Scientific Achievements & Most Relevant Contribution to Geoscience

Judith A. McKenzie – Biographic Sketch

Prof. Judith A. McKenzie received a chemistry background in her early studies, but she had always been interested in natural environmental systems. As a result of this interest, she studied marine geology and geochemistry at the Scripps Institute of Oceanography in La Jolla, CA, and subsequently earned her doctorate in July 1976 at the Institute of Geology at the ETH Zurich in Switzerland. After being a postdoc and a Senior Research Associate at the ETH Zürich, she took up an Associate Professor appointment at the University of Florida in Gainesville, Florida. She finally returned to Europe as a Titular Professor at the ETH-Zürich in 1987 and became Full Professor in 1996 until her retirement in 2007. She remains at the ETH as Professor emeritus and continues to conduct research in the field of chemical sedimentology and geomicrobiology.

Beginning with her doctoral research investigating modern dolomite formation beneath the sabkhas of Abu Dhabi, UAE, she has frequently returned to the theme involving the origin of that enigmatic carbonate mineral. Indeed, she spent a lot of time on the hot and dry sabkha coasts of Abu Dhabi, sampling and measuring coastal sediments and establishing a hydrological model to explain the formation of this mineral. Her continued interest in dolomite formation in hypersaline environments has taken on a more microbial focus on processes in the modern coastal sabkha in Qatar.

Her research career has followed several diverse pathways. The abundance of lake systems in Switzerland inspired her to use them as models to study different biogeochemical processes that could be further extrapolated to marine sediments.
She wrote several seminal papers dealing with carbon isotopes in lakes that are still applied not only to lake sediments but also to the ocean system.
Her interest in marine carbonate sediments included projects in the Great Barrier Reef, the Mediterranean, or the Bahamas, where she participated in several ocean-drilling campaigns. The results of these investigations are well-established references in the field of climate and environmental changes in Earth history. She has also investigated the relationship between marine organic-rich sediments and dolomite formation, and processes involved in the deposition of the evaporites during the Messinian Salinity Crisis.

During the last 20 years beginning with a now classic paper in the Journal of Sedimentary Research (1997), she and her associates have added a new dimension to dolomite studies with the introduction of a microbial factor. Prof. McKenzie and her research group have continued to conduct research at the interface between biology and geology, which lies at one of the most stimulating frontiers in science. With the establishment of the “dolomite microbial model”, she has made major contributions to our understanding of microbial processes in Earth history, to the point that the biological factor was added in the geochemical and sedimentological equation, helping to decipher and evaluate the relationship between biotic and abiotic processes. The publications produced by her research group are important contributions to the field and have triggered a large number of studies in the fast evolving field of geomicrobiology. In my opinion, the main contribution of Prof. McKenzie to the field of sedimentology has been her studies of dolomite formation and the related “Dolomite Problem” enigma.

Another outstanding point in her career is the fact that she has been scientifically active and a tireless promoter of international ocean research drilling programs (ODP & IODP) in both

a research and an advisory capacity. She has been president of both the IAS and the Geochemical Society. Furthermore, she has been the main advisor on 24 MSc and PhD theses during her career, as well as co-advising the MSc and PhD theses of 39 other students.

Prof. McKenzie has published about 200 papers with more than 100 in peer-reviewed journals. Her merits have already been rewarded in part by election as a Fellow of the Geological Society of America in 1983 and the American Geophysical Union in 1999, as a foreign member of the Royal Danish Academy of Sciences and Letters in 2006, by the Jean Baptiste Lamarck Medal of the European Geosciences Union in 2006, by election as a Geochemical Fellow (jointly GS & EAG) in 2007, and by the award of the Gustav Steinmann Medal of the Geologische Vereinigung in 2008. Finally, in August 2014, she became Honorary Member of the IAS at the International Sedimentological Congress in Geneva, Switzerland.

In summary, McKenzie's research ideas and findings have contributed signifiantly to determining the dynamic exchange between the biosphere, hydrosphere, atmosphere and lithosphere throughout time, creating bridges to our understanding of the interactions between Earth and biosphere in modern and ancient environments, and the role of organisms in controlling physico-chemical processes that result in the formation of sediments and sedimentary rocks

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