

## Engineering New Solutions to Climate Change

By Brad Stager

Wayne Clough's Eminent Scholar lecture, "Is Climate Change a Science Problem or an Engineering Problem?" on Feb. 23, was presented in the midst of a winter heat wave in the Tampa Bay area, notable for four consecutive days of record-high temperatures including one with a high of 87 degrees. According to the National Weather Service, daily temperatures for Tampa in February were 10.8 degrees higher than average.

While warm temperatures are great for trips to the beach, Clough suggested to the audience that an accompanying rise in sea level due to climate change could result in Georgia replacing a submerged Florida as a sunny, seaside vacation destination, as was the case during the Eocene Epoch.

"This brings us to the concept of winners and losers," says Clough, who used a map depicting how some scientists believe North America existed 50 million years ago to illustrate his point. The map showed the Gulf of Mexico extending about 70 miles into Georgia, just about to his hometown of Douglas.

"If you look at this map as you're sitting here today where we are, where is the loser?" According to Clough, the Sunshine State would be found 250 feet beneath the Gulf of Mexico's surface.

As for whether people should be concerned about the likelihood of such a drastic change, Clough pointed to scientific research showing that five to six times the amount of carbon dioxide is currently released into Earth's atmosphere each year than during the Paleocene–Eocene Thermal Maximum (PETM) of 50-million years ago which was characterized by periodic massive injections of carbon dioxide into the atmosphere and temperatures averaging eight degrees Fahrenheit higher than now.

"We're doing something to our planet that has never happened before. That is something to think about," says Clough, who earned his PhD in civil engineering from the University of California, Berkeley and was president of the Georgia Institute of Technology for 14 years.

Recent incidents of tidal flooding in coastal cities from Miami to San Francisco that now routinely occur in the absence of rainfall, (called blue sky flooding) were cited by Clough as evidence that climate change is in progress and that a rise in the sea level of even a few inches has consequences for residents.

“If you lived in Charleston, South Carolina, last year you saw it 84 times. That’s not arguing about inches, Charleston is flooding.” Clough adds that major flooding events are occurring more frequently and there are other signs of climate change such as diminishing ice in Earth’s polar regions.

Clough says the impact of climate change on communities such as Alaskan native villages that are losing their permafrost and experiencing flooding, is causing residents there to leave their homes and become climate refugees.

“These are Americans folks; we should be concerned about them. We should care about our American citizens living in Puerto Rico and places like Alaska. We should be concerned about their lives.”

For Clough, that concern leads to a question: “What is the engineer’s role and what is it that engineers can do that can complement the work of our colleagues in science?”

One principle Clough says that can be applied in finding engineering solutions to environmental problems requires going beyond technical considerations.

“Engineers have to think about humanity. We must put a human face on this issue.” Clough, who is a former Secretary of the Smithsonian Institution, adds that the global and gradual nature of climate change, among other factors, creates a context contrary to established training and practices and requires engineers to consider new problem-solving approaches.

“For engineers, this is really kind of ambivalent work.”

Among the suggestions Clough presented were to work steadily and deliberately at solving climate-related problems, adapting solutions to local conditions as well as giving sustainability and aesthetical consideration to projects. He cited economic factors such as cost, job security and that 60

percent of the world's seven billion people live in coastal communities as things to keep in mind when working at mitigating climate change on a global scale.

“When you take on a project, think of the larger purpose,” says Clough, who was involved in the reconstruction of New Orleans’ flood control system following Hurricane Katrina.

Clough acknowledges doing so can make hard problems more daunting to solve, but that should not be a deterrent factor.

“We can figure it out. We’re engineers, right?”

Clough’s presentation was the third of the 2018 edition of the College’s Eminent Scholar Lecture series and attracted a capacity crowd of faculty, community members and students like Ahmet Topcuoglu who is working on his mechanical engineering master’s degree and appreciates Clough’s perspective.

“As an engineer, creating or designing some engineering projects we have to think about the world’s climate and climate change.”