Patterns and Controls on Trace Gas Fluxes of CO$_2$ and/or CH$_4$ in Marine and Terrestrial Habitats from Barrow, Alaska to Pago Pago, American Samoa

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Educational Partnership Program with Minority-Serving Institutions

- The EPP/MSI is a Federal STEM education and NOAA mission future workforce program with focus on:
  - supporting the training and graduation of students and increasing participation of students from traditionally underrepresented minority communities;
  - developing eligible candidates in support of a diverse future workforce for NOAA and NOAA mission-related enterprises; and,
  - post-secondary education and research capacity development in atmospheric, oceanic, and environmental sciences and remote sensing technology at MSIs supported through competitive awards.

- SDSU research and graduate education of URM students
Main Research Areas for NOAA CREST EPP Students at SDSU
Measuring CO₂ fluxes along the coastal bays of American Samoa

Michael Trunkhill MS Student
Candace Alagata MS Student
Nine bays in and coastal areas in Tutuila, American Samoa
Headspace equilibrator

Ikawa & Oechel, 2011

Boat Based Eddy Covariance
CO$_2$ flux of San Diego Bay

Alexander Carsh, Ph.D. Student
Candace Alagata, MS Student
Initial Results - December 2018 survey

Key points:

- Clear spatial variation between the north section of San Diego Bay, the central-to-south section, and the bay mouth
  - May be due to difference seagrass density, relative levels of human activity, tidal flushing effects, etc.
- All points measured along the bay were sources of carbon to the air
  - Potentially due to winter season inhibiting photosynthetic activity
Controls on CO$_2$ Flues in the Mangroves of Bahia Magdalena

José Diego Uribe-Horta, MS Student

Mangroves: Underestimated for C storage; Water stress as high as desert vegetation
Effects of drought conditions and fire on CO$_2$ flux in semi-arid chaparral ecosystems

Andrea N. Fenner  
*Ph.D. Student*

Breahna Gillespi  
*Ph.D. Student*

Jessica Montes  
*MS Student*
Carbon sequestration with stand age and fire cycle

Effect of Drought on Carbon Sequestration

• AmeriFlux: US-SO4
• Chaparral stand is about 172 years old.
Controls on stand level CO₂ fluxes and water use

Breahna Gillespi, Ph.D. Student
“Soil Respiration Response to Adenostoma sparsifolium Microhabitats Among Seasons in Semiarid Shrubland”

By Jessica Montes, MS Student
Effects of Elevated CO$_2$ and Climate Change on Wines and Vines
Molly Clemens, Ph.D. Student
Alessandra Zuinga, Ph.D. Student

Experimental Vineyard at SDSU
Field Station Temecula
Molly Clemens, Ph.D. student
9 varietals
Experimental Vineyard in the Country of Georgia

Adaptation of Wine Production to Climate Change

E.g. joint research on solutions to the impacts of global warming, increasing CO₂, and changes in water availability on wines and vines in California and Georgia

In Georgia:
437 Local Varietals
350 International Varietals
Arctic CO$_2$ and CH$_4$ Fluxes

Kyle Ardnt
Ph.D. Student

Josh Hashemi
Ph.D. Student
Importance of the Zero Curtain for Fall Trace Gas Fluxes
Methanol Oxidation at Zero and Subzero Temperatures

C14-Methanol Cold SIR

0 24 48 72 96 120 144 168 192 216 240

- O C
- -2 C
- -7 C
- O C (Con)
- -2 (Con)
- -7 (Con)

Eric Wilkman
Ph.D. Student
Major Goals and Conclusions

- Patterns and controls on CO$_2$ (and CH$_4$) fluxes in the Arctic, Chaparral, Mangrove, Desert, South Pacific, and Marine Ecosystems.

- Zero curtain period very important for CO$_2$ and CH$_4$ production in Arctic
- Old chaparral can be managed as a sink for C.
- Coastal Marine can be managed as an increased Sink for C.
  - Seagrass revegetation
  - Watershed management, coral health
- Mangroves a major sink of C.
  - Mangrove water stress as high as desert vegetation
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