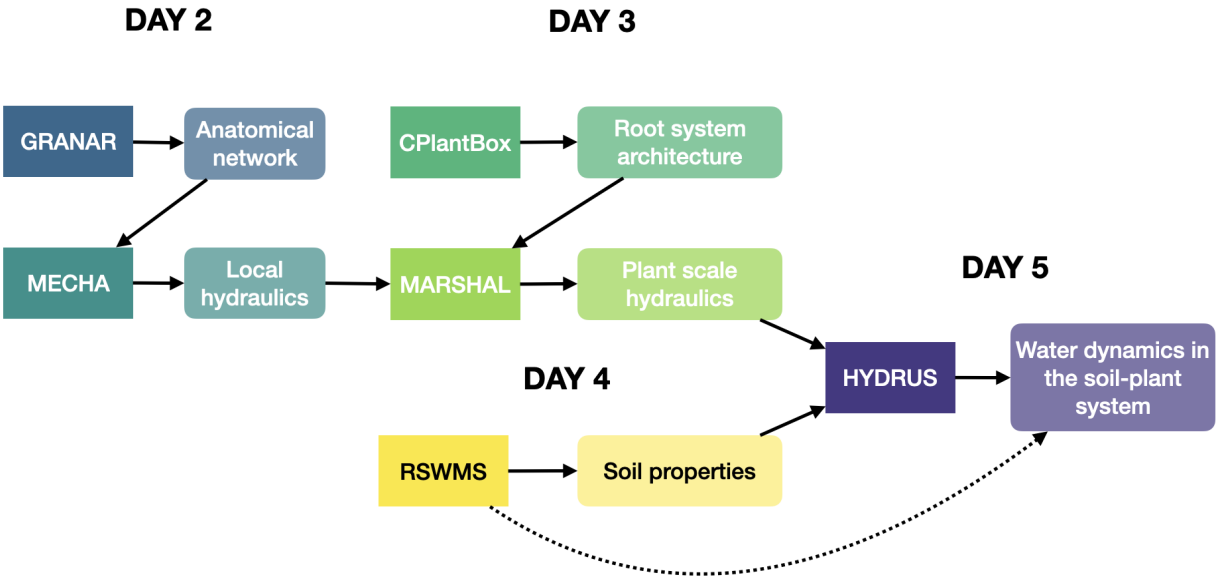
Modeling Water fluxes in the soil-plant system

Exercices Day 2 - 5

During the week, you will have the opportunity to work with different plant-soil models, at different scales. The models that we will use are all connected to each other, more or less tightly. To take advantage of these connections, we will connect the inputs and outputs of the different models, to link the effect of anatomy, architecture and soil properties on the water fluxes in the system.



You will be organized by groups. Each group will have different anatomies and architecture to model, to explore the role of both the water flow in the system.

The base file for the anatomy is : **B73_taproot_2021.xml**
The base file for the architecture is here : **Zea_mays_3_Postma_2011.xml**

Modifications to the base files

Group number	Anatomical modification	Architectural modification
1	Aerenchyma proportion increased by 25 %	Primary root growth rate decreased by 20%
2	Aerenchyma proportion increased by 25 %	Lateral root density increase by 20%
3	Cortex cell size decreased by 25%	Lateral root final length increased by 20%
4	Cortex cell size decreased by 25%	No gravitropism for seminal roots
5	Cortex cell number increased by 25%	Primary root growth rate decreased by 20%
6	Cortex cell number increased by 25%	Lateral root density increase by 20%
7	Xylem number of cell files and stele diameter by 25%	Lateral root final length increased by 20%
8	Xylem number of cell files and stele diameter by 25%	No gravitropism for seminal roots

For each group, we will ask you to :

- Create an image and data file with your anatomy
- Use your specific anatomy to estimate Kr, and Kx. Quantify the difference with the base anatomy
- Create an image and data file with your architecture.
- Use your specific architecture and anatomies to estimate Krs. Quantify the differences with the base anatomy and architecture.
- Use the macro hydraulic properties from MARSHAL into HYDRUS to simulate water flow in the soil-plant system