The Grand Challenge Initiative – CUSP and M/LT projects and status at Andøya Spaceport

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The Grand Challenge Initiative (GCI) - CUSP project is major international rocket-based research project, with participation from NASA (six scientific projects), JAXA (1 scientific project) and UiO / ASC (1 scientific project). In addition, all three nations participated in a joint two-stage student rocket - "G-CHASER", launched from Andøya as part of GCI CUSP in January 2019.

12 rockets will be launched from Andøya and Ny-Ålesund, Svalbard between 2018-2020, often with both launch sites operated simultaneously. GCI CUSP is one of the largest scientific rocket projects NASA has ever participated in.

The project idea and ownership are Norwegian, conceived in 2012 by Professor Jøran Moen (UiO) and Kolbjørn Blix (ASC):

"*Gathering scientists working on issues related to the gap in the Earth's magnetic field (CUSP) over Svalbard and for the first time ever launch sounding rockets from both Andøya and Ny-Ålesund in the same campaign*".

This way, Andøya launch NASA's largest scientific rockets – the Black Brant XII's, and fly them horizontally through the CUSP, high above Svalbard. While from Ny-Ålesund, we launch smaller rockets, straight up and into the CUSP.

Doing this at different heights and with different instruments is important when trying to understand the processes going on in and close to the CUSP. Coordinating already planned CUSP related projects and motivating the creation of new and complementary efforts was utterly important during the initial phase of the work with GCI CUSP. It was also important to ensure that necessary ground-based instruments and modelling communities were included in the team at an early stage.

Another important goal from the Norwegian side was to ensure that all data from rockets and ground-based instruments is available from a common database, where all active participants have equal access. After all, data is the most important part of a scientific campaign, and these must be easily available for potential users after quality control and necessary quarantine time. The GCI data-sharing agreement was signed by SIOS (The Svalbard Integrated Earth Observing System), NASA, JAXA and UiO in Tokyo in 2017.

So far, 10 of the 12 rockets have been launched successfully out of Norway and Svalbard, and the next GCI project – GCI M/LT is already being planned. It will include at least US, Norway, Germany, Sweden, Russia, UK, Canada, Japan and Poland, but other nations are more than welcome to join. Due to working with lower altitude science than its CUSP cousin, GCI M/LT has a potential for even more activities. Rockets, measurements using aircrafts, satellites, balloon borne and ground based instruments. Launching out of even more sites is also a possibility to be discussed, all based on the science topics raised during the planning phase. The people working with the GCI projects are highly devoted to including students, and a student sounding rocket mission for the M/LT project is already being discussed – GHOST – "Grand cHallenge MesOsphere Student rockeT".

In addition to creating and executing sounding rocket projects like the two GCI's, Andøya Space Center is working to establish the first mainland Europe launch site for satellites up to 1000kg - Andøya Spaceport. if funded by the Norwegian government, the first launch is scheduled for Q1 2021.