# *Project Level Carbon Accounting Toolkit*

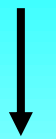
CSIRO Forestry and Forest Products
Department of Forestry, Australian National University
Australian Greenhouse Office

# Carbon Futures Trading

Sink Creation

Sink Assessment

(current, forecasted)



Pool Manager

Carbon Trader

# Carbon Accounting Toolkit

*Provides support to estimation of carbon stocks and their temporal change.*

**Coverage:**

- Methods for measuring key model inputs
- Factors (defaults) for converting inventory data to C stocks for a range of important systems
- Forecasts of stock change based on current forest condition
- Prediction of temporal pattern of ecosystem C change for ‘new’ environments

# Carbon Accounting Toolkit

## Outputs:

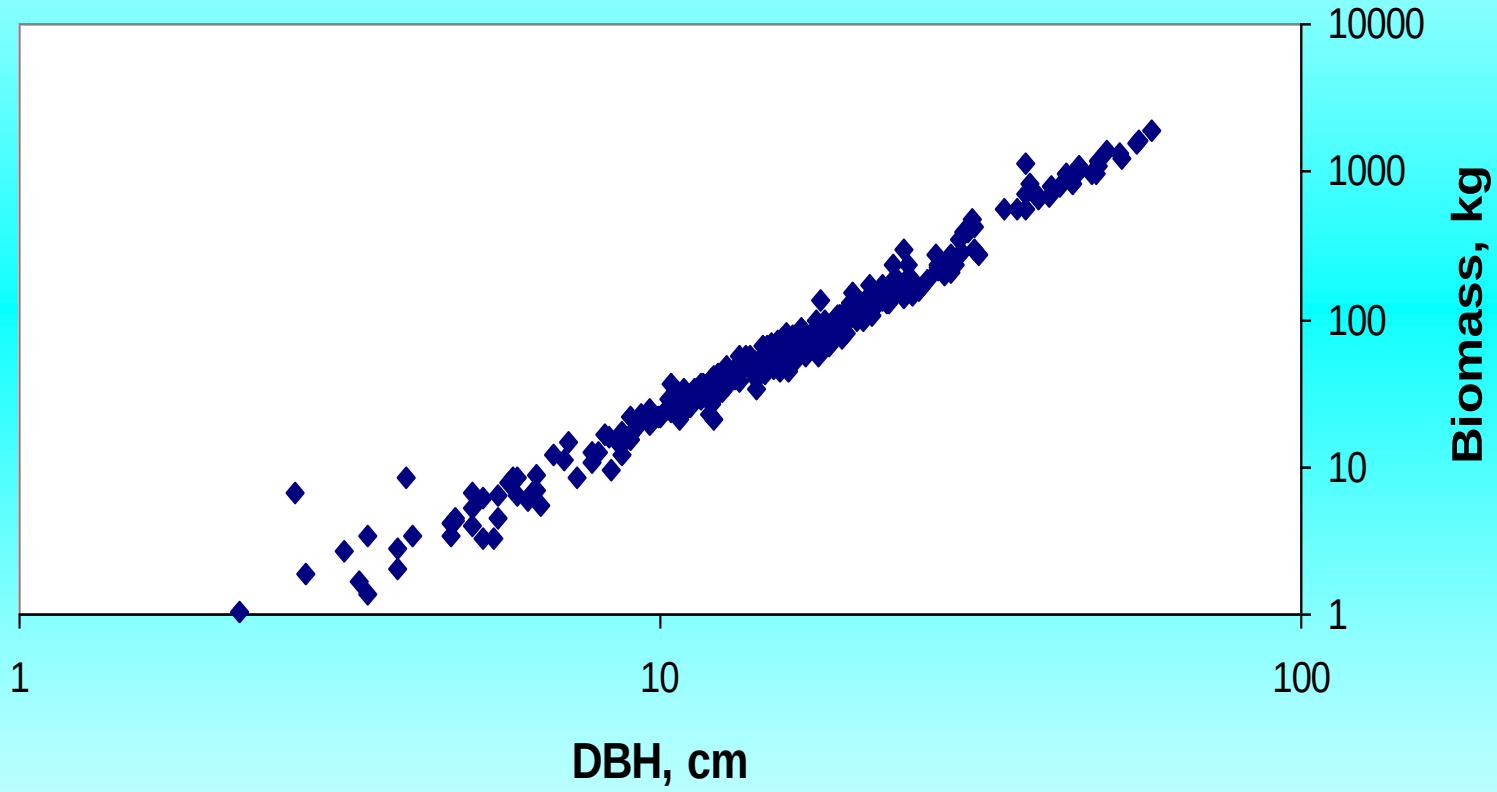
- Initially a set of case studies for important plantation systems – specifying temporal change in C pools and associated uncertainties.
- Eventually an extensive set of net C accumulation curves for a range of species, environments and silvicultures based on calibrated and validated models.

# Project Level Carbon Accounting Toolkit

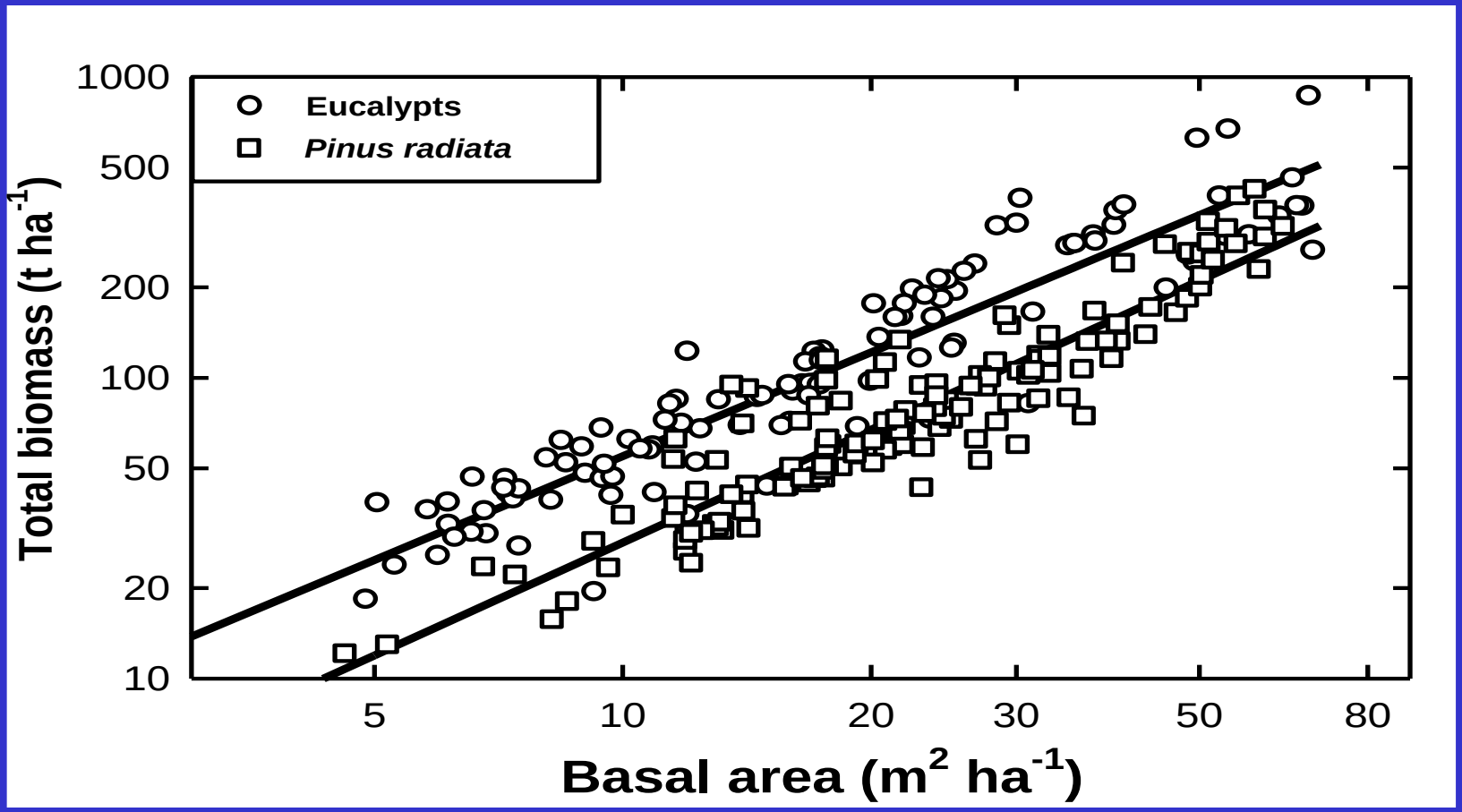
## Defaults

- scalers for use in specific systems
- examples
  - Allometric equations (sps, site)
  - Harvest index (age, utilization)
  - Expansion factors (age, sps)
  - Wood densities (sps, age)
  - Root:shoot ratios (age, site)
- justify use of alternative values

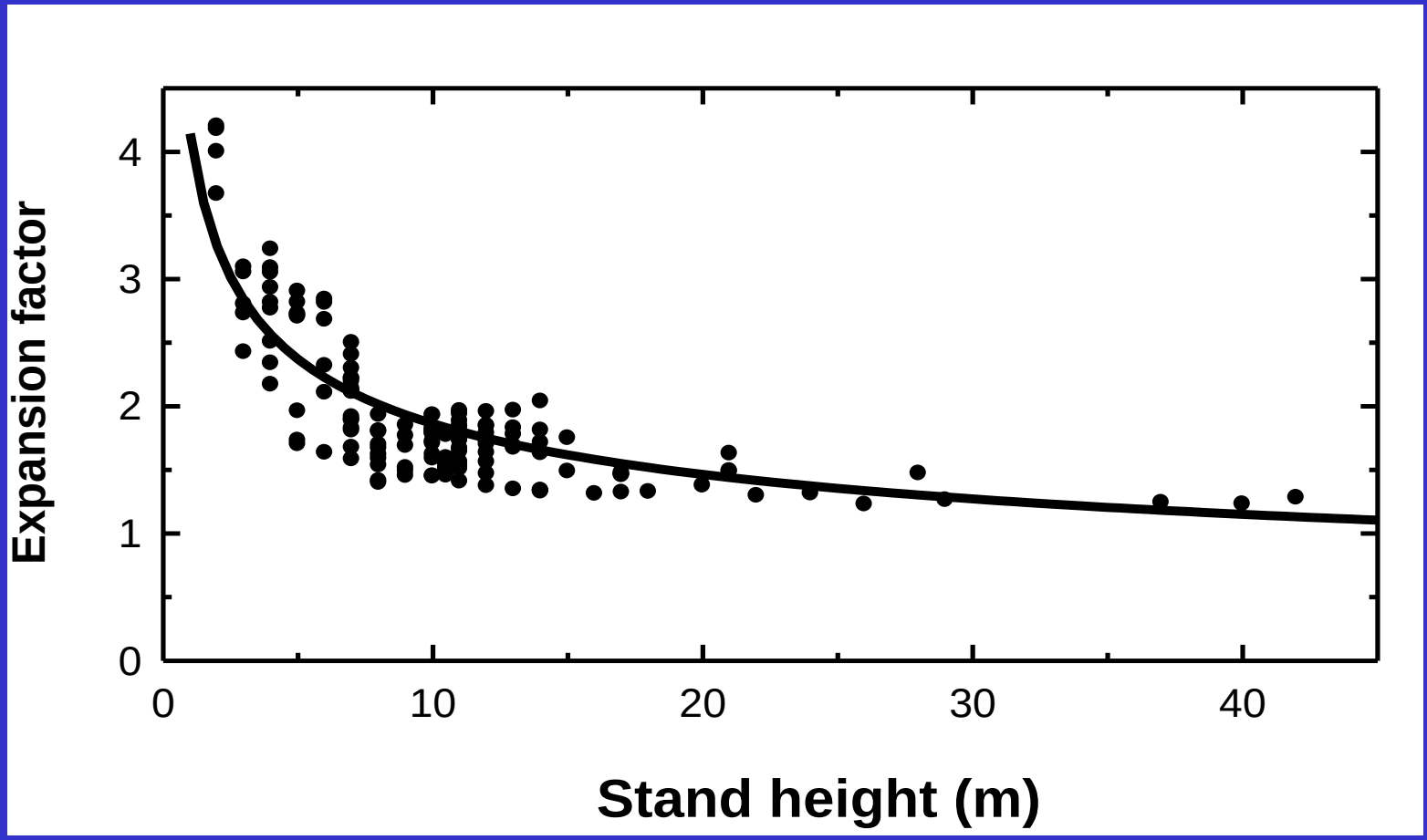
# Effect of tree size on above-ground biomass of *Pinus radiata*



# Relationship between stand basal area and above-ground biomass



# Ratio of total biomass: stemwood biomass in stands of *Pinus radiata*



# Estimating harvested biomass from roundwood removals

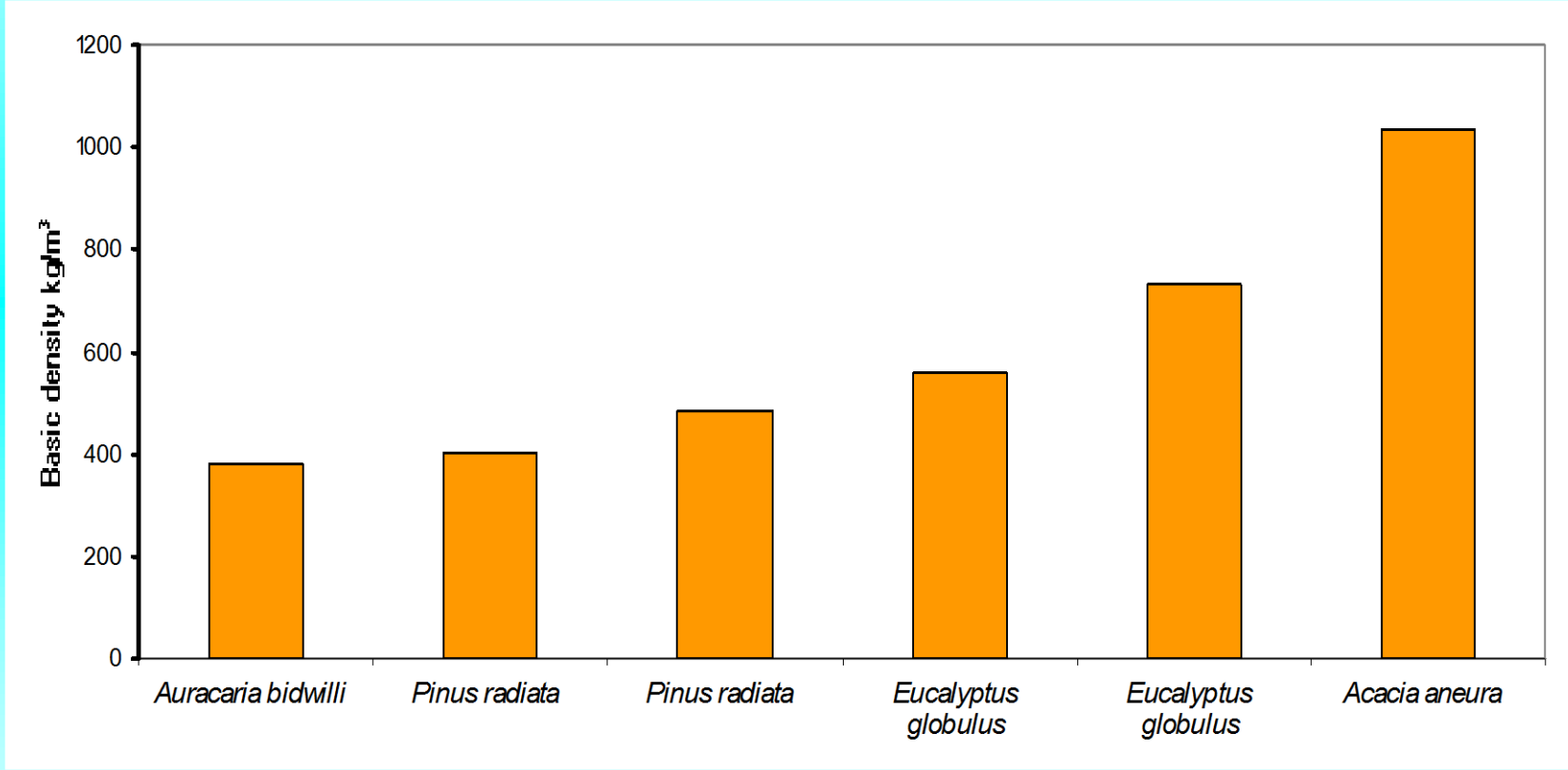
Expansion factors for native eucalypt forests

| | With pulp | No pulp |
|---|---|---|
| **Moist high quality forest** | | |
| - patch harvest | 1.7 | 2.9 |
| - Single tree selection | 1.2 | 1.8 |
| **Dry low quality forest** | | |
| - patch harvest | 2.0 | 5.0 |
| - Single tree selection | 1.3 | 2.2 |

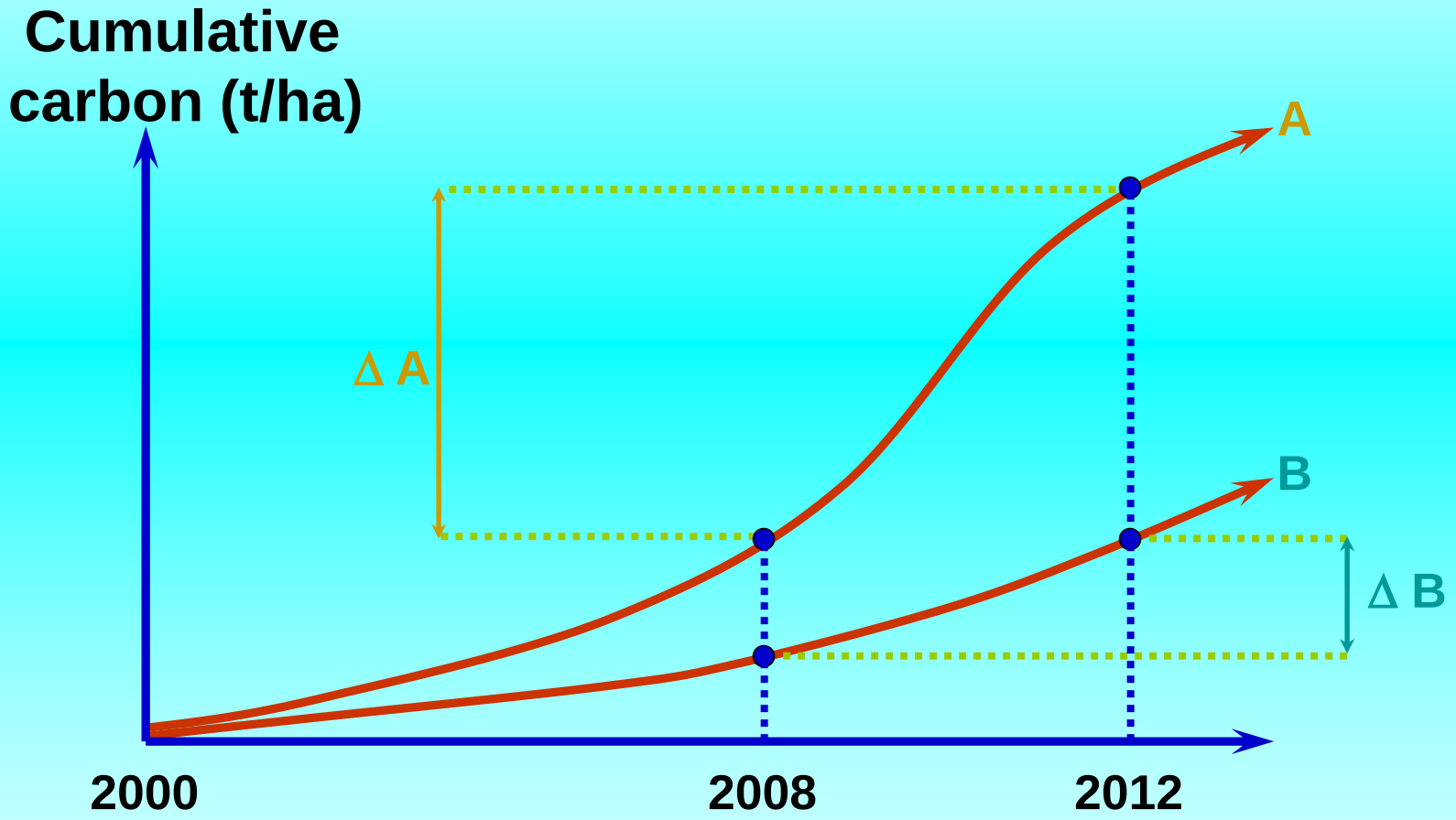
# Root:Shoot Ratios in Australian Forests

| Forest Type | *n* | Ratio |
|---|---|---|
| Softwood plantation | 7 | 0.29 |
| Hardwood plantation | 49 | 0.22 |
| Eucalypt woodland | 16 | 0.41 |

# Variation in wood density
# Some material from Ilic *et al.* report

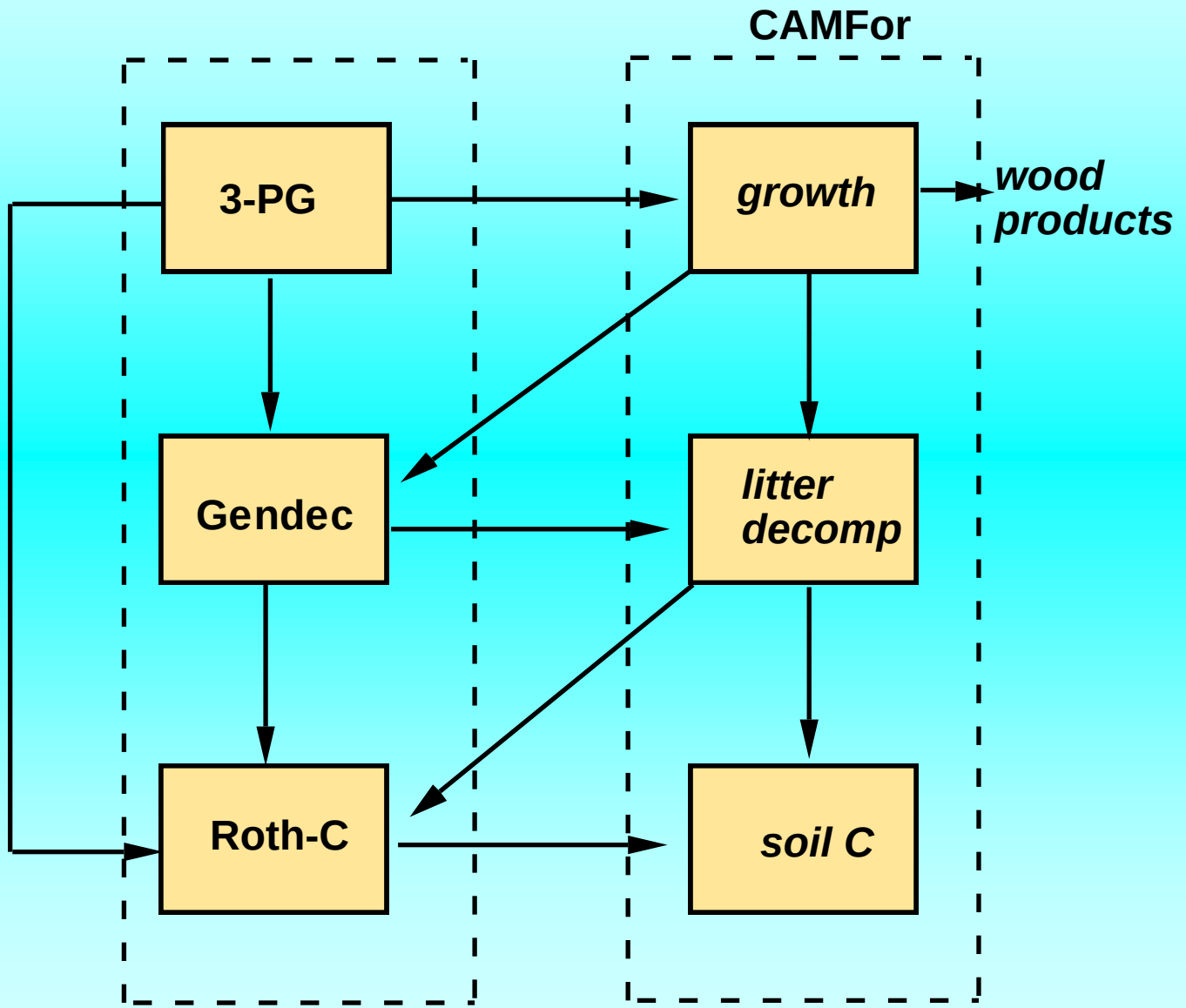


# Forecasting growth

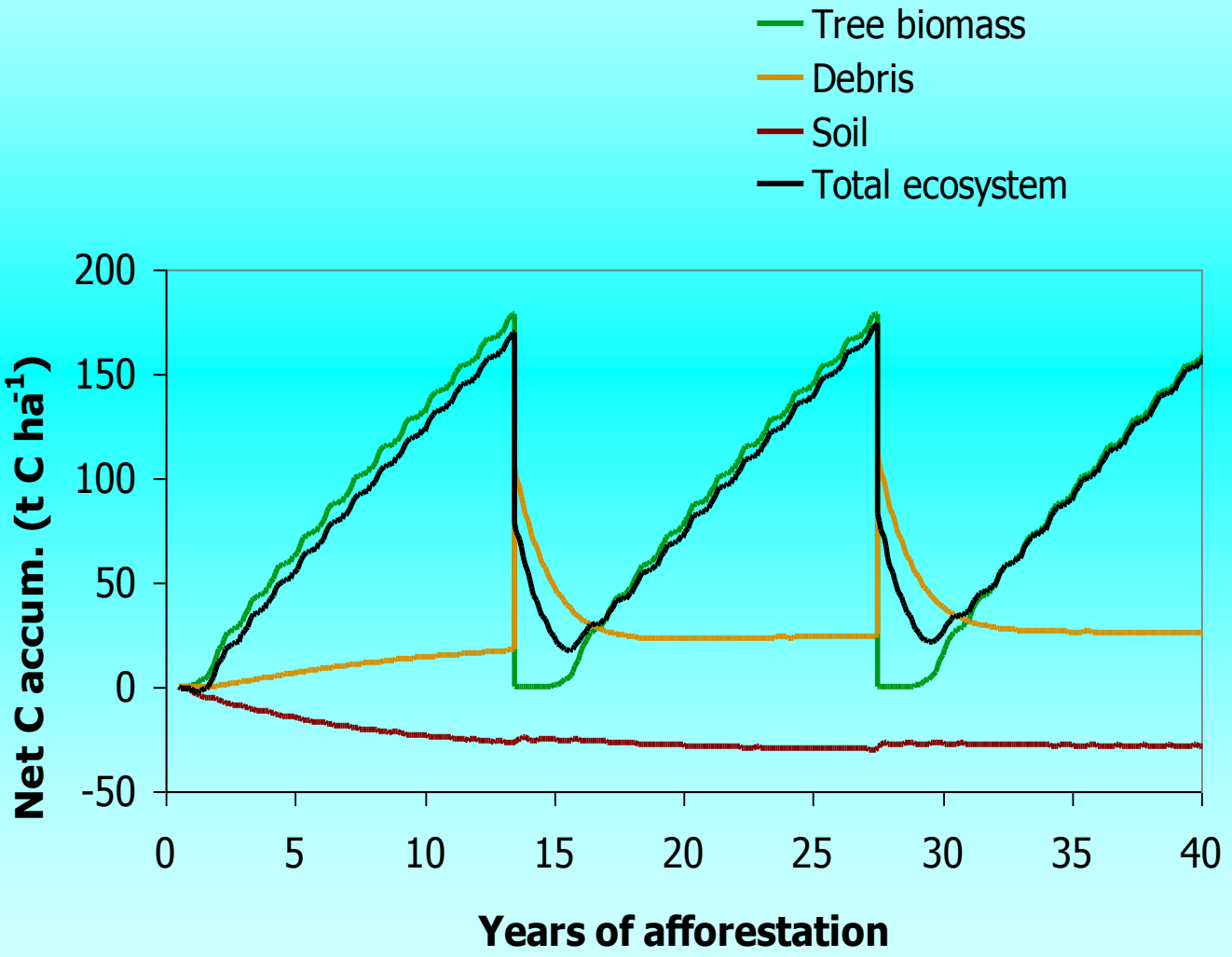


# Model enhancement

**GRC-3**



# Modelling change in forest carbon



# Project Level Carbon Accounting Toolkit

## Error and Uncertainty Analysis

- Estimate variability of model inputs (e.g. spatial measures of stand condition).
- Use of @ risk to estimate uncertainty of model outputs.
- Express as probability of stand carbon density.

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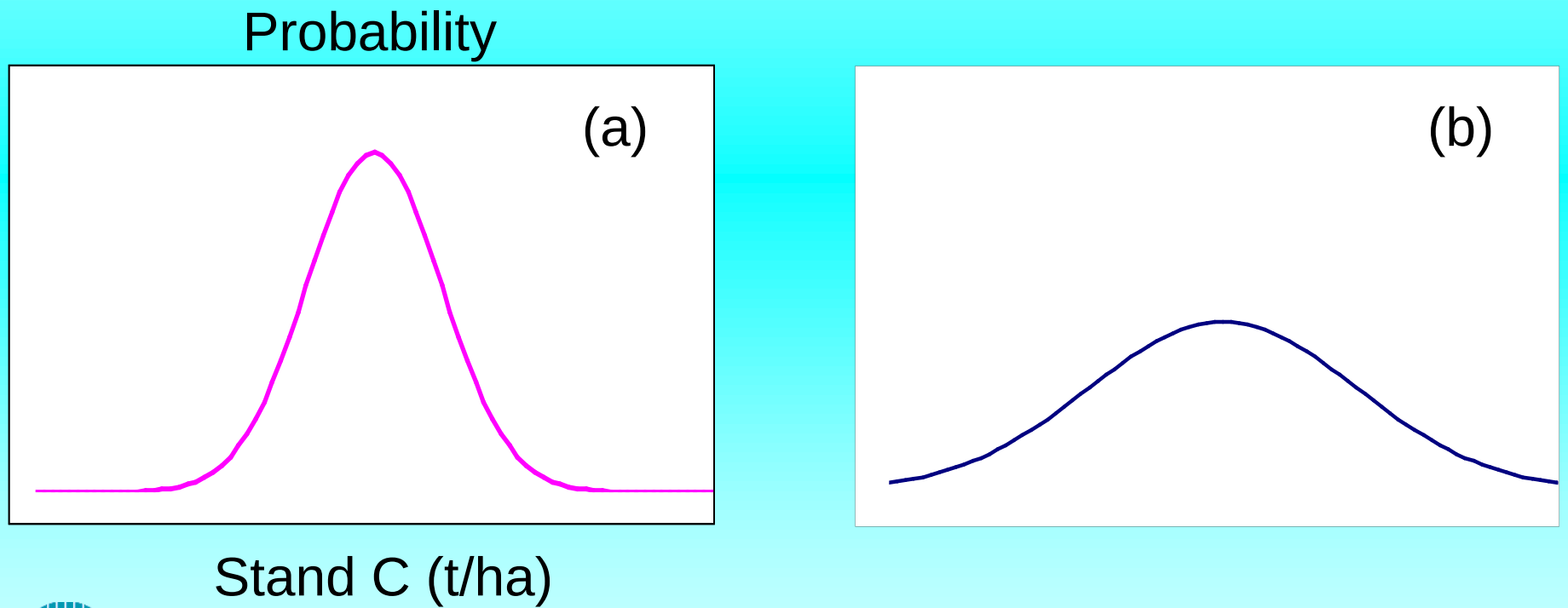
Probability of Stand Carbon Density



# Project Level Carbon Accounting Toolkit

## Verification

- Field measures
- Model outputs
- Error and uncertainty analysis
- Independent audit

# Project Level Carbon Accounting Toolkit

## Status

- Inventory methods documented
- Model calibration and testing underway
- Defaults summarized
- Case studies underway for pine and eucalypt plantations and environmental plantings – including uncertainty analysis
- Initial product in 3-4 months