

## INTERNATIONAL EXPLORATIONIST GROUP EVENING MEETING—NOVEMBER 19, 1986

### KEVIN T. BIDDLE—Biographical Sketch



Kevin T. Biddle is research supervisor of the Basin Framework Section at Exxon Production Research Company in Houston, Texas. Kevin supervises 20 people engaged in research on basin analysis, structural geology, tectonics, basin formation, subsidence, thermal history, and patterns of sediment fill.

He received his B.S. degree in Earth Sciences in 1973 from the University of California at Santa Cruz.

He received his M.A. degree in Geology in 1976 and his Ph.D. in 1979 from Rice University. As a graduate student, he worked for United Resources in Houston as a consulting geologist. Upon graduation, Dr. Biddle joined Exxon Production Research Company as a research geologist in the Basin Systems Section. He was promoted to research specialist in 1981 and to research supervisor in 1983.

Dr. Biddle's principal interests are basin analysis, sedimentology, stratigraphy, tectonics, structural geology and carbonate geology.

In 1985, he was honored as alumnus of the year at the University of California at Santa Cruz. He received the Houston Geological Society's Outstanding Student Award in 1978.

Dr. Biddle is a member of the Geological Society of America, Society of Economic Paleontologists and Mineralogists, International Association of Sedimentologists, and the American Geophysical Union. He has served on numerous research and technical program committees for various professional organizations. Dr. Biddle was the convener for the 1984 SEPM Research Symposium on strike-slip deformation, basin formation, and sedimentation. He also served as editor of the SEPM Special Publication #37. Dr. Biddle is currently on the editorial board of *Geology* and is an associate Editor of the American Association of Petroleum Geologists Bulletin. He is currently chairman of the SEPM Foundation Basin Symposium Committee.

Dr. Biddle has authored over sixteen papers on various aspects of basin research in the United States, southern South America, Italy, France, and the North Sea.

#### THE STRATIGRAPHIC AND STRUCTURAL EVOLUTION OF THE MAGALLANES BASIN, SOUTHERN SOUTH AMERICA

The Magallanes Basin is located at the southern edge of the South American plate and is underlain by crust of Paleozoic age. The initial history of the basin is one of extension associated with the breakup of the South American sector of Gondwanaland. Triassic to Late Jurassic extension produced a normal-faulted terrane with numerous grabens and half grabens. This extensional event also resulted in extensive, dominantly silicic volcanism. The basin floor subsided from the Late Jurassic to the Late Cretaceous with decay of the thermal anomaly associated with extension. During the

Late Cretaceous and Tertiary, uplift and shortening occurred along the western and southern edges of the basin, forming the Patagonian Andes and the fold and thrust belt of southernmost South America. Subsidence in the basin during this interval of time was the result of lithospheric flexure caused by loading.

The sedimentary fill of the basin is related to three major phases of basin development. The rift-related Triassic to Middle Upper Jurassic succession consists of mostly non-marine volcanic and volcanoclastic rocks largely restricted to isolated grabens. Upper Jurassic to Upper Cretaceous, largely retrogradational sedimentary units, were deposited while the basin passively subsided on the remnant-arc side of a small marginal sea. Uppermost Cretaceous and Tertiary units were derived from the south, west, and northwest, and show a progressive onlap geometry from west to east. These deposits mark the onset of sedimentation from the Andes, although subsidence caused by tectonic loading started somewhat earlier in the Late Cretaceous. Depositional patterns for this interval consist of conglomerates separated by deep-water shales from an eastern complex of low-sedimentation-rate glauconitic sandstones which onlap a long-lived basement high. The most impressive feature formed during the foreland basin stage is a regional composite unconformity that separates rocks as old as Paleocene from the Mesozoic section.

Production or shows of oil and gas occur in many of the stratigraphic sequences defined in the basin. The producing interval, the Springhill Sandstone, and the major source-rock units were deposited while the basin was a westward-facing remnant-arc margin. Burial of these rocks during the foreland basin stage led to the maturation and migration of hydrocarbons. Thus, the Magallanes Basin is a polyphase foreland basin and each phase of evolution has had a role in making the basin a productive one.