INTERNATIONAL EXPLORATIONISTS

HGS INTERNATIONAL GROUP
DINNER MEETING—FEBRUARY 25, 1992
Post Oak Doubletree Inn
Social hour, 5:30 p.m., Dinner, 6:30 p.m.
Technical Presentation, 7:30 p.m.

B. CLARK BURCHFIEL—Biographical Sketch

Dr. Clark Burchfiel currently teaches at California Institute of Technology on a sabbatical leave from Massachusetts Institute of Technology, where he is a professor of geology. Dr. Burchfiel received his B.S. degree, with distinction, from Stanford University in 1957. He received his M.S. from the same institution in 1958. Burchfiel completed his Ph.D. in geology from Yale in 1961 and was awarded the Silliman Prize.

Clark Burchfiel worked as an assistant professor from 1961-66, an associate professor from 1966-70 and as a professor from 1970-76 at Rice University. Burchfiel became the Carey Crineis professor of Geology at Rice from 1975 to 1976. He joined M.I.T. faculty as a professor of Geology in 1977 and holds the Schlumberger Professor of Geology chair since 1984. His research interests include structural geology, regional geology, plate tectonics and orogenesis.

Outside of his academic responsibilities, Burchfiel's involvement includes chairmanship and membership on numerous committees associated with GSA, AAPG, National Science Foundation, National Academy of Sciences, National Research Council, Graduate Record Examination and COCORP. Burchfiel has edited Journal of Geophysical Research and Tectonics. Some of his other work includes American Geological Institute Visiting Scientist (1963 and 1969), visiting professor at University of Southern California (1964 and 1966), post-doctoral fellowship at Geological Institute University of Belgrade, Yugoslavia (1968), National Academy of Science Eastern Europe Exchange Program in Romania (during summers of 1970 and 1973), University of Houston Continuing Education Program (1974 and 1975), Sigma Xi National lecturer, and visiting professor at Australian National University (from 1975-76).

Burchfiel has worked as a consultant for numerous oil companies and technical firms. He is a member of Maxus Energy Board of Directors (1989-present), National Academy of Sciences, Geological Society of Australia and AAPG. He is a fellow of American Academy of Arts and Sciences, GSA, AGU and an honorary foreign fellow of Euopean Union of Geologists. He has published numerous papers, reports and books.

LEIGH H. ROYDEN—Biographical Sketch

Dr. Leigh Royden currently teaches at California Institute of Technology on a sabbatical leave from Massachusetts Institute of Technology where she is an associate professor of Geology and Geophysics. Leigh H. Royden received her A.B. degree *cum laude* in physics from Harvard in 1977. She completed her Ph.D. in geology and geophysics from M.I.T. in 1982. Royden's research interests include regional geology and geophysics, plate tectonics, thermal effects and consequences of continental deformation and mechanics of large scale continental deformation.

Leigh Royden worked as a research assistant at Woods Hole Oceanographic Institution during 1977-78. She had a joint appointment with M.I.T. and Harvard as a post-doctoral fellow during 1982-84. Royden started at M.I.T. as an assistant professor of Geology and Geophysics in 1984, and became an associate professor in 1988. She has received numerous awards and honors including Kerr-McGee Career Development Chair, M.I.T. (1984-88), Presidential Young Investigator, National Science Foundation (1985-present), Donath Medal (Young Scientist Award), Geological Society of America (1990), Visiting Professorship for Women, National Science Foundation (1991-present), and Faculty awards for Women Scientists and Engineers, National Science Foundation (1991-present).

Royden has worked as a consultant for numerous oil companies and technical firms. She co-organized Penrose, and NATO Advanced Study conferences in Hungary and Turkey. She is a member of AGU, AAPG, and GSA and works with different committees associated with National Research Council, AAPG and GSA. She has published numerous papers, reports and books.

EASTERN EUROPEAN MOUNTAIN BELTS - THE HIGHS AND LOWS

The Mediterranean region is an area of incomplete continental collision. It lies between the European and African plates, which have been converging since late Cretaceous time (80 Ma). Because the continental edges of Europe and Africa are irregular in shape, the Mediterranean region contains zones where the two continents have already collided and adjacent zones where the two continental masses have not yet collided. Within the convergence zone between Europe and Africa are small fragments made up of both oceanic and continental crust that move independently, or partly independently, from the large plates. The movements of these small fragments are responsible for the formation of all of the Alpine mountain belts west of central Turkey. In many cases the velocities of these small fragments may be much faster than those of Europe or Africa and their directions of motion can be oblique or even orthogonal to the direction of convergence between the two large plates. Old ocean floor has been subducted beneath the fragments and new ocean floor has been created in their wake by back-arc type extension.

Because the Mediterranean region is young and many of the tectonic systems within it are active today, it is possible to relate different structural and morphological styles present within Mediterranean mountain belts to the dynamic processes and larger-scale tectonic systems within the mountain belts formed. We recognize two fundamentally different structural styles in mountain belts of the Mediterranenan region, and these mountain belts can also be shown to have formed in two different dynamic environments. Classic mountain belts with high topography, such as the Alps, also have cores of high-grade metamorphic rocks, display significant deformation of crystalline basement, and commonly develop antithetic thrust belts. These mountain belts have formed in areas where the two fragments were pushed together to form a mountain belt faster than the invervening crust was subducted. In contrast, other mountain belts have been formed in areas where the intervening crust was subducted faster than the two fragments were pushed together. These mountain belts look very different. They have low topography, low-grade metamorphism, lack significant deformation of continental crystalline basement, and display extensional deformation in the back-arc region. Examples of this type of mountain belt are especially well developed in eastern and central Europe, such as the Apennine and Carpathian mountain belts.

The concepts derived from studying these two different types of mountain belts within the Mediterranean region can be applied throughout the world and throughout geologic history. The geologic record contains some beautifully preserved examples of incomplete continental collision. In many cases, however, incompletely-collided zones are only the early stage in a progressive collision process, and mountain belts formed during the early stages of collision are strongly modified during subsequent post-collisional convergence. These mountain belts formed during the early stages of collision are difficult to recognize in areas where collision has continued to completion, but probably account for some of the paradoxical relationships observed in old collisional mountain belts.