AN OVERVIEW OF THE DESDYNI MISSION

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In 2007, NASA received directions from the National Academy of Science through its report "Earth Science and Applications from Space: National Imperatives for the Next Decade and Beyond" report to launch a mission to study the Earth's forested ecosystems, ice sheets and glaciers and areas prone to volcanoes and earth quakes. Earth's land surface is constantly changing and interacting with its interior and atmosphere. In response to the interior, plate tectonics deform the surface, causing earthquakes, volcanoes, mountain building, and erosion, which includes landslides. These events can be violent and damaging. Human and natural forces are rapidly modifying the global distribution and structure of terrestrial ecosystems on which all of life depends, causing steep reductions in species diversity, endangering sustainability, altering the global carbon cycle and affecting our climate now and for the foreseeable future. Our ice sheets, sea ice, and glaciers are key indicators of these climate effects and have themselves been undergoing dramatic changes.

The primary mission objectives for DESDynI are to: 1) Determine the likelihood of earthquakes, volcanic eruptions, and landslides through deformation monitoring; 2) Characterize the global distribution and changes of vegetation aboveground biomass and ecosystem structure related to the global carbon cycle, climate and biodiversity; and 3) Predict the response of ice masses to climate change and impact on sea level. In addition, DESDynI would provide observations that would greatly improve our monitoring of groundwater, hydrocarbon, and sequestered CO_2 reservoirs. DESDynI will be the first mission to systematically and globally study the solid Earth, the ice masses, and ecosystems, all of which are sparsely sampled at present.

Two complementary technologies are planned for DESDynI (Donellan et al, 2008) : an L-Band Synthetic Aperture Radar (SAR) will be used as an interferometer to measure small deformations of the Earth surface related to below ground processes and dynamics of ice. A Multi-Beam LiDAR will provide a dense sampling of forest structure parameters that can produce accurate estimates of biomass and vertical canopy structure (Houghton and Goetz 2008). In addition the LiDAR can provide accurate sampling of ground and ice surface elevations useful for solid earth and cryosphere science. The L-band SAR will also be used in multi-polarimetric mode to provide a mapping capability for forest disturbance, regrowth and areas of low biomass. A unique feature of DESDYnI is the joint use or fusion of LiDAR and SAR in pursuit of multidisciplinary science objectives.

This invited, session-opening presentation will provide an overview of the DESDYnI mission including science objectives, science requirements for the solid earth deformation, ecosystem structure and dynamics of ice elements and the mission concept,. The presentations in this invited session will discuss concepts and results of this capailbity for all three disciplines.

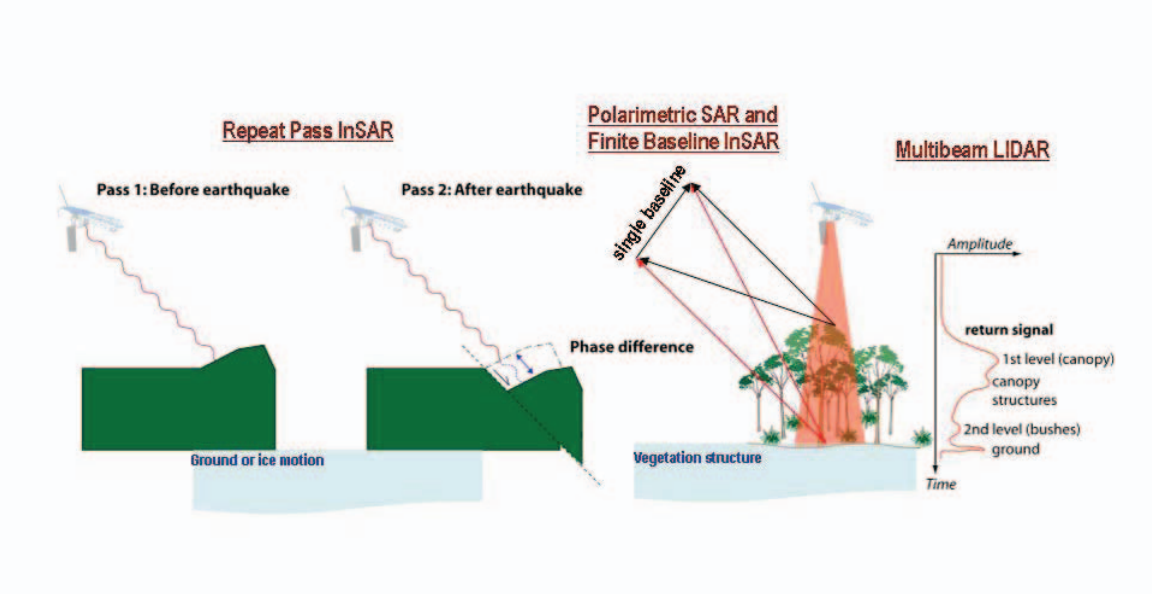

Figure 1 illustrates the DESDYnI mission concept. Ice and solid InSAR measurements detect surface deformation dynamics.

References

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