Large Functional-Structural Crop Models in XL

Design – Maintenance – Pitfalls

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Overview

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Modularisation

- Breaking long model code down to chewable pieces.
- Natural correspondence of modules to objects (plant organs)

Model Calibration

Definition

Model calibration is the process of modifying the input parameters to a model until the output from the model matches an observed set of data.

- Which parameters should be calibrated?
- Which parameters should be left?
- In which sequence should parameters be calibrated?

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- Verification is done to ensure that:
  - The model is programmed correctly
  - The algorithms have been implemented properly
  - The model does not contain errors, oversights, or bugs
- Verification ensures that the specification is complete and that no mistakes have been made in implementing the model
- Verification does not ensure the model:
  - Solves an important problem
  - Meets a specified set of model requirements
  - Correctly reflects the workings of a real world process

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Model validation.

- Validation ensures that the model meets its intended requirements in terms of the methods employed and the results obtained
- The ultimate goal of model validation is to make the model useful in the sense that the model
  - addresses the right problem,
  - provides accurate information about the system being modeled,
  - ensure subsequent use of the model

Scenarios

- Running GroIMP headless

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Example rose

Example tomato

The problem with boolean flags

Boolean flags

- Pro's
  - Allow simple execution of scenarios
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- Con's
  - Can lead to *mysterious* behaviour if undocumented

Summary

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  - Big models are ok, but they need to be modular / refactorized / documented
  - Prevent inflation of global parameters: assign parameters to objects where possible
  - Use Boolean flags for certain scenarios, but use them wisely
- Outlook
  - Modularization helps structuring.
  - Is Bigger Better??

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