PART 7. SENSOR WEB/TESTBED INITIATIVES

1. OVERVIEW

To better understand how physical phenomena, such as volcanic eruptions, evolve over time, multiple sensor observations over the duration of the event are required. A sensor web approach offers the ability to trigger the imaging of these transient events via in-situ sensors and global coverage, lower-resolution, on-orbit assets to capture higher temporal, spatial and spectral resolution images. The EO-1, along with other space and ground assets, have been used to implement progressive mission autonomy which in turn is used to identify, locate and image phenomena such as wildfires, volcanoes, floods and ice breakup with high resolution instruments. The software that plans, schedules and controls the various satellite assets are used to form ad hoc constellations of multiple satellites which enable collaborative autonomous image collections triggered by transient phenomena. This software is both flight and ground based and works in concert to run all of the required assets cohesively and includes software that is model-based and contains artificial intelligence. Furthermore, experiments demonstrating more cost-effective interconnectivity between the various satellites are being conducted using adaptive antenna arrays arranged in an architecture similar to cell phone towers. These experiments are being conducted by a team of researchers and scientists at NASA's Goddard Space Flight Center and Jet Propulsion Laboratory in collaboration with numerous universities and other government agencies under the mantle of the Sensor Web. This activity provides a true end-to-end approach for prototyping the "system of systems" needed for global Earth observations as well as for honing lunar/planetary exploration strategies.

Documentation of the overview of efforts to create an above described end-to end “system of systems”, using EO-1 as a testbed, can be obtained from the links contained in the Table of Contents for Part 7, Section 1.