Distinguished Faculty

Sushil Atreya. Fellow, American Association for the Advancement of Science; Academician, International Academy of Astronautics
Stephen Bougher. Andrew F. Nagy Collegiate Research Professor
Michael Combi. Distinguished University Research Professor
R. Paul Drake. Henry S. Cartart Collegiate Professor of Space Physics; Fellow, American Physical Society
Lennard A. Fisk. Thomas M. Donahue Distinguished University Professor of Space Science; Former Chair, NASA Space Studies Board; Member, National Academy of Sciences; National Associate, National Research Council; Fellow, American Geophysical Union; Elected Member, International Academy of Astronautics; UM-CoE Award Atwood Excellence in Engineering; Henry Russel Lecturer
George M. Gloeckler. Member, National Academy of Sciences; Fellow, American Geophysical Union; Fellow, American Physical Society; Member, American Association for the Advancement of Science; Elected Member, International Academy of Astronautics
Tamas I. Gombosi.Rolfin M. Gerstacker Professor of Engineering; Fellow, American Geophysical Union; Elected Member, International Academy of Astronautics; UM-CoE Award Atwood Excellence in Engineering; Inaugural Recipient, American Geophysical Union Space Weather Prize
Christiane Jablonowski. Recipient, Department of Energy Early Career Award
Margaret Kivelson. Member, National Academy of Sciences; Fellow, American Geophysical Union; Recipient, European Geophysical Union Alvin Medal; Recipient, American Geophysical Union Fleming Medal
Janet Kozyra. George Carignan Collegiate Research Professor; Fellow, American Geophysical Union
Mark Moldwin. Recipient, National Science Foundation CAREER Award
Andrew Nagy. Fellow, American Geophysical Union; Elected Member, International Academy of Astronautics; UM-CoE Award Atwood Excellence in Engineering.
Joyce Penner. Ralph J. Dicicco Distinguished University Professor of Atmospheric Sciences; Fellow, American Geophysical Union; Contributor, UN Intergovernmental Panel on Climate Change; Co-recipient, ’07 Nobel Peace Prize
Richard Rood. Fellow, American Meteorological Society; Recipient, World Meteorological Organization Norbert Gerbier-Mumm International Award
Christopher Ruf. Fellow, Institute of Electrical and Electronics Engineers; Recipient, IEEE Resnick Field Award
Perry Samson. Arthur Thurnau Professor; Recipient, Teaching Innovation Prize; Michigan Distinguished Professor of the Year
Allison Steiner. Recipient, National Science Foundation CAREER Award; Recipient, Henry Russel Award
Thomas Zurbuchen. Recipient, Presidential Early Career for Scientists & Engineers Award; Member, NASA Space Studies Board

Research Centers and Missions (select list)

- Air Quality Laboratory
- Atmospheric Chemistry and Climate Modeling
- Atmospheric Dynamics Modeling Group
- Cassini-Huygens Mission to Saturn and Titan
- Center for Planetary Sciences
- Center for Radiative Shock Hydrodynamics (CRASH)
- Center for Space Environment Modeling (CSEM)
- Laboratory Astrophysics at High Energy Density
- Magnetosphere-Ionosphere Science
- MESSENGER Mission to Mercury
- Microwave Geophysics Group
- MultiWell Chemistry Software
- Remote Sensing Group
- Rosetta Mission to Comet 67P / Churyumov-Gerasimenko
- Solar and Heliospheric Physics Group
- STEREO Mission
- Tropospheric Ozone and Air Quality Modeling
- Venus Express Mission

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Denise Biss, Birmingham Farms
Julia Connors Darlack, Ann Arbor
Laurence E. Deitch, Birmingham Farms
Andrew Fischer Newman, Ann Arbor
Andrea C. Richter, Groves Painte Park
Shanna Ryder Oggie, Groves Painte
Katherine E. White, Ann Arbor
Mark Schlissel, ex officio

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**Program Description**

The AOSS BSE degree program in Earth System Science and Engineering (ESSE) embraces the notion that the earth is coupled to the space environment in which it is immersed, and that it consists of a multitude of closely coupled internal systems. This Earth System (earth and its space environment) is the subject of all of the research that takes place in AOSS and is the natural subject of our undergraduate curriculum.

As an ESSE student, you’ll begin to understand the interactions among all Earth system components while gaining in-depth knowledge in one of four concentrations: Climate Impact Engineering, Climate Science, Meteorology or Space Weather. You’ll join a community who:

- Build instruments and study the climate, sun, space and planets
- Explore our changing atmosphere and study how the climate affects us all
- Develop forecasting skills for broadcast, storm analysis, and pollution and operational meteorology
- Build models and predict Earth weather, space weather and planetary weather
- Merge science and engineering into an integrated study of Earth, climate and space

“You know you should join AOSS if you want professors and graduate student instructors (GSIs) who are extremely intelligent, personable, and willing to work with you on something until you understand it.”

**Climate Impact Engineering**

The Study of Earth’s Changing Climate

The Climate Impact Engineering concentration will provide you with an understanding of the relationship between Earth’s changing climate and characteristics of the Earth system that are affected by it. Students receive training in the fundamentals of Earth system science and they examine the impact of environmental factors on the Earth system through a set of approved concentration courses, which are taken in designated pairs to promote a depth of study into particular aspects of climate impact. At least one experiential course is required to promote hands-on learning outside the traditional classroom environment.

Advisor: Professor Christiane Jablonowski
cjablon@umich.edu

**Climate Science**

Developing more accurate techniques to forecast climate change

AOSS Climate Science covers a broad range of topics including: global and regional climate modeling for present-day and future climate scenarios; integration of satellite products into climate models; improvement of physical processes in climate models; biosphere-atmosphere interactions; ice-atmosphere interactions; and, chemistry-climate interactions. Also, there are a number of cross-campus projects that integrate climate modeling with other fields; including public health, business, geology, ecology, and public policy.

Advisor: Professor Natasha Andronova
natand@umich.edu

**Meteorology**

Solving problems related to air pollution and forecasting

The ESSE Meteorology concentration expands your career options beyond those in weather forecasting and graduate studies in meteorology. You’ll also be prepared for skilled positions in the modeling and “value added” industries that are increasingly the source of weather analyses and predictions and for graduate studies involving the technologies that enable weather and climate prediction.

Advisor: Professor John Boyd
jpboyd@umich.edu

**Space Weather**

The systemic relationships between the Earth, atmospheres and planets

The conditions and processes occurring in space have the potential to affect the near Earth environment. Space Weather processes can include changes in the interplanetary magnetic field, coronal mass ejections from the sun, and disturbances in the Earth’s magnetic field. The effects can range from damage to satellites to disruption of power grids on Earth. Solar Energetic Particles, accelerated by coronal mass ejections or solar flares, are also an important driver of space weather as they can damage electronics onboard spacecraft through induced electric currents, and threaten the life of astronauts. The U-M Center for Space Environment Modeling (CSEM) is a major center for modeling the space environment.

Advisor: Professor Aaron Ridley
ridley@umich.edu

“You know you should join AOSS if you want professors and graduate student instructors (GSIs) who are extremely intelligent, personable, and willing to work with you on something until you understand it.”

“The most valuable aspect of my AOSS program is the high caliber professors and the opportunities they provide.”

“AOSS is one of the best and brightest departments at U-M. It may be smaller, but that’s only a boon to students.”