

## Biodiversity Breakout meeting notes – Day 1

Tune our language – make it clear we are not sensing biodiversity

“There is no absorption band for biodiversity”

We are “enabling” studies of biodiversity.

We are getting at “potential habitat” or habitat surrogates.

- Getting at diversity of species via diversity of niches / habitat as opposed to / in addition to habitat preferences of specific species (keystone spp)

Need to think about how to inform models using RS variables. What types of models (niche models, etc).

We are “not yet there” in terms of highly specific RS requirements but we know from those studies that exist and from extensive field mmt studies (non RS) that there are specific structural variables of relevance, and that they vary by functional types (and ‘guilds’ of these), scale, energy environment (incl productivity).

- Key theories: productivity / biomass, disturbance , habitat heterogeneity
  - o We focused on the latter because it has the most potential from Veg3D structural mmts.

Structural / habitat heterogeneity variables / metrics of relevance

- [see PPT slide on this including height, vertical complexity, etc]
- what is missing? What would be enhanced?
  - o Successional stage / disturbance / stand age
  - o diversity of canopy height surfaces (rigosity, roughness)
  - o ground topography as well as canopy topography parameters
  - o

Possible to develop lists of these specific to birds / mammals / reptiles / veg / etc

- list of habitat heterogeneity metrics that vary with these

Scale / resolution issue

- Radar spatial resolution
  - o Riparian areas, windbreaks / hedgerows, human habitat (e.g. smallholder agriculture)
  - o forest degradation / selective logging (e.g. African mahoganies)
  - o 30m cell size would be compatible with Landsat
- 25m spot size of lidar good.
  - o Vertical resolution of lidar is good
  - o Much information in waveforms / height profiles.
- Temporal resolution tradeoffs with sampling density
  - o 90 day repeat acceptable, probably less ok too
  - o sampling density will be important – can it be increased between tracks? (5 lasers)

Accuracies required:

- 1m height error good but in case of shrub areas / encroachment may not be good enough

Links with LTER, NEON, TEAM, and other field sites to further develop richness of biodiversity data sets, as well as other programs (DIVERSITAS) – try to make these data sets more usable to the community. Perhaps also coordinate with NACP, etc sites.

Provide open lidar & radar data sets to facilitate fusion studies at well studied sites (e.g. ALOS & LVIS)

Complexity of 3D habitat important for spp diversity, but individual spp use that space in unique / particular ways. We also think of variability & data distributions rather than means.

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Also, spatially, what is variability / autocorrelation / lacunarity / how far do we go spatial lags? Variations of foliage height diversity metric, point patterns.

Use RS to “constrain guilds” e.g. using CI’s global mammal database to derive envelopes that guilds occupy (which variables rise to the top)?

The Disturbance and Biomass breakouts / variables have direct relevance to Biodiversity.

- some are more dynamic (light environment) than others (canopy structure, biomass)

Can we provide metrics at broader spatial scales (at relatively fine grain size)?

**5. What temporal, i.e. repeat, capabilities are needed?**

**6. What levels of accuracy and precision are required?**

- How does this vary by scale
- How does this vary by application?

**7. Sensors and sensor fusion**

- What sensors and parameters are required?
- Active sensor fusion (i.e. Radar-Lidar) utility and needs for habitat/biodiversity mapping and modeling
- Active and passive optical sensor fusion (i.e. Radar or Lidar with Landsat-MODIS) utility and needs for habitat/biodiversity mapping and modeling
- Recent advances

**8. Models**

- Types of models/modeling in habitat and biodiversity science
- Incorporating structure in models for biodiversity and habitat – how could structure data be used in and improve habitat and biodiversity models
- Recent advances