurally-thickened by early Brooks Range thrusting; b) a western package of Early Cretaceous rocks that filled the western part of the foreland basin; and c) an eastern package of Late Cretaceous and Paleogene rocks that filled the eastern part of the foreland basin.

The seven petroleum systems we have identified and mapped are: a) a southern system involving the Kuna-Lisburne source rock unit that was active during the Late Jurassic and Early Cretaceous; b) three western systems involving source rock in the Shublik-Otuk, Kingak-Blankenship, and pebble-GRZ-Torok source rock units that were active during the Albian; and c) three eastern systems involving the Shublik-Otuk, Kingak-Blankenship, and Hue Shale source rock units that were active during the Paleogene.