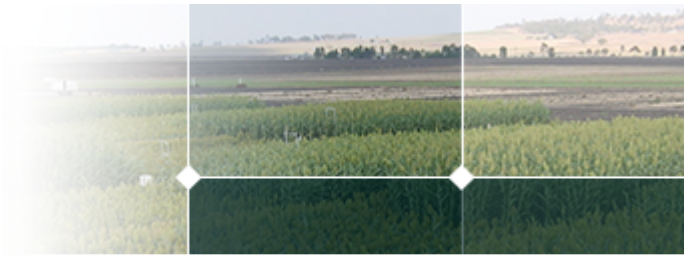


Version 0.0.0.0, built 2020-03-10

A replacements model

A report class for writing output to the data store.

1 DataStore

A storage service for reading and writing to/from a database.

1.1 Observed

Reads the contents of a specific sheet from an EXCEL file and stores into the DataStore.

1.2 PredictedObserved

Reads the contents of a file (in apsim format) and stores into the DataStore. If the file has a column name of 'SimulationName' then this model will only input data for those rows where the data in column 'SimulationName' matches the name of the simulation under which this input model sits. If the file does NOT have a 'SimulationName' column then all data will be input.

1.3 ProfileWaterPO

Reads the contents of a file (in apsim format) and stores into the DataStore. If the file has a column name of 'SimulationName' then this model will only input data for those rows where the data in column 'SimulationName' matches the name of the simulation under which this input model sits. If the file does NOT have a 'SimulationName' column then all data will be input.

2 Evaporation

List of experiments.

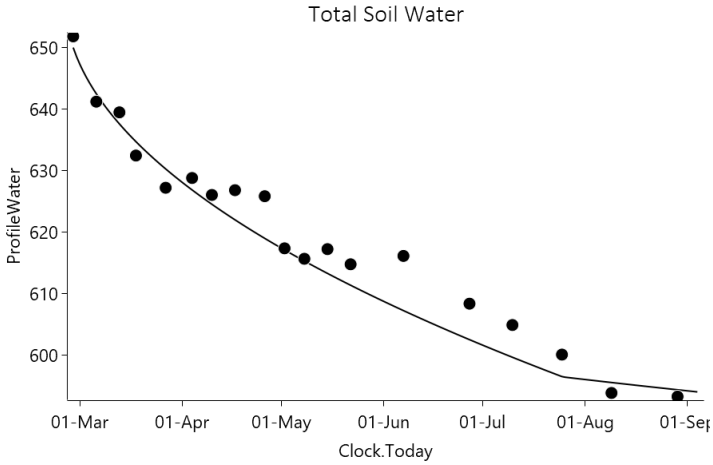
Experiment Name	Design (Number of Treatments)
ABlock_Residues	Cover (4)

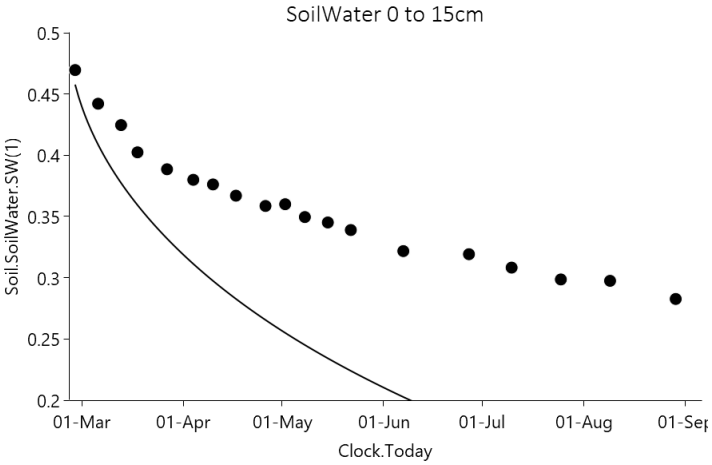
2.1 Wellcamp

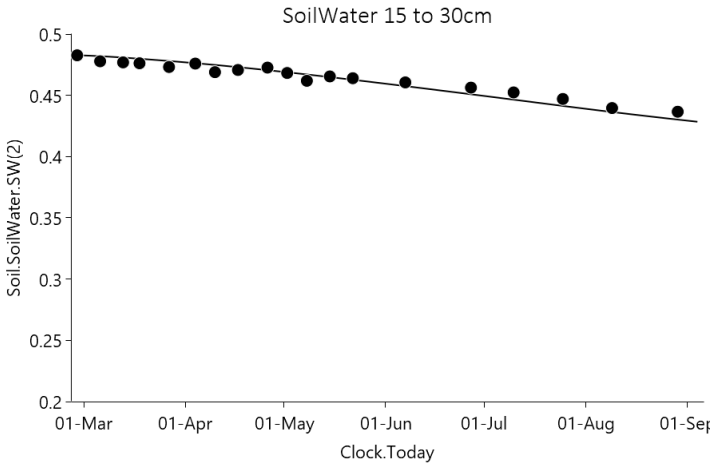
This dataset was developed as part of work by Huth et al., 2008. Evaporation from a Black Vertosol over a period of 6 months was measured using a Neutron Moisture Meter at Wellcamp, near Toowoomba in Queensland, Australia. Rainfall was excluded from the soil. Drainage was unlikely during the study period and so all changes in water content should be due to evaporation alone.

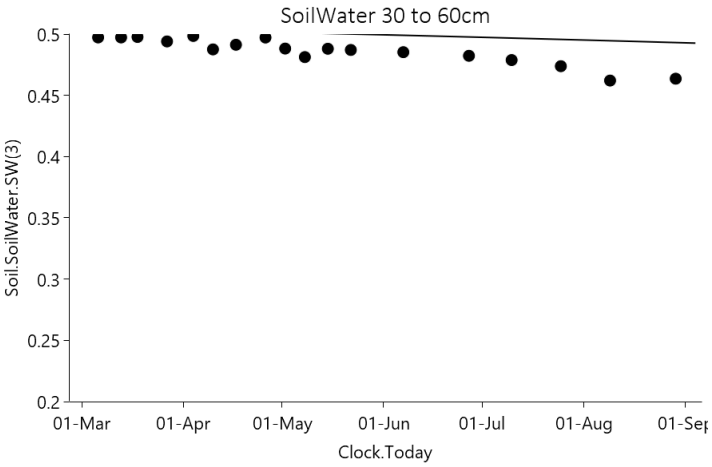
List of experiments.

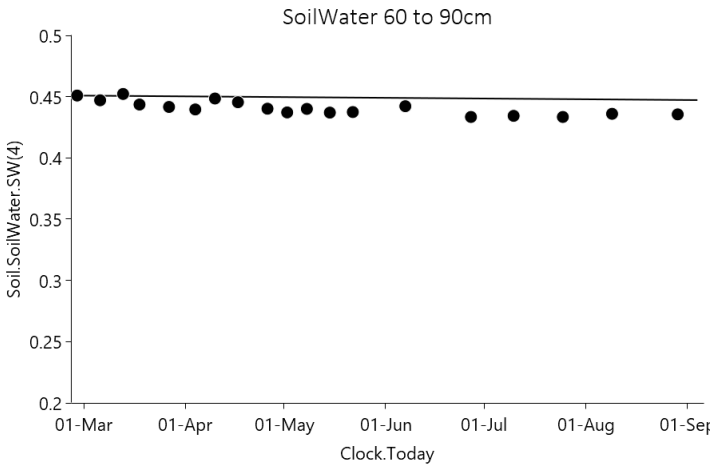
Experiment Name	Design (Number of Treatments)
WellCamp	Surface (1)

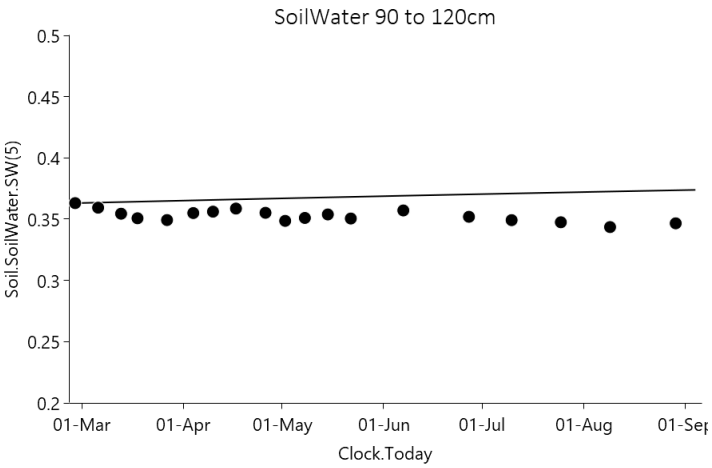


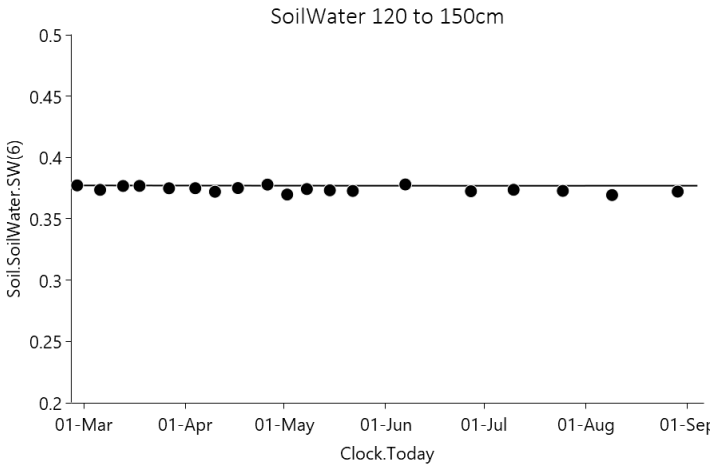










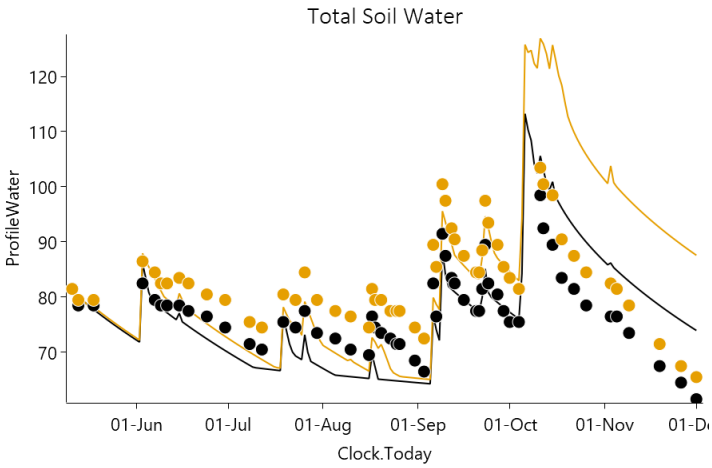


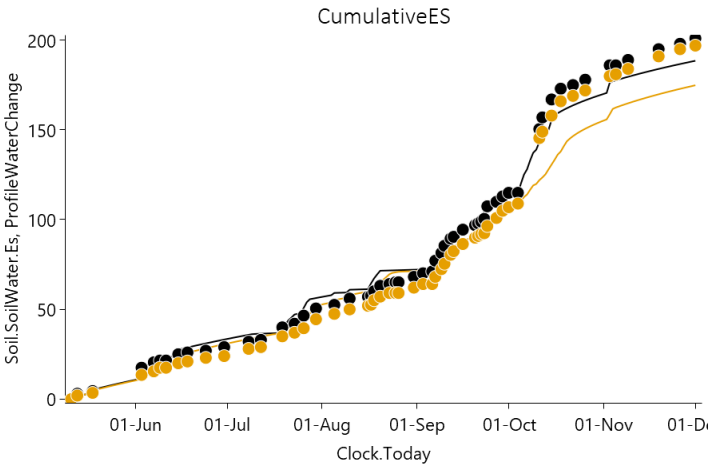
2.2 TorStreet

Evaporation from a Grey Vertosol over a period of 7 months was measured using weighing lysimeters in Toowoomba, Queensland, Australia.

List of experiments.

Experiment Name	Design (Number of Treatments)
TorStreet	Surface (2)



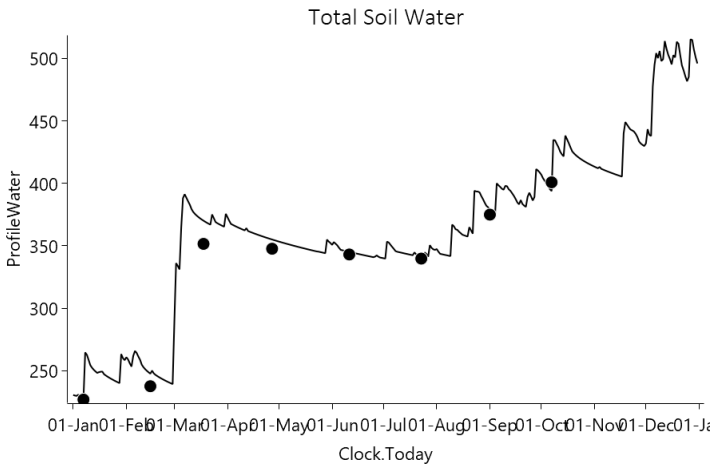


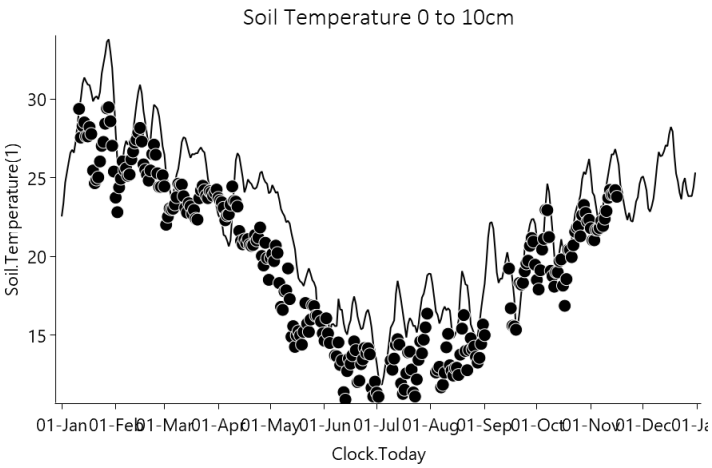
2.3 Norwin

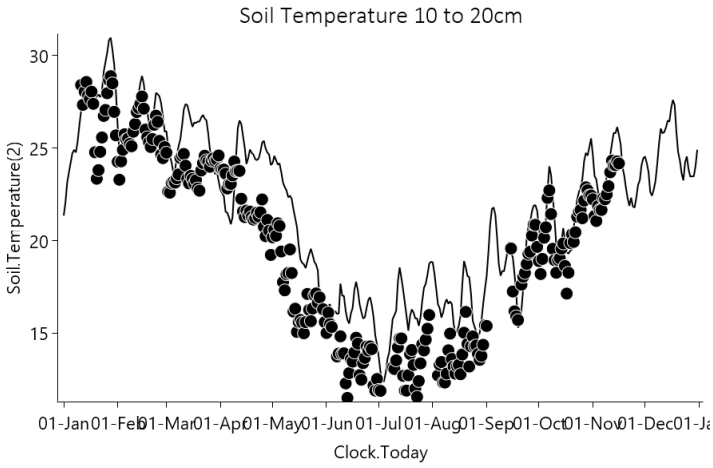
This dataset was developed as part of work by Huth et al., 2008. Evaporation from a Black Vertosol over a period of 6 months was measured using a Neutron Moisture Meter at Wellcamp, near Toowoomba in Queensland, Australia. Rainfall was excluded from the soil. Drainage was unlikely during the study period and so all changes in water content should be due to evaporation alone.

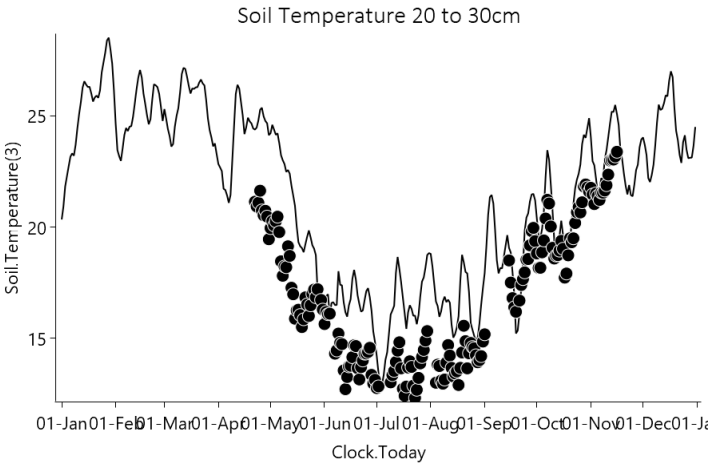
List of experiments.

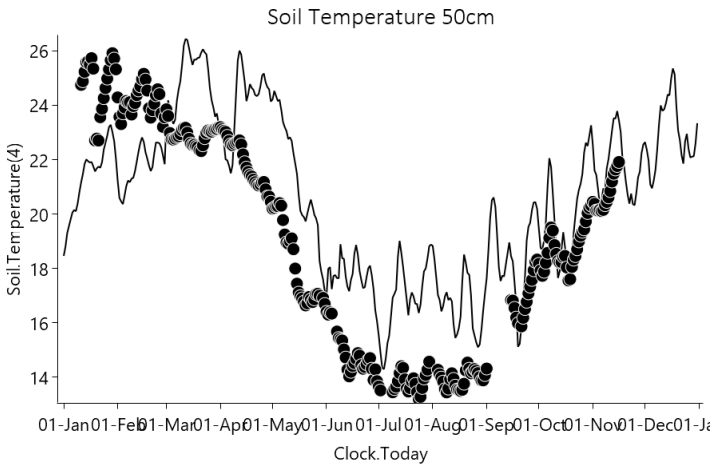
Experiment Name	Design (Number of Treatments)
Norwin	Surface (1)

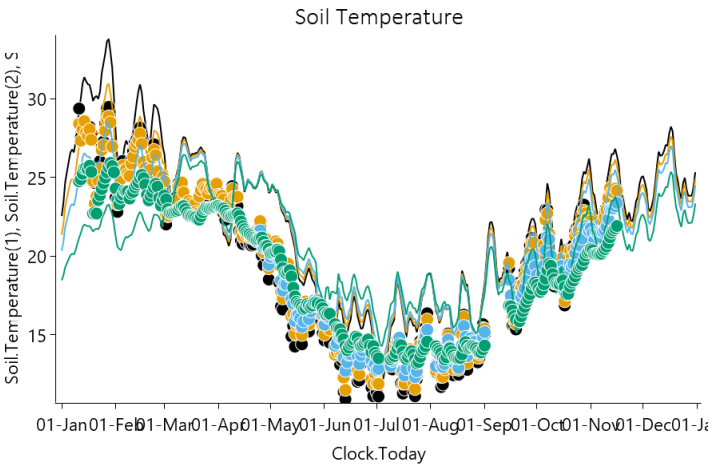










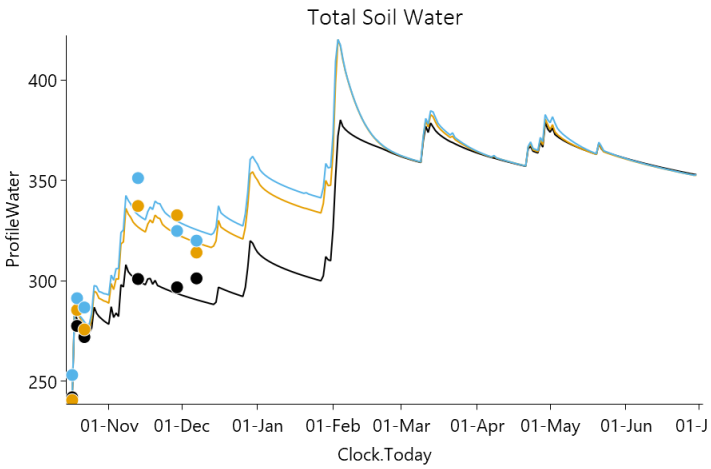


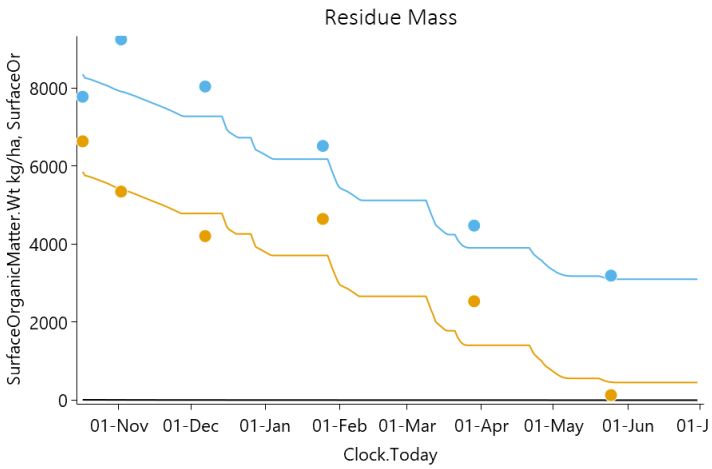
2.4 Gatton

Evaporation from a Grey Vertosol over a period of 7 months was measured using weighing lysimeters in Toowoomba, Queensland, Australia.

List of experiments.

Experiment Name	Design (Number of Treatments)
Gatton	Surface (3)



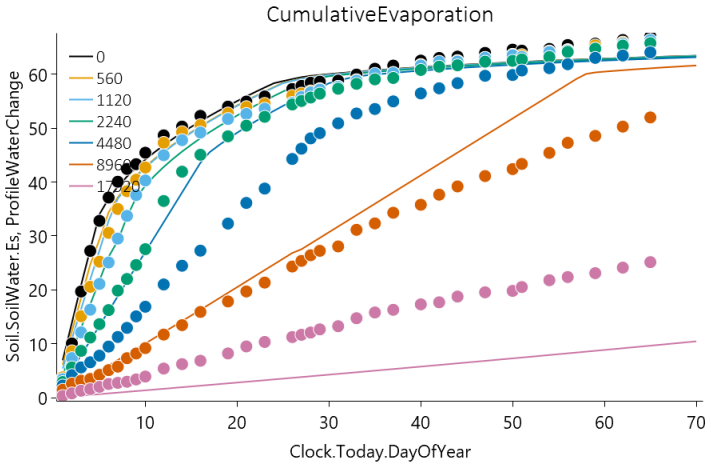


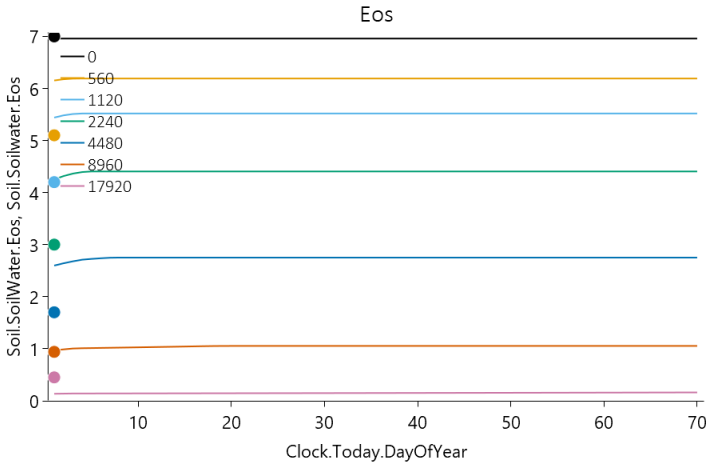
2.5 BondAndWillis

This dataset reproduces the evaporation experiment by Bond et al., 1970 in which microlysimeters were used to measure evaporation under varying residue levels and evaporative demands within controled environments. Note that evaporation parameters may be higher than under natural systems as evaporative conditions were maintained for 24 hours per day. The soil type was a fine sandy loam and the residue was clean bright wheat straw cut into 1.3 cm lengths.

List of experiments.

Experiment Name	Design (Number of Treatments)
BondAndWillis	Residue (7)





2.6 ABlock_Residues

This experiment was conducted in Plant and Food Researches A Block field near Lincoln, New Zealand. A uniformly managed, unirrigated barley crop was grown and harvested prior to the estastablishment of this experiment. A randomised complete block was layed out with 5 x 15 m plots laid out to avoid harvester wheel tracks with 4 replicates of 4 treatments:

- StandingStubble where the stubble that was left by the combine harvester remained standing and any residue that
- HarvesterWindrow where the residue mown from the other two treatments was piled ontop of the standing stubble to simulate a harvester windrow with the residue from approximately 2 times the area applied
- MownStubble where stubble was mown at 5cm height and removed from the plots
- BareSoil where stubble was mown and removed and then plots were ploughed and cultivated to leave a bare soil.

Following the establishment of treatments CS616 soil moisture sensors were installed in each plot at 0-20, 20-40 and 40-60 cm depth and logged at 1 hourly intervals from establishment in Autumn through until the following spring.

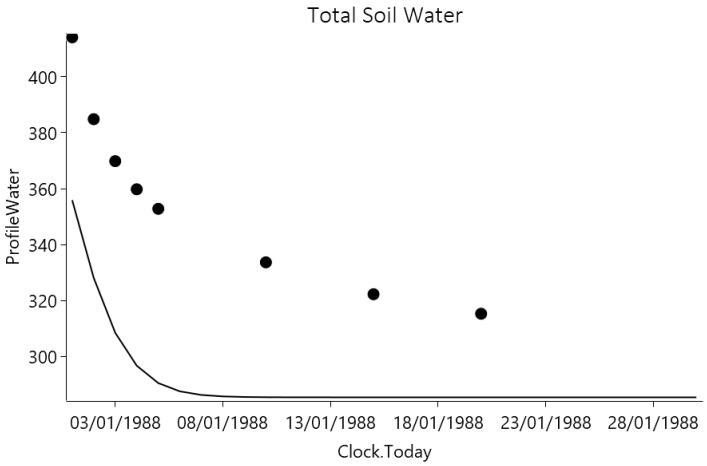
3 Drainage

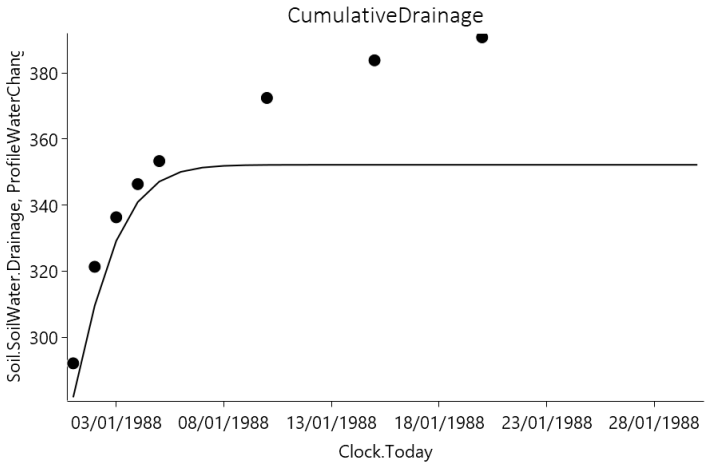
3.1 Libardi

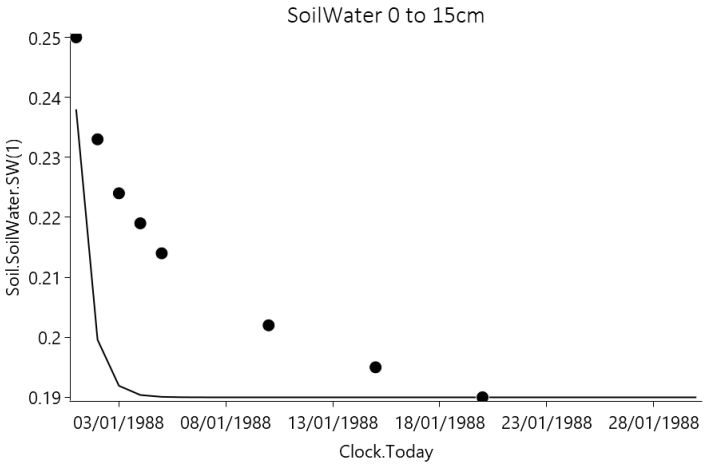
Data used here were collected during an internal drainage experimentLibardi et al., 2001, carried out on a sandy–loam Red Yellow Latosol (Typic Hapludox) near Piracicaba, SP, Brazil. The soil had a fairly homogeneous profile down to the depth of 2 m. Soil water content values were calculated from tensiometer readings, through the use of laboratory established soil water retention curves and of soil water potential heads, measured with the same mercury manometer tensiometers.

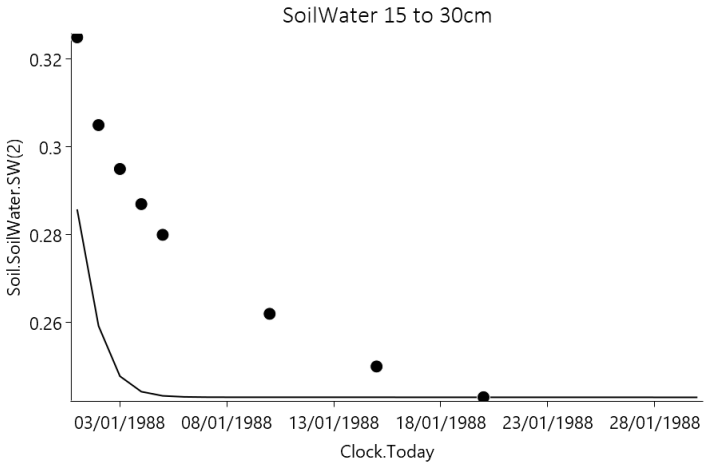
List of experiments.

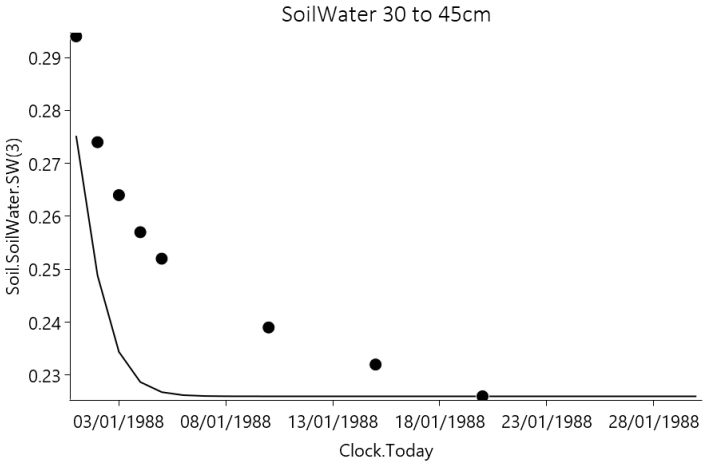
Experiment Name	Design (Number of Treatments)
Libardi	Surface (1)

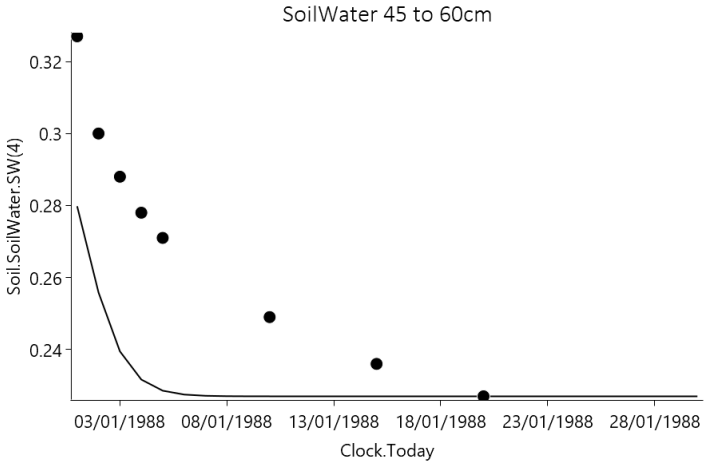


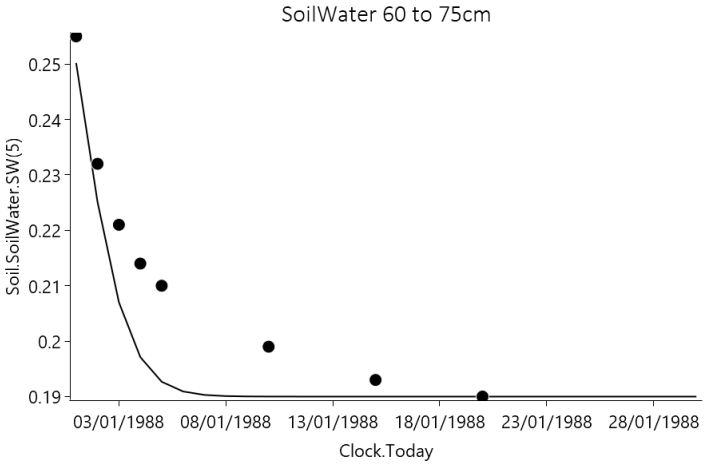


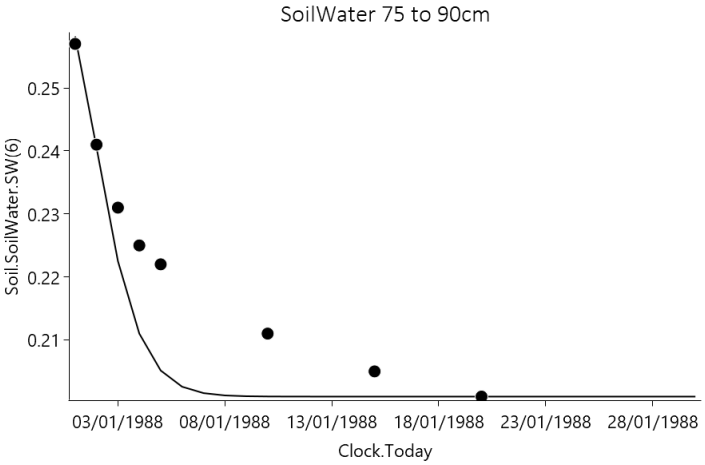


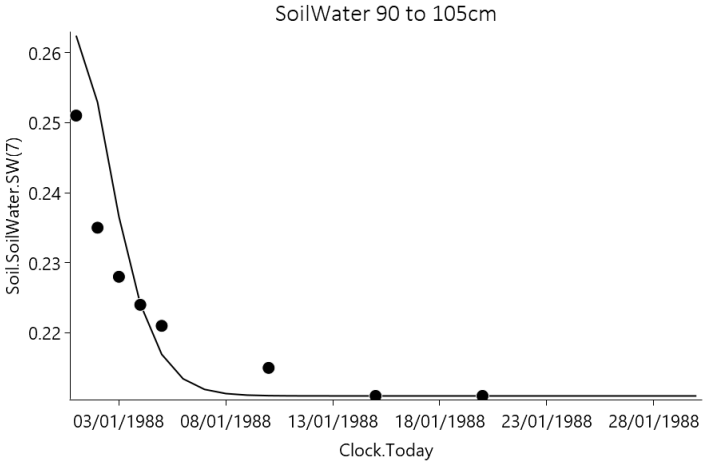


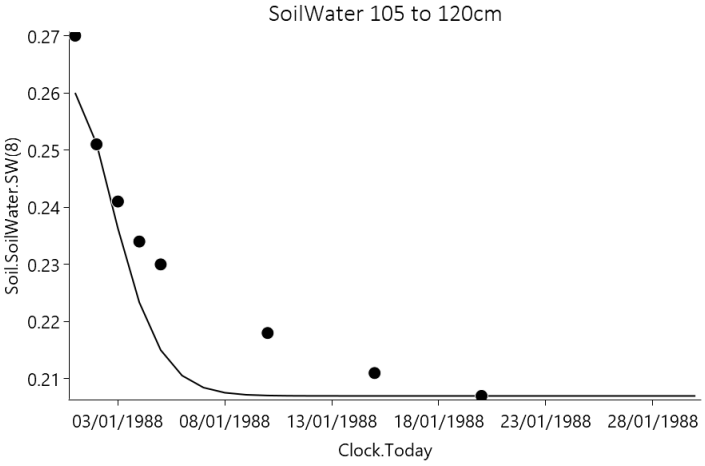


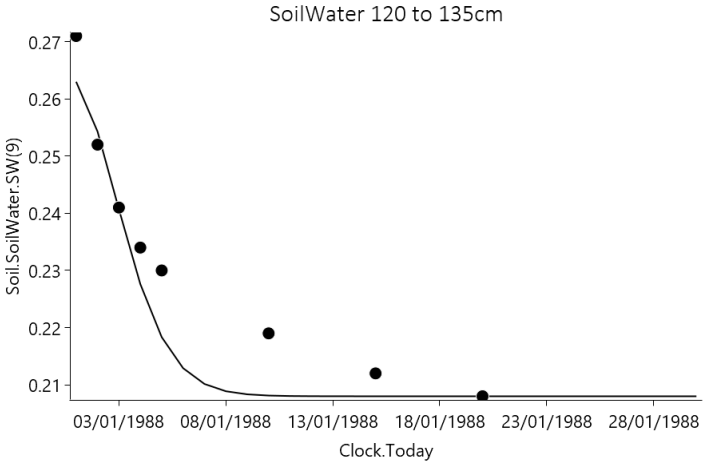












4 WaterExtraction

List of experiments.

Experiment Name	Design (Number of Treatments)
Lincoln2015	(6)
LandP	(8)

4.1 LandP

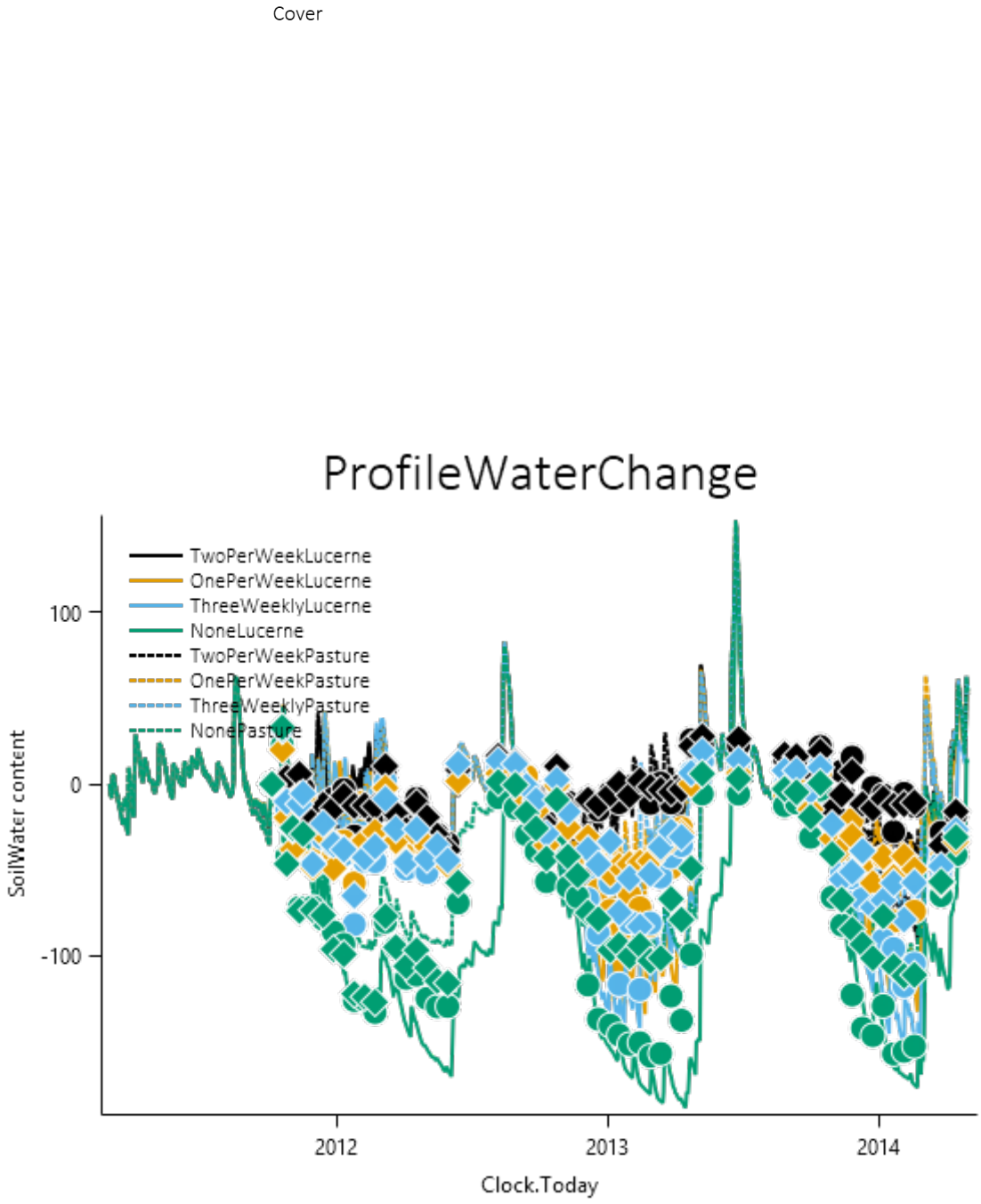
This experiment was run over 3 years in Lincoln, New Zealand on a shallow stony soil. Treatments of Lucerne and Pasture (Ryegrass) were established in the Autumn of 2011 and irrigtion treatments were installed in the spring of 2011 and applied for three years. Treatments were:

- None where no irrigation was applied

- TwoPerWeek where irrigation was applied twice per week during spring/summer/autumn to replace water use measured by neutron probe
- OnePerWeek where the same amout of irrigation was applied as the above treatment but at weekly frequency (i.e fewer, larger irrigations)
- ThreeWeekly where the same amount of irrigation was applied as abouve but at a 3 weekely frequency (i.e fewer, larger irrigations)

Lucerne and pasture were defoliated at differing frequiencies following best mananagment practice resulting in 8-10 regrowth period per year for pasture and 5-6 for lucerne. Neutron probes were installed to 1.6 m depth using a 20T digger with a pnumatic plate on its boom to drive and extract a pilot rod into the stony sub soil and then an aluminum access tube was installed into the resultant hole. Neutron probes measurements were tatken at 7 - 10 day intervals during the irrigation season. CS616 probes were also installed in the top soil at 0-15 and 15-30 cm depths in each plot and logged hourly. Slurp is used to represent the crop in this test so it can focus on soil water and not be blured by the performance of the crop model. To do this observed values for green cover, LAI, and Height were set in Slurp each day using a manager script.

4.1.1 Crop Status



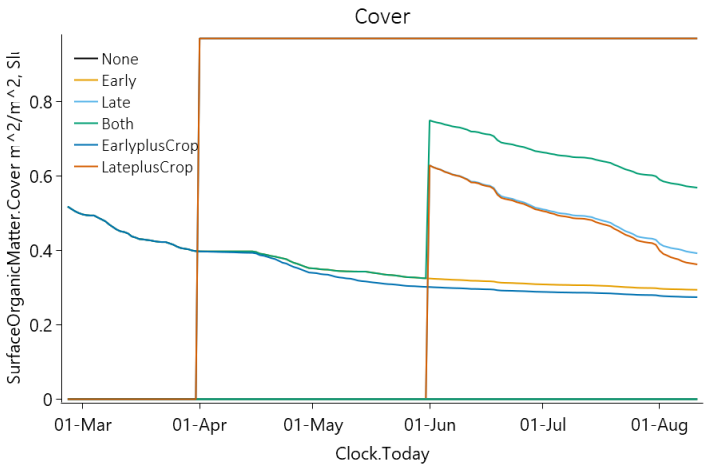
5 SensibilityTests

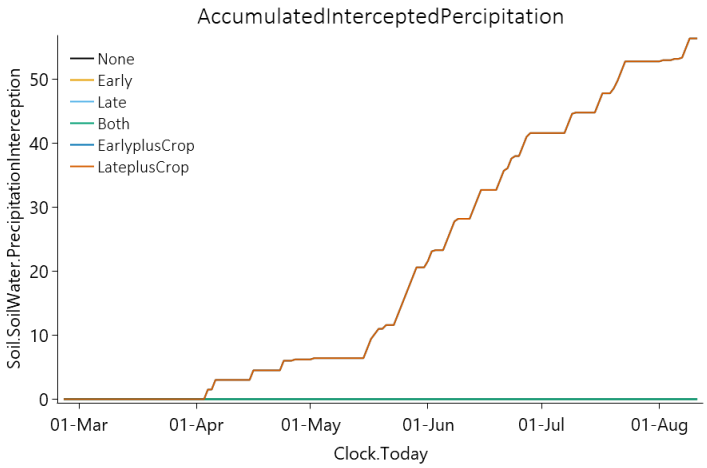
List of experiments.

Experiment Name	Design (Number of Treatments)
ResidueEvaporationTest	Residue (6)

5.1 ResidueEvaporationTest

5.1.1 Folder





6 References

Bond, JJ, Willis, WO, 1970. Soil Water Evaporation: First Stage Drying as Influenced by Surface Residue and Evaporation Potential. Soil Science Society of America Proceedings 34, 924-928.

Huth, N. I., Carberry, P. S., Cocks, B., Graham, S., McGinness, H. M., O'Connell, D. A., 2008. Managing drought risk in eucalypt seedling establishment: An analysis using experiment and model. Forest Ecology and Management 255 (8-9), 3307-3317.

Libardi, PL, Reichardt, Klaus, 2001. Libardi's method refinement for soil hydraulic conductivity measurement. Australian Journal of Soil Research 39, 851-860.