

Model resolution, scale and statistics

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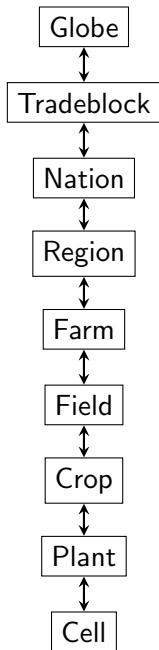
This workshop

- ▶ show how this work relates to the topic of the workshop (different scales) and what are the open issues
- ▶ indicate how (further) integrated modeling would improve future findings and what concrete steps are necessary to accomplish this



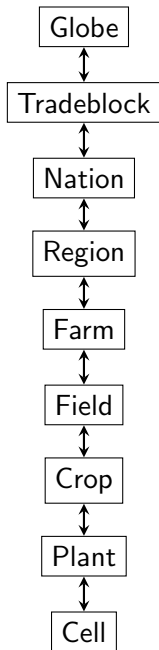
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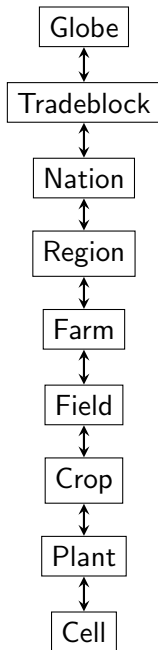
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 - ▶ crop scientists tend to emphasize the lower part — sometimes with upward arrows towards regions



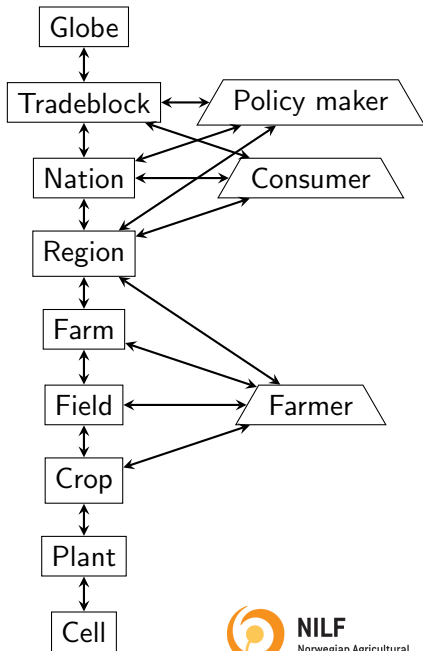
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State of the art economic assessment models do have policy makers, consumers and farmers represented. So, what are the problems?

- ▶ Reliability
- ▶ Resolution
- ▶ Dynamics
- ▶ Stochastics
- ▶ Statistics



And what are possible solutions?

Reliability:

- ▶ Harmonization of models will end up with a single model — disguising but not removing the modeling uncertainty
- ▶ Predictions can potentially be improved by confronting models with data
- ▶ Incorporating dynamics and stochastics in robust ways guided by data may improve predictions further
- ▶ In this respect much more structure and input can probably be taken from crop, livestock and farm models



And what are possible solutions? (2)

Resolution:

- ▶ Predictions can not be given for all cases at all scales, but possibly for a sample of cases
- ▶ The further the time-horizon the smaller scale predictions are less relevant and precise



And what are possible solutions? (3)

Dynamics:

- ▶ Land-conversion decisions — from forest or grassland to cropland — have far lasting consequences. Bring it into the models
- ▶ Farmer succession represents irreversible replacement of relatively traditional farmers with new types — possibly a Chinese one



And what are possible solutions? (4)

Stochastics:

- ▶ We can all live with the fact that the future is uncertain, that predictions are uncertain is hence not a basic problem, but this insight has consequences for farmers', traders' and consumers' decisions
- ▶ Risk adverse behavior of individual decision makers and policies and institutions affecting it, will affect the food security of consumers. Bring it in



And what are possible solutions? (5)

Statistics:

- ▶ The field of *hierarchical* models deals precisely with several scales simultaneously
- ▶ Small scales are represented by *samples* only
- ▶ Bayesian techniques opens for models with unobserved features

