ICON

Ionospheric Connection Explorer

Exploring where Earth's Weather meets Space Weather

The Ionospheric Connection Explorer (ICON) will be the newest addition to NASA's fleet of Heliophysics satellites. Led by UC Berkeley, scientists and engineers around the world are coming together to make ICON a reality.

The goal of the ICON mission is to understand the tug-of-war between Earth's atmosphere and the space environment. In the "no man's land" of the ionosphere, a continuous struggle between solar forcing and Earth's weather systems drive extreme and unpredicted variability. ICON will investigate the forces at play in the near-space environment, leading the way in understanding disturbances that can lead to severe interference with communications and GPS signals.

ICON WILL:

- *Explore the variability in our near-Earth space environment.*
- *Help understand the influence of terrestrial weather on near-Earth space.*
- *Improve understanding of space weather that can affect our technology, life, and society.*

What's going on in our upper atmosphere?

Why ICON?

The TIMED and IMAGE missions recently discovered that changes in the upper atmosphere are driven not only by the Sun, but, surprisingly, by tropical weather and rainy seasons.

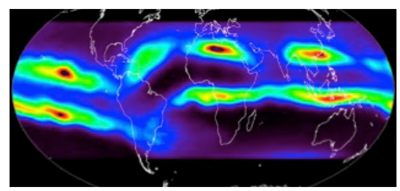
This finding is a big clue that tells us the yet unexplained variation in our space environment is connected to conditions in our own atmosphere and our weather.

ICON is the first mission designed to understand this mystery.

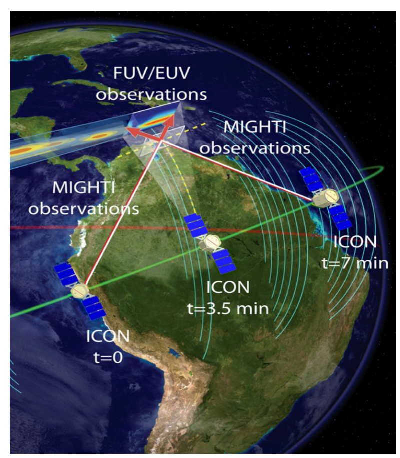
How does it work?

ICON will measure the invisible connections linking Earth's atmosphere and the space environment, including:

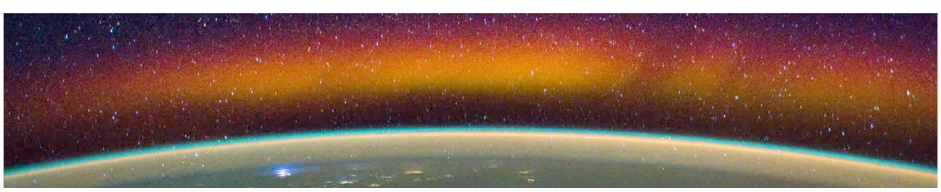
- The high altitude wind, driven by Earth weather, which redistributes the ionized gases of space.
- The chemical makeup of the high altitude atmosphere, which is the source of the ionized gas.
- The motion of the ionized gas, in response to the high altitude winds.
- The electrical conductivity of the atmosphere, which determines the strength of the connections.
- The temperature of the upper atmosphere, to reveal localized and rapid motions of the gas in response to Earth's weather.



ICON will help us understand how Earth's near-space environment is driven by terrestrial weather.



ICON will analyze regions of the atmosphere from multiple perspectives.



Earth's airglow shows variations in brightness which provide clues to the mystery of the Earth-space connection.

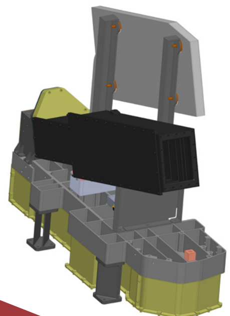
IONOSPHERIC CONNECTION EXPLORER

U.S. NAVAL RESEARCH LABORATORY · UT DALLAS · CSL · Space Dynamics Laboratory, Utah State University Research Foundation · Orbital ATK · Space Sciences Laboratory, University of California Berkeley

Spacecraft and Instruments

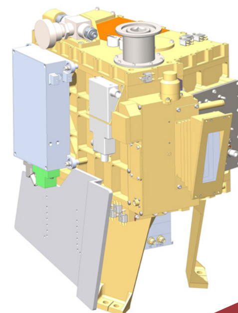
Michelson Interferometer for Global High resolution imaging of the Thermosphere and Ionosphere (MIGHTI) —Naval Research Lab, DC

MIGHTI images the atmosphere to measure the high altitude winds and temperature variations in the atmosphere-space transition region. These winds and temperature fluctuations are driven by weather patterns closer to the Earth's surface, and in turn, drive the motions of the ionized gases of space.



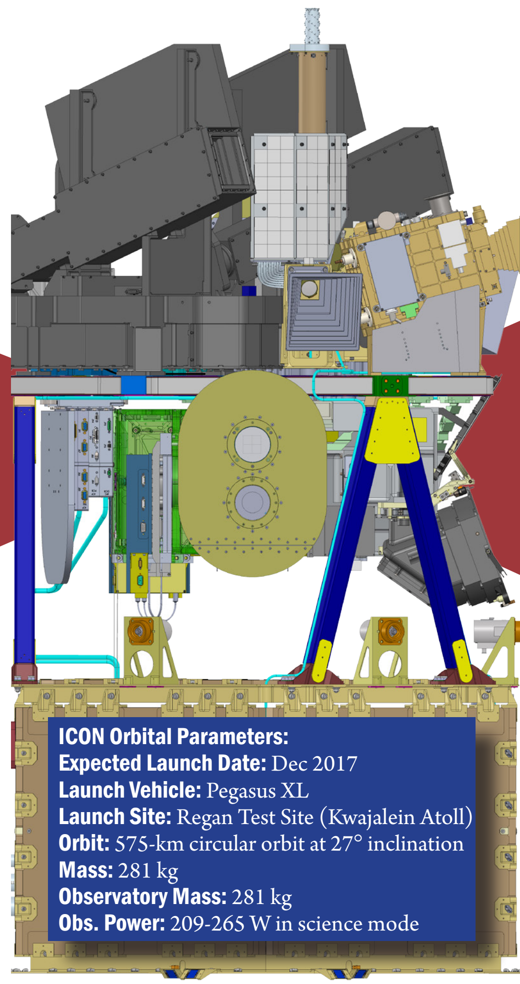
Extreme Ultraviolet spectrometer (EUV) —UC Berkeley, CA

EUV will measure the density of the ionized gas of the ionosphere during the daytime, revealing the response of the space environment to forcing by lower atmosphere weather. EUV is a single-optic "push-broom" imaging spectrometer that images in the extreme ultraviolet region of the spectrum.



Instrument Control Package (ICP) —UC Berkeley, CA

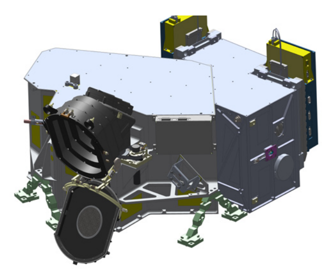
At the heart of the instrument payload, the ICP does all onboard science processing. It also provides instrument power, controls instrument functions, receives instrument commands and obtains housekeeping and science data.



ICON Orbital Parameters:
Expected Launch Date: Dec 2017
Launch Vehicle: Pegasus XL
Launch Site: Regan Test Site (Kwajalein Atoll)
Orbit: 575-km circular orbit at 27° inclination
Mass: 281 kg
Observatory Mass: 281 kg
Obs. Power: 209-265 W in science mode

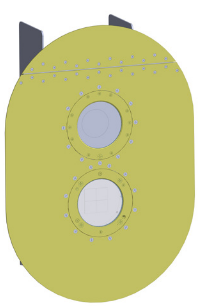
Spacecraft —Orbital ATK, VA

ICON's instruments will be flown on a LEOStar-2 spacecraft provided by Orbital ATK. The instruments will be mounted to a thermally stable Payload Interface Plate to provide an "edge on" view of the atmosphere. ICON will be launched on a Pegasus XL vehicle in 2017.



Ion Velocity Meter (IVM) —UT Dallas, TX

IVM will measure the motion of the ionized gases in response to the push of the high altitude winds and the electric fields they generate. There are two identical IVM instruments, each consisting of a Retarding Potential Analyzer and a Drift Meter that collect and measure ions to determine their velocity, density, and temperature.



Far Ultraviolet spectrometer (FUV)—UC Berkeley, CA

FUV will measure the density of the ionized gas of the ionosphere during the nighttime, revealing the response of the space environment to forcing by lower atmosphere weather. During the day, it will determine how the chemistry of the upper atmosphere changes, modifying the source for the ionized gas. FUV images the upper atmosphere in the far ultraviolet.