INTERNATIONAL EXPLORATIONISTS

HGS INTERNATIONAL GROUP
DINNER MEETING—MARCH 16, 1992
Post Oak Doubletree Inn
Social hour, 5:30 p.m., Dinner, 6:30 p.m.
Technical Presentation, 7:30 p.m.

HARRY E. COOK—Biographical Sketch

Since 1974 Harry has been a research geologist with the U.S. Geological Survey in Menlo Park. He is also the President-Elect of SEPM and will be the President of SEPM beginning at the Annual AAPG meeting in Calgary this June. He earned his B.A. degree at the University of California at Santa Barbara and his Ph.D. degree at the University of California at Berkeley.

Prior to joining the Survey, Harry was a research geologist with Marathon Oil Company in Littleton Colorado from 1965 to 1970. While at Marathon much of his work focused on the origin and exploration characteristics of carbonate debris flows and turbidites of western Canada and west Texas. From 1970 to 1974 he was a Professor of Geology at the University of California where his interests shifted to studying the development of the continental slopes of western North America and passive-margin plate tectonics around the Pacific rim. Harry has been active in AAPG's and SEPM's Continuing Education Programs, having taught an AAPG Field Seminar on Paleozoic carbonates in the Great Basin and the SEPM Short Course, "Carbonate Platform Margin and Deep Water Carbonates". He is also an Adjunct Professor at several universities.

Since 1985 Harry has been conducting joint US-USSR research on the Proterozoic and Paleozoic in various areas

of the former Soviet Union and comparing their evolution to time-equivalent rocks in western North America. His Soviet research colleagues are from various Academy of Science Institutes and Ministry of Geology Institutes in Moscow, Alma-Ata (the capital of Kazakhstan), and Novosibirsk and Academgorodoc in Siberia. Harry is the author of over 100 papers and books and is co-editor of a forthcoming monograph on passive-margin carbonate platforms in the western USA and the USSR.

COMPARISON OF PALEOZOIC PASSIVE-MARGIN CARBONATE PLATFORMS OF THE WESTERN UNITED STATES AND THE USSR

Comparative studies of coeval passive-margin carbonate platforms from widely separated paleotectonic terranes provide a synergistic approach to (1) better analyze the degree of similarity in the stratigraphic evolution and paleogeography of carbonate platforms, and (2) assess the importance of different geologic controls in establishing the platforms' similarities and variations. Field work shows that the four geologic controls primarily responsible for the development of passive-margin carbonate platforms in the Great Basin, southern Kazakhstan, and eastern Siberia include paleolatitude, style of tectonic rifting and spreading, magnitude and duration of post-rift thermally controlled subsidence, and sea level changes.

Low paleolatitude locations: Special marine environments are required for carbonate sedimentation. Each of the passive-margin carbonate platforms evolved in warm, shallow water at low paleolatitudes. In addition, sedimentation occurred in clear waters protected from major influx of fine terrigenous siliciclastic sediment.

Tectonic style of rifting and spreading: The Great Basin and the USSR carbonate platforms developed on rifted Precambrian continental crust. During rifting and spreading in the Late Proterozic, both the western margin of North America and the eastern margin of Siberia developed as broad, relatively stable, north-trending passive continental margins attached to their cratons. In western North America, the open-ocean platform margin faced westerly, whereas in eastern Siberia the open-ocean platform margin faced easterly. During Late Proterozoic rifting and spreading in southern Kazakhstan, the Precambrian continental crust did not retain its structural integrity and was broken into large isolated blocks. Thus, carbonate platforms evolved on isolated blocks forming a northwest-trending archipelago of carbonate seamounts.

Thermally controlled subsidence: Thermally controlled subsidence during rifting and spreading provided accommodation space for the carbonate platforms to develop. The longest record of passive-margin platform growth is in the Great Basin where sediment accumulation on the carbonate platform kept pace with thermal subsidence by building a 5000-m-thick, 300-km-wide Cambrian-Devonian carbonate platform. Late Proterozic spreading and thermal subsidence in eastern Siberia continued into the Ordovician allowing a 2000-m-thick, 2000-km-wide late Precambrian and early Paleozoic carbonate platform to evolve. During thermal subsidence in southern Kazakhstan, 40-km-wide isolated blocks became the sites of carbonate deposition that kept pace with post-rift subsidence, resulting in carbonate seamounts that accumulated 1000 m of carbonate sediment during the Cambrian and Early Ordovician. Renewed post-rift subsidence in southern Kazakhstan during the Late Devonian and Carboniferous provided accommodation space for a 4000-m-thick, 100-km-wide carbonate platform to evolve. This carbonate platform trended northwest, with the continental land mass to the east and the open ocean platform margin to the west.

Sea level lowstands: Stratigraphic sections in the western United States and the USSR record several episodes of sea level lowstands. The lowstands, which are interpreted to be eustatic in origin, are recognized by seaward collapse of long segments of platform margins and slopes, and solution breccias and faunal discontinuities in shoal-water sites of platform interiors. Platform margin collapse contributed massive amounts of debris for the development of carbonate submarine fans and aprons.

A variety of potential hydrocarbon reservoir facies occur in these carbonate platforms, including carbonate submarine fan and apron facies in slope and basinal settings, platform margin organic buildups and ooid sand bodies, and shallow-water platform-interior facies that exhibit karsting and solution porosity. Oil fields occur in Devonian platform rocks in the Great Basin, Cambrian platform rocks in eastern Siberia, and in Devonian and Carboniferous platform rocks in the new super-giant Tengiz carbonate oil field in Kazakhstan.