SBG

Mission Applications
Water Resources & Aquatic Ecosystems

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SURFACE BIOLOGY AND GEOLOGY

EMIT

ECOSTRESS

EMIT

Spatial resolution	~60 m
Spectral resolution	7.5 nm
Spectral range	380-2500 nm
SNR	>500

ECOSTRESS

Spatial resolution	70 m	
Spectral resolution	6 Thermal bands	Band center: 1.66, 8.28, 8.78, 9.06, 10.52, 12
Data products	L1 - L4	Radiance, LST, Evapotranspiration, Evaporative Stress Index

SBG

VSWIR

	Spatial	Temporal	Spectral
SBG Baseline	30-m	16 days	0.38– 2.5 µm 220 bands
EMIT	60-m	Variable	0.38– 2.5 µm 285 bands

SBG

TIR

	Spatial	Temporal	Spectral
SBG Baseline	60-m	3 days	3 – 12 µm 8 bands
ECOSTRESS	70-m	Variable	8-12.5 µm 5 bands

How have Applications Contributed to SBG Mission Concept?

Mission Architecture
synergize research and applications
(SATM)

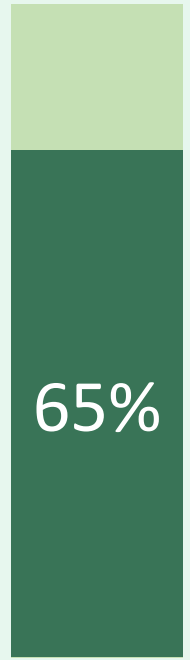
Mission Requirements
research and applications informed
(hardware, latency)

Community Engagement
application ready products and data systems
(SISTER, SHIFT)

2 Unprecedented Studies on the Impact and Value of SBG

560+ individuals surveyed

94 Interviews across 11 thematic areas



Interviews from private sectors and NGO's

Fire Ecology & Risk

Agriculture & Water resources

Algal blooms and WQ mapping

Mineral resource mapping

Urban & Health

Forest Management

Coral reef ecosystems

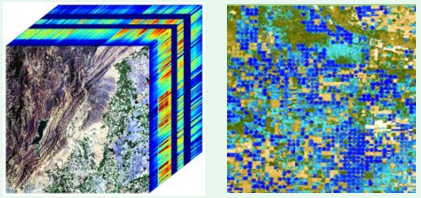
Global food security

Conservation & Biodiversity

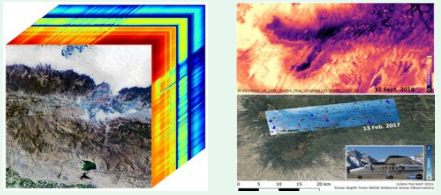
VASPs

SBG Applications Overview

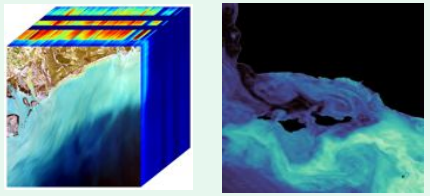
Hydrology (H-1-2)
Agriculture



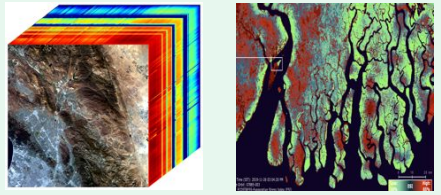
Hydrology (H-1-2)
Water Resources - Snow



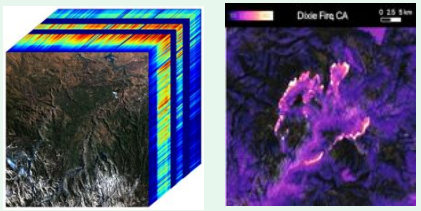
Ecosystems (E-1-3)
Coastal and Inland Aquatic



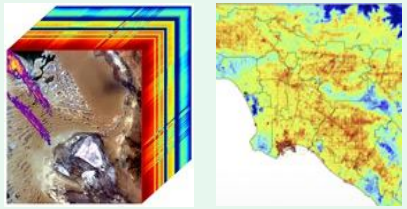
Ecosystems (E-1-3)
Conservation management



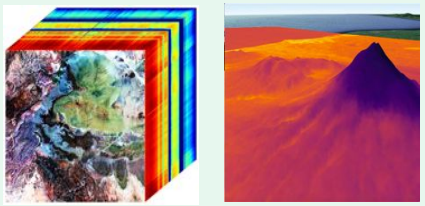
Ecosystem + Solid Earth
(E-1-3, S-1) Wildfire Risks and Hazards



Climate (C-3)
Extreme Heat + Greenhouse Gas



Solid Earth (S-2)
Volcanoes + Mineralogy



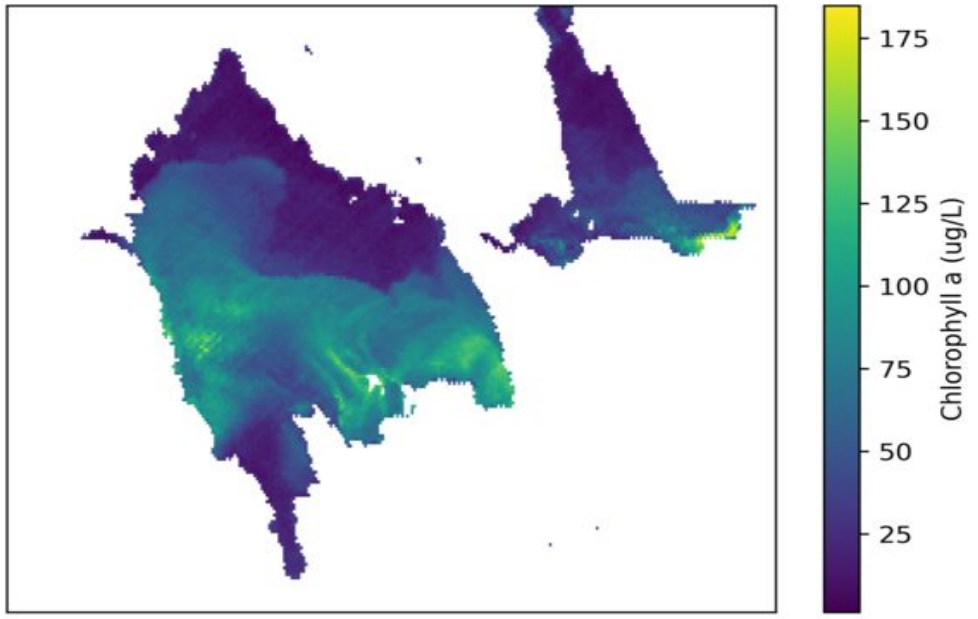
Source: Christiana Ade, JPL

Aquatic Ecosystems – Harmful Algal Blooms

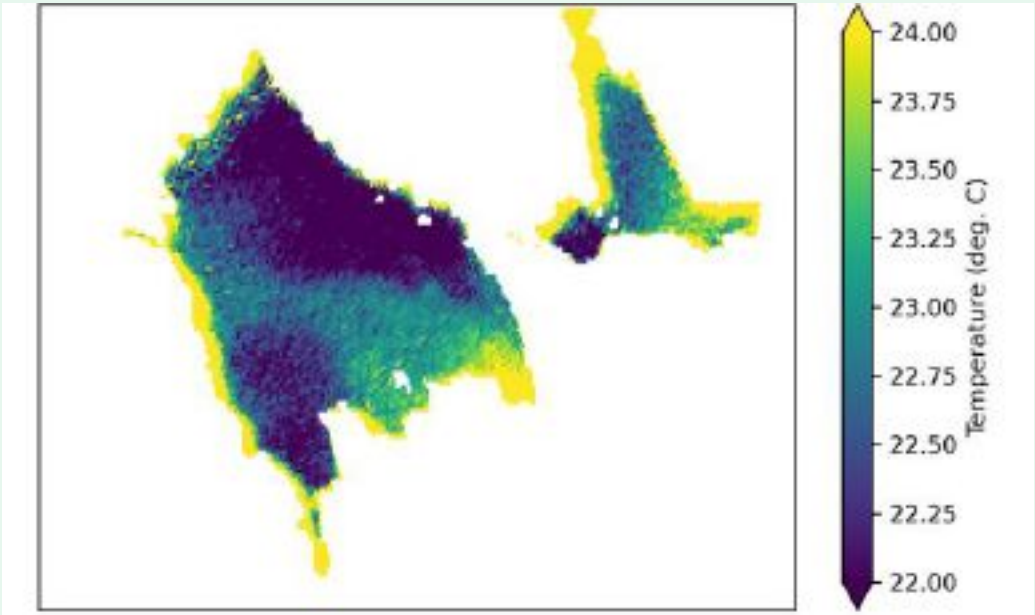
SBG VSWIR + TIR are critical to understanding environmental controls (e.g., marine heat waves) on harmful algal blooms for public health management

San Luis Reservoir, California – August 14, 2022

EMIT Chlorophyll-a



ECOSTRESS Water Surface Temperature

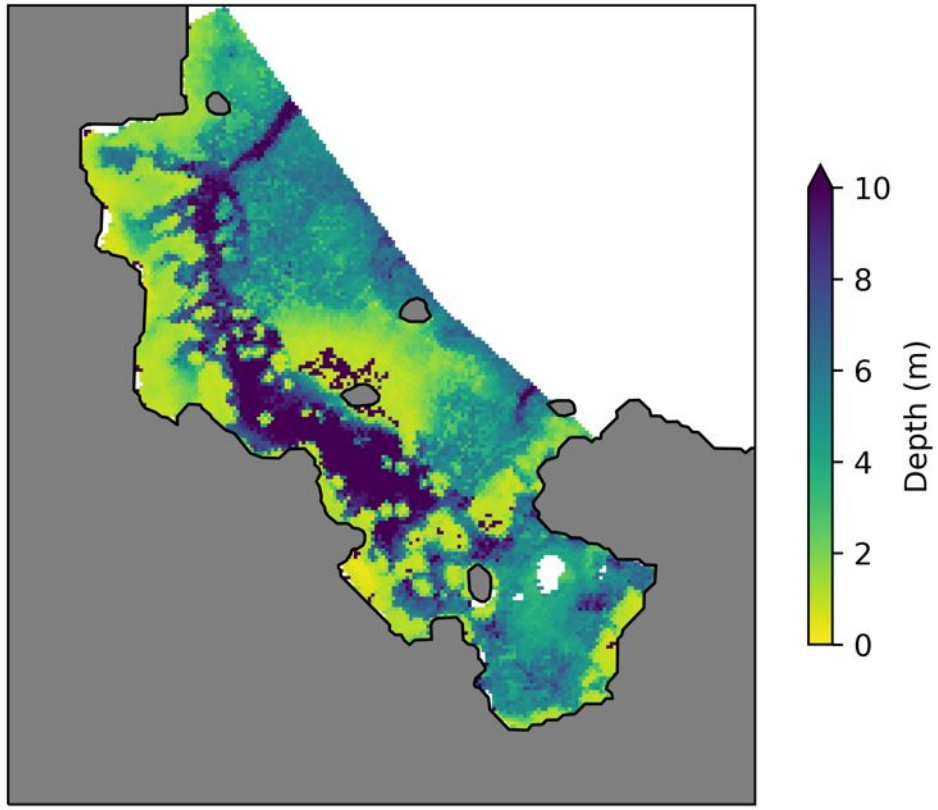


Source: Christiana Ade et al, JPL

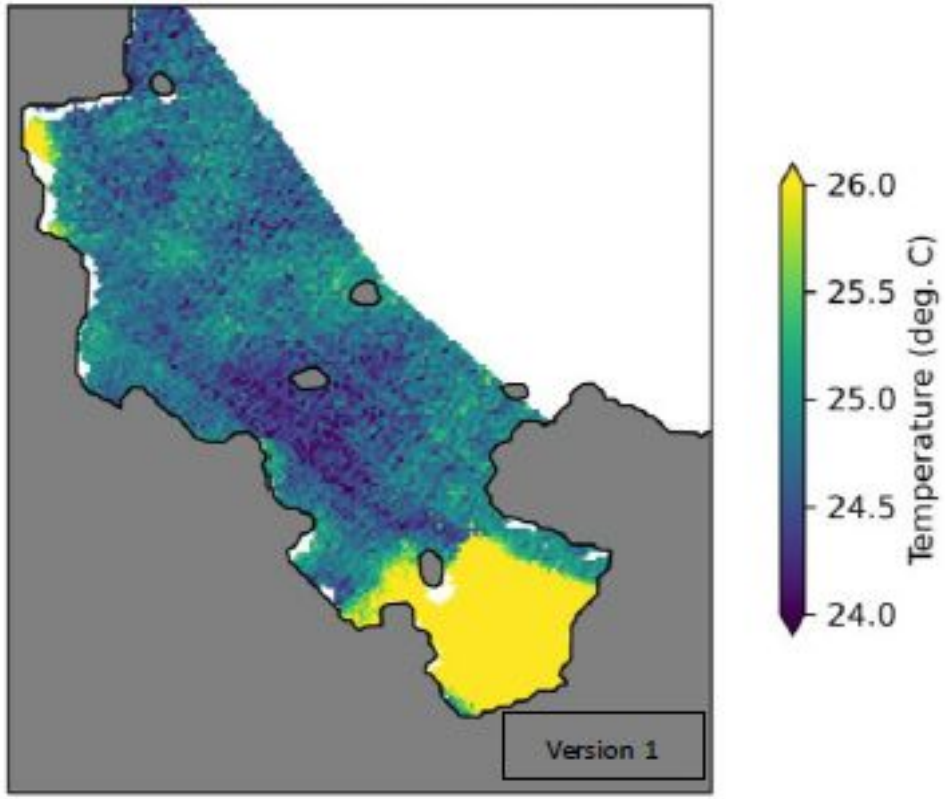
Aquatic Ecosystems – Coral

Kāne‘ohe Bay, Hawai’i – March 25, 2023

EMIT Water Depth



ECOSTRESS Water Surface Temperature



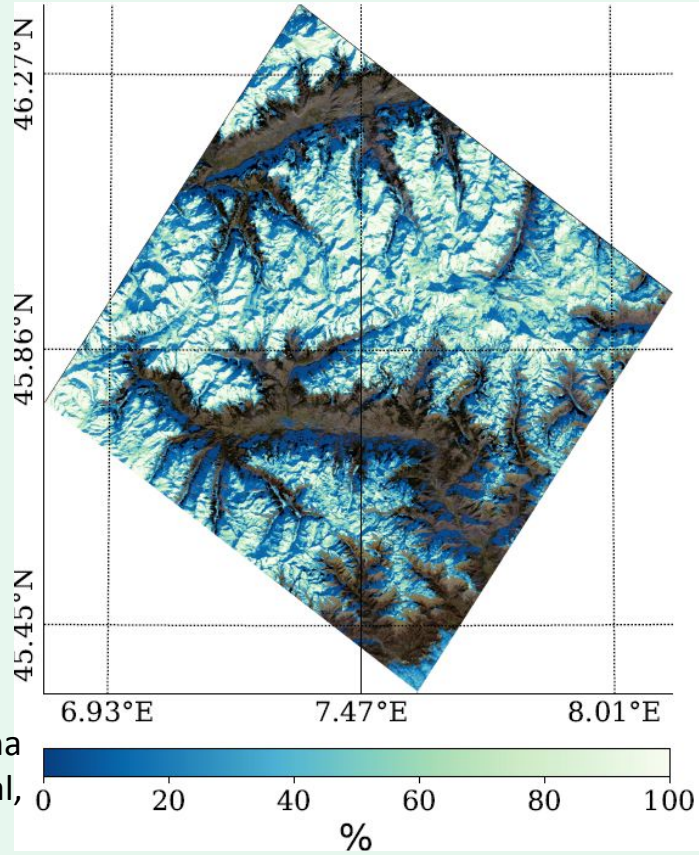
Source: Christiana Ade, et al, JPL

Hydrology & Water Resources - Snow

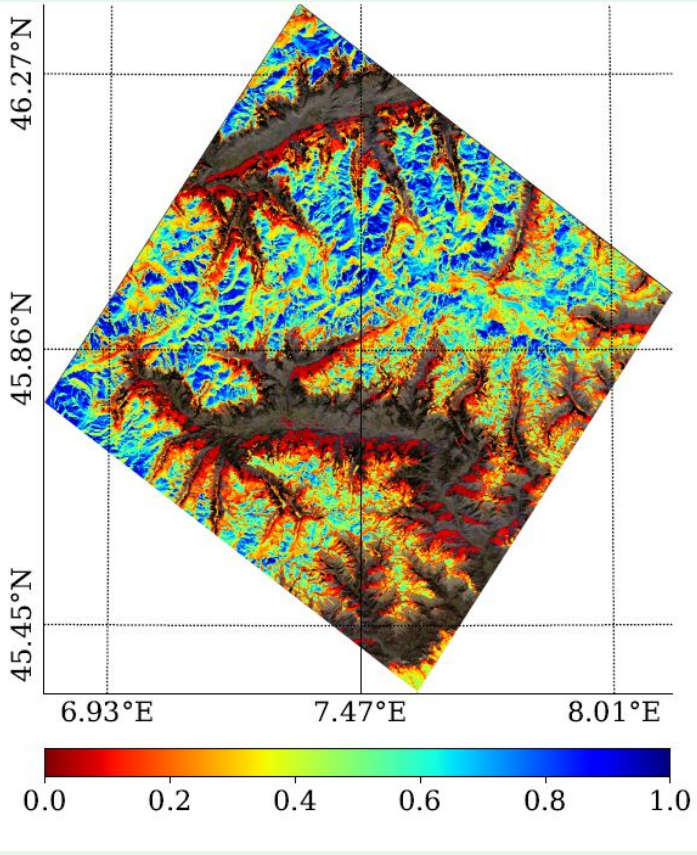
SBG VSWIR + TIR are critical to quantifying snowpack and water supplies which leads to improved water resource allocations and management

Pennine Alps – February 20, 2023

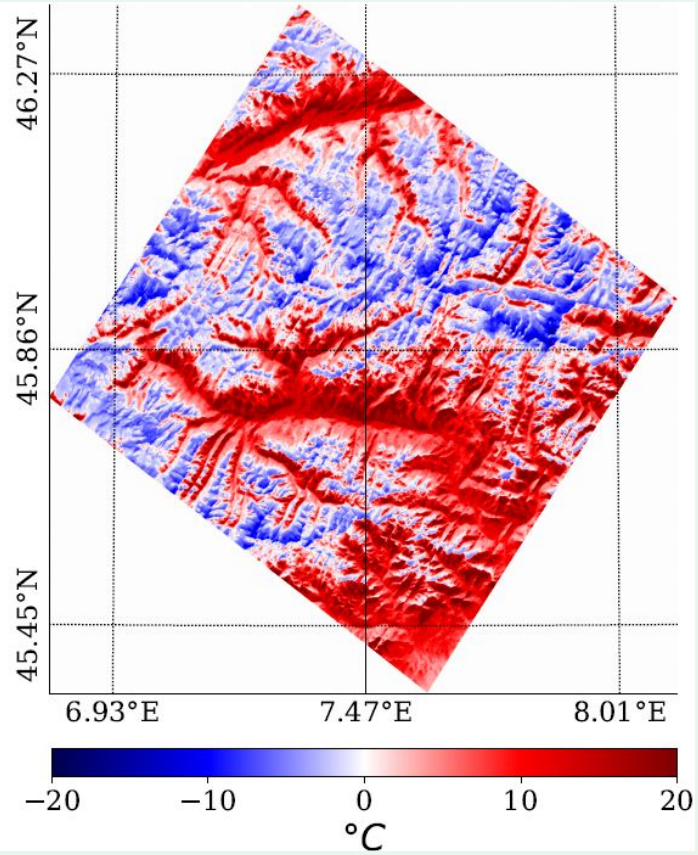
EMIT Snow fCover



EMIT Broadband Albedo



ECOSTRESS Surf. Temp.



Source: Christiana Ade, et al, JPL

Resources

- SBG Science and Applications Technical Interchange Meeting (June 2024)
- HYR-SENSE 2024 summer school
- Mapping minerals with space-based imaging spectroscopy workshop (IGARSS 2024)
- Synergizing place and space! Gaining Ecological Insights from NASA Imaging Spectroscopy and Thermal Data (ESA 2024)
- **EMIT + ECOSTRESS resources for aquatic applications (Ocean Optics XXVI 2024 – submitted)**

Vitals: EMIT + ECOSTRESS Tutorials

Forecasting Algal Blooms in Lake Atitlan [1]

Available at: **https://freshwater.net/**

This system forecasts daily probability of algal bloom formations in Lake Atitlan. A biodiversity and cultural landmark in Guatemala, Lake Atitlan is the second most visited site in the country.

This forecasting system is a key input into the Lake Authority's Harmful Algal Bloom (HAB) Alert System. A new algal bloom was detected in late August 2022 as a result of the information provided by this forecast.

A key input into the forecast model is GEOGloWS[2] ECMWF streamflow data.

The web platform also provides daily information on the lake environmental conditions to inform authorities about conditions for field campaigns.

[1] This project was supported by National Geographic and Microsoft.
[2] GEOGloWS is supported by CNES, NASA, World Bank, Microsoft, BYU, NOAA, the Swiss government, with additional in-kind contributions from ECMWF, JRC, BYU, USAID-NASA-SERVIR, Esri, and many national hydromet agencies.

Earth Observations in Action

1. FORECAST
Daily algal bloom probability

→

2.VERIFICATION
Informs WQ field campaigns by AMSCLAE and UVG

→

3. ALERT
HAB Alert System / Activate Action Plan

THE UNIVERSITY OF ALABAMA IN HUNTSVILLE · SERVIR · GOBIERNO de GUATEMALA · AUTORIDAD PARA EL MANEJO SUSTENTABLE DE LA CUENCA DEL LAGO DE ATITLÁN Y SU ENTORNO · AMSCLAE · UVG UNIVERSIDAD DEL VALLE DE GUATEMALA · CENTRO DE ESTUDIOS ATITLÁN INSTITUTO DE INVESTIGACIONES · BYU Civil & Environmental Engineering

SBG Science and Application Technical Interchange Meeting

Please join us!

- **Washington, DC May 29-31st**
- NASA HQ and Hyatt Place Washington DC

Register here

Thank you!

Register here