NASA successfully launches its Soil Moisture Active Passive (SMAP) satellite

On January 31st, NASA successfully launched the SMAP satellite onboard a United Launch Alliance Delta II rocket. The satellite, designed to collect high resolution soil moisture maps on a global scale every two to three days, will improve the ability to forecast droughts, forest fires and floods, and will help in crop planning and rotation. On February 24th the reflector antenna was successfully deployed and in the following days the first radiometric data have been acquired.

Image: NASA, United Launch Alliance

In order to obtain detailed soil moisture measurements of the entire world, SMAP is placed in a near-polar sun-synchronous orbit, allowing the observatory to use Earth's natural spin to maximize the area that can be scanned by the satellite's instruments. The orbiter will use its L-band radar and L-band radiometer to scan the top 2 inches (5 cm) of our planet's soil with a resolution of around 31 miles (50 km).

Two previous launch attempts had to be scrubbed, the first due to high wind speeds while the second due to minor repair work on the booster insulation of the Delta II rocket. The rocket finally lifted off from the Vandenburg Air Force Base, California, at 6:22 am Pacific time. The solid fuel boosters burnt for a full minute, with booster separation taking place 90 seconds into flight. Main engine shutdown occurred 4 minutes and 21 seconds after launch, followed 6 seconds later by first stage separation. This was followed by separation of the protective fairing, housing the SMAP satellite, and after a series of two burns, deployment of the satellite itself. SMAP's solar arrays deployed successfully following

separation, with telemetry confirming that the spacecraft was indeed drawing power from the twin arrays. The upper stage of the launch vehicle fired once more, before successfully deploying three pea pod satellites – FIREBIRD, EXOCUBE AND GRIFEX – each of which will launch a number of cube sats. Once this deployment phase had been completed, the remnant of the Delta II rocket used the remainder of its fuel to de-orbit itself in a safe and controlled fashion.

Graph: *NASA's SMAP press kit*

Here is a note from Dara Entekhabi, SMAP Science Team Leader on late February: "Following **successful launch of the SMAP mission** on January 31, the satellite control and communication systems were tested. They are performing very well and as expected. The radiometer and radar (in receive-only mode) were turned on last week before the deployment of the reflector antenna. Images of cold sky were downlinked and processed through the Science Data System. The measurements show that the instruments are behaving very well. The 6-meter reflector deployment was just completed with success. This is an important milestone in deployment process. The instruments will be turned on (radar in transmit and receive modes) again this week and measurements will be made later this week in a non-spin configuration. The observatory spin up will start in late March. The In-Orbit Checkout Phase D will be complete approximately in late April to early May. Routine science data acquisition and Phase E will start soon-after."

Now in orbit, SMAP will provide moisture maps from a polar-orbit of 426 miles (686 km) altitude that will be instrumental in predicting floods, droughts, food shortages and expanding our understanding of our planet's water, energy, and carbon cycles.

Graph: *NASA's SMAP press kit*

BEC participates in the SMAP Early Adopter programme by assessing the risk of forest fire from the soil moisture maps. BEC will also compare the soil moisture maps produced by SMAP with those derived from SMOS at CP34-BEC.

BEC team