SBG Update for TRISHNA Science Team Meeting

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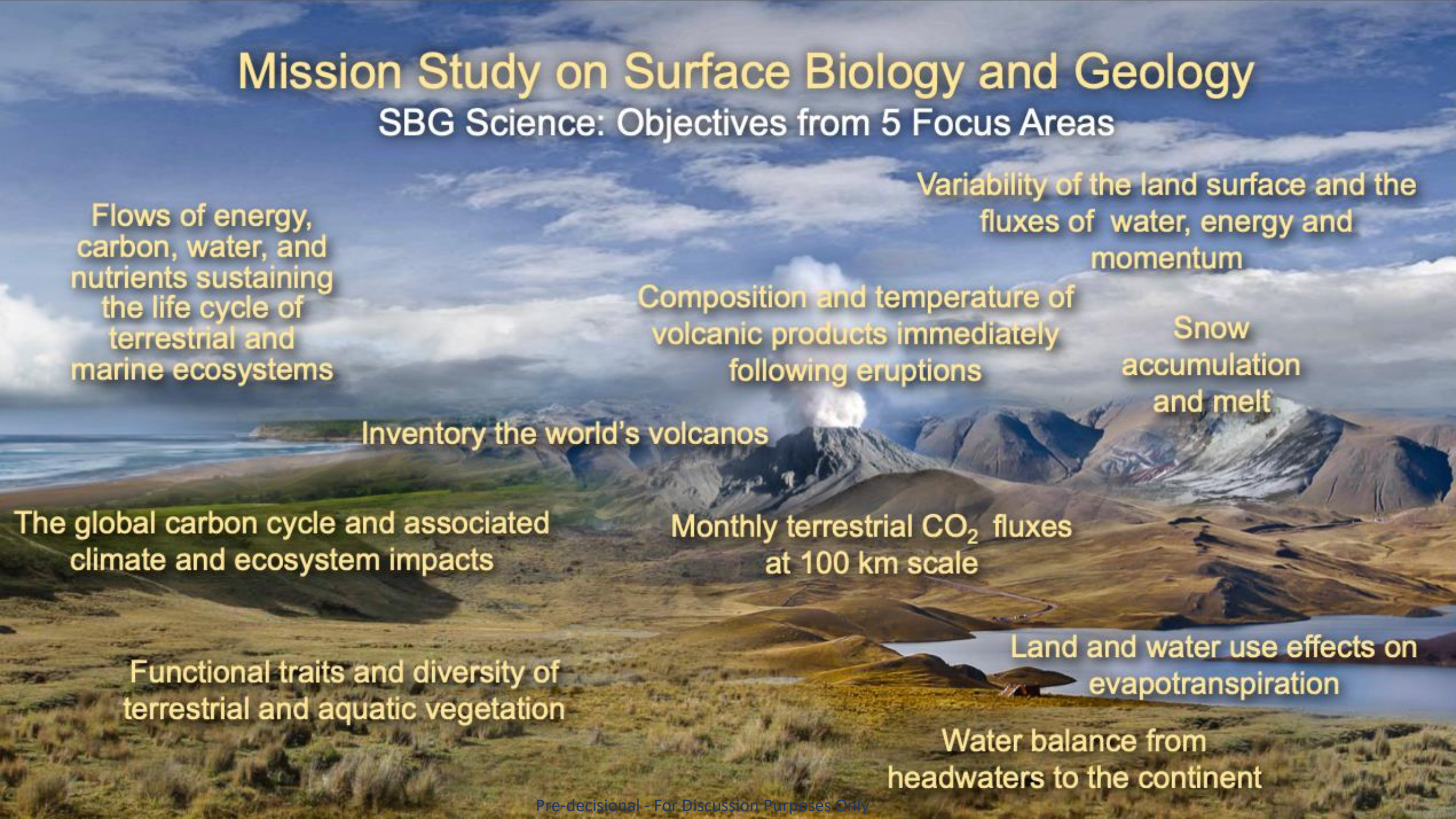
Mission Study on Surface Biology and Geology

SBG Science: Objectives from 5 Focus Areas



5 Most Important

7 Very Important

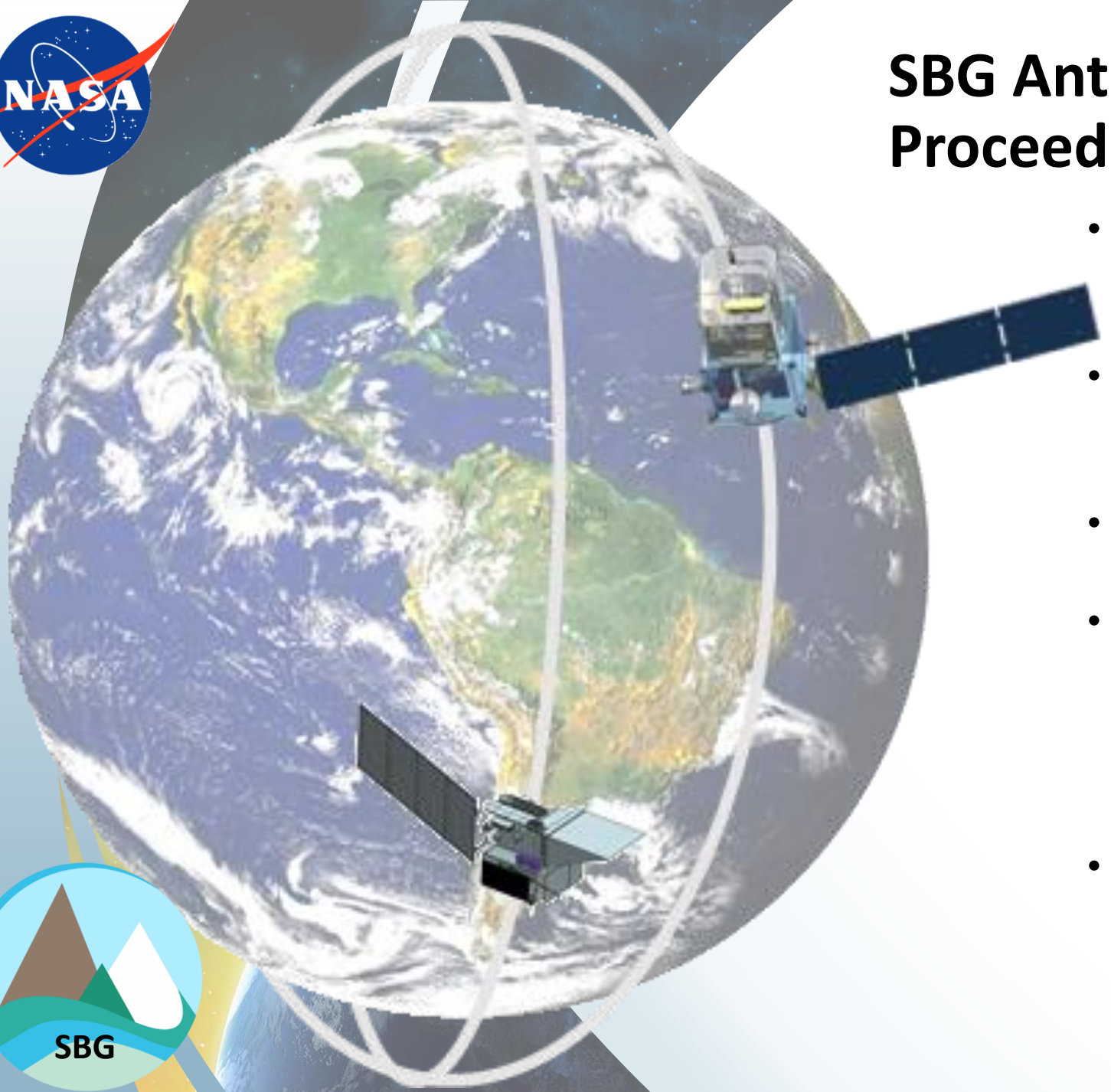
Decadal Survey Priority	Panel	Earth Science/Application Objectives from the Decadal Survey Science and Applications Traceability Matrix
E1c	Ecosystems	Quantify the physiological dynamics of terrestrial and aquatic primary producers to determine the structure, function, and biodiversity of Earth's ecosystems.
E2a		Quantify the fluxes of CO2 and CH4 globally at spatial scales of 100 to 500 km and monthly temporal resolution with uncertainty <25% between land ecosystems and atmosphere and between ocean ecosystems and atmosphere.
E3a		Quantify the flows of energy, carbon, water, nutrients, etc. sustaining the life cycle of terrestrial and marine ecosystems and partitioning into functional types to understand resource flows and changes within ecosystems.
H1c	Hydrology	Quantify rates of snow accumulation, snowmelt, ice melt, and sublimation from snow and ice worldwide at scales driven by topographic variability to determine how water cycle is changing.
S1a	Solid Earth	Measure the pre-, syn-, and post-eruption surface deformation and products of Earth's entire active land volcano inventory at a time scale of days to weeks. Allow forecast of hazards in socially relevant timeframe.
E1a	Ecosystems	Quantify the distribution of the functional traits, functional types, and composition of vegetation and marine biomass, spatially and over time in order to determine the structure, function, and biodiversity of Earth's ecosystems.
H2a	Hydrology	Quantify how changes in land use, water use, and water storage affect evapotranspiration rates and local and regional precipitation systems, groundwater recharge, temperature extremes, and carbon cycling in the short and long term
H4a		Monitor and understand hazard response in rugged terrain and land margins to heavy rainfall, temperature and evaporation extremes, and strong winds at multiple temporal and spatial scales. This socioeconomic priority improves preparedness and mitigation of water-related extreme events.
S1c	Solid Earth	Forecast and monitor landslides, especially those near population centers, in a socially relevant time frame.
S2b		Assess surface deformation (<10 mm), extent of surface change (<100 m spatial resolution) and atmospheric contamination, and the composition and temperature of volcanic products following a volcanic eruption (hourly to daily temporal sampling).
C3a	Climate	Quantify CO2 fluxes at spatial scales of 100-500 km and monthly temporal resolution with uncertainty <25% to enable regional-scale process attribution explaining year-to-year variability by net uptake of carbon by terrestrial ecosystems (i.e., determine how much carbon uptake results from processes such as CO2 and nitrogen fertilization, forest regrowth, and changing ecosystem demography.) Determine the variations in the global carbon cycle and ecosystem impacts thereof.
W3a	Weather	Determine how spatial variability in surface characteristics modifies regional cycles of energy, water and momentum (stress) to an accuracy of 10 W/m2 in the enthalpy flux, and 0.1 N/m2 in stress, and observe total precipitation to an average accuracy of 15% over oceans and/or 25% over land and ice surfaces averaged over a 100 × 100 km region and 2- to 3-day time period. Improves understanding of influences on weather and air quality.

SBG Performance Targets Support Needed Data Products

- For the eight measurement parameters, choosing the most-frequently identified values in the Decadal Survey leads to satisfying 50 to 95% of Decadal Survey objectives.
- SBG measurement performance targets fully meet an average of 63% (across 8 parameters) of Decadal Survey targets for the 12 DS Most and Very Important objectives.
- Close to 100% can be met through international collaboration and data sharing.

SBG Performance Parameters

	GSD	Revisit	Spectral Range and Resolution	Sensitivity
VSWIR	30 m	16 days Global repeat coverage , ~10 with partner	0.38 or 0.4 to 2.5µm 10nm or better, Continuous coverage	VNIR >400 SWIR >250
TIR	60 m	3 days Global repeat coverage, 1 with partner	8 to 12µm 3 to 5µm >5 Bands desired, 8 recommended	NEdT <0.2 K



SBG Anticipates Direction to Proceed to Pre-Phase A

- SBG Architecture Study results presented to NASA
- 2020 DO Annual Review sessions held October – November 2020
- SBG Team ready to enter pre-Phase A
- SBG continues to investigate international collaborations to reduce revisit time and deliver fused & harmonized VSWIR, TIR and (VSWIR + TIR) data products
- SISTER algorithm and data product pathfinder project being led by M Gierach (JPL) and P Townsend (Univ Wisconsin)