Modeling forest degradation using dynamic vegetation models – approaches and strategies for implementation

Marcos Heil Costa

NASA AIMES Workshop

Manaus, November 11 2019

Approaches:

- Disturbance approach
- Vegetation structure approach

Disturbance approach

- Disturbance input model or parametrize effect on vegetation structure simulate implications for carbon, energy and water balances and biodiversity patterns
- Ex: Local fire data changes in LAI, mortality (validation data) simulation of carbon, energy, water balances and biodiversity (validation data)
- Fully mechanistic approach
- Appropriate for plot-level simulations

Disturbance approach

- Advantages:
  - Contributes to process understanding and model development
  - Data-ready sites available
    - Tanguro fire experiment
    - K83 LBA logging site
    - LBA Seca-Floresta / ESECAFLOR sites
  - Easy development and implementation from most DGVMs
- Disadvantages:
  - Requires significant amounts of input and validation data

Vegetation structure approach

- Input effect on vegetation structure (from RS) simulate implications for carbon, energy and water balances and biodiversity patterns
- Ex: Remote sensing data on LAI, biomass data assimilation simulation of carbon, energy, water balances and biodiversity (validation data)
- Partially mechanistic approach
- Appropriate for regional-scale simulations

Vegetation structure approach

- Advantages:
  - May be implemented from current remote sensing observation programs
- Disadvantages:
  - Incomplete input data may lead to incomplete ecosystem simulation
  - Data assimilation techniques may need to be developed
  - Dichotomy between using multiple available remote sensing data as input or as independent validation
  - Available validation data is mostly local, not regional