Applications

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Integrated with Science Breakouts

← **Applications** →

Solid Earth

- Tectonics/deposition/ erosion/climate coupled processes
- Earthquake, volcano and landslide assessment, response, mitigation and modeling
- Anthropogenic and natural change detection

Vegetation Structure

- Ecosystem structure and function
- Carbon accounting
- Biomass inventory, dynamics, monitoring
- Biodiversity, habitat structure and response to disturbance
- Forest resources management
- Wildfire, fuel, risk and post-fire recovery

Cryosphere

- Ice sheet, ice cap and glacier elevation change and sea level impact
- Sea ice thickness and cover change and impact on the ocean/atmosphere system
- Ice flow and dynamics
- Constraints for time-series modeling

Hydrology

- Lake and reservoir heights and shallow bathymetry
- Snow depth and melt impact on water resources
- Stream and river flow
- Flooding and inundation modeling
- Wetland processes and management

Coastal Processes

- Storm surge and tsunami inundation hazards
- Shoreline erosion and sediment transport
- Benthic vegetation
- Tidal interaction with mangroves and salt marshes
- Shallow water navigation and hazards

Decadal Survey & STV Applications

- The Decadal Survey recognized explicitly the connection between science and applications in the identified priorities.

- Many Decadal Survey questions call out societal impact, in recognition of the increasing need for and capability of remote sensing & Earth science to inform decision-making.

- The STV mission provides multi-disciplinary information with substantial applicability – applications within every science discipline.

- Some of the most challenging DS questions with Most Important priority both have great societal importance and are cross-disciplinary in nature.
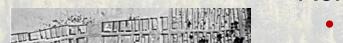
Overview: STV Applications

- For most STV science goals, there is at least one (often more) application
  - *Plan on STV data being widely used for both science & applications*

- Considering applications from the early mission planning stage can make the incremental cost negligible to meet their needs
  - *In most cases the same data, with or without minor changes, can be used by operational agencies*
  - *DATA OBSERVATION PLAN (COVERAGE) and LATENCY ARE OFTEN KEY*

STV Study Team Approach:

Integrate Applications into the SATM interleaved with relevant Science Goals & Objectives

Solid Earth Applications

- Related to DS Solid Earth Goals:
  - Earthquake, Volcano, Landslide applications
  - Vertical Land Motion (VLM) component of Relative Sea Level Rise (RSLR)
- Other:
  - Disaster Response
  - Sinkhole Hazards
  - Subsidence from resource extraction
  - Critical Infrastructure monitoring
  - Space Archaeology

Vegetation Structure Applications

- Related to DS Vegetation Goals:
  - Forest Ecosystem applications
    - Sustainability
      - Human influence
      - Natural influence
    - Biomass / Emissions
  - Deforestation
- Other:
  - Agriculture
  - Agroforest applications
  - Forest Fire applications
  - Wetland management

Cryosphere Applications

- Related to DS Cryosphere Goals:
  - Sea Level Rise
- Other:
  - Sea Ice applications
  - POLAR SEA NAVIGATION
  - FACILITIES

Hydrology Applications

* Includes freshwater systems, glaciers, permafrost

- Related to DS Hydrology Goals:
  - Snow water resources
  - Wetland management
  - Riverine flooding
  - Inundation modeling
- Other:
  - Permafrost mapping, change
  - Glacier applications
    - melt & flooding
    - water resources

Coastal Processes Applications

- Related to DS Coastal Processes Goals:
  - Tsunami hazards
  - Storm surge and inundation
  - Wetland & benthic ecosystem applications
  - Coastal sustainability / relative sea level rise
- Other:
  - Shallow water navigation & hazards
  - Marine archaeology

Solid Earth
S-3b: Coastal Subsidence

SCIENCE:

Science and Applications		Physical Parameters	
Goals	**Objectives**	**Targeted Observable(s)**	**Derived Parameter(s) Required**
(S-3) How will local sea level change along coastlines around the world in the next decade to century?	S-3b: Determine vertical motion of land along coastlines at uncertainty <1 mm yr-1.	Surface Topography	Bare Earth Topography

Solid Earth Applications: VLM Component of RSLR

Jakarta, Indonesia
VLM <=25 cm/yr

APPLICATION:

Science and Applications		Physical Parameters	
Goals	**Objectives**	**Targeted Observable(s)**	**Derived Parameter(s) Required**
Applications: Coastal Subsidence	What is the current land surface elevation at the local scale? What are the current rates of subsidence at the local-to-regional scale? What are the main drivers of subsidence at the local-to-regional scale? How much is subsidence contributing to relative sea level rise? Where should remediation activities be undertaken to have the highest impact on coastal sustainability? What is the sustainability at the decade-to-century timescale? Are remediation activities working? How is flood risk changing due to RSLR?	Surface Topography	Bare Earth Topography

S & A Breakouts: Application Objectives

- Identify **high value** applications for STV within each discipline
  - Unique information or a significant increase in information
    - Can be closely tied to science goals in regards to needs
    - Can use the same measurement or slightly modified measurement
    - Can have different latency, frequency of imaging, or coverage requirements
  - Enables a major agency to meet one or more of its primary goals
- Take special note of **cross-disciplinary applications**, where STV can provide information about BOTH vegetation & topography
- Focus on realistic applications given STV DS science goals, objectives & <u>needs</u>
  - Ideally, they are closely related to science goals
  - Should have similar or identical <u>instrument measurement needs</u>
    - Identify differences, consider whether they are realistic
  - Focus on different CONOPS or processing: coverage, frequency of imaging, or processing latency needs

Applications Charge

Practical Matters:

- Provide input to develop S<u>A</u>TM for the community
    - Spatial resolution
    - Frequency
    - Coverage
    - Latency (Downlink & Processing)
    - Ancillary information
    - Current state-of-the-art & gaps in capability

- Identify missing high value applications
    - Try to group similar applications with identical needs into one entry

- Justify needs with sources, analysis, agency missions, etc.

https://science.nasa.gov/earth-science/decadal-stv/workshop
Link to questionnaire: https://arc.cnf.io/sessions/qkrg/#!/dashboard