



FALL 2013 SEMINAR SERIES

DEPARTMENT OF OCEAN, EARTH, AND ATMOSPHERIC SCIENCES
3PM – ROOM 200 IN THE OCEANOGRAPHY/PHYSICS BUILDING
THURSDAY NOVEMBER 7th, 2013

“CLIMATE CHANGE AND THE ARCTIC”

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ABSTRACT

Decreasing Arctic sea ice the past 20 years has been attributed to human-induced climatic change. In addition, during the past few decades, the Arctic has experienced other climate-related changes in ocean temperature, salinity, coastal erosion, and marine ecosystems. What factors explain these trends and what is the role of climate? Because instrumental records extend back only a few decades, they are insufficient to fully understand natural variability in sea ice, ocean temperature, circulation and ecosystems or the impacts of a warming climate on the Arctic. With today's atmospheric carbon dioxide (CO₂) concentrations at levels not seen in roughly 3 million years, there is a growing need to understand how the Arctic Ocean, including its sea ice cover, has responded to climate changes of the past. Dr. Cronin will discuss these trends in the context of paleoclimate records from Arctic Ocean sediment cores, which provide proxy records sea ice, ocean temperature and circulation. Results show that pre-industrial perennial sea ice developed about 5,000 years ago and that during past warm periods, when atmospheric CO₂ concentrations were like those during pre-industrial times, parts of the Arctic lacked summer sea ice. The most notable periods were 5,000-10,000 years ago (the early Holocene) and 400,000 years ago (a warm interglacial known as Marine Isotope Stage 11). These warm climatic periods alternated with glacial periods (ice ages) when most of the Arctic was covered with land ice, ice shelves and thick sea ice. Sea-ice free periods have also been documented during the early Cenozoic ~ 56-46 Ma (Million years ago) and the Pliocene (5-3 Ma). The implications are that Arctic sea ice is extremely sensitive to climate changes and that Arctic Ocean marine ecosystems have been affected repeatedly to both short and long-term climatic cycles.

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