Water Resource Topics (#1-2)

1. Changes in drought patterns with elevation
   - Background research to identify 2-3 drought indices for use in Hawaii
   - Identify 3-4 rain gages with long records across range of elevations
   - Apply indices to identify droughts and variability of their severity/duration with elevation

2. Upconing of salt water into drinking water wells
   - Background research on analytical methods to assess upconing in unconfined and confined aquifers
   - Identify aquifer sector, drinking water wells, and data availability
   - Apply methods to determine vulnerability to upconing
   - Validate results using monitoring data

Aly El-Kadi (elkadi@hawaii.edu)
Water Resource Topics (#3-4)

3. Impact of Hawaii Dam and Reservoir Safety Act of 2007 on water resources for agriculture
   - Background research on agricultural water resources in Hawaii and requirements of Act
   - Identify study area (e.g., island, farming area) and water resources for agriculture
   - Summarize status of water sources before/after enactment of Act

4. Evapotranspiration differences between native and non-native tree species found in Hawaii
   - Background research on impacts of non-native tree species on Hawaiian watersheds
   - Identify features/characteristics that control ET
   - Identify common native and non-native tree species for comparison
   - Review literature to summarize differences in ET and potential effects on water resources

Aly El-Kadi (elkadi@hawaii.edu)
Determination of Social Costs of Resource Use

• Social costs of our activities (burning fossil fuels, production and use of toxic chemicals, deforestation, etc) are not collected at point of sale

• Society pays these costs indirectly through additional health care costs, loss of ecosystem services, etc.

• Project will involve calculation of social costs of an activity of your choice.

Neil Frazer: neil@soest.hawaii.edu
Microzooplankton Grazing in Kaneohe Bay

- Supervisor: Karen Selph
- Co-PI on a SeaGrant funded project with Erica Goetze & Petra Lens
- Field work (infrequent, but intense at times)
- Lab work (filtering/making chemical solutions, microscopy, flow cytometry,)
- Starting next semester (Spring 2012)
- Probably start at 5 hrs/week, up to 10 hrs/week at times

selph@hawaii.edu
Why study microzooplankton grazing?

- Microzooplankton are the main grazers of phytoplankton.
- In most areas and at most times, grazing by microzooplankton is the leading cause of death for phytoplankton.
- We know little about the microzooplankton grazers in K-Bay, including how their populations might change over time.
- Knowing how grazers respond to changes in their prey (phytoplankton) now will help us predict how this relationship might change as the planet changes in the future.
- We will focus on the protozoan (single-celled) micro-grazers (your senior thesis project).
- Erica and Petra will focus on metazoan (many-celled) micro-grazers, which are mainly immature forms of larger grazers (a graduate student is making this her project).
- We will measure their preferred prey types, how fast they are eating them, and what the balance between phytoplankton growth and mortality is in the bay.
- You will learn a variety of common hands-on biological oceanography techniques, including how to make your own reagents, how to use a microscope imaging system and how to use a flow cytometer.
Web-research position

- **Supervisor:** Karen Selph selph@hawaii.edu
- **Hours per week:** ~10
- **Total hours:** ~240 (project must be completed by June, 2012)

**Project Goals:**

- **To find** the current occupation/location/web address of past participants in the DISCO & PODS Symposia (see next slide)
- **To contact** them for information for a web-site currently under development

Can work at your own pace, with weekly progress reports

Number of people to find: ~650!
DISCO & PODS Symposia

DISCO:
Dissertations Symposium in Chemical Oceanography

PODS:
Physical Oceanography Dissertations Symposium

- These symposia, which are funded by NSF, have the goal of creating connections (professional and social) between recently graduated PhD-level scientists in chemical and physical oceanography.

- DISCO meetings were started in 1977: the 23rd meeting will be in 2012.

- PODS meetings were started in 2002: the 7th meeting will be in 2012.

- Each meeting had ~25 participants, and we don’t know their current whereabouts or occupation.

Be a detective! Help us find them!
Learn about the career path of oceanographers!
Movements of large pelagic animals

Kevin Weng and Nikolai Maximenko
kevin.weng@hawaii.edu
Movements of large pelagic animals

- Marine animals make long migrations
- How do ocean currents help or hinder them?
- Can they sense ocean currents?
- Qualifications: Good quantitative background and experience programming with matlab or R

Kevin Weng and Nikolai Maximenko
kevin.weng@hawaii.edu
If you like to program in Matlab and/or enjoyed OCN312...

contact Janet Becker (jbecker@soest.hawaii.edu) to discuss potential senior research projects on the dynamics of surface waves and coastal processes.
High Rate Anaerobic Digestion

Hawaii Natural Energy Institute

Michael Cooney

Ryan Lopez
Current Work

• Biofilm immobilization material for UFAF
  – Biochar (corn cob)
• System performance
  – Chemical oxygen demand (COD) reduction
  – Volumetric gas production (gas box)
  – Gas Composition (GC)
• Two waste streams
  – Synthetic sucrose based
  – Aqueous phase waste trap grease
• Biochar treatment for use as soil amendment
• Microbial fuel cell (MFC)
Future Work (Projected for 2012)

• Pilot demonstration project on Sand Island
• New immobilization materials
  – Porous chitosan membrane
  – Other forms of biochar such as carbonized anaerobic sludge
• Different waste streams
  – Processing animal waste on the big island
• Methods to mitigate sulfate inhibition of methanogenesis
Contacts

• Dr. Cooney is the P.I. (POST 104)
  – mcooney@hawaii.edu

• Ryan Lopez (POST 122)
  – rjlopez@hawaii.edu
Are you interested in communicating science to support resource management?

Researchers at NOAA’s Coral Reef Ecosystem Division are working on a variety of projects to provide sound science to enable informed and effective implementation of ecosystem-based management and conservation strategies throughout the Pacific.
Coral Triangle Atlas

The Coral Triangle Atlas will...
- Centralize information
- Encourage data sharing
- Reduce duplication of data collection efforts
- Provide most complete and current data

The spatial information can be used...
- For complex analyses
- For management planning in a regional context
- For design of MPAs and MPA Networks throughout the region
How to support the Coral Triangle Atlas:

- Provide oceanography and climatology data
- Provide the interpretation of the data in relation to the integrated ecosystem-based management of Coral Triangle region
- Bridge the gap between science and managers

Contact: Tomoko.Acoba@noaa.gov
A Coral Reef Ecosystem Model as a Decision-support Tool for Ecosystem-based Management

Collect and analyze data on habitat, abundance, diet, movement, consumption, mortality, growth rate, maximum length & weight, etc for coral reef …

Zooplankton, Invertebrates, Reef fish, Marine mammals, Marine reptile, Sea birds

Contact: Mariska.Weijerman@noaa.gov
Hawaii Conservation Alliance
Effective Conservation Program
Marine Focus Group

Contribute to the development of a new marine mapping resource equivalent to the terrestrial characterization of the main Hawaiian Islands to support watershed management efforts in Hawaii

Contact: Annette.DesRochers@noaa.gov
Do you have a flare for Graphic Design
Or for synthesizing Complex Scientific Information?

Work with our team of researchers and technical professionals to develop outreach and education materials to support conservation efforts in American Samoa.

Contact: Annette.DesRochers@noaa.gov
Assess patterns of cryptic diversity using Autonomous Reef Monitoring Structures

1. Sort through bulk samples from selected Pacific Islands for motile invertebrates ≥ 2mm
2. Identify to morpho-species level
3. Examine patterns of diversity of motile organisms
4. Examine plate recruitment of sessile organisms
5. Data QC and management
Other GES Topics within NOAA’s Coral Reef Ecosystem Division CRED

1. Benthic image analyses for some of the Main Hawaiian Islands or Guam (with Dr. Bernardo Vargas-Angel)
2. Climate Change Vulnerability Assessment for Reef Fish (with Drs. Adel Heenan and Rusty Brainard)
3. WorldView2 shallow water bathymetric or habitat mapping (Dr. John Rooney)
4. Laboratory development and processing of calcification acidification units (CAUs) (Dr. Rusty Brainard and Cristi Richards)
5. Assist with US Coral Triangle Initiative (CTI) capacity building training module development for Ecosystem Approaches to Fisheries Management (fishery mgmt plans, Councils, reef fish stock assessment, Climate change and EAFM). (Drs. Rusty Brainard, Robert Schroeder, and Megan Moews)
For more information contact:

Rusty Brainard
NOAA Coral Reef Ecosystem Division

Rusty.Brainard@noaa.gov
Civilization Threatening Impact

Mass Extinction Impact

Earth Sterilizing Impact

From NASA NEO program.

Contact Dr. Greg Ravizza: ravizza@hawaii.edu
Searching for the geochemical signature of impact events in the sediment record

- Why? Impacts events rapidly perturb the Earth system but only the largest of known impact events seem to cause extinction. We know very little about the global consequences of “small” impact events.

- How? We measure concentrations of Osmium and Iridium and \(^{187}\text{Os}/^{188}\text{Os}\) ratios in sediments that accumulated close to the time of known impact craters. Finding these the chemical “fingerprints” of impact events in sediments is essential to understanding the effects of these impact on the Earth system.

- What (would you do)? Work in the lab separating Os and Ir from sediment samples and analyzing these trace metal by ICP-MS.
What are the environmental consequences of “small” impact events?

To answer this question we must find them....
Global impact signature across the K-T extinction horizon.

Can we detect much smaller events?
Idealized temporal evolution in a well-mixed ocean.

The time scale of $^{187}\text{Os}/^{188}\text{Os}$ recovery to pre-impact values is mainly determined by the marine residence time of Os. The size of the "dip" may record projectile size.
Weather-Related Topics
Steven Businger, Meteorology

1. Lightning climatology
2. Strong NE Tradewind Study
3. Vog
4. Mauna Kea Ecology

Support available to student with motivation and a modicum of computer skills.
Contact info: businger@hawaii.edu or call 956-2569 with questions.
Shedding Light on Storms

Recent satellite-based measurements estimate that there are an average of \(~4.5\) million lightning flashes per day around the world [Christian et al., 2003].
Lightning Represents a Hazard

- Cause fires.
- Impact on power infrastructure. Utilities interested in updating the occurrence of lightning estimates.
Background: VLF Signal Propagation

- Pulses of electromagnetic radiation produced by lightning flashes peak in the very low frequency (VLF) region of the spectrum (3-30 kHz).
- The Earth-ionosphere waveguide preferentially channels to great distances the pulses associated with current in the vertical channels in IC and CG flashes.
- This guided electromagnetic pulse is called a radio atmospheric, or sferic, and has a low attenuation in the VLF band and can propagate effectively in the earth-ionosphere waveguide for thousands of kilometers.
- Our ability to measure this impulse at great distances from the strike forms the basis for a long-range lightning geo-location network.
DE Model Calibration for Ocean Condition
Collaboration with Stanford

- Professor Umran Inan and Dr. Ryan Said of Stanford University
  - Contributed a more sensitive detector that has better angular resolving ability (But, more sensitivity increases noise).
  - And an improved processing approach that addresses noise and variations in the propagation channel and makes use of the whole waveform.

Smaller GLD360 VLF detector.

Dr. Ryan Said in Antarctic with an ultra sensitive VLF detector.
Radar Reflectivity Product

Lightning-derived reflectivity with airline flight tracks overlaid on IR satellite image.
Organized Thunderstorms
Fuel Winter Storms

Northeast Pacific Storm 18-20 December 2002

Lightning Strikes in Katrina