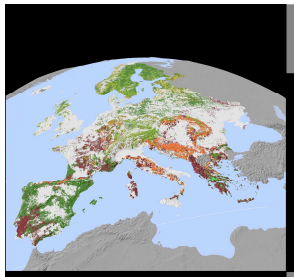


# European scale forest modeling

**Isabel van den Wyngaert**
**Geerten Hengeveld**
**Nanny Heidema**
**Mart-Jan Schelhaas**
**Gert-Jan Nabuurs**

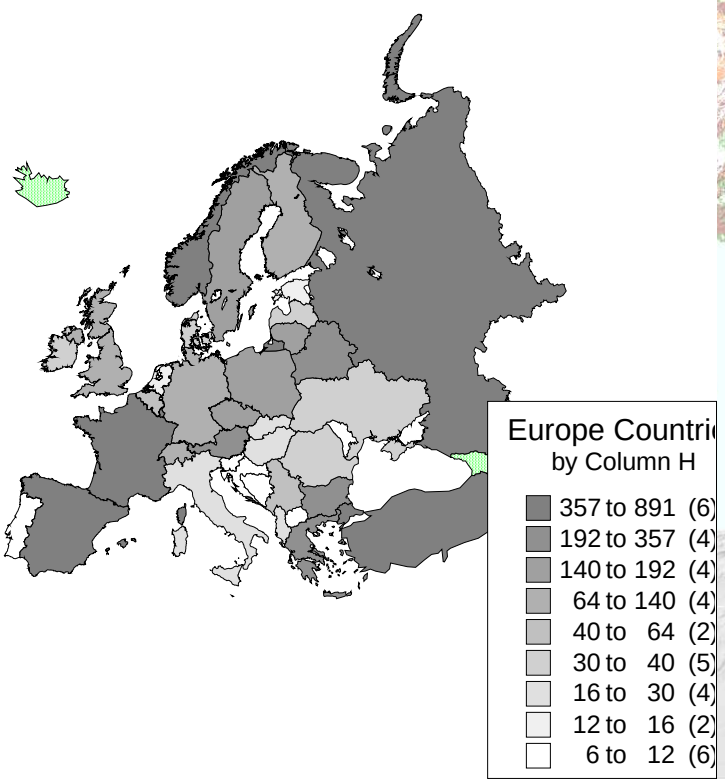
ALTERRA

SENSOR conference
Berlin, April 8, 2008

# EFISCEN: input data & method

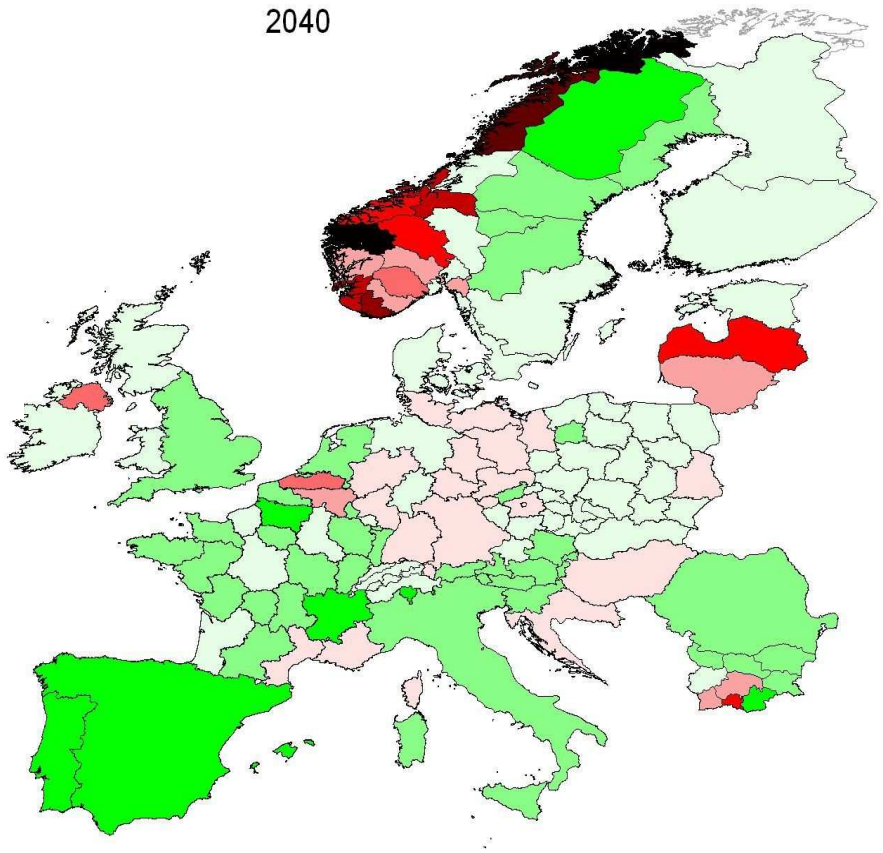
Contains a detailed forest resource description down to NUTS2.

5579 Forest types obtained from NFI institutes




Under management constraints per forest type, EFISCEN tries to find the requested wood and projects forest growth.

# Providing insight in regional supply of wood – A shortage of wood?




Harvest/increment ratio by region in 2040 under nature oriented management.

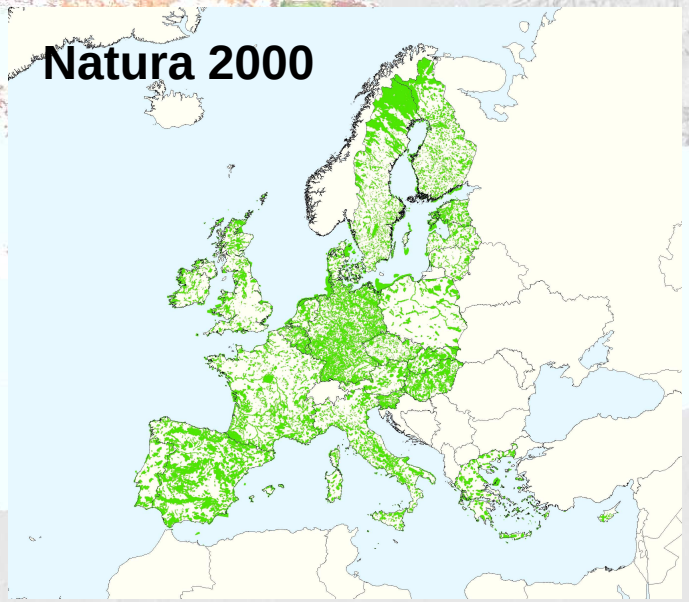
Analyses were also done by building in impacts of climate change from process based models

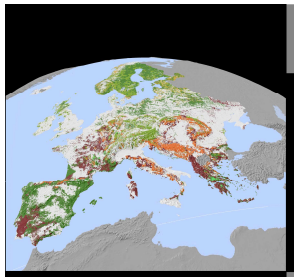
Nabuurs et al. 2006

# But…

- Diversification of management
- Uneven aged / mixed forests
- Short rotation production

- Availability of GIS





# EFISCEN$^{space}$



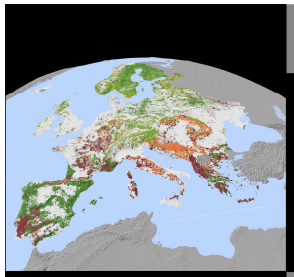
A

- Spatially explicit
- Fine grained
- Data based

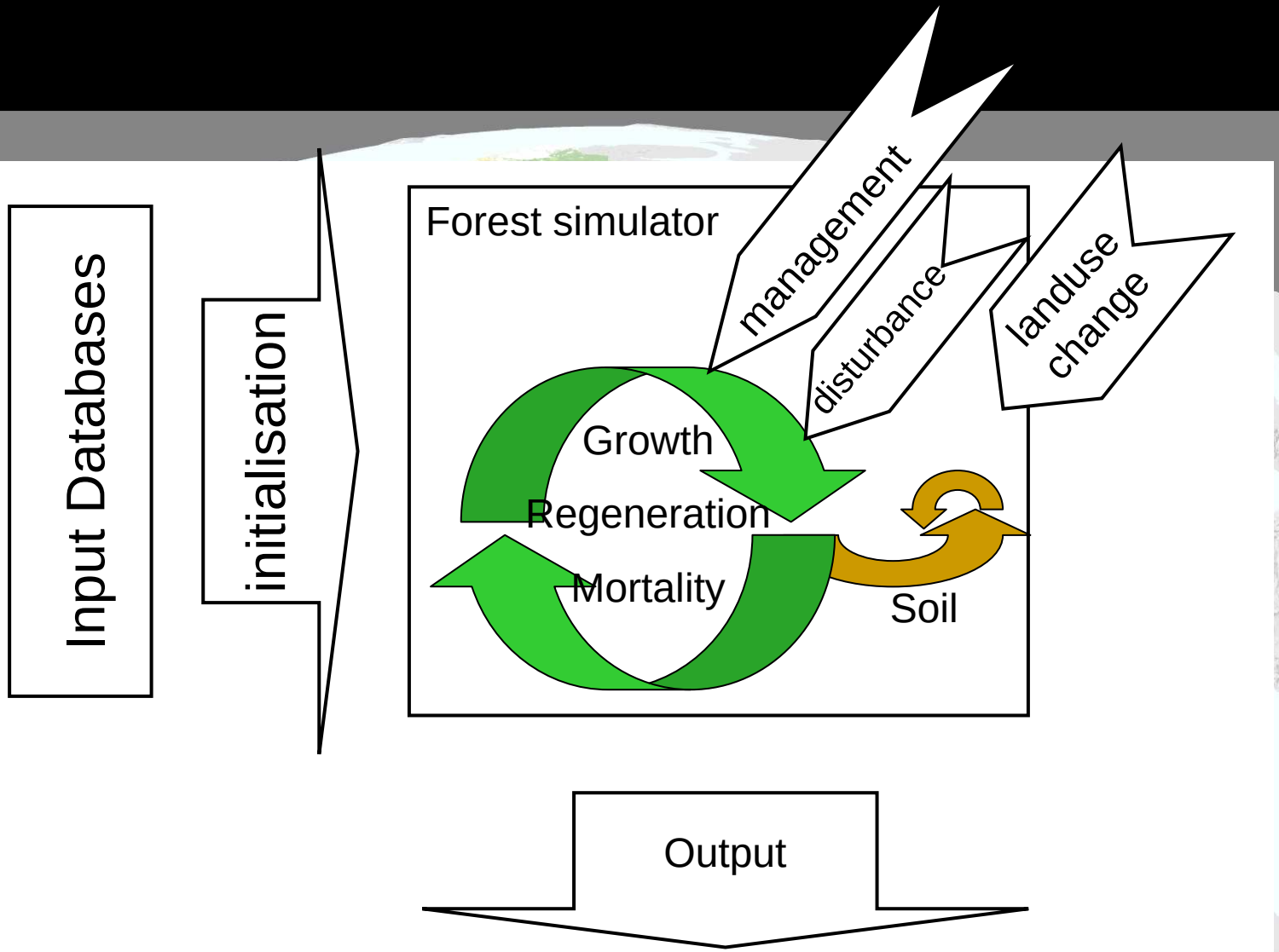
European forest resource simulator for

- (Un)evenaged
- Mixed
- (Un)managed

Stands

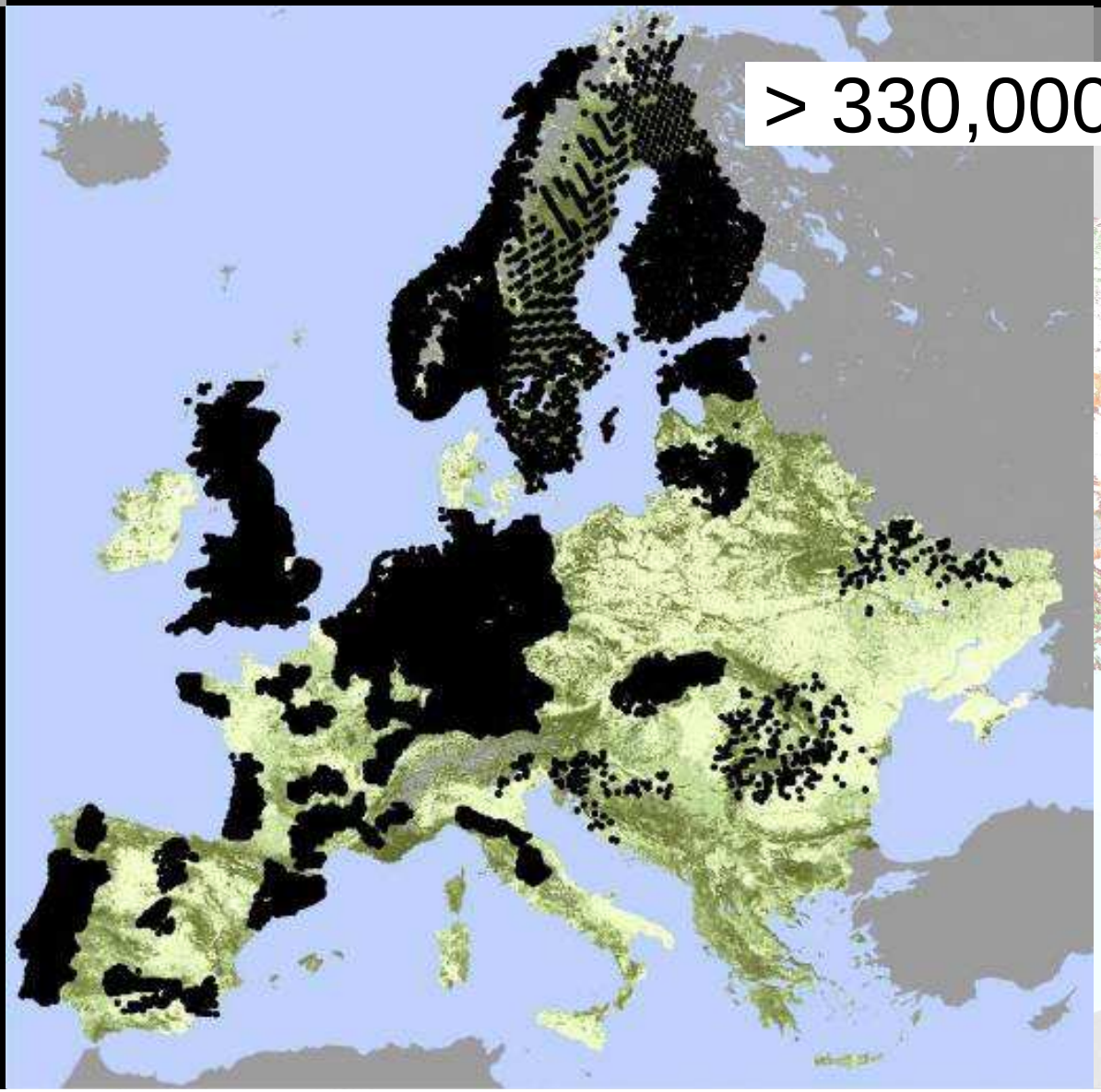





Input Databases
initialisation
Forest simulator
management
disturbance
landuse change
Growth
Regeneration
Mortality
Soil
Output

# Gathered NFI Plot data



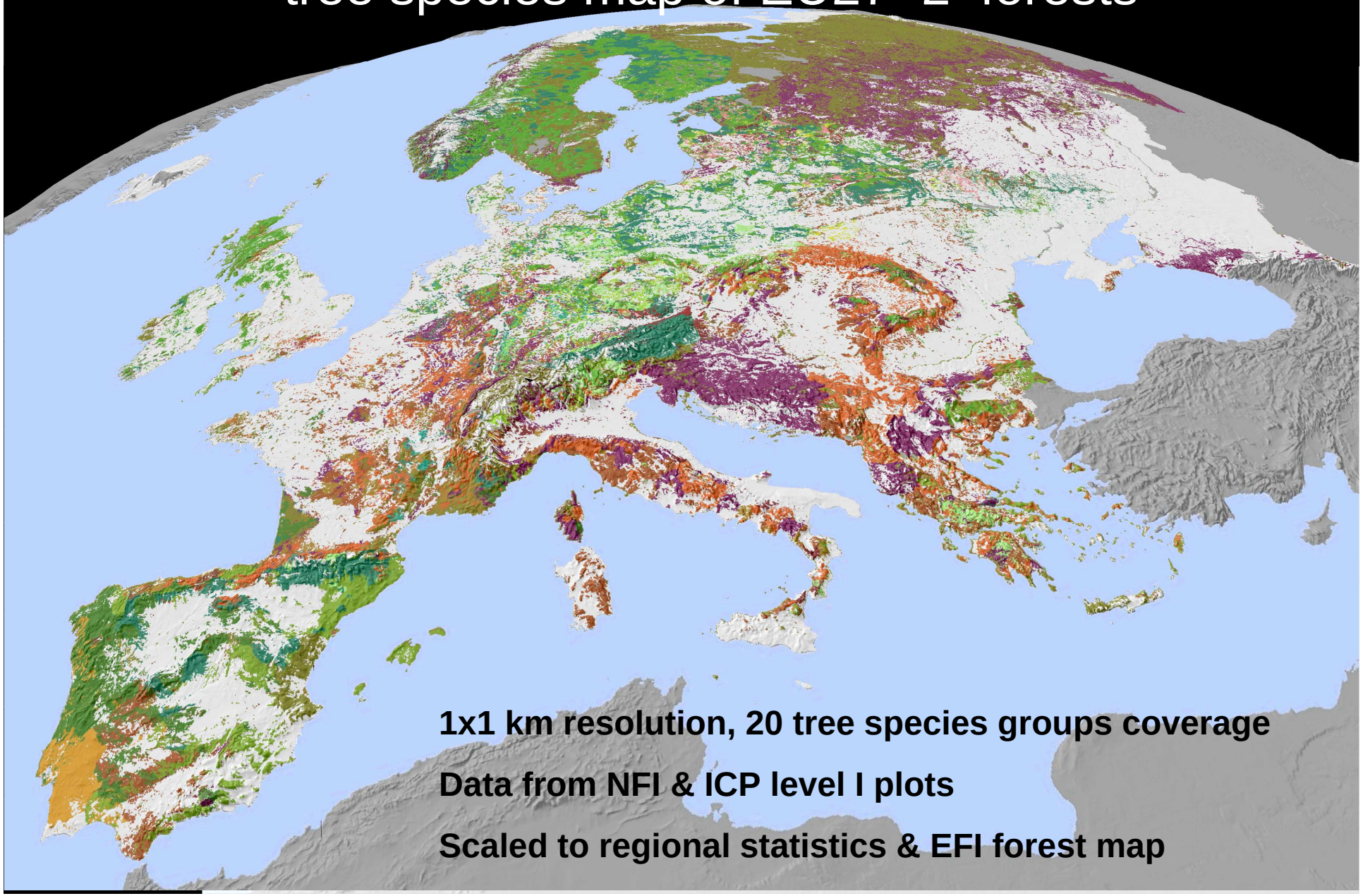


> 330,000 plots

**Varying detail**

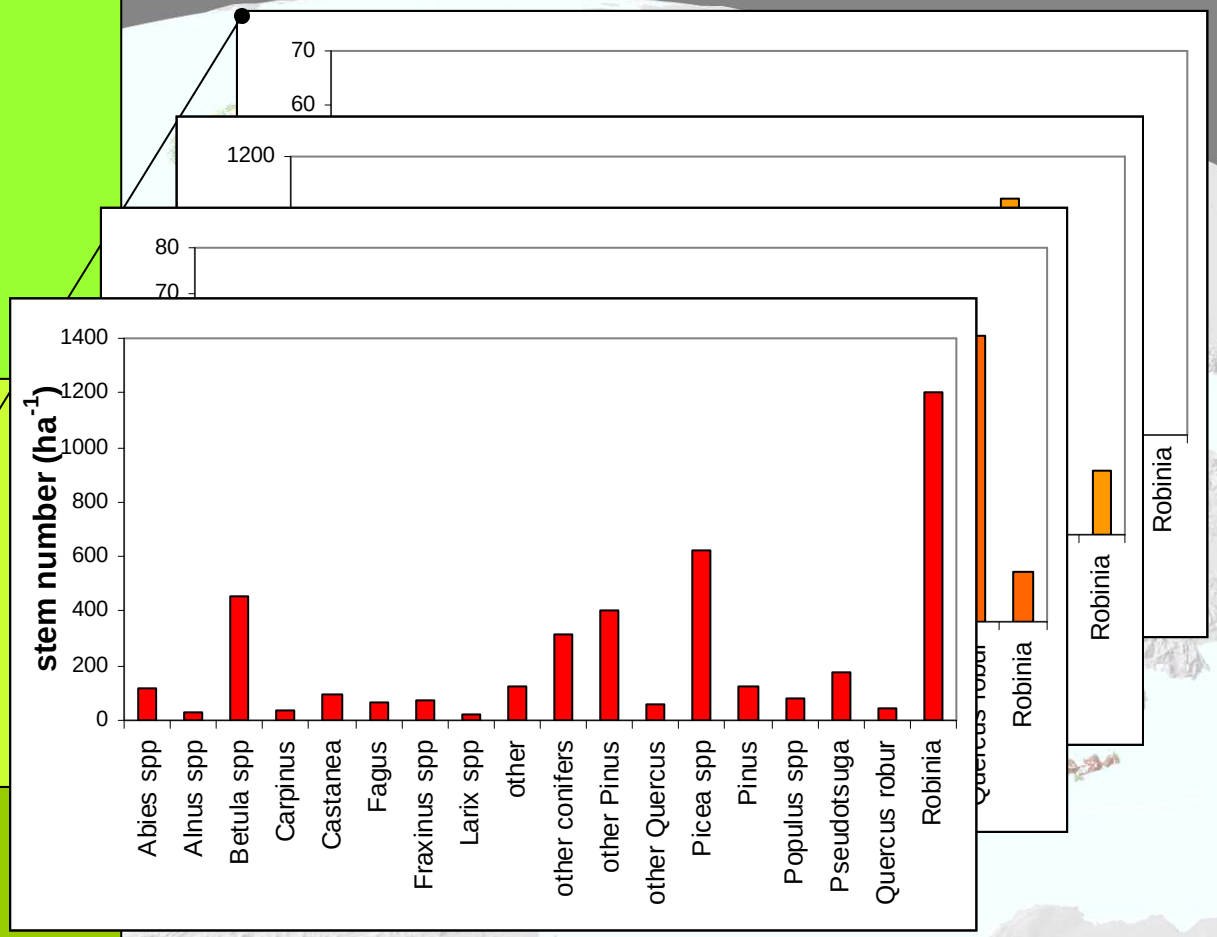
- X,Y coordinate
- Species
- Growing Stock
- Increment
- Height
- DBH
- Stem number
- Dead wood
- Harvest
- Age

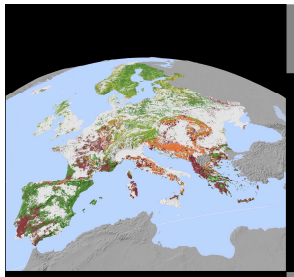
# A Beta version of the first high resolution tree species map of EU27+2 forests



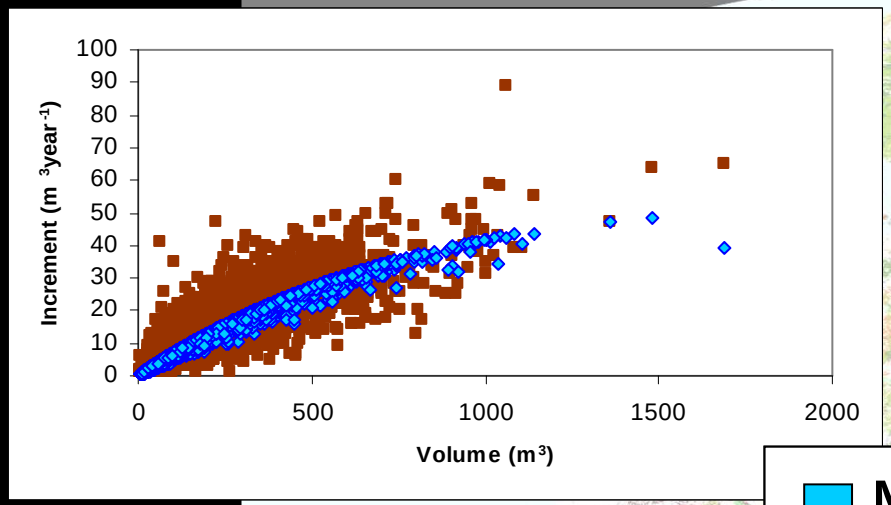
# Pseudostands

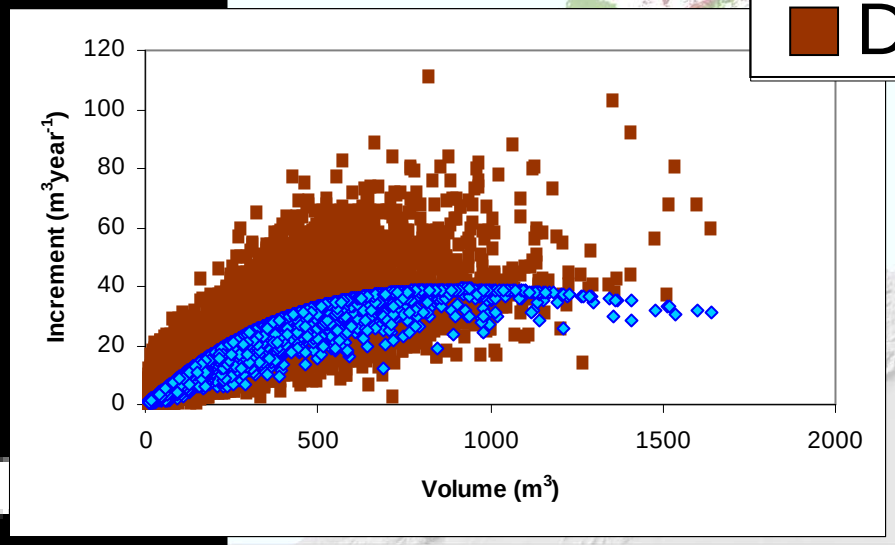






# $\ln(dV_i/dt) = k + p.\ln(V_i) + q.V_s$ (p>0; q<0)

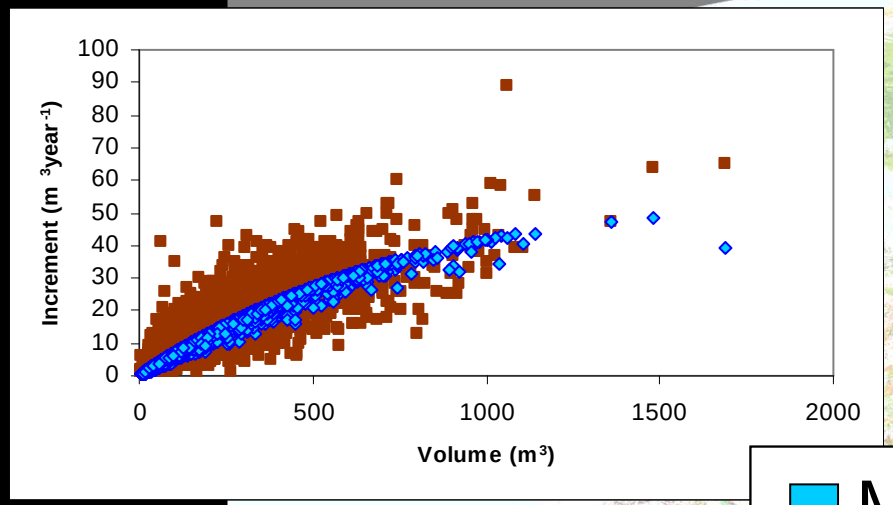


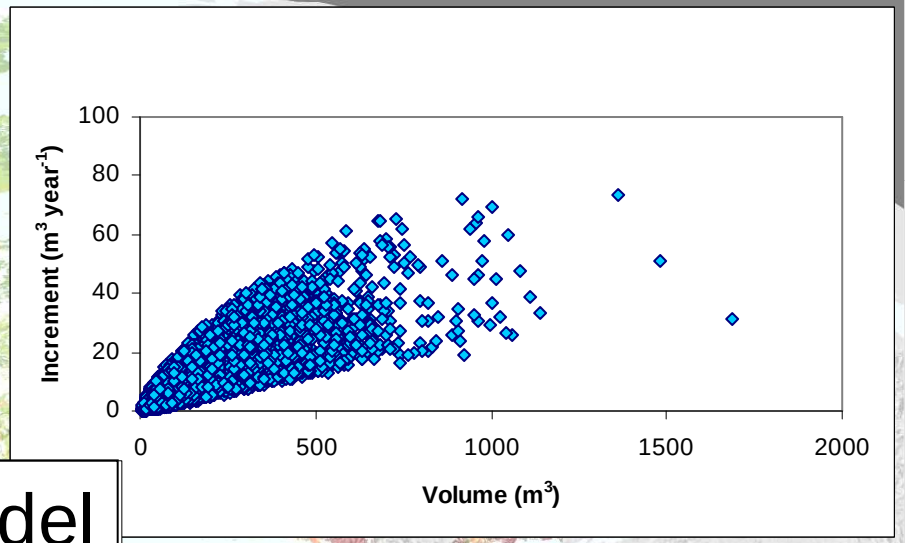




Model

Data

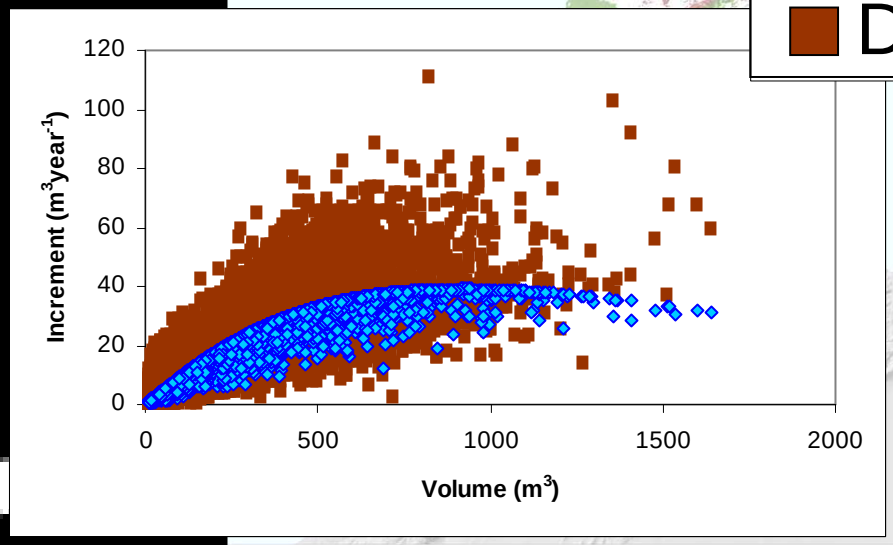
# $\ln(dV_i/dt) = k + p.\ln(V_i) + q.V_s + \varepsilon$ (p>0; q<0)

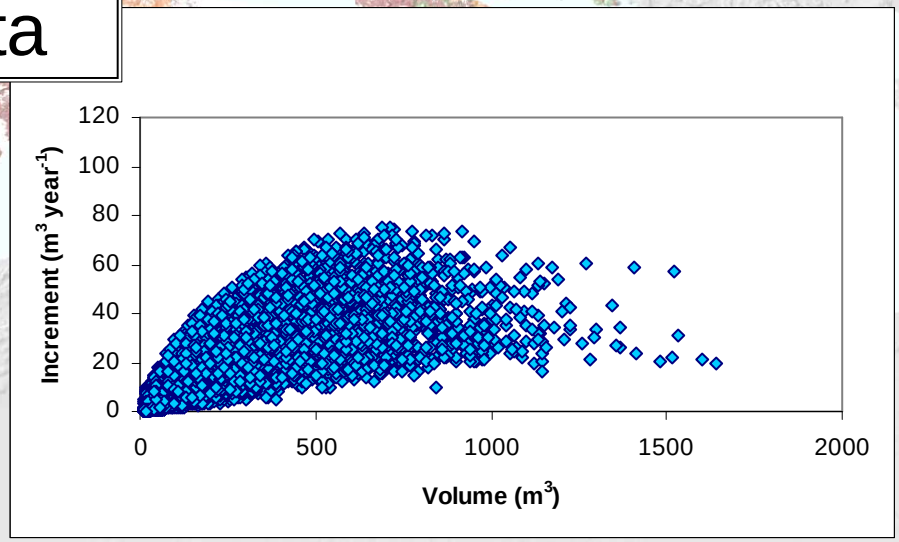


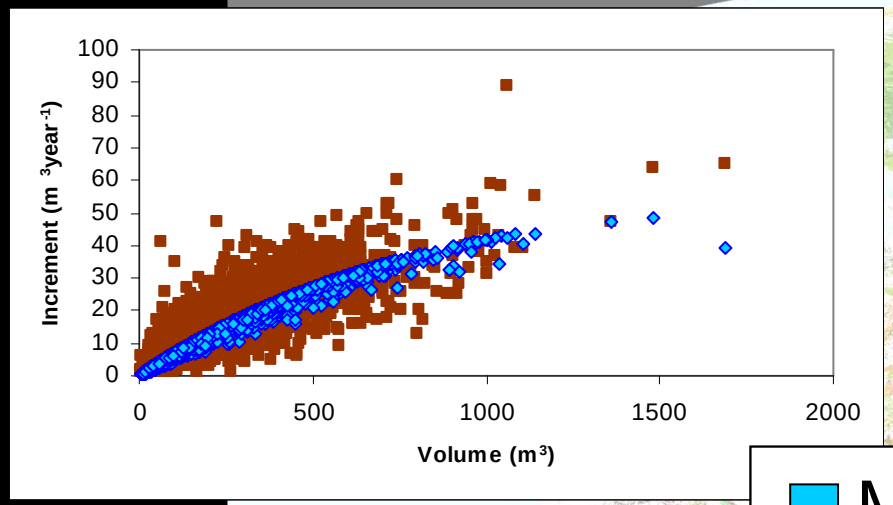

Model

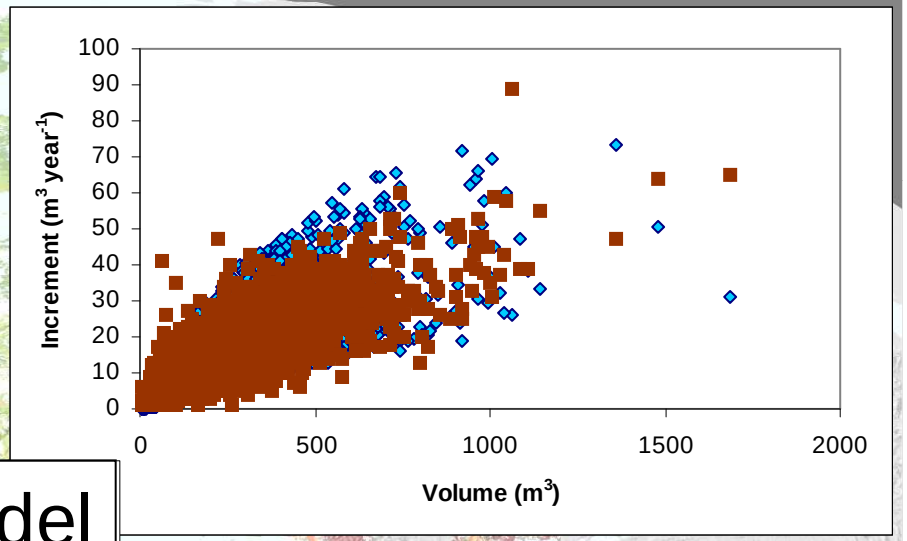
Data



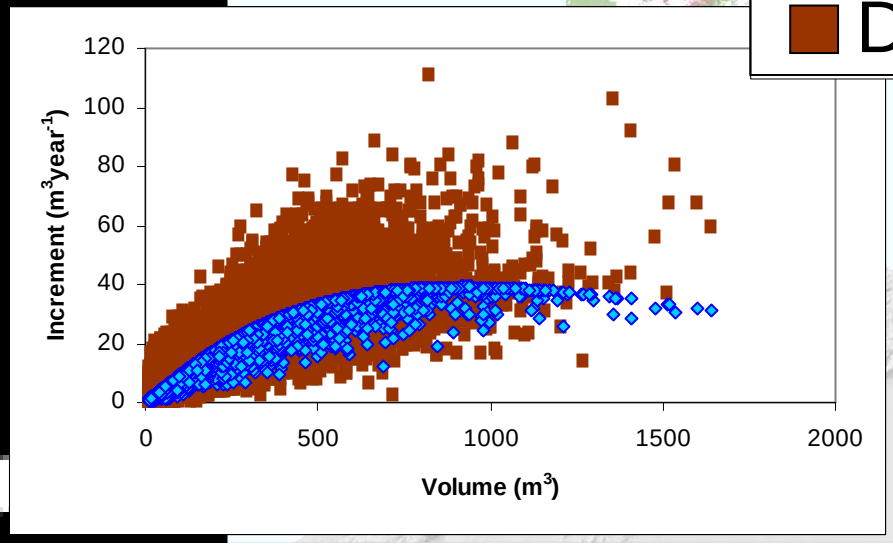
# $\ln(dV_i/dt) = k + p.\ln(V_i) + q.V_s + \varepsilon$ (p>0; q<0)

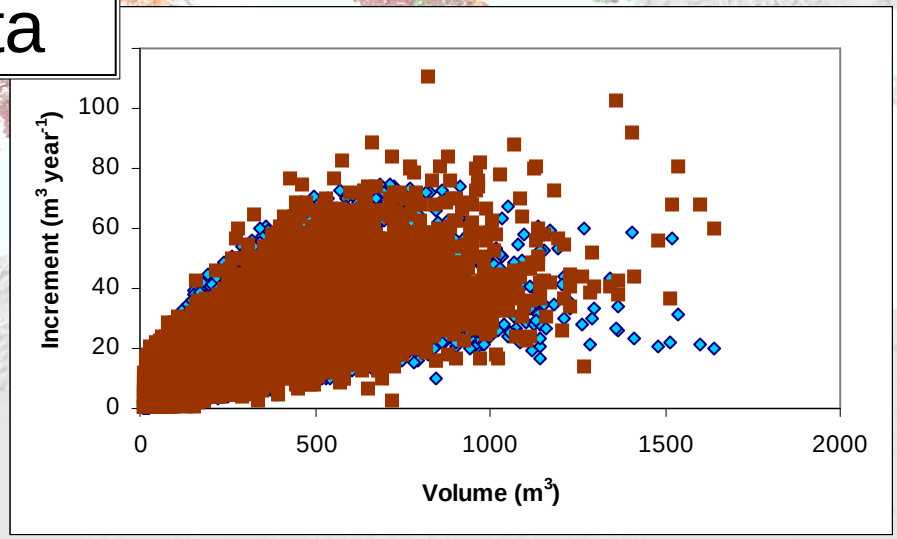


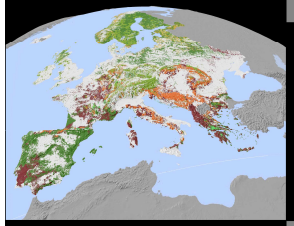




Model

Data



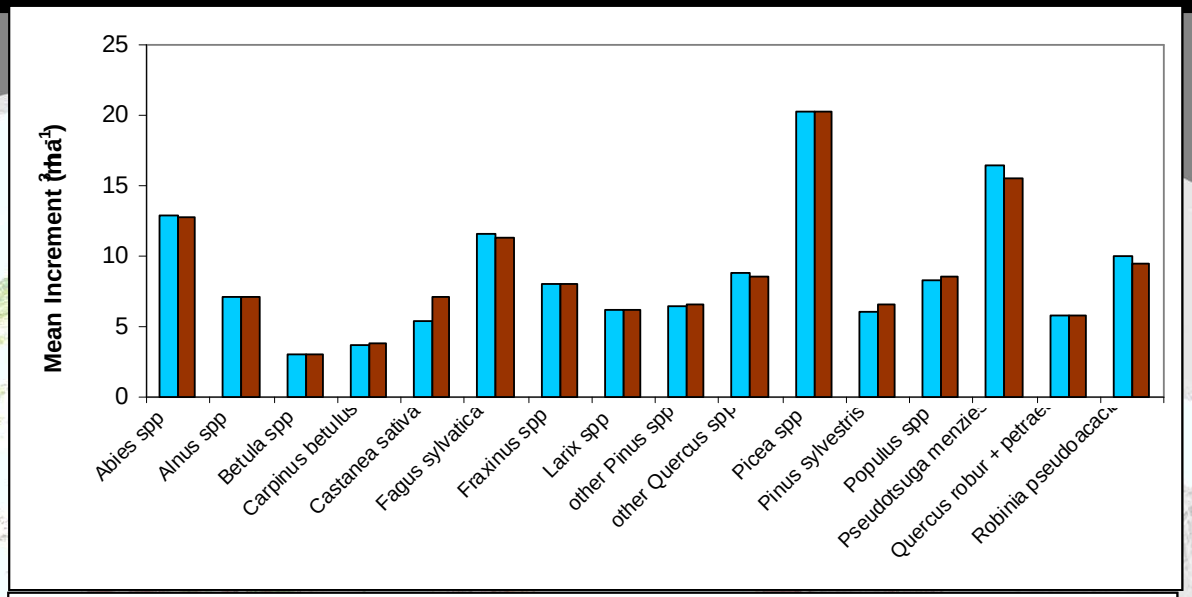



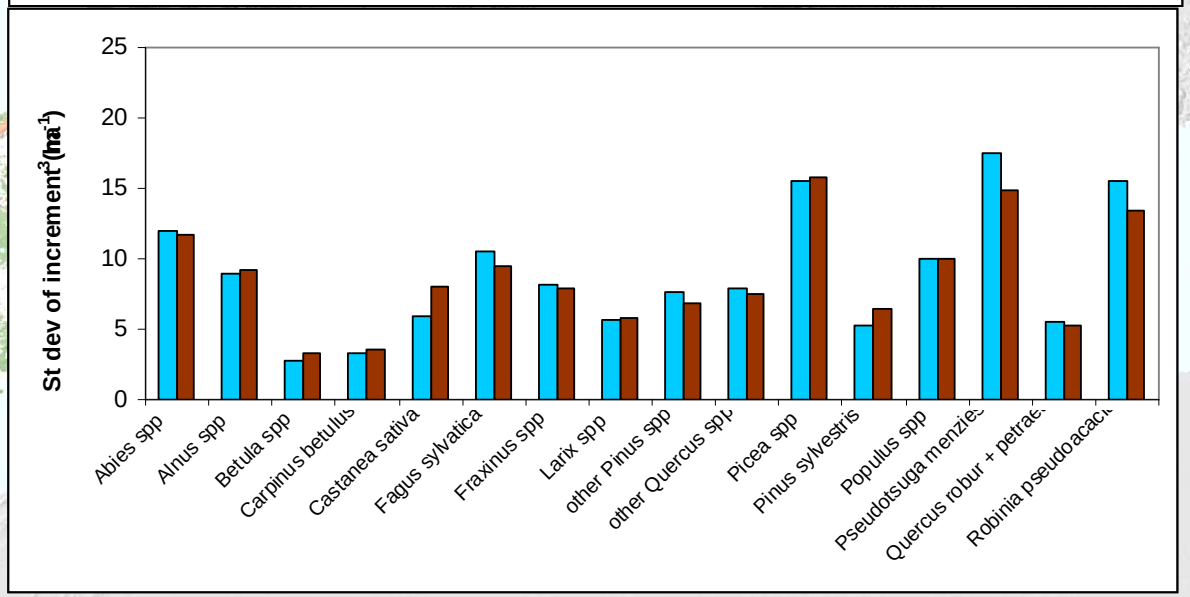


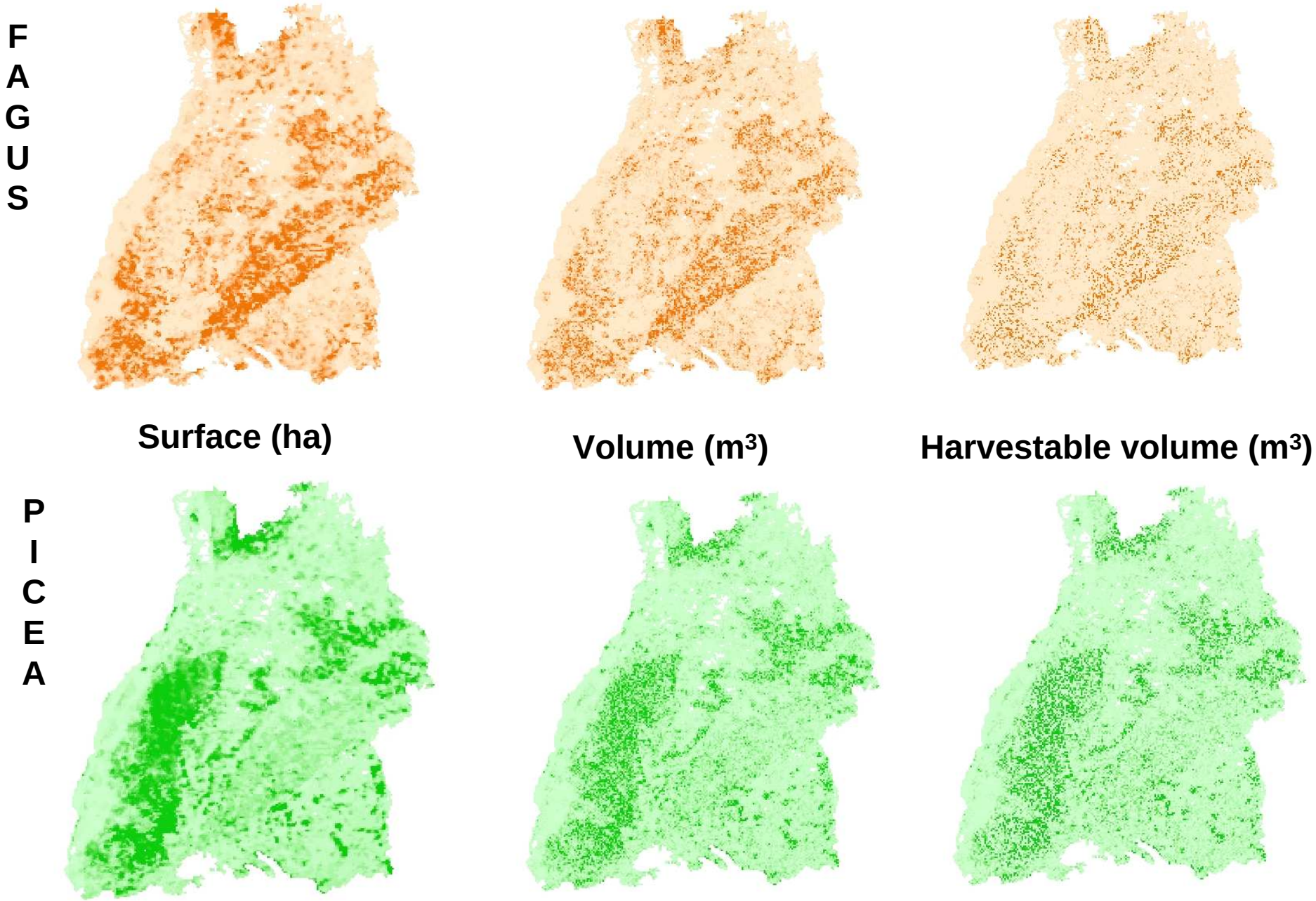
# Forest growth

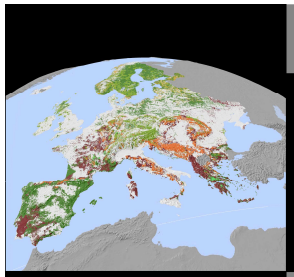
Model

Data




FAGUS
Surface (ha)
Volume (m³)
Harvestable volume (m³)
PICEA

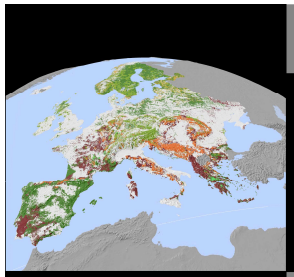




# Indicators

stand –species level to regionally aggregated

- GHG-emissions
  - » $CO_2$
- Carbon stock
  - » In forest
  - » In harvest
- Forest resources
  - » Area of forest (input)
  - » Growing stock by assortment
  - » Forest available for wood supply (based on management)
- Forest biodiversity
  - » Up to 20 species
  - » Forest types per $km^2$
  - » Protection status (input based on management)

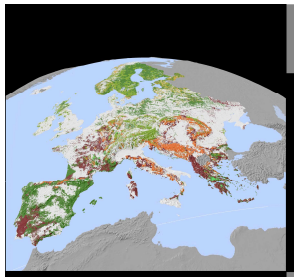


# 1x1 km modeling of European forests



…is in its initial stages ….

- Provides improved regional detail
- Allows variation to be reproduced
- Allows overlay of GIS material
- Allows e.g. assessment of transport costs
- Allows overlay of Natura 2000 sites



# Thank you

**NFI plotdata were received from:**

Jacques Rondeux and Martine Waterinckx, Belgium
Juro Čavlović, Croatia
Veiko Aderman, Estonia
Kari Korhonen, Finland
Thierry Bélouard, France
Heino Polley, Germany
Maurizio Teobaldelli, Italy
Andrius Kuliesis, Lithuania
Wim Daamen and Henny Schoonderwoerd, Netherlands
Stein Tomter, Norway
Margarida Tomé, Portugal
Olivier Bouriaud, Romania
Vladimir Seben, Slovak Republic
Gal Kusar, Slovenia
J. Villanueva and Antoni Trasobares, Spain
Göran Kempe, Sweden
Igor Buksha, Ukraine
Shona Cameron, United Kingdom

Within the framework of EFORWOOD, CARBOEUROPE, ADAM, MASCAREF