

NASA Workshop

VEG3D & BIOMASS Workshop Science and Measurement Requirements for Future Spaceborne Missions

March 3-5, 2008

Questions for Breakout Sessions

Breakout I Carbon Stock

- How much carbon is stored in the (forest) ecosystems of the world, and what is the distribution of forest carbon stocks?
 - What is the required spatial resolution for forest carbon stocks?
 - What is the required accuracy for estimates of biomass?
 - How often should global carbon stocks be measured during a 5 year mission?
 - What are the structural variables required to estimate forest biomass?
 - What methods are available for validation of global carbon stocks?
 - To what extent can ecological models contribute to improved global estimates of forest biomass?
 - What are the main observational requirements to initialize and validate models of forest structure?

Breakout I

Disturbance & Recovery

What are extent, duration of forest disturbance and recovery, and the magnitude of the carbon cycle consequences.

Disturbance

- what types need to be measured (fire, blowdown, deforestation, logging, selective logging, insects, tree fall, etc.)?
- what are the forest structural variables (height, biomass, stand density, ...) that need to be detected?
- what are the spatial resolution requirements for detection and for quantitative assessment?
- what are the temporal resolution requirements for detection and for quantitative assessment?
- what are the accuracy requirements (height, biomass, ...) for detection and for quantitative assessment?

Recovery

- same questions. Do the answers differ?

Modeling forest ecosystem carbon dynamics

- does model evaluation and or initialization impose more stringent or additional requirements for spatial/temporal resolution or accuracy?

Breakout I

Biodiversity & Habitats

- How are biodiversity and species habitats distributed over the Earth surface, how are they changing, and what Veg3d information is critical for biodiversity and habitat science and management?
 1. Importance: why is biodiversity and habitat mapping and modeling using Veg3D important (i.e. what will it contribute to science and society)?
 - General needs
 - Specific programs
 2. What Veg3D variables are needed:
 - For *mapping* and quantification of biodiversity and habitat?
 - For use in *models* (e.g. statistical, ecological niche models, species range/distribution models)?
 3. What are the Veg3D variables requirements:
 - What are the required *spatial resolutions* for important structural variables?
 - What are the required *accuracies* for important structural variables?
 - What are the required *geographic extents*?
 - What are the required *temporal frequencies*?

Breakout II

Polarimetric & InSAR

What are the requirements for Polarimetric & InSAR
Measurements of Forest Structure and biomass?

Polarimetric Backscatter

- What is the biomass range and accuracy from polarimetric backscattering measurements at L-band?
- What is the required coverage and spatial resolution for biomass estimation?
- What is the required temporal and spatial resolution for measuring disturbance and recovery?

InSAR

- What is the minimum required configuration for InSAR measurement (polarization and baseline)?
- What is the height accuracy of InSAR measurements?
- What is the biomass accuracy derived from InSAR measurements?
- What are the validation/calibration requirements for InSAR measurement of forest height?
- What is the impact of phenology on InSAR measurements? What is the required seasonal coverage?
- What is the impact of temporal decorrelation? What is the required repeat cycle?

Synergism

- To what extent lidar measurements can improve SAR estimation of biomass and structure?
- What are the measurement requirements for lidar for driving ecosystem models?
- To what extent BIOMASS (P-band SAR) can improve the accuracy and range of L-band SAR measurements?

Breakout II

Multi-beam Lidar

What are the requirements for Multi-beam Lidar Measurements of
Forest Structure & Biomass?

- What is the accuracy of the lidar height measurements at the pixel level over various forests, i.e. and what affects this measurement?
- What is the biomass accuracy derived from lidar measurements of forest structure?
- What sampling strategy (e.g. number of observations, number of beams, etc) is required to achieve the required height and biomass accuracies for an individual sampling unit (grid cell) in various biomes?
- What is the impact of phenology on lidar measurements? What is the required seasonal coverage?
- What is the reasonable grid cell for lidar products of global vegetation biomass?
- What are the measurement requirements for lidar for driving ecosystem models?

Breakout II

Lidar & Radar Fusion

- What are the potential requirements for Lidar and Radar data fusion?
 - How many lidar samples are required within or near radar pixel to calibrate the radar measurements of heights or biomass?
 - What is the maximum useful time difference between the lidar and radar measurements over the same vegetation area?
 - What type of geospatial approach can combine the lidar samples with radar height or other structure measurements?
 - To what extent the annual radar products can be degraded with the lack of lidar samples?
 - What are the requirements for potential lidar samples and radar measurements to quantify disturbance and recovery processes?

Breakout III

Carbon Stocks

- What are the minimum requirements for forest carbon stock information? What are the desired requirements?
 - Carbon stocks
 - Biomass
 - Frequency of global survey
 - Structure variables
- What are the major issues to be resolved in achieving these minimum and desired accuracies?
 - Information accuracy needs versus achievable sensor accuracies
 - State of knowledge of either of the above?
 - Needed mission trade studies (orbits, platform & Instrument config.)
- What studies are needed to resolve these issues?
 - Field Studies
 - Observing System Simulation Experiments
 - Model validation and improvement

Breakout III

Disturbance & Recovery

- What are the minimum requirements for disturbance and recovery information? What are the desired requirements?
 - Disturbed area, time since disturbance
 - Type of disturbance (min and desired category distinctions)
 - Frequency of information
 - Biomass and structure variables
- What are the major issues to be resolved in achieving these minimum and desired accuracies?
 - Information accuracy needs versus achievable sensor accuracies
 - State of knowledge of either of the above?
 - Needed mission trade studies (orbits, platform & Instrument config.)
- What studies are needed to resolve these issues?
 - Field Studies
 - Observing System Simulation Experiments
 - Model validation and improvement

Breakout III

Biodiversity & Habitats

- What are the minimum and desired requirements for structural variables needed to support biodiversity and habitat studies?
- What are the major issues to be resolved in achieving these minimum and desired accuracies?
 - Information accuracy needs versus achievable sensor accuracies
 - State of knowledge of either of the above?
 - Needed mission trade studies (orbits, platform & Instrument config.)
- What studies are needed to resolve these issues?
 - Field Studies
 - Observing System Simulation Experiments
 - Model validation and improvement