BIOMASS PRODUCT FROM ALOS-PALSAR

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ALOS
Unique observing system in the forthcoming decade for

. Deforestation /harvest

. Above ground biomass accumulation (low biomass)

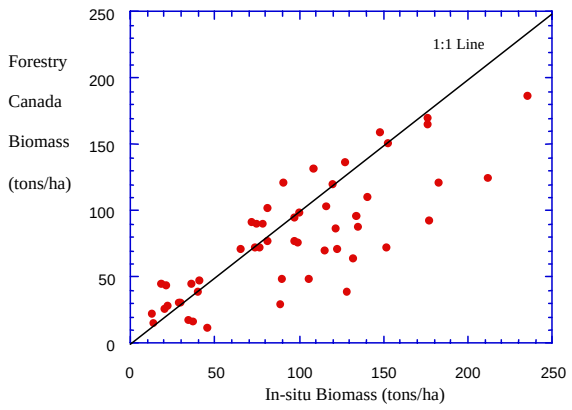
- Mass balance equation (Inventory approach)

$\Delta C = \Delta$ **Above Ground Biomass** $+ \Delta$ Below Ground Biomass $+ \Delta$ Litter $+ \Delta$ Soil Carbon

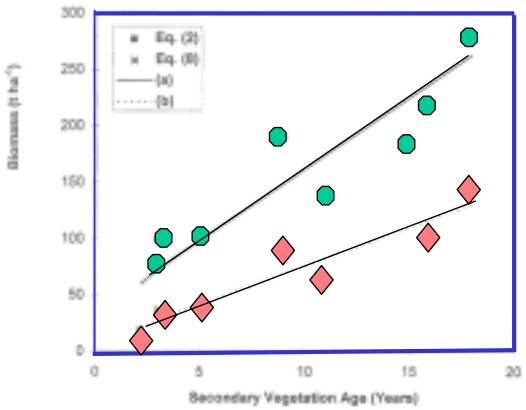
- Process equation (Dynamic Vegetation Model Approach, Productivity Efficiency Approach)

$\Delta C =$ Gross Primary Production- Autotrophic respiration- Heterotrophic respiration - Loss by disturbances

Current assessment of biomass at local scale

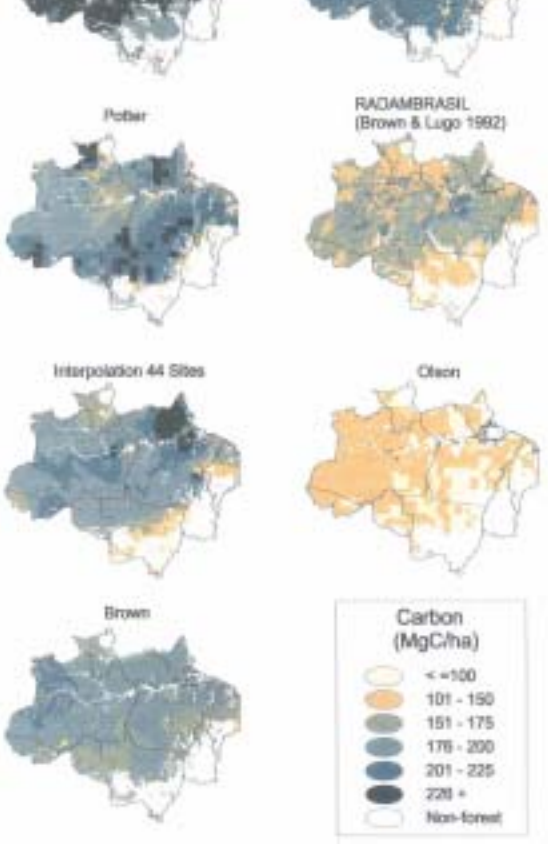


Comparison of biomass measurement at a BOREAS site by two different teams



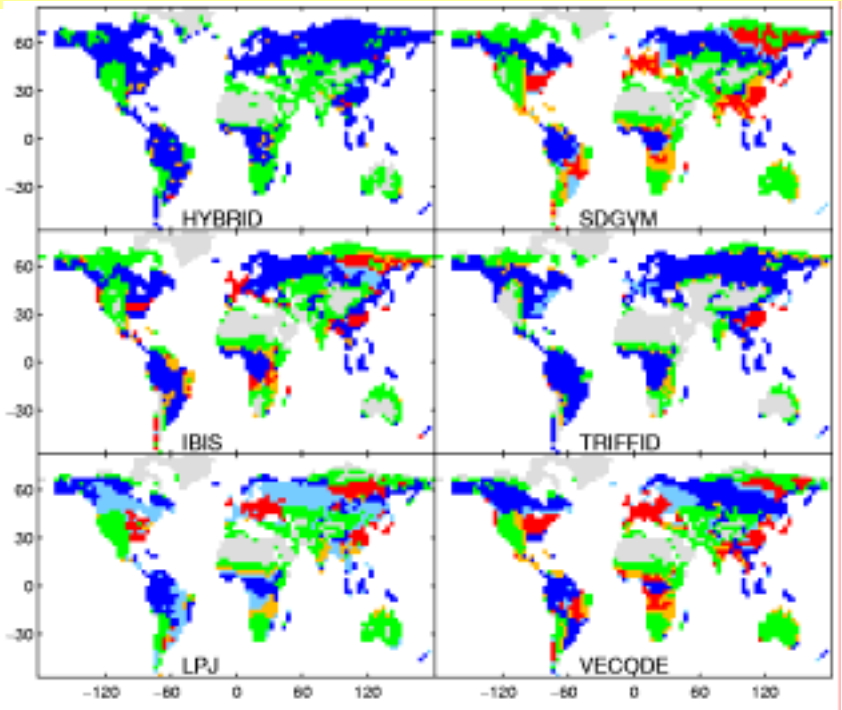
Biomass as a function of regrowth age at an Amazon site, using different

measurements



Spatial distribution of biomass in the Amazon
Comparison of current methods
(Houghton et al., 2001)

Global biosphere models



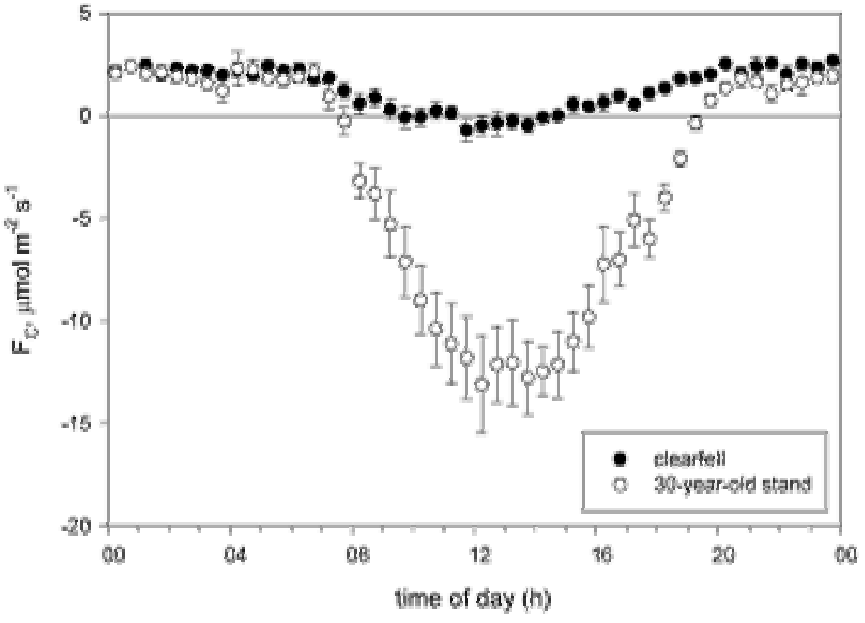
Cramer et al., 2001

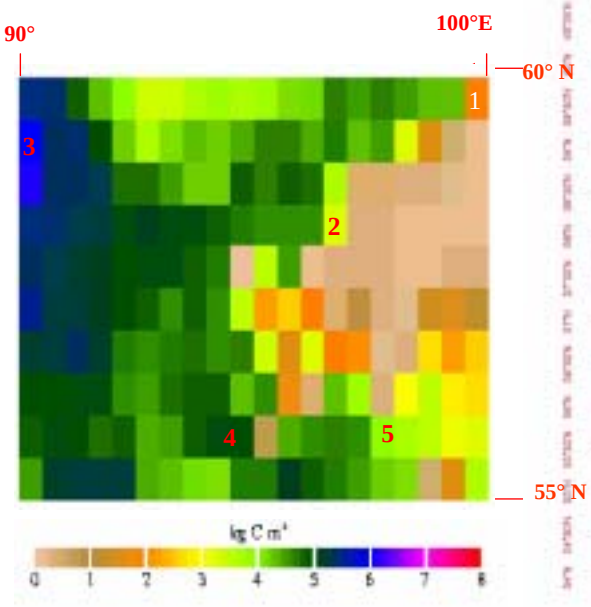
Recent research results indicated that young forest is C source, because
Respiration of dead biomass (heterotrophic) > NPP

--> Forest is source after disturbances:
Siberia: until few decades (Schulze et al., 2000)
Canada: until 10 years (Amiro et al, 2001)
US: 10-20 years (Law et al., 2001)
UK: 15-15 years (Grace et al., 2003)

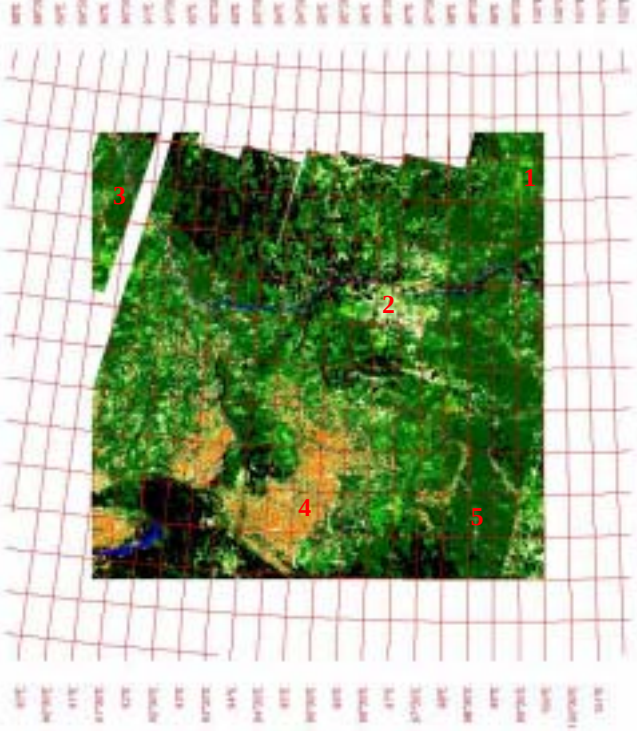
Knowledge of forest biomass in the low range (<50 t/ha) critical for the assessment of carbon budget

Carbon flux measured from clearfell and 30 yr old forest stands





heffield Dynamic Global Vegetation Model
Lomas, Woodward, Quegan, 2002)



Siberia biomass maps using ERS & JERS

Use of biomass in satellite driven models

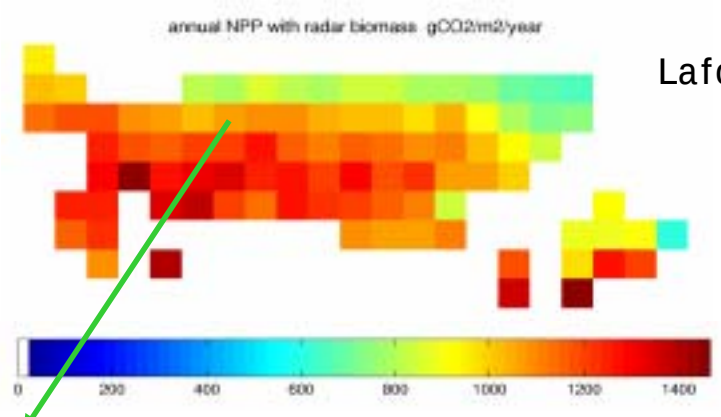
NPP=ε * IPAR * fAPAR - Autotrophic Respiration

Photosynthetic Efficiency

From NDVI (e.g. Spot/Vegetation)

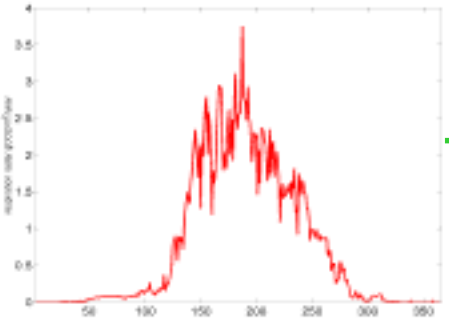
Incoming Radiation (e.g. ECMWF)

Autotrophic respiration = function of Temperature and Biomass
(Biomass map (1°) by Olson (1985) used in models)

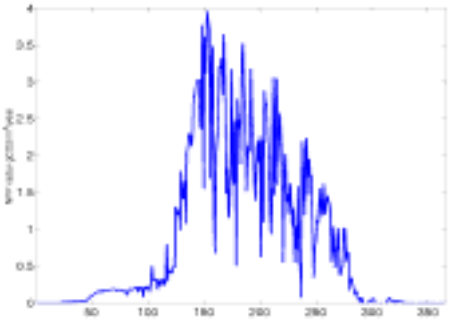


Lafont et al., 2002

Autotrophic respiration



NPP



ALOS data source for biomass

1. Mature technique:

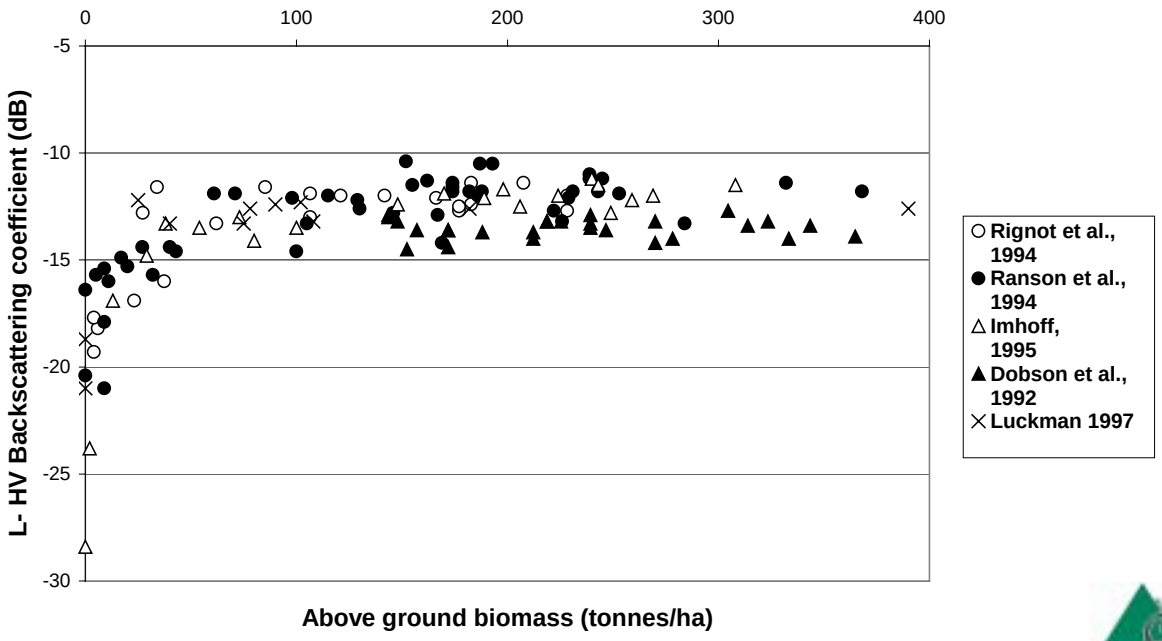
L-HV, high incidence
L-HH, high incidence

} Dual-pol, 43.4°

2. Experimental:

Repeat pass interferometry, in Winter
for Northern latitudes 34.3 °

Generality of the relations L-HV-Above ground biomass

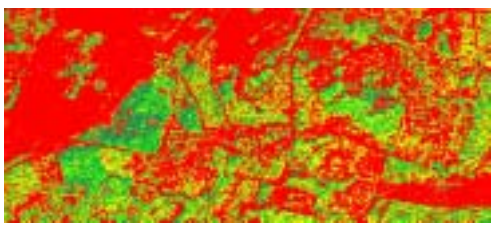


Mapping of biomass using L-band ESAR data
Büdingen forest, Land Hessen, Germany

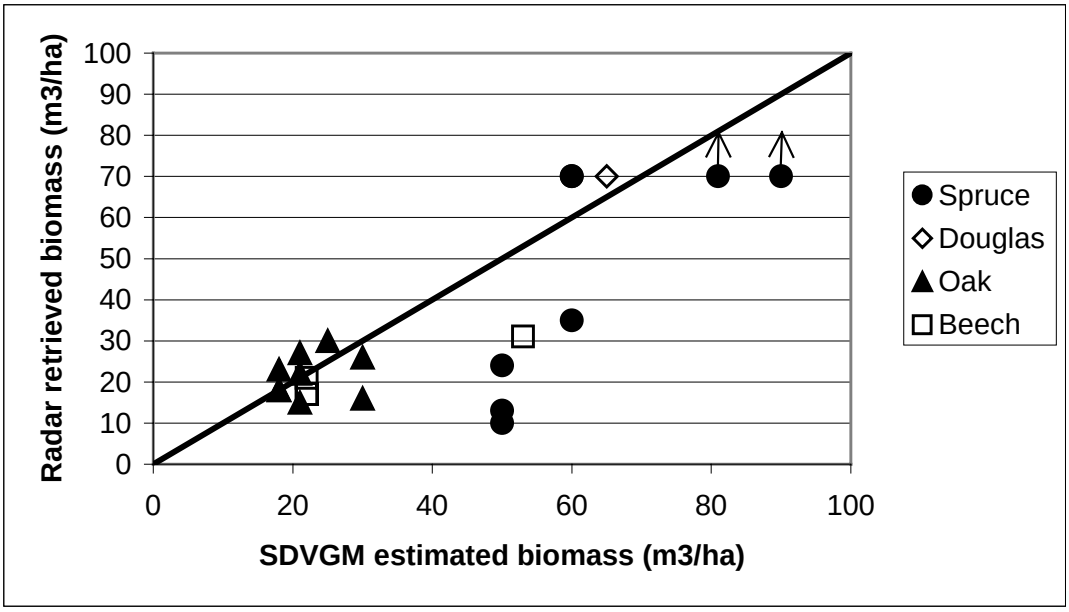
Pixel-wise inversion from ESAR

tand-wise inversion

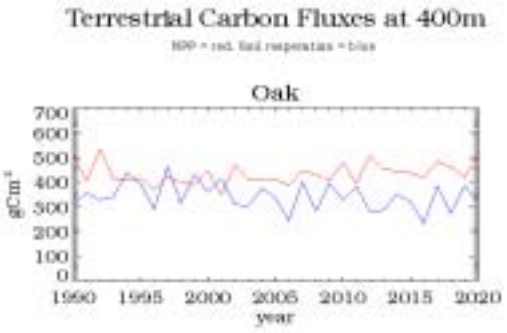
Aerial photo

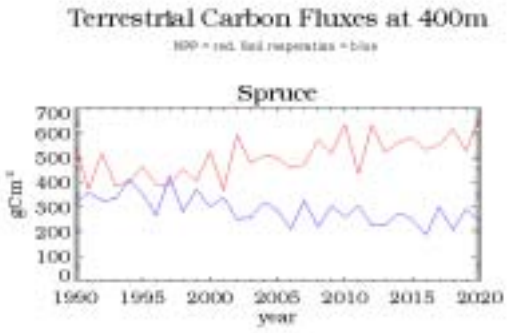


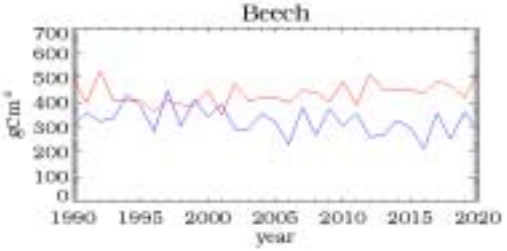
< 12 t/ha
> 12 t/ha - 24 t/ha
> 24 - 42 t/ha
> 42 t/ha

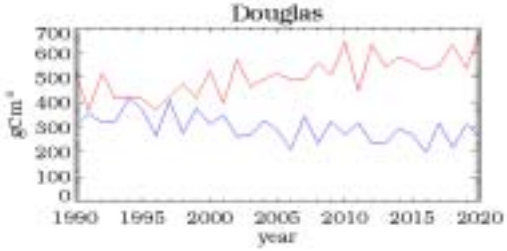


DVM predicted Carbon fluxes
NPP(red) and soil respiration (blue)



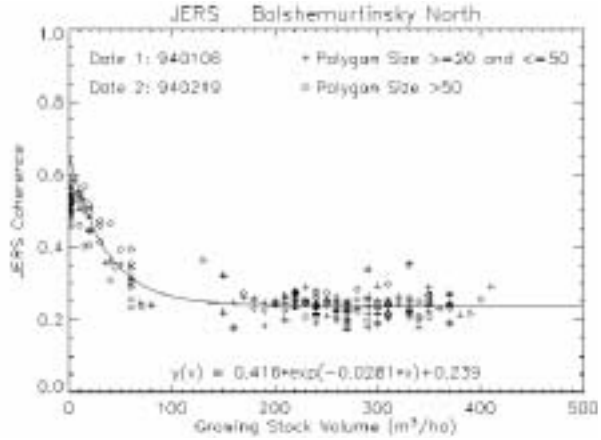


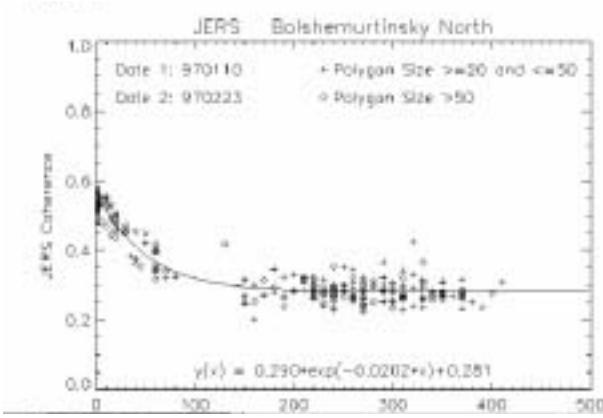




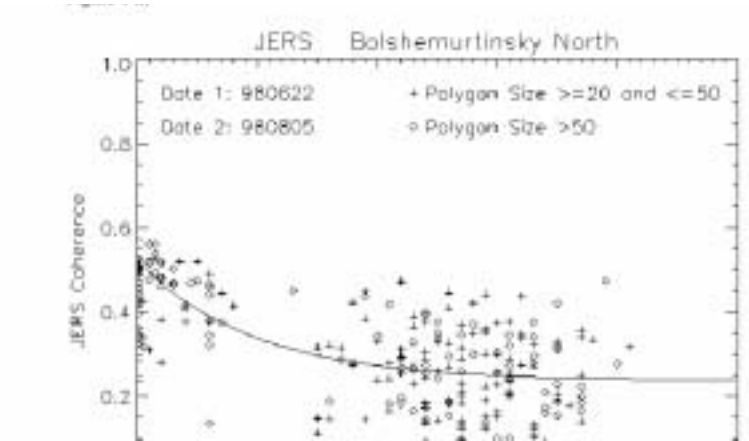
JERS, January-February,Siberia site, 1994 (a), 1997 (b)

Eriksson et al, 2003





JERS interferometric coherence, May-June 1998 Siberia site



1. Boreal forest

2. Regeneration in tropics

3.Temperate forest

Proposed ALOS Large Scale Forest Observation focused on the Terrestrial Carbon Science

Multitemporal PALSAR acquisitions over critical regions

- Deforestation monitoring (forest/non forest mapping)
- Biomass mapping
- Regrowth monitoring (during the lifetime of ALOS)

■ Algorithm development & validation :

- C. Schmullius (SIBERIA)
- M. Hallikainen (Scandinavian forest)
- K. Mc Donald / Boreas(N. American forest)
- D. Hoekman (tropical forest)
- R. Lucas/ INPE/LBA (Amazon)
- S. Quegan (temperate forest) .....

■ Pilot users assessment:

- Inventory method: IIASA for Siberia
- DGVM: PIK, Centre of Terrestrial Carbon Dynamics
- Light use Efficiency Method:
- ....

■ Data exploitation:

Gamma Remote Sensing

Science plan

1. Direct and inverse modelling :

Analysis at team members test sites
Direct and inverse modelling

2. Algorithms development and implementation

Inversion techniques, data handling, GIS.

3. Validation & accuracy assessment

4. Pilot users assessment

Integration in carbon and vegetation models and assessment

5. Dissimilation plan