Spatially interactive simulation of climate change effects on forest composition and biomass in Korea with LANDIS-II

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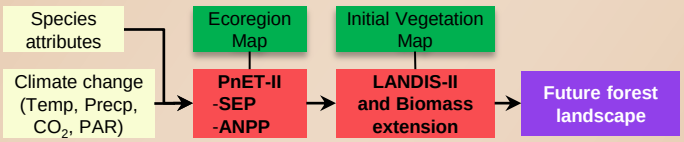
Research Objectives

- Restoring and maintaining ecological connectivity is one of the primary climate change adaptation strategies available to land managers.
- Understanding disturbance and recovery of forest landscape is a challenge because of complex interactions over a range of temporal and spatial scales.

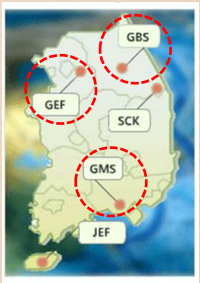
- ***How does climate change affect forest aboveground biomass and species composition in Korea?***

Schematic of the study

- Quantify the effect of multiple disturbances and climate change on aboveground biomass and species composition using a spatially dynamic forest landscape model, LANDIS-II coupled with forest ecosystem processes model, PnET-II .

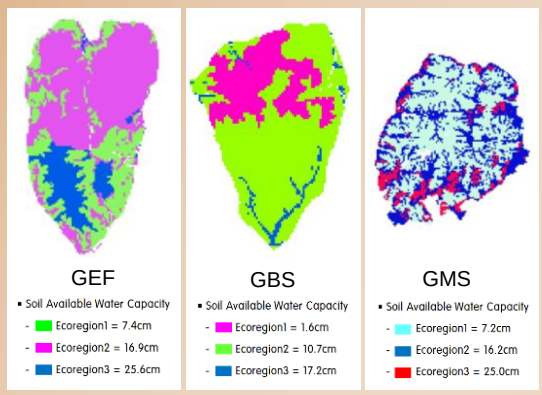


Materials and Methods



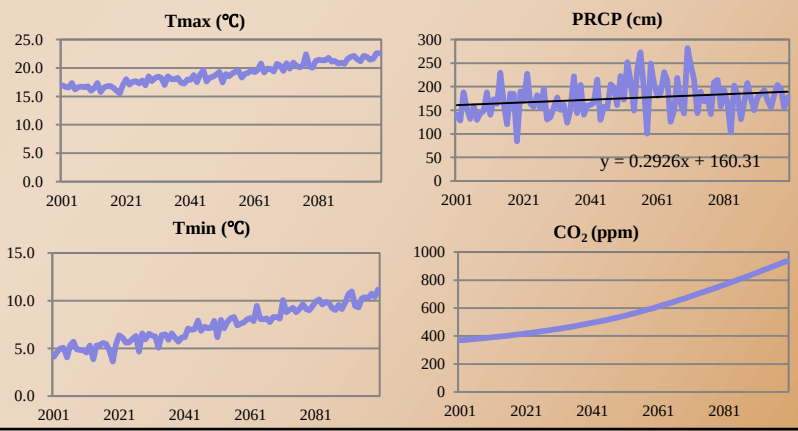
- **GEF is a unique forest ecosystem reserve with little disturbance for hundreds of years.**
- **GBS is a typical secondary forest in rugged mountain terrain.**
- **GMS is located in a warm temperate coastal region.**

Ecoregion Map



Soil available water = field capacity – wilting point

Climate Change Scenario (RCP 8.5)



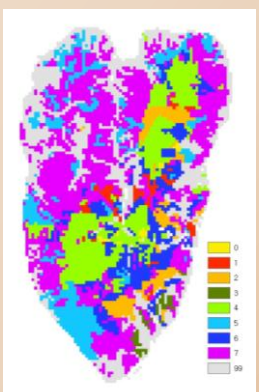
Preliminary Results and Discussions

Dominant Species

Site	Species	Index
GEF	*Carpinus laxiflora*	CarpiLax
	Pinus densiflora	PinusDen
	Quercus aliena	QuercAli
	Quercus mongolica	QuercMon
GBS	*Acer pseudosieboldianum*	AcerPseu
	Betula schmidtii	BetulSch
	Pinus densiflora	PinusDen
	Tilia amurensis	TiliaAmu
	Quercus mongolica	QuercMon
GMS	*Carpinus laxiflora*	CarpiLax
	Chamaecyparis obtusa	ChameObt
	Pinus densiflora	PinusDen
	Styrax japonicus	StyraJap
	Quercus serrata	QuercSer

- Generally, modeled biomass in GEF increased over time
- *Pinus densiflora* shows declined pattern after 2060.

Example of Initial Vegetation Map in GEF



>>Old Coniferous forest
MapCode 0
PinusDen 60

>>Young Coniferous forest
MapCode 1
CarpiLax 30
PinusDen 40
QuercAli 20
QuercMon 10

>>Old Pine forest
MapCode 2
PinusDen 50 60

>>Young Pine forest
MapCode 3
PinusDen 30 40

>>Old Deciduous forest
MapCode 4
CarpiLax 50 60
QuercAli 50 60
QuercMon 50 60

>>Young Deciduous forest
MapCode 5
CarpiLax 40
PinusDen 40
QuercAli 30 40
QuercMon 10 20 30 40

>>Old Mixed forest
MapCode 6
CarpiLax 60
PinusDen 50 60
QuercMon 50 60

>>Young Mixed forest
MapCode 7
CarpiLax 20 30 40
PinusDen 10 20 30 40
QuercAli 30 40
QuercMon 20 30 40