

Opinion

The First Amendment

Congress shall make no law respecting an establishment of religion, or prohibiting the free exercise thereof; or abridging the freedom of speech, or of the press, or the right of the people peaceably to assemble, and to petition the Government for a redress of grievances.

Taking stock of the soil from the skies

Tonight at 7:50 CST the world will take one step toward better weather forecasts and climate predictions

One step toward improved forecasts of crop yields.

One step toward reducing the amount of pollutants that wash into our rivers and streams.

And one step toward more accurate and timely forecasts of flooding.

In short, one step toward improving the health, safety, economic security and quality of life of all Iowans.

How?

The European Space Agency will launch the Soil Moisture and

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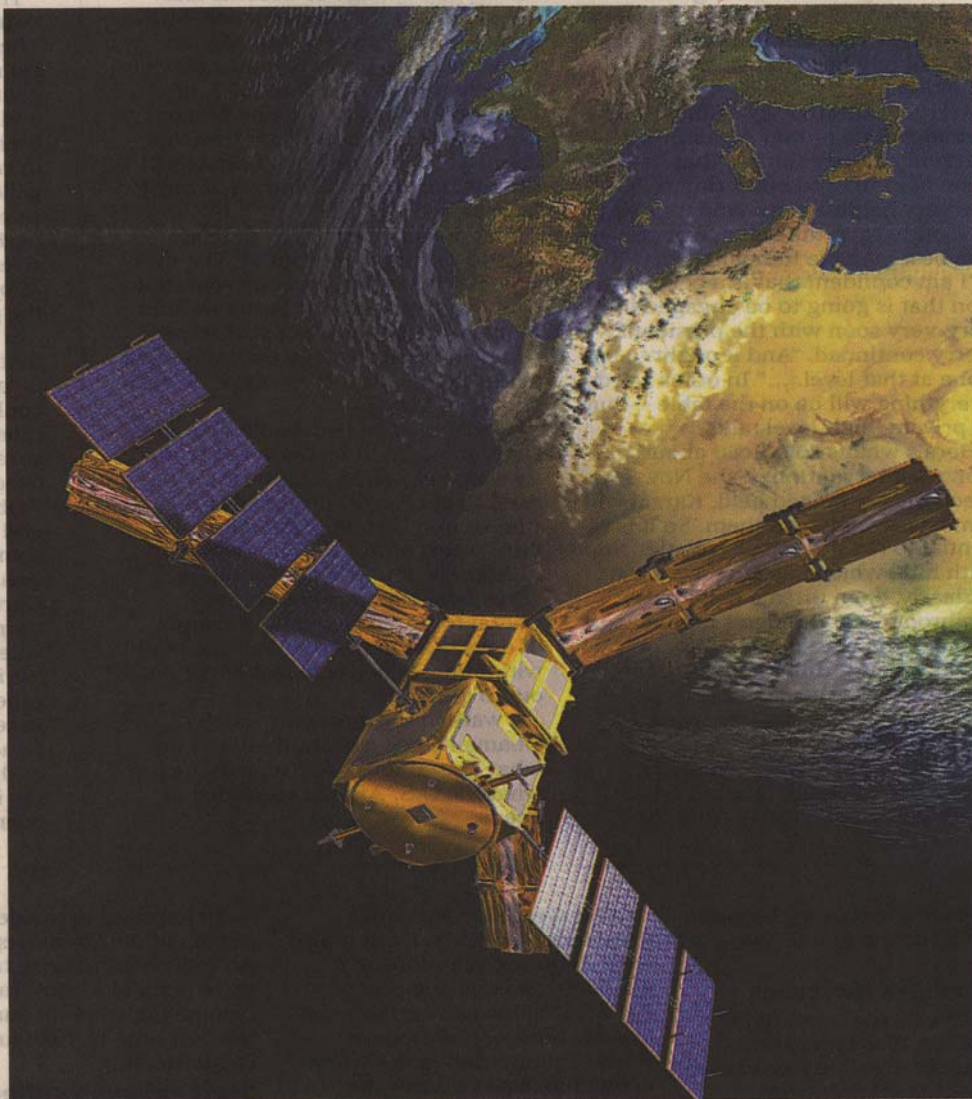
Ocean Salinity (SMOS) satellite from the Plesetsk cosmodrome in Russia. Its mission is to generate global maps of soil moisture (the amount of water stored in the soil) and ocean salinity (the saltiness of the ocean surface) as it orbits Earth in space for at least the next three years. These measurements made by SMOS (rhymes with boss) will be unlike any before in human history, and they will be obtained with one-of-a-kind remote sensing technology.

I lead a team of scientists at Iowa State University, the University of Iowa and the USDA Agricultural Research Service who will contribute to the SMOS mission. Why are we interested in SMOS? How is it relevant to Iowans?

The SMOS satellite carries a special type of camera that records the amount of microwave radiation emitted by Earth's surface. Think of the image captured by SMOS as a black and white photograph. Physics tells us that bright areas in this image correspond to dry soil and fresh water, dark areas to wet soil and salty seawater.

With SMOS we will have the ability to quantify soil moisture and the remaining water storage capacity of soil in real time. And soil moisture is obviously something that Iowans care about, although there may be some subtle details that you have not thought about before.

For example, knowledge of current soil



SPECIAL TO THE REGISTER/EUROPEAN SPACE AGENCY

A rendering of the Soil Moisture and Ocean Salinity satellite.

moisture conditions can improve weather forecasts. Take 1993. The precipitation patterns that caused the flooding that summer can not be explained unless the soil moisture conditions during that period are taken into account. Why? The soil is an important source of moisture for the atmosphere, a reservoir of water that has not been effectively monitored until SMOS.

Plants can not grow without soil moisture. Currently we do not have a reliable method of quantifying the seasonal patterns of soil moisture. Measurements from SMOS will help us understand Earth's hydroclimate and give us a clearer picture of how soil moisture conditions change over the growing season. In the future we may be able to use this information to estimate crop yield well before the combine hits the field.

Wet soils combined with heavy precipitation result in large amounts of runoff that can carry pollutants and cause flooding. Although each individual measurement that SMOS makes represents an area about the size of Story County,

SMOS is leading us toward future remote sensing technologies with finer spatial resolutions that could help us protect the water quality of our lakes, rivers, and streams, and give residents of flood-prone areas timely estimates of the extent and magnitude of flooding.

Although Iowa is far from the coast, ocean salinity is important for global weather patterns. Salinity affects the density of seawater, which in turn influences ocean currents that transport heat like a conveyor belt from continent to continent. Ever heard of the Gulf Stream? It's an ocean current that moves warm water northward from the Florida coast toward Europe, keeping Europeans warmer in the winter than they should be considering their latitude. Are currents like the Gulf Stream changing? SMOS will help us find out.

So look up at the clear night sky sometime this week. Although you won't be able to see SMOS, find the nearest star and think about how SMOS represents one step toward a brighter future for Iowans and all of Earth's people.