Geophysical Research Abstracts
Vol. 20, EGU2018-19863-1, 2018
EGU General Assembly 2018

Looking Down on the Earth: Satellites, Science, and Societal Benefit

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Spaceborne observations are crucial for understanding our planet as an integrated system. Satellite measurements form the essential foundation for Earth System Science. Spaceborne data resolve a broad range of time and space scales; only from space can uniformly accurate and stable measurements be made having high spatial resolution and global coverage, frequently at each location for long periods of time. By acquiring and analyzing simultaneous satellite measurements of many different quantities, researchers are gaining quantitative knowledge of the connections between ocean, atmosphere, and land processes as well as the individual processes themselves. Crucially, because all humans reside on Earth, the satellite observations, when coupled with understanding derived from research, can be used to improve the decision-making and lives of every person.

NASA's Earth Science program is composed of 4 elements: a Flight program that develops, launches, and operates a large fleet of Earth-observing satellites and instruments to monitor the planet; an interdisciplinary, competitive, integrative Research and Analysis program covering all aspects of Earth System Science through analysis of domestic and international remotely sensed and in situ measurements and modeling; an Applied Sciences program that builds capacity in user communities, and develops and tests focused information products based on Earth observations and models to support a wide range of decision-makers; and an Earth Science Technology Office that uses competitive grants to advance component, instrument, and data processing technologies as well as conducts in-space technology demonstrations using CubeSats.

The presentation will highlight key accomplishments from NASA's Earth Science Division program, providing unique insights into key Earth systems and examples of societal benefit from applications including disaster and extreme event response support. Particular emphasis will be placed on the need for free and open data exchange, the use of constellations of spacecraft and integrated analyses of global data from multiple sources, and the abilities of decadal-scale remotely sensed time series to illuminate the existence – and causes – of variability and trends in our planet's environment.