

October 28, 2003

**IN MEMORIAM
HARMON CRAIG
PROFESSOR OF OCEANOGRAPHY
1926 - 2003**

Harmon Craig, one of the great pioneers of isotope geochemistry, died on March 14th after suffering a massive heart attack one day shy of his 77th birthday.

Through an academic career of more than fifty years, Professor Craig made a remarkable number of fundamental and far-reaching contributions in a wide range of important subjects concerned with the chemical and physical processes by which the solid earth, the oceans, the atmosphere and the solar system interact. His research was characterized by meticulous field and laboratory work and insightful data interpretations.

While still a doctoral student in the laboratory of Nobel Laureate Harold C. Urey at the University of Chicago, Craig established the field of carbon isotope geochemistry by characterizing the stable isotopic signatures of carbon in nature. His work provided the foundation of modern isotopic studies of the global carbon cycle, and thus plays a fundamental role in current efforts to understand and predict the roles of the oceans and the terrestrial biosphere in sequestering anthropogenic carbon dioxide and thus in modulating global warming.

In a separate field, Urey and Craig showed that chondritic meteorites occur in discrete compositional groups with different oxidation states and different relative iron and silicon abundances, known as the Urey-Craig chondritic meteorite classifications.

In 1955, as part of Director Roger Revelle's plan to establish a UC campus at La Jolla, very strong in science, he recruited Craig, along with others like Suess and Elsasser. Craig joined the Scripps Institution of Oceanography, where he expanded his work on stable isotopes to include the study of the global water cycle. In a classical study, he provided the foundation for the application of isotopic studies to the roles of evaporation, freezing and exchange in the formation of ocean water masses, as well as for the study of paleoclimatology using the stable isotope record in polar ice.

Later he turned his interests to applications of geochemical tracers in oceanography and became one of the leaders of the GEOSECS program, the first integrated chemical, isotopic and hydrographic study of the world's oceans. Craig and his students also studied the isotopic composition of atmospheric and dissolved oxygen and variations in the composition of dissolved gases. This work led to a method for determining biological oxygen production and consumption in the ocean mixed layer, as distinct from physical effects, and thus to a better quantification of biological primary production rates in the oceans.

Craig's collaboration with W. B. Clarke and M. A. Beg resulted in the important discovery, confirmed simultaneously and independently by I. N. Tolstikhin, of excess helium-3 in the mantle, a primordial remnant of Earth's formation. Excesses in the waters of the deep Pacific were attributed to the emission of mantle-derived volcanic gases by seafloor spreading along the East Pacific Rise.

Craig also made significant contributions to the study of the present atmosphere and its more recent history. He was one of the earliest workers to study gases trapped in glacier ice and showed that atmospheric methane has roughly doubled owing to human activities over the past 300 years. This work is fundamental to the reconstruction of past atmospheric composition and plays an important role in continuing efforts to understand past climatic change.

Harmon Craig had a remarkable ability to focus his energies on important problems and was widely known for the imagination and thoroughness with which he interpreted observations. His curiosity was limitless and his enthusiasm for science and drive for scientific achievement were unparalleled. He stimulated much research at SIO and mentored many graduate and postdoctoral students who are now themselves scientific leaders. He formed close scientific ties with leading geochemists around the world, collaborating on projects and exchanging visits. Within Scripps, he was a strong advocate for the fleet of

research vessels and himself organized and participated in many ocean expeditions. His was a forceful and independent voice in departmental and Institutional affairs, sometimes at odds with prevailing views, but always in the vein of fostering what he saw as the true academic mission of Scripps. Harmon's accomplishments earned him widespread recognition, prizes and honors. UCSD has lost a truly spirited adventurer and a great teacher and researcher of the natural environment.

He is survived by his wife of 55 years, Valerie, their three daughters, and four grandchildren.

Kurt Marti
Ray F. Weiss
Edward L. Winterer, Chair