



1 Swim

Parameters (Inputs)

| Name | Description | Units | Type | Value |
|-------------|---|---|---------|-------|
| A | Tortuosity Constant. | | double | 0 |
| CN2Bare | Bare soil runoff curve number | | double | 0 |
| CNCov | Cover for max curve number reduction | | double | 0.8 |
| CNRed | Max. reduction in curve number due to cover | | double | 20 |
| Diagnostics | Show diagnostic information? | | boolean | False |
| Dis | Dispersivity. | $(\text{cm}^2/\text{h})/(\text{cm}/\text{h})^p$ | double | 0 |
| Disp | Dispersivity Power. | | double | 0 |
| DTHC | Tortuosity Offset. | | double | 0 |
| DTHP | Tortuosity Power. | | double | 0 |
| DTMax | Maximum Timestep. | min | double | 1440 |
| DTMin | Minimum Timestep. | min | double | 0 |
| KDul | Hydraulic conductivity at DUL | mm/d | double | 1 |

| Name | Description | Units | Type | Value |
|----------------------------|-----------------------------------|-------|---------|-------|
| MaxWaterIncrement | Maximum water increment. | mm | double | 10 |
| PSIDul | Matric Potential at DUL. | cm | double | -100 |
| Salb | Base soil albedo | 0-1 | double | 0.13 |
| SoluteSpaceWeightingFactor | Solute space weighting factor. | | double | 0 |
| SpaceWeightingFactor | Space weighting factor. | | double | 0 |
| VC | Vapour Conductivity Calculations. | | boolean | True |

Properties (Outputs)

| Name | Description | Units | Type | Settable? |
|--------------------|---|-------|--------|-----------|
| ConcWaterCl | Amount of CL not adsorbed (ppm). | | double | False |
| ConcWaterNH4 | Amount of NH4 not adsorbed (ppm). | | double | False |
| ConcWaterNO3 | Amount of NO3 not adsorbed (ppm). | | double | False |
| ConcWaterUrea | Amount of Urea not adsorbed (ppm). | | double | False |
| CoverSurfaceRunoff | Surface cover effects on runoff curve number reduction. | 0-1 | double | False |
| Drainage | Water drainage from bottom of profile | mm | double | False |
| Eo | Potential evapotranspiration of the whole soil-plant system | mm | double | True |
| Eos | Potential evaporation from soil surface | mm | double | False |

| Name | Description | Units | Type | Settable? |
|----------------|---|-------|--------|-----------|
| Es | Actual (realised) soil water evaporation | mm | double | False |
| ESW | Extractable soil water relative to LL15 | mm | double | False |
| Flow | Amount of water moving upward from each soil layer during unsaturated flow (negative value means downward movement) | kg/ha | double | False |
| FlowCl | CL movement out of a layer. | | double | False |
| FlowNH4 | NH4 movement out of a layer. | | double | False |
| FlowNO3 | NO3 movement out of a layer. | | double | False |
| FlowUrea | NH4 movement out of a layer. | | double | False |
| Flux | Amount of water moving downward out of each soil layer due to gravity drainage (above DUL) (mm) | | double | False |
| Infiltration | Water infiltration (rainfall and irrigation) into the surface layer. | mm | double | False |
| K | Water potential of layer | cm/h | double | False |
| LateralOutflow | Amount of water moving laterally out of the profile (mm) | | double | False |
| LeachCl | CL leached from the bottom of the profile. | | double | False |
| LeachNH4 | NH4 leached from the bottom of the profile. | | double | False |
| LeachNO3 | NO3 leached from the bottom of the profile. | | double | False |
| LeachUrea | Urea leached from the bottom of the profile. | | double | False |
| PAW | Plant available water SW-LL15. | mm/mm | double | False |

| Name | Description | Units | Type | Settable? |
|---------------------------|--|----------------------------------|--------|-----------|
| PAWmm | Plant available water SW-LL15. | mm | double | False |
| Pond | Pond depth. | mm | double | False |
| PoreInteractionIndex | Pore Interaction Index for shape of the K(theta) curve for soil hydraulic conductivity | - | double | True |
| PotentialInfiltration | Rainfall less than intercepted by the canopy and residue components (Set by Microclimate). | | double | True |
| PrecipitationInterception | Amount of rainfall intercepted by crop and residue canopies | | double | True |
| PSI | Water potential of layer | cm | double | True |
| Runoff | Water runoff | mm | double | False |
| SoluteFlowEfficiency | The efficiency (0-1) that solutes move up with water. | | double | True |
| SoluteFluxEfficiency | The efficiency (0-1) that solutes move down with water. | | double | True |
| SubsurfaceDrain | Subsurface drain. | mm | double | False |
| SubsurfaceDrainCL | CL movement out of a sub surface drain. | | double | False |
| SubsurfaceDrainNH4 | NH4 movement out of a sub surface drain. | | double | False |
| SubsurfaceDrainNO3 | NO3 movement out of a sub surface drain. | | double | False |
| SubsurfaceDrainUrea | NH4 movement out of a sub surface drain. | | double | False |
| SW | Volumetric water content | mm/mm | double | True |
| SWmm | Water content | mm | double | False |
| Theta | Theta | cm ³ /cm ³ | double | True |

| Name | Description | Units | Type | Settable? |
|------------|-------------------------------------|-------|--------|-----------|
| Thickness | Soil thickness for each layer (mm)(| | double | False |
| WaterTable | Water table depth (mm) | mm | double | True |

Links (Dependencies)

| Name | Type | IsOptional? |
|----------------------|-------------------------------------|-------------|
| canopies | ICanopy | False |
| clock | IClock | False |
| physical | IPhysical | False |
| solutes | ISolute | False |
| subsurfaceDrain | SwimSubsurfaceDrain | True |
| summary | ISummary | False |
| surfaceOrganicMatter | ISurfaceOrganicMatter | False |
| water | Water | False |

Methods (callable from manager)

| Name | Description |
|-----------------------------|---|
| RemoveWater | void RemoveWater(double dlt_sw_dep) <i>Remove water from the profile</i> |
| Reset | void Reset() |
| SetLowerBCForGivenPotential | void SetLowerBCForGivenPotential(double bbcPotential) <i>Set the constant potential bottom boundary.</i> |
| SetLowerBCForGradient | void SetLowerBCForGradient(double bbcGradient) <i>Set the lower boundary condition for gradient.</i> |

| Name | Description |
|---------------------------------------|---|
| SetLowerBCForSeepage | void SetLowerBCForSeepage(double bbcPotentialSeepage) <i>Set the constant potential bottom boundary.</i> |
| SetSurfaceBCForCurveNumber | void SetSurfaceBCForCurveNumber() |
| SetSurfaceBCForPowerFunction | void SetSurfaceBCForPowerFunction(double minimumSurfaceStorage, double maximumSurfaceStorage, double initialSurfaceStorage, double precipitationConstant, double runoffRateFactor, double runoffRatePower) <i>Runoff calculated by a power function.</i> |
| SetTopBCForConductanceFunction | void SetTopBCForConductanceFunction(double minimumConductance, double maximumConductance, double initialConductance, double precipitationConstant) <i>Set the top boundary condition for conductance function.</i> |
| SetTopBCForConstantPotential | void SetTopBCForConstantPotential() |
| SetTopBCForInfiniteSurfaceConductance | void SetTopBCForInfiniteSurfaceConductance() |
| SetWaterTable | void SetWaterTable(double InitialDepth) <i>Sets the water table.</i> |
| Standardise | void Standardise(double targetThickness) <i>Gets the model ready for running in a simulation.</i> |
| Sum_Report | void Sum_Report() |
| Tillage | void Tillage(TillageType Tillage) <i>Perform tillage</i> |
| Tillage | void Tillage(String tillageType) <i>Perform tillage</i> |

2 Water

This class encapsulates the water content (initial and current) in the simulation.

Properties (Outputs)

| Name | Description | Units | Type | Settable? |
|-----------------------|--|-------|-----------|-----------|
| AllowedRelativeTo | Allowed strings in 'RelativeTo' property. | | String | False |
| Depth | Depth strings. Wrapper around Thickness. | mm | String | True |
| DepthWetSoil | Calculate the depth of wet soil (mm). | | double | True |
| FilledFromTop | Distribute the water at the top of the profile when setting fraction full. | | boolean | True |
| FractionFull | Calculate the fraction of the profile that is full. | | double | True |
| HydraulicConductivity | Soil hydraulic conductivity (mm/d) | mm/d | double | False |
| InitialPAWmm | Plant available water (mm). | mm | double | True |
| InitialValues | Initial water values | mm/mm | double | True |
| InitialValuesMM | Initial values total mm | mm | double | False |
| MM | Amount water (mm) | mm | double | False |
| PAW | Plant available water SW-LL15 (mm/mm). | mm/mm | double | False |
| PAWmm | Plant available water SW-LL15 (mm). | mm | double | False |
| pF | Soil water potential (kPa) | - | double | False |
| Physical | Finds the 'Physical' node. | | IPhysical | False |
| Potential | Soil water potential (kPa) | kPa | double | False |
| RelativeTo | The crop name (or LL15) that fraction full is relative to | | String | True |

| Name | Description | Units | Type | Settable? |
|--------------|--|-------|------------|-----------|
| RelativeToLL | Find LL values (mm) for the RelativeTo property. | | double | False |
| Tables | Tabular data. Called by GUI. | | GridTable | False |
| Thickness | Thickness | | double | True |
| Volumetric | Amount (mm/mm) | mm/mm | double | True |
| WaterModel | Finds the 'SoilWater' node. | | ISoilWater | False |

Events published

| Name | Type |
|--------------|--|
| WaterChanged | Void WaterChanged (Object sender, EventArgs e) |

Methods (callable from manager)

| Name | Description |
|--|---|
| AreInitialValuesWithinPhysicalBoundaries | boolean AreInitialValuesWithinPhysicalBoundaries(double initialValues) <i>Checks to make sure every InitialValue value is within airdry and SAT values.</i> |
| Reset | void Reset() |
| Standardise | void Standardise(double targetThickness) <i>Gets the model ready for running in a simulation.</i> |

3 SwimSubsurfaceDrain

SWIM sub surface drain model

Properties (Outputs)

| Name | Description | Units | Type | Settable? |
|-------------|--------------------------------|-------|--------|-----------|
| DrainDepth | Gets or sets the drain depth. | mm | double | True |
| DrainRadius | Gets or sets the drain radius. | mm | double | True |

| Name | Description | Units | Type | Settable? |
|--------------|---------------------------------|-------|--------|-----------|
| DrainSpacing | Gets or sets the drain spacing. | mm | double | True |
| ImpermDepth | Gets or sets the imperm depth. | mm | double | True |
| Klat | Gets or sets the klat. | mm/d | double | True |

4 TillageType

Tillage type structure

Properties (Outputs)

| Name | Description | Units | Type | Settable? |
|---------------|---------------------------------|-------|--------|-----------|
| cn_rain | Gets or sets the cn_rain. | | int32 | True |
| cn_red | Gets or sets the cn_red. | | int32 | True |
| f_incorp | Gets or sets the f_incorp. | | double | True |
| tillage_depth | Gets or sets the tillage_depth. | | double | True |