EXCELLABUST

EXCELLING LABUST IN MARINE ROBOTICS

INVITED TALK

25th October 2016

Fjord ecosystems on the West Antarctic Peninsula - hotspots of biodiversity and response to climate warming (the FjordEco Project)

Prof. Craig Smith
University of Hawai'i at Manoa

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 691980.

EXCELLABUST

1. INVITED TALK DETAILS

Date: 25th October 2016
Time: 10:00 – 11:00
Location: Gray Hall, University of Zagreb Faculty of Electrical Engineering (UNIZG-FER)
Unska 3, Zagreb, Croatia

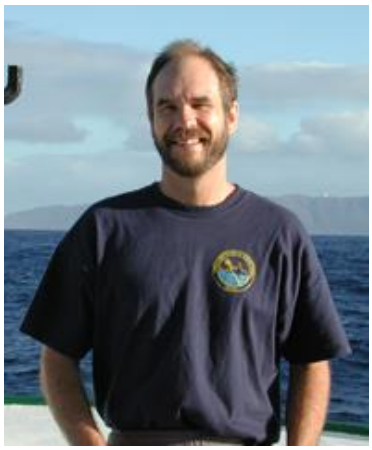
Title: Fjord ecosystems on the West Antarctic Peninsula - hotspots of biodiversity and response to climate warming (the FjordEco Project)
Name: Prof. Craig Smith
Affiliation: Department of Oceanography, University of Hawaii at Manoa

2. ABSTRACT

The West Antarctic Peninsula (WAP) has an extensive, rapidly warming system of sub-polar fjords with tidewater glaciers. These fjords appear to be hotspots of biomass and biodiversity, with sustained phytoplankton blooms, massive aggregations of krill and humpback whales, and high abundance and species richness of benthic megafauna. This spectacular marine life attracts >20,000 tourists to individual WAP fjords each summer. Nonetheless, the drivers of high fjord productivity/biodiversity, as well as the sensitivity of WAP fjord ecosystems to climate warming, are very poorly understood. Within the FjordEco Project, we are conducting an integrated field and modeling program to evaluate physical oceanographic processes, glacial inputs, plankton dynamics, and benthic community structure and function in Andvord Bay, a sub-polar WAP fjord, to address two overarching questions: *(1) What physical, glaciological, biological and chemical processes interact to enhance fjord productivity and biodiversity? (2) How sensitive are these fjord processes to increased glacial meltwater and sediment inputs expected from climate warming?* Our field program will test mechanistic hypotheses concerning oceanographic/glaciological forcing, and phytoplankton and benthic community responses, within the fjord, and includes: (1) Deployments of moorings (physical oceanographic, sediment traps, seafloor time-lapse camera), weather stations, and glacial and sea-ice time-lapse cameras to obtain an integrated view of ecosystem processes in the fjord and adjacent Gerlache Strait over 15 months; and (2) spring and fall process cruises using shipboard CTD, towed Acrobat system, AUV glider, and intensive studies of phytoplankton and benthic species composition and production/respiration to elucidate fjord ecosystem structure and function during different seasons. We will then use a coupled physical/biological modeling approach (ROMS/NEMURO) to evaluate drivers of biogeochemical cycles in WAP fjords and to explore their potential sensitivity to enhanced meltwater and sediment inputs.

I will present results from our spring and fall cruises to Andvord Bay in Dec 2015 and March 2016, to deploy instruments and evaluate ecosystem processes. Our findings thus far are as follows:
(1) Despite major glacial fluxes and recent warming along the Antarctic Peninsula, there is only weak influence from meltwater and sediment plumes in Andvord Bay.
(2) Phytoplankton blooms can occur very early (Dec) in Andvord Bay and yield intense pulses of phytodetritus to the basin floor.
(3) Sediment respiration, megabenthic abundance and sediment chl-*a* inventories indicate very high export flux in Andvord Bay compared to the open shelf, especially in the innermost fjord basin nearest large glaciers.
(4) Climate warming and increased meltwater production will ultimately alter these patterns of high export flux in the inner fjord; we plan to elucidate fjord sensitivity to climate warming through ecosystem modeling.

3. BIOGRAPHY OF LECTURER



Prof. Craig Smith

Email: craigsmi@hawaii.edu

Craig Smith obtained his Ph.D. from Scripp's Institution of Oceanography in 1983 and is currently a Professor of Oceanography at the University of Hawai'i. He has strong interests in biodiversity, disturbance ecology, and human impacts in seafloor ecosystems. Craig has conducted research in Antarctica, mangroves, submarine canyons, organic-fall communities, cold seeps, continental slopes, and abyssal plains to obtain a broad perspective of natural and stressed marine ecosystems. He has lead over 50 research expeditions from the equator to Antarctica, and has conducted over 100 HOV, ROV and AUV dives. Craig has also published over 140 papers in the scientific literature on seafloor ecology, biodiversity, climate-change impacts, and the design of marine protected areas.

4. DESCRIPTION OF THE INSTITUTION:

Department of Oceanography, University of Hawaii at Manoa

Address: 1000 Pope Road, Honolulu, Hawaii 96822, USA

Website: http://www.soest.hawaii.edu/oceanography/
https://craigrsmithlab.com/
https://www.soest.hawaii.edu/oceanography/faculty/csmith/

The School of Ocean and Earth Science and Technology (SOEST), at the University of Hawai'i at Mānoa (UHM) is a world-class research and academic institution focused on informing solutions to some of the world's most vexing problems, including the patterns and consequences of climate change in diverse ocean environments, from equatorial waters to the poles. Through an integrated, comprehensive, and sustained system of field programs, Earth and planetary observations, research, and education, SOEST professors, researchers and staff work to transform the way people live on Earth by enabling a healthy public, economy, and planet.