



The **UNIVERSITY of OKLAHOMA**
Environmental Concerns Committee

Minutes

ENVIRONMENTAL CONCERNS COMMITTEE MEETING

Call To Order

A meeting of the Environmental Concerns Committee was held in Gould Hall on November 8th, 2018. It began at 9:00 AM and was presided by Sarah Ballew.

Attendees

Voting Members in Attendance: Sara Mata and Koretta McArthur

Ex-Officio Members in Attendance: George Ahmadi, Sarah Ballew, Sean Crowell, Brian Ellis, Shelly Finley, Dorothy Flowers, Dave Hambright, Jason Hancock, Brian Holderread, Maya Henderson, Cynthia Martinez, and Jeremi Wright.

Agenda Items

I. Introduction

Sean Crowell, Shelly Finley and Cynthia Martinez attended as representatives of the Geostationary Carbon Cycle Observatory ([GeoCarb](#)). A moment was taken to introduce the Geocarb representatives as well as all in attendance of the meeting. Sean, Deputy PI, led the presentation. Shelly serves as Deputy Program Manager and Cynthia serves as the PR and Outreach Coordinator.

II. Geostationary Carbon Cycle Observatory Presentation

The University of Oklahoma has partnered with NASA, Lockheed Martin Advanced Technology Center, and SES Government Solutions to develop the Geostationary Carbon Cycle Observatory (GeoCarb), a first-of-its-kind space Earth science mission.

A hosted payload, scientific observatory GeoCarb will be placed on a commercial communications satellite to study Earth from more than 22,000 miles above Earth's equator, paving the way for future low-cost, commercially enabled Earth observations.

Observing changes in concentrations of three key carbon gases – carbon dioxide, carbon monoxide and methane– from day to day and year to year, will help us make a major leap forward in better understanding the carbon cycle.

GeoCarb also will be measuring solar-induced-fluorescence throughout the Americas, a direct indicator of plant health and vegetation stress.

GeoCarb is a university-led mission, funded by NASA. It is the single-largest contract ever received by OU. The mission marks one of the most exceptional accomplishments in OU history.

A. *What is the importance and reasoning for pursuing this mission?*

- Global Carbon Cycle – Carbon is present in the Earth’s atmosphere, soils, oceans and crust. When the Earth is viewed as a system, these components are defined as carbon pools (or reservoirs/stocks). The pools act as storage for large amounts of carbon. When carbon moves between these reservoirs, it is called a flux. In the Earth system, fluxes connect carbon pools together to create cycles and feedbacks. The Earth’s carbon pools act as both sources, adding carbon to the atmosphere, and sinks, removing carbon from the atmosphere. Plants, soil and the ocean are the Earth’s main carbon sinks. The Earth’s carbon sources are both natural and man-made. The ocean and volcanic activity naturally emit carbon into the atmosphere while deforestation, wood burning and the combustion of fossil fuels are anthropogenic sources of carbon into the atmosphere. Collectively, the pools and fluxes of carbon comprise the global carbon cycle.
- Keeling Curve – The Keeling Curve is a daily record of atmospheric carbon dioxide from the Scripps Institution of Oceanography measured at the Mauna Loa Observatory in Hawaii. The plot of the data measurements indicate that atmospheric CO₂ levels have been increasing over the measured time frame of the late 1950s through the present. Each year, CO₂ levels fall between March and September – this is when the vegetation in the Northern hemisphere absorbs carbon from the air. At the end of summer, carbon levels increase as vegetation dies. For decades, the observed trend has been that the lowest CO₂ levels of any given year have been higher than the year before, which results in an upward trend of CO₂ levels.
- Why pursue a space based mission? There are not enough surface observatories. When there are emissions in the atmosphere, it is necessary to know the flow structures to determine the source and movement of gases. Currently, it is difficult to interpret some of this data. Space-based measurements will fill the gaps by making these measurements from space.

→ Each year, there are great swings in the uptake and emissions of the carbon cycle. As atmosphere concentrations increase, it is important that we understand the influences and process of the global carbon cycle.

B. *What questions does the GeoCarb Mission seek to answer?*

- To what extent is the Amazon basin a CO₂ sink? What are the mechanisms governing this sink?
- To what extent is the Amazonian basin a CH₄ source?
- Are CH₄ emissions estimates over the contiguous U.S. underestimated? What is the spatial/temporal distribution?
- How do CO₂ emissions from cities scale with population? Do larger cities emit less per capita? As a population should we move towards cities?

C. *Geostationary Carbon Cycle Observatory (Geocarb) Mission*

- Geocarb will be measuring carbon trace gases and vegetation health from space.
- The Geocarb instrument will be located on the nadir deck of an SES government solutions communications satellite which will be parked in orbit above North and South America. The

instrument will make continuous measurements to observe the movements of carbon gases, which will take away the guess work involved in identifying sources.

- GeoCarb will measure CO₂ (carbon dioxide), CH₄ (methane), CO (carbon monoxide) and solar-induced fluorescence (SIF). SIF is a direct indicator of photosynthesis and has shown a quick response to environmental stressors such as drought; therefore, it is a valuable measure of ecosystem health.
- Geocarb uses a step and stare approach to provide mapping like coverage with high signal noise ratios over terrestrial landmasses in the western hemisphere
- Geocarb's observing strategy is flexible. Geocarb can look anywhere in the western hemisphere as long as there is sunlight. The instrument will follow the sun throughout the day to collect measurements.
- Timeline
 - Preliminary Design: September 2017 – January 2019
 - Instrument Build and Test: January 2019 – June 2020
 - System Integration: June 2020 – June 2022
 - Launch and Orbit Raising: June 2022 – March 2023
 - Operations: March 2023 – March 2026

*But if NASA continues funding, operations could continue 10-15 years because the communications satellite is designed to last that long.

- Validation through the Total Carbon Column Observing Network (TCCON) – remote sensors must be calibrated and the resulting retrievals must be validated
- Geocarb will provide daily maps of SIFs.
- A primary goal of the mission will be to understand the source of carbon gases and which direction the emissions travel.
- While the Geocarb project is managed by the University of Oklahoma, it is an international collaboration of scientists and administrators from OU, Colorado State University, NASA Ames Research Center, NASA Goddard Space Flight Center, Lockheed Martin, the Jet Propulsion Lab at the California Institute of Technology, University of Melbourne, and others.

III. New Business

An update on Earth Month was given. Katharine Hayhoe, a renowned climate and atmospheric scientist, has been secured as a keynote presenter.

IV. Future Agenda Items

Our next meeting will take place on December 13th.

Adjournment

Meeting adjourned 10:00 am