CSQ-57 Summary

Question	Knowledge Advancement Objectives	Geophysical Observables	Measurement Requirements	Tools & Models	Policies / Benefits
How vegetation and climate interactions vary across scales?	A) Linking vegetation characteristics to climatic conditions at detailed/plot level often monitored by ecologists	• Vegetation structure and cover • Land surface temperature, albedo, soil moisture, water vapor • Related dynamics over time	• Sentinel 1 / 2 time series, high resolution data • LSTM / Landsat (LST) • ENMAP/CHIME (albedo) • S1/SMOS (soil moisture)	• Various EO time series analysis methods • ICOS site networks	- UNCBD - IPBES - Nature-based solutions - Restoration efforts - UNFCCC and climate science
	B) Scale from plot level (monitored by ecologists) to more macro-Earth System models to improve the monitoring the impacts of changing climates at the level of species and individuals	• Vegetation structure and cover • Land surface temperature, albedo, soil moisture, water vapor • Related dynamics over time	• EO data at different resolutions (10 m – 1 km resolution) covering Land surface temperature, albedo, soil moisture, water vapor	• Various EO time series analysis methods • ICOS (and other) site networks	

CSQ-57 Narrative

How vegetation and climate interactions vary across scales?

The better understanding of vegetation-climate interactions at macro-climatic levels has been addressed by the Earth System modeling community using coarse-scale data (i.e., MODIS data). A key scientific question now is how macro-climate is linked to micro-climate and to take the vegetation climate interactions to a level of detail considering climate conditions that is experienced by most terrestrial species. Micro-climate is often regulated by vegetation and spatially detailed remote sensing data of land surface temperature, albedo, water vapor and soil moisture can help linking vegetation characteristics to local climatic conditions and help to scale from plot level often monitored by ecologists to more macro-Earth System models. Bridging information and understand across scales will improving monitoring the impacts of changing climates at the level of species and individuals.

From a sensing perspective, land surface temperature (i.e. Landsat, LSTM), albedo and water vapor are critical variables. In particular LSTM with good spatial/temporal resolution and high precision and making good use of ENMAP/CHIME as way to measure albedo would be desirable. The use of soil moisture information (i.e. from SMOS) is also very important.

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