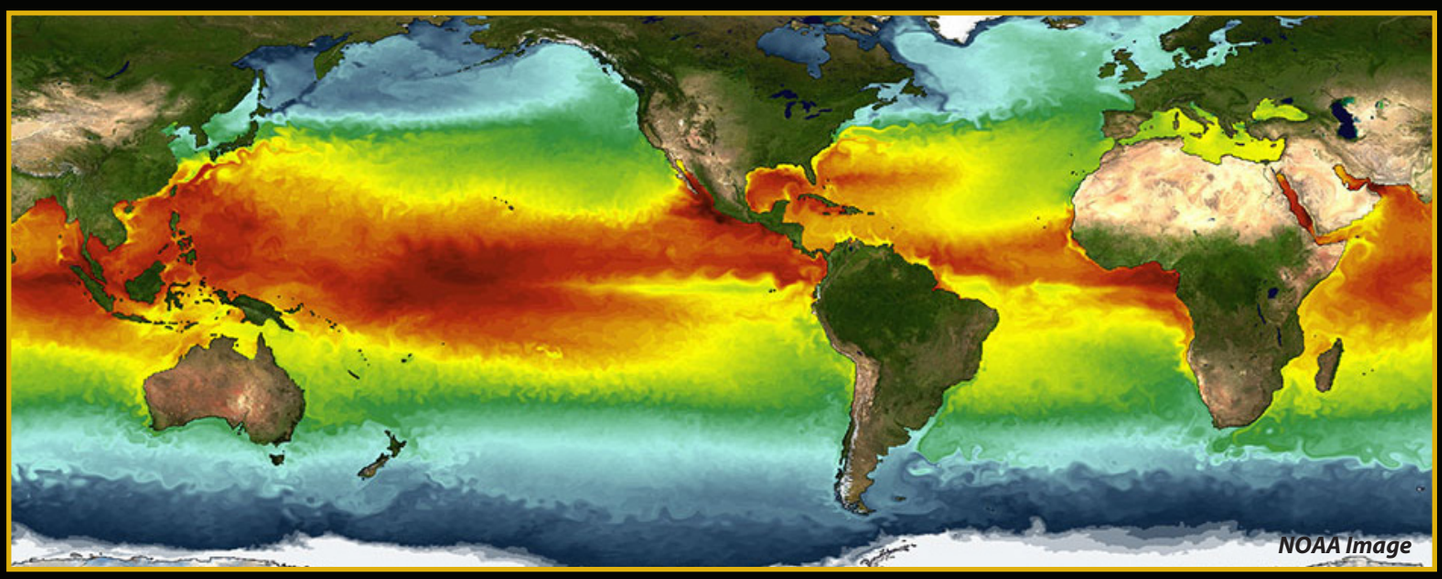
D.W. LEVANDOWSKI LECTURE IN EARTH SCIENCE

Dr. Jessica Tierney, University of Arizona



"Revisiting the Pliocene ocean as an analog for near-term climate change"

The warm Pliocene — 3-5 million years ago — was the last time that atmospheric CO2 exceeded its current level of 410 ppm. For this reason, the Pliocene has been closely studied as an analog for near-future climate change. Previous work suggested that the warm Pliocene had a so-called "permanent El Niño"— a dramatic reduction in the east-west sea-surface temperature (SST) gradient across the tropical Pacific akin to an El Nino event. The permanent El Nino is difficult to explain with CO2 forcing alone, leading to hypotheses that exotic feedbacks involving clouds and hurricanes must have been active during the warm Pliocene. In this work, we re-analyzed proxy records of SST during the Pliocene and found that while the SST gradient in the Pacific was reduced, it was not nearly as extreme as previously thought. Climate models can, generally speaking, capture the Pliocene SST changes without exotic forcings. Our new spatial reconstruction of Pliocene SSTs shows a diagnostic pattern of weaker Walker circulation, a well-known response to elevated CO2. We find that cloud feedbacks are likely to amplify this pattern, but that extreme changes in cloud albedo are not needed. The pattern and magnitude of Pliocene warmth is very similar that simulated under low-emissions future scenarios, suggesting a remarkable symmetry between past and near-future climate change. In this sense, the Pliocene is template for the climate change of "now." Furthermore, the Pliocene confirms that a weakening of Walker circulation, along with associated changes in ocean and atmospheric circulation, should occur as anthropogenic emissions rise.

THURS, APRIL 18
EE 117 / 3:30 P.M.

Refreshments after in HAMP 2201

Dr. Donald W. Levandowski served Purdue University for more than 20 years, including 10 years as EAPS Department Head. During this time the Geosciences Department was renamed the Department of Earth and Atmospheric Sciences. He served on numerous departmental, school and university committees, including the University Senate and the Committee for Development of Facilities for Physically Handicapped Students, and was Director of the Indiana Mining and Mineral Resources Research Institute from 1980 until 1993. Dr. Levandowski's work in remote sensing was widely recognized, and he was invited by a number of countries to work in association with government and research agencies, including the International Atomic Energy Agency. Among his extensive list of publications were works that received the ERDAS Best Science Award and the Autometric Award for Superior Publication on Imagery Interpretation. He served as an advisor to NASA on observation satellites and was a member of the Indiana Lieutenant Governor's Science Advisory Task Force.

PURDUE UNIVERSITY®

Earth, Atmospheric, and Planetary Sciences
COLLEGE OF SCIENCE