PACE Applications

Climate

Aerosol and Cloud Properties

How do **aerosols and clouds** affect the Earth's energy balance? How can we measure them from space?

Who Cares and Why?

Aerosol particles (including dust storms, smoke, industrial haze, and others) and clouds affect the Earth's energy balance by reflecting and absorbing the Sun's light during the daytime, and (particularly for clouds at night) trapping the heat emitted by the Earth. The importance of this reflection and absorption depends on many factors, including the types, amounts, and altitudes of the aerosols and clouds, as well as the surface (such as dark ocean or vegetation, or bright desert, snow, or ice) below. Aerosols can also affect cloud formation and development. In fact, these interactions between aerosols and clouds have been identified by the Intergovernmental Panel on Climate Change (IPCC) as some of the most critical processes to better understand, if we are to advance our understanding of the Earth's energy balance.

Satellites provide an excellent way to study aerosols, clouds, and their interactions on a large scale. PACE will allow us to not only continue our existing satellite-based aerosol and cloud data record, but also, thanks to its three complementary instruments, to improve on it in new ways.

The NASA Reponse

HARP-2 & SPEXone

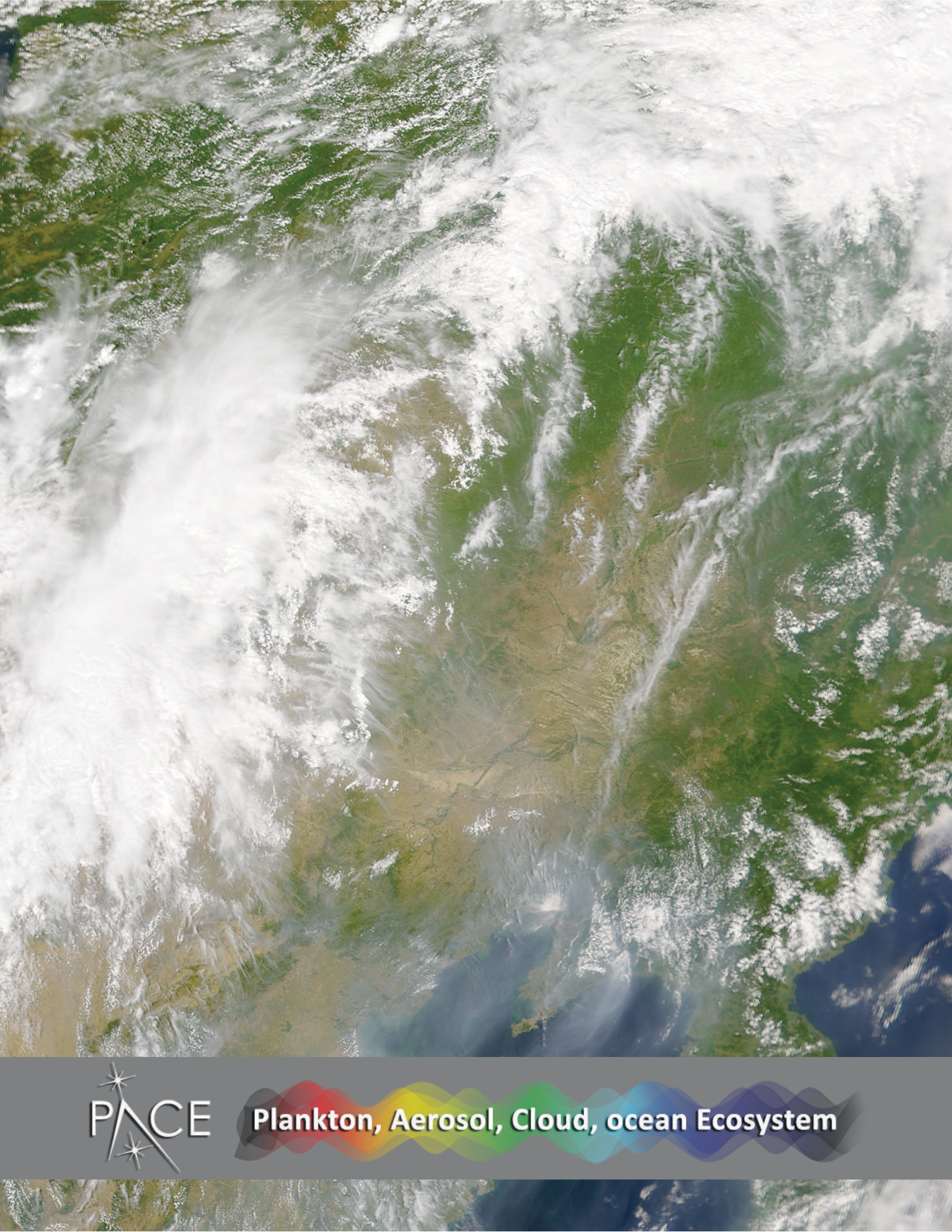
- *Multi-angle polarimeters*
- *440, 550, 670, 870 nm (HARP-2)*
- *386-770 nm (2-4 nm steps; SPEXone)*
- *3 km; 2.5 km at nadir*

PACE's two polarimeters will provide improved ways to monitor aerosol and cloud properties, continuing and enhancing our space-based record.

PACE Ocean Color Instrument (OCI)

- *5 nm hyperspectral resolution*
- *UV (345 nm)- SWIR (2260 nm)*
- *1-2 day overpass*
- *1 km at nadir*

PACE OCI will provide estimates of aerosol (amount, absorption, altitude), and cloud (cover, height, phase, brightness, and droplet size) properties that are essential for climate model assessment.


PACE
Plankton, Aerosol, Cloud, ocean Ecosystem