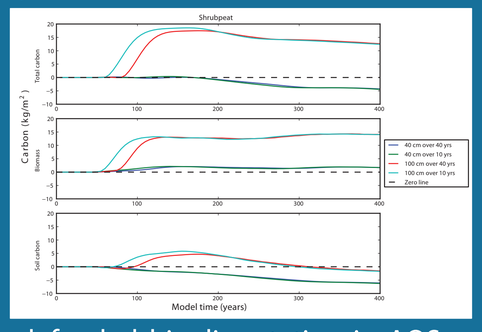
Ecosystem-Atmosphere Research in the Desai Ecometeorology lab

PI: Ankur R Desai, Associate Professor, Dept of Atmospheric and Oceanic Sciences
Faculty affiliate: Nelson CCR, SAGE, and Limnology & Marine Science

Our lab observes and models micrometeorological, ecological, and biogeochemical interactions of the surface with the atmosphere at regional to global scales, with a focus on anthropogenic influences to these interactions. Here's what we're working on lately.

The Ecometeorology Bunch, Spring 2012 Edition:

Ben Sulman, Ph.D.

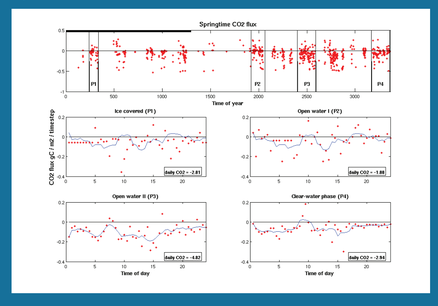


- Ben Sulman recently defended his dissertation in AOS on peatland carbon cycle responses to water table declines.

- In the figure above, he shows how both plant growth and soil decomposition increased in response to drought. Large declines in water table led to net carbon gain, while smaller declines caused net carbon loss.

- Ben is now a post-doc at Princeton/GFDL working on simulating wetlands in global earth system models.

Gosia Golub, Ph.D.

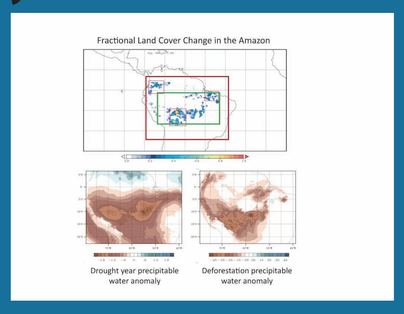


- Malgorzata "Gosia" Golub is a current Ph.D. student in Limnology & Marine Science and member of CCR.

- Recently, she instrumented a flux tower over Lake Mendota to study at how ice dynamics impact lake carbon and energy exchange.

- In the figure above, she notes several distinct phases of lake carbon uptake throughout winter-spring 2012, indicating a continued carbon sink pre and post ice-out.

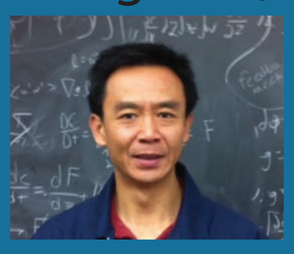
Justin Bagley, Ph.D.

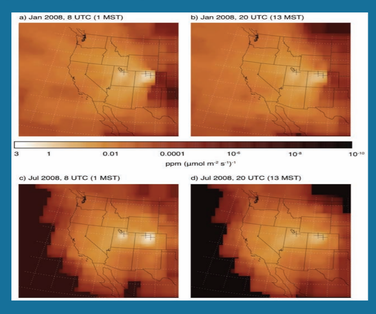


- Justin Bagley completed his Ph.D. in Fall 2011 and is currently a post-doc studying implications of bioenergy for the hydrologic cycle at the University of Illinois.

- In the last decade, the Amazon rainforest has experienced two "once in a century" level droughts. Justin tested changes in the hydrological impacts of Amazonian deforestation under drought and pluvial conditions by modeling realistic land cover change in the region and tracking where moisture evaporated from areas of deforestation fell as precipitation.

Dong Hua, Post-doc

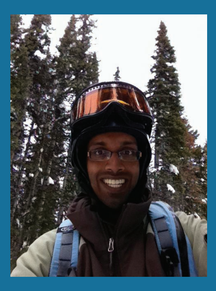


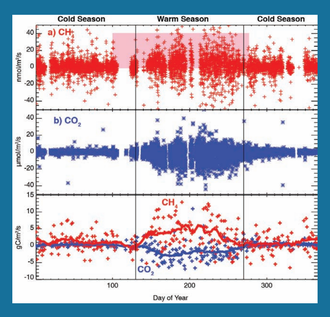


- Dong Hua is a post-doctoral scholar in CCR, working on research in ecosystem carbon cycle modeling, flux tower observation, and atmospheric inverse modeling with NOAA's CarbonTracker model.

- Currently, he is investigating the influence of boundary layer surface fluxes on atmospheric tracer concentrations in the Rocky Mountains. The figure above shows aggregated surface influence functions derived from WRF-STILT back trajectories run for 2008 at three sites in Colorado and Utah.

Ankur Desai, PI

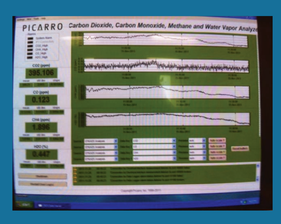




- Ankur Desai joined UW in 2007 and has been mentoring students, teaching courses, and conducting research in boundary-layer meteorology and ecosystem ecology.

- He is PI of five eddy covariance flux towers, including the 447-m northern Wisconsin WLEF Park Falls tower, pictured above, where a variety of lower-atmospheric research is conducted. Recently, he has been measuring the flux of methane, which as the figure above shows, has surprising winter emissions relative to quiescent CO_2 emissions.

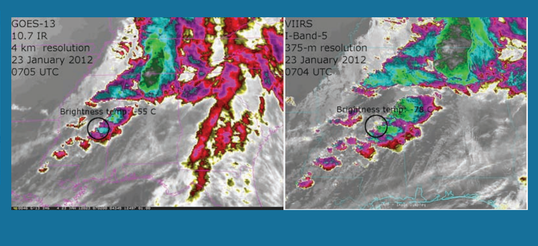
Jonathan Thom, Assoc. Res.



- Jonathan Thom, in addition to his work in the SSEC Antarctic Meteorological Research Center, serves as lab manager and field site special-ops for the Desai lab's six field research sites.

- Recent projects include installation of a real-time phenology camera on a 30 meter tower in Northern Wisconsin (center photo) and set-up of the AOSS 1553 lab, including the AOSS roof-top greenhouse gas sampling of CO_2, CH_4, CO, and H_2O on the RIG tower using cavity ringdown spectroscopy (right photo).

Tommy Jasmin, M.S.

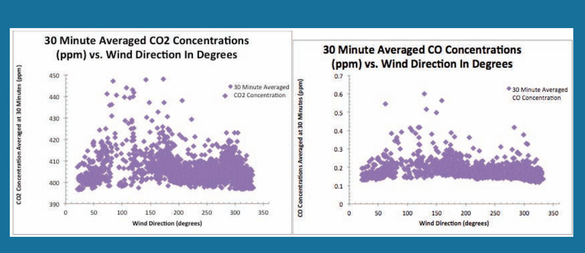


- Tommy Jasmin is a researcher in SSEC and recently joined the Desai lab to acquire an M.S. in Environment and Resources.

- Recently, Tommy had added support for Suomi NPP instruments VIIRS, ATMS, and CrIS to SSEC's McIDAS-V scientific data visualization and analysis software.

- The figure above shows high spatial resolution thermal band (I-Band 5, 375 m resolution) on VIIRS captures cloud structure not detectable from GOES. In this case, a cloud-top temperature difference of over 20 degrees Celcius

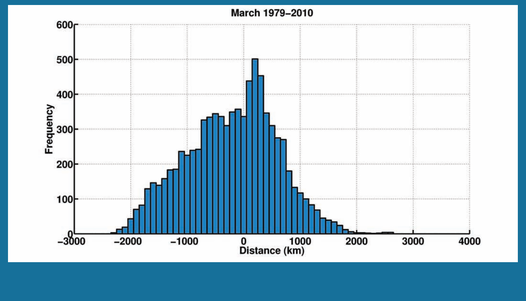
Molly Young, B.S.



- Molly Young is a UW sophomore and Desai lab intern as part of her Bio 152 course.

- Molly worked on analyzing the AOSS RIG tower rooftop greenhouse gas data in relation to wind direction and air parcel source regions. The figure above shows half-hourly CO_2 (left) and CO (right) concentrations in winter 2012 as a function of wind direction, revealing the strong influence of the power plant with easterly winds.

Matt Rydzik, M.S.



- Matt Rydzik recently completed is M.S. thesis in AOS on the relationship of pre-existing snow cover to mid-latitude cyclone trajectories.

- In the figure above, Matt reveals an enhanced frequency of mid-latitude cyclones in regions 50-350 km south of the snow cover extent.

- Matt is now a meteorological forecaster and consultant with a private-sector company in Maryland.

On deck: Ke Xu (incoming AOS Ph.D.), Sean DuBois (incoming Environment and Resources M.S.), Quinn Thomas (visiting scientist), Austin Thomas & Amanda Gumber (summer undergraduate REUs)

Many thanks to our funding agencies: DOE, NSF, NOAA, WI Focus on Energy, SSEC, UW Graduate School, and also our growing list of alumni members!

Learn more: http://flux.aos.wisc.edu