

Energy Conservation efforts at the UW Atmospheric, Oceanic and Space Sciences Building (AOSS)



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March 2009

AOSS & Campus Conservation

2008 Accomplishments

- UW Campus Conservation & Sustainability Committee bi-weekly meetings
- Strategy developed for AOSS to become an “Energy Smart Building”
 - Identification of Electricity Savings (lighting audit completed)
 - Monitor and Identify HVAC Savings (monitors already installed)
 - Participation in pilot of new UW recycling program
 - Employee Education

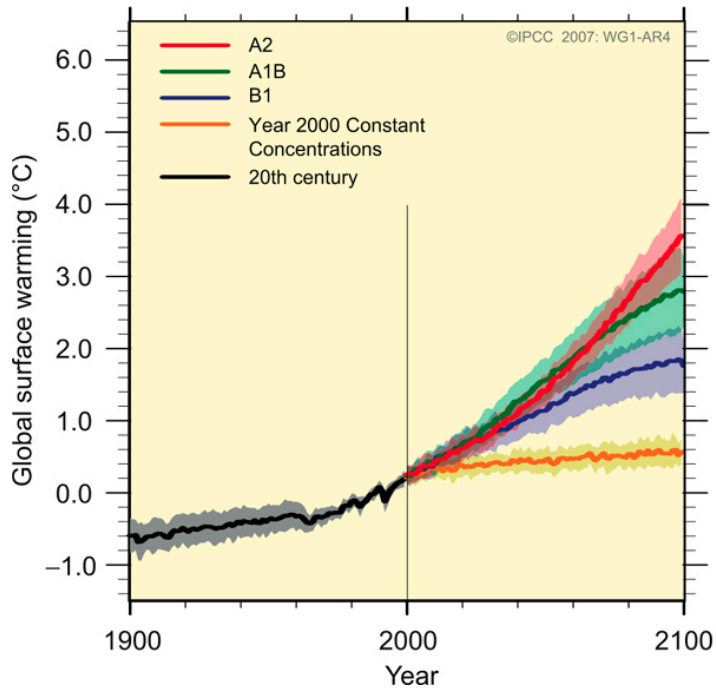
*In 2008 a group of energy conscious individuals began meeting twice a month to strategize how we could collectively reduce our carbon footprint at AOSS. Our dedication and enthusiasm caught the attention of the UW-Madison WE CONSERVE program and bumped our building to the front of the queue for energy efficiency projects such as lighting upgrades, HVAC modifications, and participation in a pilot recycling program. (low hanging fruit)
Up Next – Employee Education & Awareness Campaign*

2009 Goal -

- Kick-off our Employee Education & Awareness Campaign and formalize an “Energy Smart Building” Model for UW campus



Motivation



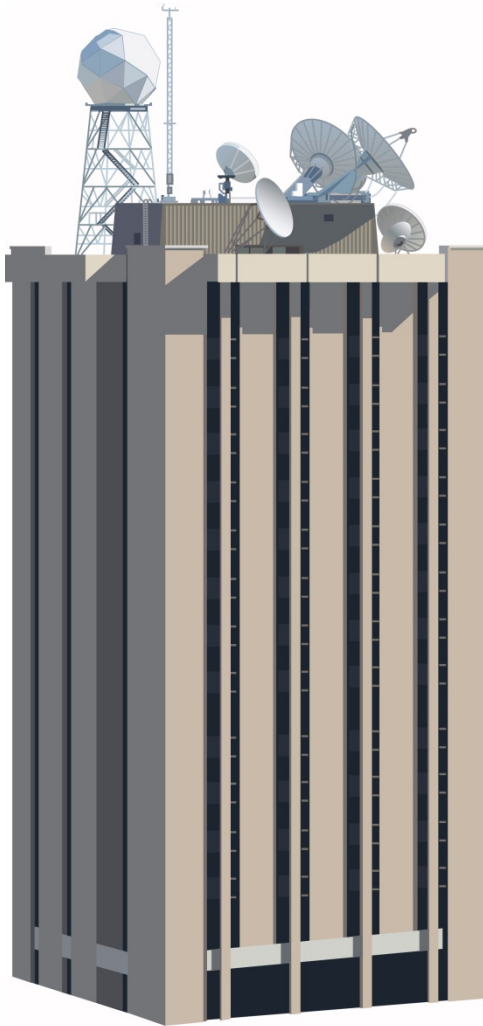
IPCC (2007) “Warming is unequivocal, and most of the warming of the past 50 years is very likely (90%) due to increases in greenhouse gases.”

21st century anthropogenic CO₂ emissions have been growing four times faster than in the 1990s and are now **above the worst-case emission scenario** projected by the IPCC.

National Academy of Sciences 2009

So what is our Carbon Footprint?

First a little background ...



Facility Facts

ATMOSPHERIC OCEANIC&SPACE SCIENCES BLDG

UW Building # 0156

Official Name: ATMOSPHERIC
OCEANIC&SPACE SCIENCES
BLDG

Facility Address: 1225 W DAYTON ST
Delivery 1225 W DAYTON ST
Address:

MADISON WI 53706-1612

Assignable SF: 79,262

Non-Assignable 40,024

SF:

Total SF: 119,286

Gross SF: 144,147

Construction 01/01/1966

Date:

Occupancy 01/01/1969

Date:

Fac. Control: Madison Campus

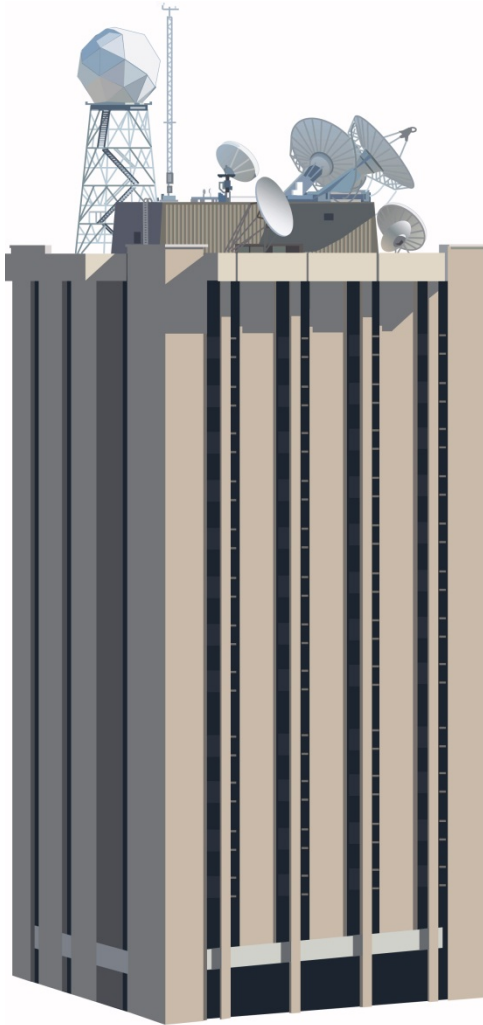
Ownership: Owned

Inactive Date:

Atmospheric, Oceanic & Space Sciences



AOSS Building Facts



- Main: East and West Air Handling Systems
 - Currently shut off from 10 p.m. – 5:30 am
 - East System: moves 75,000 ft³/minute
- 6th Floor: Independent system for Data Center, continuous operation
- 5th Floor: Independent cooling system, continuous operation
- 14th Floor: Independent cooling system, continuous operation
- Rooms have individual conditioning units
- Approximately 250 total thermostats (145 are independently controlled)

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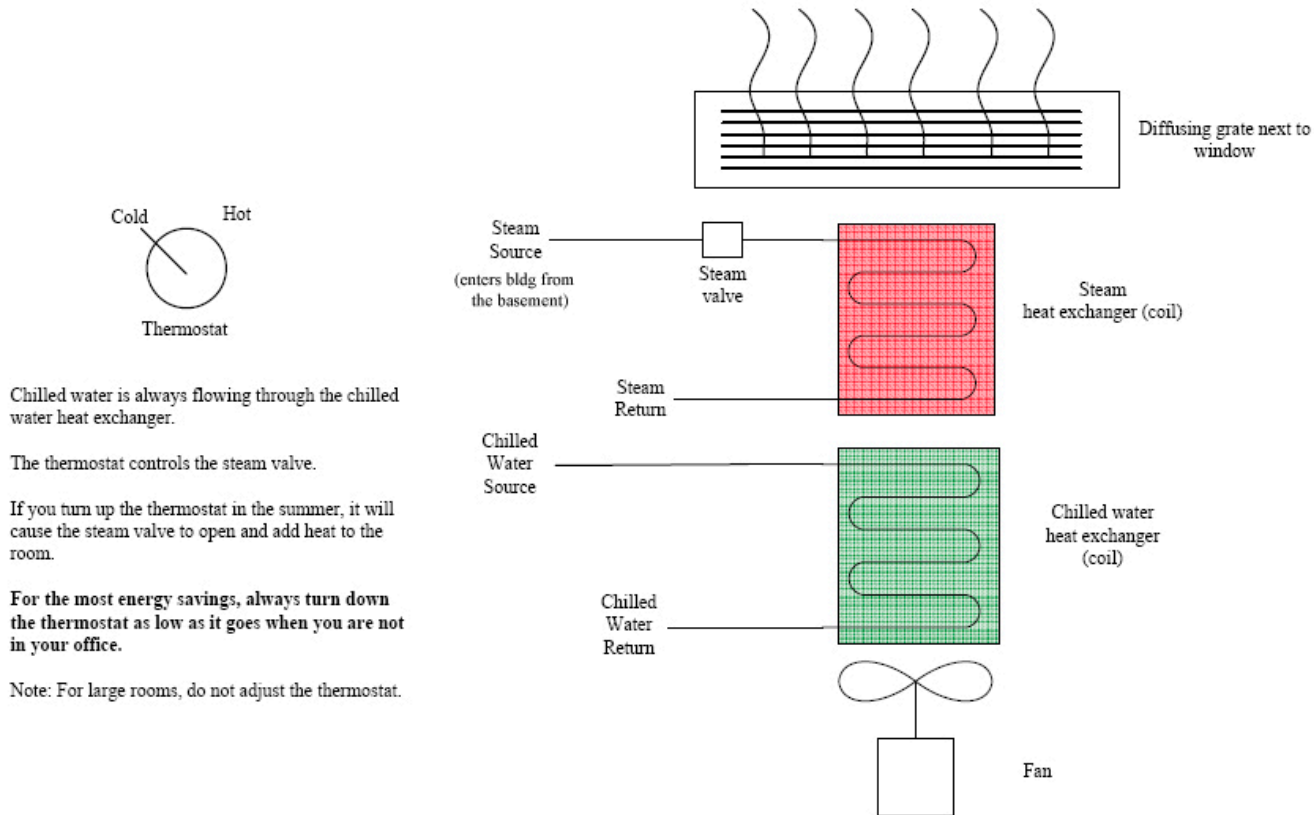


During the summer, air is cooled to 55 degrees before circulated throughout the building to wring out the humidity. (this temperature is about 10 degrees cooler in the winter)

AOSS HVAC is powered by electricity

(natural gas *only* for our emergency generator)

SELECT Heating and Cooling system – Room heat exchanger diagram



Chilled water is always flowing through the chilled water heat exchanger.

The thermostat controls the steam valve.

If you turn up the thermostat in the summer, it will cause the steam valve to open and add heat to the room.

For the most energy savings, always turn down the thermostat as low as it goes when you are not in your office.

Note: For large rooms, do not adjust the thermostat.

FOR THE MOST ENERGY SAVINGS TURN DOWN THERMOSTAT YEAR-ROUND!

Total Annual Electrical Consumption:

~ 3 million kilowatt hours (~72% from HVAC)

(Electric bill, paid by the state is about \$270,000)

AOSS 2007 kWh usage

2,809,0803 kWh

AOSS 2008 kWh usage

3,122,682 kWh

AOSS CARBON FOOTPRINT

Using MG&E conversion of 2.27 lbs per kWh for coal-generated electricity:

2007 - 6376612 lbs / 3188 tons

2008 - 7088488 lbs / 3544 tons

~ 10% increase in 1 year!

Reducing our Carbon Footprint

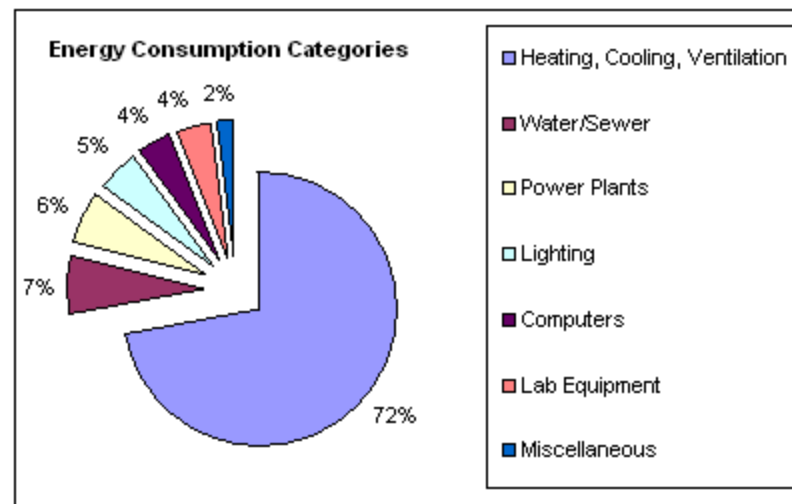
UW We Conserve has goal of 20% by 2010

- HVAC modifications (study almost done)
- Lightning upgrades (approved & budgeted by FP&M)
- Stream-lined Recycling (underway)
- Education and Awareness – starts in April!

AOSS HVAC Study

72% of our electrical consumption is from Heating & Cooling


- HVAC is off from 10:00pm to 5:30 am
- Currently, air is exchanged about 16 times per hour (recommended 6 times per hour)
- Study nearly done & recommendations to follow



Lightning

~ 400,000 kWh projected reduction from new T-8 5000K lamps
less than our total increase in electricity usage between 2007-08

#13



BUILDING NAME		Atmospheric, Oceanic and Space Sciences			
BUILDING #	0156				
DATE	10/22/08	New ballast and lamp replacement			
LIGHTING CALCULATOR		SURVEY INFO			
TOTAL EXISTING LIGHTING LOAD - OLD		kW	177.5		
TOTAL LIGHTING LOAD - NEW		kW	77.2	710,000.00	kWh
BUILDING OCCUPANCY / YEAR		HOURS	4000	308,800.00	kWh
SENSORS - ENERGY SAVINGS		%	5%		
ENERGY COST @ \$/kWh		\$	\$0.07		
NEW LIGHTING MATERIAL COST		\$	\$40,874.86		
NEW LIGHTING INSTALLATION COST/LABOR		HOURS	1,669.50	TOTAL LABOR	TOTAL T+M
	RATE	\$	\$68.00	\$113,526.00	\$154,400.86
SENSORS COST		\$	\$15,900.00		
SENSORS INSTALLATION COST/LABOR		HOURS	238.50	TOTAL LABOR	TOTAL T+M
	RATE	\$	\$68.00	\$16,218.00	\$32,118.00

SAVINGS-ONLY LIGHTING INSTALLED	401,200.0	kWh	\$28,084.00
TOTAL SAVINGS LIGHTING AND SENSORS	416,640.0	kWh	\$29,164.80
TOTAL PROJECT COST, MATERIAL AND LABOR			\$186,518.86
PAYBACK [ONLY FIXTURES INSTALL. \$: SAVINGS \$]	5.50	YEARS	
PAYBACK YEARS [TOTAL PROJECT COST \$: SAVINGS \$]	6.40	YEARS	

— Savings
 cost

AOSS Campus-wide model for an “Energy Smart Building”

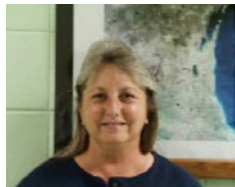
- Implement revised Recycling Program
- Understand HVAC technology and needs
 - Monitor Energy use
 - Optimize HVAC use
 - Document initial conditions, changes, and reductions
 - Assess each room, suggest improvements, set benchmarks
- De-lamp where possible, reduce timing for occupancy sensors, lightning upgrades etc...
- Educate building occupants
& Promote the **I Pledge** (50% participation)

Conservation Coaches – Join US!

*400 employees at AOSS
AOS-SSEC-CCR*

- Raise awareness about how to prevent energy waste, how the building uses energy, how the HVAC system works etc...
- Turn off unnecessary lighting & other unused items
- Make sure computers are in energy saving mode (or off)
- Advocate less paper use, print on both sides etc...
- Adapt the I pledge

<http://www.conserve.wisc.edu/pledge.htm>



Education & Awareness Campaign

Earth Week – (April 20th-24th)

- Building heating & cooling education (HVAC, lights, etc...)
- Computers (cradle to grave issues, screen-savers power-save, printing on both-sides etc...)
- Reduce, re-use, and recycle guidelines for the office (4th floor composting for coffee & tea)
- Commuting to work issues (promote bike to work week & the I pledge)



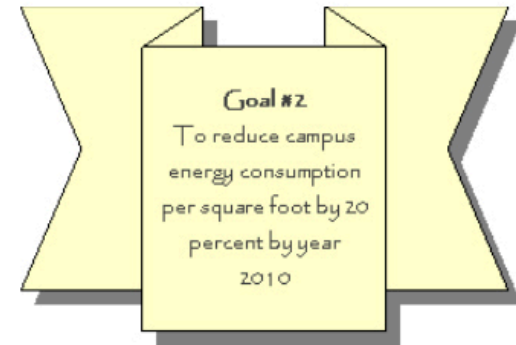
"I Pledge" Program

This is a great opportunity for you to get involved and pledge your passion and resolve for making energy conservation an active part of your daily life.

Below are some suggestions for you to consider pledging to, or just declare your own goals.

Choose Your Pledge:

- 1. Turn off lights when possible
- 2. Enable power-save mode on your PC
- 3. Unplug under-used equipment
- 4. Close windows in conditioned space
- 5. Keep recyclables out of trash
- 6. Watch for energy waste & spread the word
- 7. Use cold water when possible
- 8. Set thermostats sensibly and dress to the season
- 9. Encourage others to get involved
- 10. Become knowledgeable on conservation issues



*Name:

*Status:

*Email:

*** Required Field**

11. Other

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[Watch Video](#)

If Not Us, Who? If Not Now, When?

<http://www.conserve.wisc.edu/pledge.htm>

SSEC Schwerdtfeger Library features kWh meter loan starting in April!

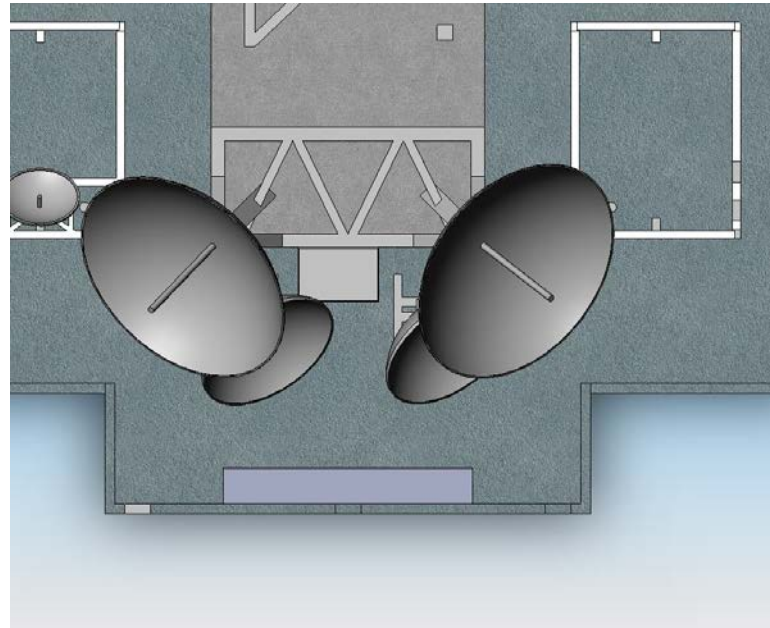
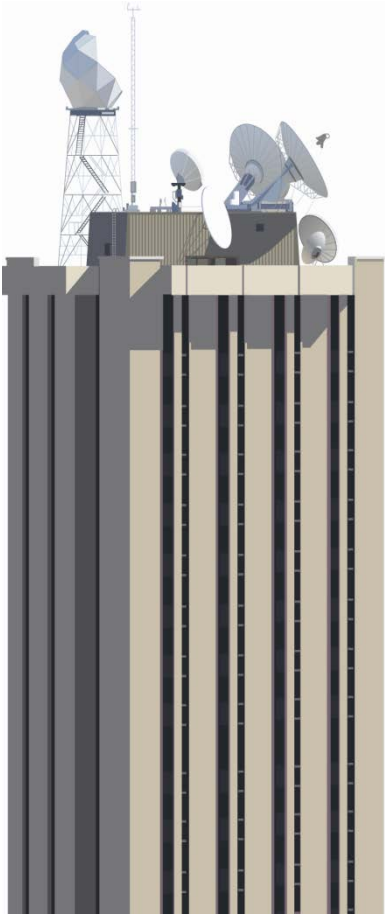
Check out a portable energy meter!

Borrow a portable energy meter, just like you would a book, to gain energy insights, make office equipment decisions, and conserve energy at AOSS.



Solar

In November 2007, MG&E donated \$10,000 to SSEC towards a grid-tied 1 KW solar power system to power a 3-D weather globe.



*"I'd put my money on the sun and solar energy.
What a source of power! I hope we don't have to
wait until oil and coal run out before we tackle that."
- Thomas Alva Edison, 1931*

Wind Turbines & Urban Wind Tunnels

Dr. Giri Venkataramanan (Engineering) proposes to oversee engineering students as they reverse engineer and install a commercial helical wind turbine

? on the top of the AOSS building

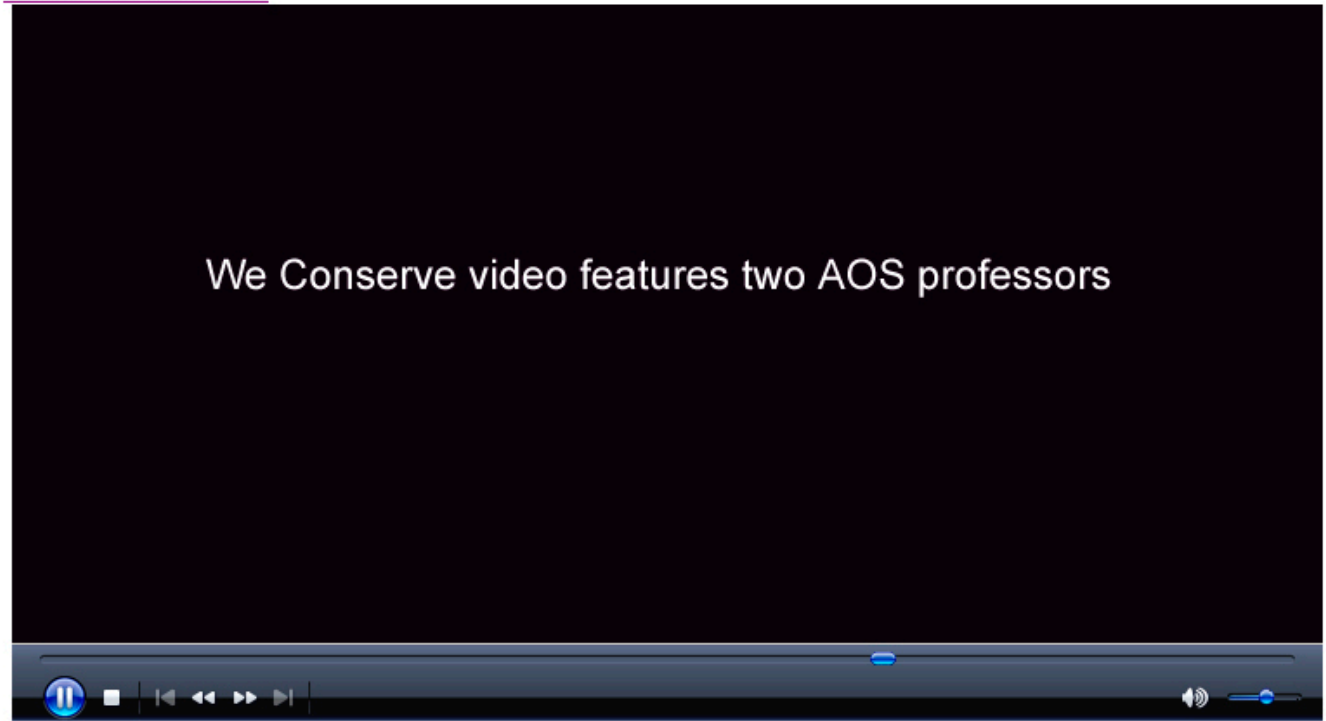
? between AOSS and Geology

Dr. Ankur Desai (AOS) is Co-PI with Dr. Venkataramanan on DOE proposal for wind energy curriculum from the UW





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Questions/Discussion?

