THE
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Examining the Atmosphere and Atmospheric Resource Management

THE NEXT GENERATION OF WEATHER SATELLITES: GOES-R

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This November 4, a revolutionary new group of weather satellites are scheduled to be launched aboard an Atlas V 541 rocket from Cape Canaveral, Florida. They belong to the Geostationary Operational Environmental Satellite-R Series (GOES-R), part of a collaboration between the National Oceanic and Atmospheric Administration (NOAA) and the National Aeronautics and Space Administration (NASA). GOES-R will initially be tested between November and mid-2017 before it can officially be put into service. Once operational, GOES-R will provide more weather information in its first six months than all weather satellites combined have provided over the last 40 years!

Geostationary satellites are positioned directly over the equator so that they match Earth's rotational speed and can continually report conditions for the same location. In order to fully cover Alaska, Canada, Hawaii, the continental United States, and the Atlantic and Pacific Oceans, two satellites must be placed in orbit; GOES-East at 75° W and GOES-West at 137° W. The greatest immediate benefits to North Dakotans will be increased lead time for severe thunderstorm and tornado warnings. Currently, meteorologists have to wait precious minutes for satellite images to update. When it comes to severe weather, just a few minutes of improved warning lead-time can make a huge difference for people and property. GOES-R will be sending image updates in as little as every 30 seconds, providing forecast meteorologists with near real-time information.

There's a quadrupling (four times) in satellite image resolution between the current GOES-14 and the GOES-R. The Advanced Baseline Imager (ABI) aboard GOES-R also has the ability to collect three times more data than GOES-14 and will provide five times faster coverage. This will result in improvements in hurricane track and intensity forecasts, aviation flight route planning, warning lead-time for severe storms, air quality warnings and alerts, fire detection and intensity estimation, and data for long-term climate variability studies.

Other new product features unique to GOES-R include detailed lightning mapping and improved space weather monitoring. The Geostationary Lightning Mapper (GLM) will be the first operational lightning mapper in geostationary orbit. By detecting both in-cloud and cloud-to-ground lightning, weather forecasters can use combined increases in lightning activity to locate storms that are more likely to produce severe weather. This results in increased severe weather warning lead-times for the public. With ever-increasing dependence on electrical power systems, communication, and air travel, geomagnetic storms can wreak havoc on our everyday lives and we must have the ability to monitor space weather to accurately forecast these storms. GOES-R contains a Space Environment In-Situ Suite (SEISS) that measures proton, electron, and ion fluxes in Earth's Magnetosphere. Solar radiation can be hazardous to astronauts and satellites, so the SEISS instrument array will be able to support future launch missions of spacecraft and satellites as well as current ones which include the International Space Station.

In the next decade, GOES-R is scheduled to be replaced by GOES-S in 2018, GOES-T in 2019, and GOES-U in 2024. This redundancy of satellites helps ensure that if one of the two current geostationary satellites malfunctions, another one can take its place at 22,300 miles above the Earth. Weather forecasting has improved dramatically since the 1970s when geostationary satellites first came into use. GOES-R will ensure that there are huge improvements for many years to come!

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