

KOHOUT EARLY CAREER AWARD

Presented to

M. Bayani Cardenas

Charlotte, North Carolina
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Hydrogeology Division
The Geological Society of America

M. Bayani Cardenas



Bayani Cardenas is an Associate Professor at the Department of Geological Sciences at the University of Texas at Austin. His teaching and research are focused on flow and transport dynamics in natural hydrologic systems. Bayani and his group's research spans many scales and settings; their main focus is groundwater-surface water interactions in both aquatic and marine environments. His group has study sites and collaborators around the world. Their recent research efforts have been directed at micro-scale flow and transport phenomena in porous and fractured media, integration of biogeochemical and hydrodynamic process models, and novel applications of geophysics and remote-sensing in hydrology. His group combines experimental, field and mathematical-modeling approaches in their inter-disciplinary research.

Although he was born in Goettingen, Germany, Bayani grew up in his native country the Philippines, where he obtained his BS in Geology from the University of the Philippines-Diliman in 1999. He then went to the University of Nebraska-Lincoln to work under Prof. Vitaly Zlotnik for his MS in Geology (with a Hydrogeology focus). His wife, Tracy, a public school teacher, also went to graduate school in Nebraska. The young couple, with their two-month old son, Makisig Miguel, then moved to Socorro, New Mexico in 2002 where Bayani joined the hydrology PhD program at the New Mexico Institute of Mining and Technology. Bayani's four years of dissertation work was supported by the Frank M. Kottlowski Fellowship administered by the NM Bureau of Geology and Mineral Resources. Tracy worked as the director of the institute's children's center. After Bayani finished his dissertation under the mentorship of Prof. John Wilson in 2006, the family moved to Austin, Texas where Bayani started as Assistant Professor at UT. The latest addition to the family, Mayumi Olivia, was born in 2007. Bayani obtained tenure and was promoted to Associate Professor in 2011. The Cardenas family continues to enjoy the quirkiness and vibrancy, but not the heat, of Austin.

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It is my pleasure to introduce Bayani Cardenas as the inaugural recipient of the Francis A. Kohout Early Career Award.

Bayani made a strong start in Nebraska. In a happy and hard-working company of students from the U.S., Germany, Philippines, and Russia in my group, he developed a model of point bar deposits by combining hydraulic testing, geophysical imaging, and geostatistics. The acceptance letter of the resulting manuscript addressed Bayani as “Dr. Cardenas” prior to obtaining his MS. His bright future in hydrogeology was already apparent.

Bayani then switched from field studies to modeling groundwater-surface water interactions with John Wilson, his PhD adviser at New Mexico Tech. His use of multiphysics modeling revolutionized our ability to quantify coupled turbulent channel flows with heat flow and biogeochemical solute transport within the streambed. Bayani’s results elegantly showed the role of momentum transfer from fast-flowing surface water to the hyporheic flow through pressure variations near streambed ripples. Completely original was the simultaneous quantification of interactions between bedform-scale hyporheic flow and deeper groundwater fluxes; some figures from his papers are often used in talks and classrooms around the world.

The professorial phase of his academic life resulted in an explosion of ideas in many areas. He designed a sophisticated experimental flume for physical modeling. His field sites are spread across continents. In conducting his research, he flies, dives, and crawls in caves; his enthusiasm is contagious. His current studies on coastal aquifers and free convection of groundwater near volcanic crater lakes are especially appropriate for the Kohout Award since Kohout was a pioneer in the study of density-driven groundwater convection in coastal areas.

Now, Professor Cardenas runs a world-renowned program combining wide reaching field, experimental, and theoretical methods. His accomplishments are enormous on many scales: invited lectures, awards from the American Geophysical Union, National Science Foundation, student accomplishments, and volume of grants. He has a gift: combination of deep understanding and simplicity of presentation.

Dr. Bayani Cardenas is a perfect recipient of the new Kohout Award in view of his fundamental contributions at the intersection between groundwater-surface water interactions, multiphysics modeling, and geophysics.

—Vitaly A. Zlotnik, *Citationist*

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The Kohout Early Career Award is considered annually in accordance with the bylaws of the Division. It is awarded to a distinguished early-career scientist (35 years of age or younger throughout the year in which the award is to be presented or within 5 years of receiving their highest degree or diploma) for outstanding achievement in contributing to the hydrogeologic profession through original research and service, and for the demonstrated potential for continued excellence. The recipient need not be a member of the Hydrogeology Division, or of the Society.

The Kohout Early Career Award is funded by a generous bequest from the estate of Francis A. Kohout, a long-time USGS hydrologist. Francis Kohout was the 1961 recipient of the AGU's Robert E. Horton Award (now Hydrologic Sciences Award). Kohout conducted hydrogeologic and marine geologic research primarily along the continental margin of North America. He is probably best known for the so-called "Kohout convection", the geothermally driven circulation of sea water deep into carbonate platforms (as illustrated in the figure below).

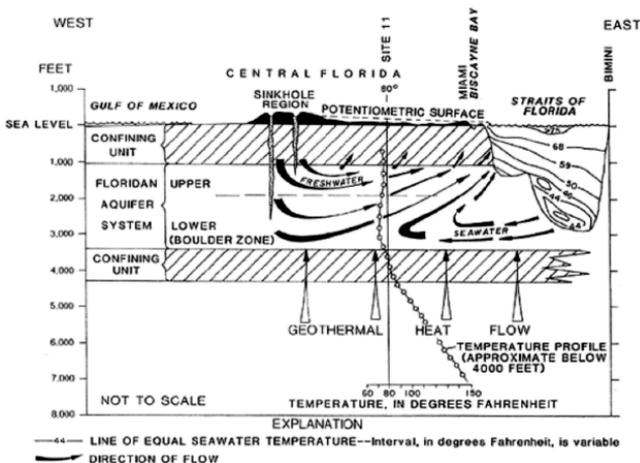


Figure from Kohout, F.A., 1965, A hypothesis concerning cyclic flow of salt water related to geothermal heating in the Floridan aquifer: *New York Academy of Sciences Transactions*, ser. 2, v. 28, no. 2, p. 249-271.