



## **INSPIRE: International Space Weather Research Using CubeSat Platforms**

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The International Satellite Program in Research and Education (INSPIRE) grew out of courses at the University of Colorado to teach aspiring students not only about the design and development of small spacecraft, but to be immersed in the outstanding science that can be accomplished with such missions. INSPIRE today has five small satellite missions in development funded by four countries comprising mission objectives ranging from studying ionospheric dynamics to mesosphere and lower thermosphere wind and temperature observations, and solar observations in mid- and far-ultraviolet wavelengths. It is also developing a versatile University small satellite platform capable of carrying a variety of payloads ranging from plasma instruments to ultraviolet and infrared imagers. A network of four S-band stations and eight UHF ground stations enables high data downlink from these platforms. In this presentation, we describe INSPIRESat-1 & 2 science objectives in making simultaneous measurements of ion densities, velocities and temperature from two different altitudes and a range of local times to characterize plasma bubbles and traveling ionospheric disturbances. INSPIRESat-3 carrying a UV instrument is designed to make solar observations in the mid- and far-UV extending the SORCE observations beyond 2019 as well as occultation measurements of the thermosphere to derive gravity wave effects in thermospheric temperatures in the high latitudes in both hemispheres. INSPIRESat-4 is carrying a spatial heterodyne interferometer to make MLT temperature measurements and a hall effect thruster to lower its altitude to make in-situ plasma measurements at very low Earth orbits. The INSPIRE small satellite bus is a ring-deployed satellite that mounts on the launch vehicle payload fairing. The spacecraft bus is configurable to carry a variety of instruments. However, the different subsystems and card stacks conform to the cubesat standard and hence can be used in standard cubesat configuration as well. We contend that such small satellite missions can play a huge role in space weather programs around the world and can do so in an affordable and prudent way.