MAATALOUDEN ALUEELLISEN VESIENHALLINNAN LASKENTA-ALUSTA

Aalto-yliopisto, Salaojituksen tutkimusyhdistys ry, Salaojayhdistys ry, Luonnonvarakeskus (Luke), Sven Hallinin tutkimussäätiö sr

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Dr. Salo H.,

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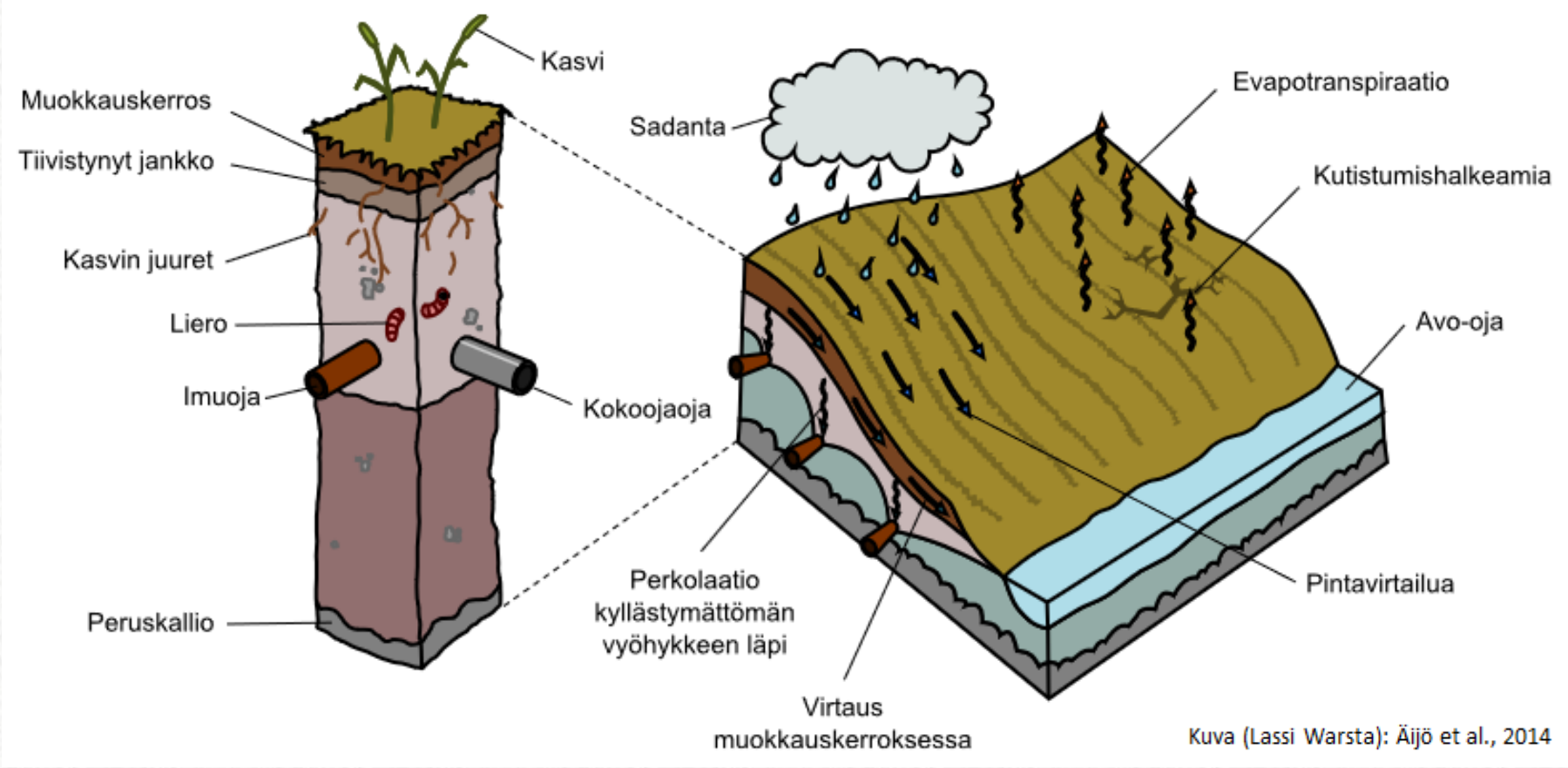
FLUSH-malli

Aalto-yliopistossa kehitetty laskennallinen malli ojitettujen peltoalueiden hydrologian kuvaamiseen

Mallille annetaan

Peltokuvaus:
- Topografia
- Maakerrosten ominaisuudet
- Ojitussysteemi (salaojat, avo-ojat, säätösalaojitus)
- Juuristokerroksen paksuus (haihduntaa varten)

Meteorologinen kuvaus:
- Potentiaalinen haihduta
- Sadanta
- Lumiprosessit: lämpötila, säteilyenergia, tuulennopeus, suhteellinen kosteus

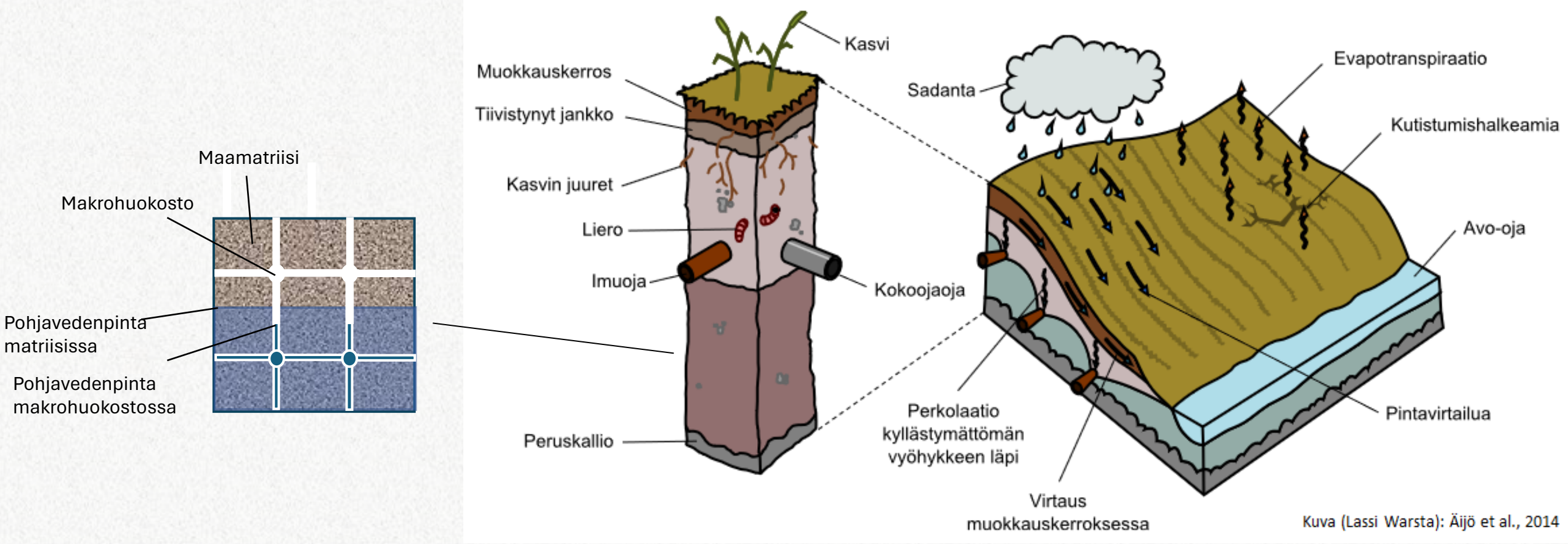


Kuva (Lassi Warsta): Äijö et al., 2014

Äijö et al., 2014. Salaojituksen tutkimusyhdistys ry:n tiedote 31

FLUSH-malli

Aalto-yliopistossa kehitetty laskennallinen malli ojitettujen peltoalueiden hydrologian kuvaamiseen



Äijö et al., 2014. Salaojituksen tutkimusyhdistys ry:n tiedote 31

MAATALOUDEN ALUEELLISEN VESIENHALLINNAN LASKENTA-ALUSTA

Application description

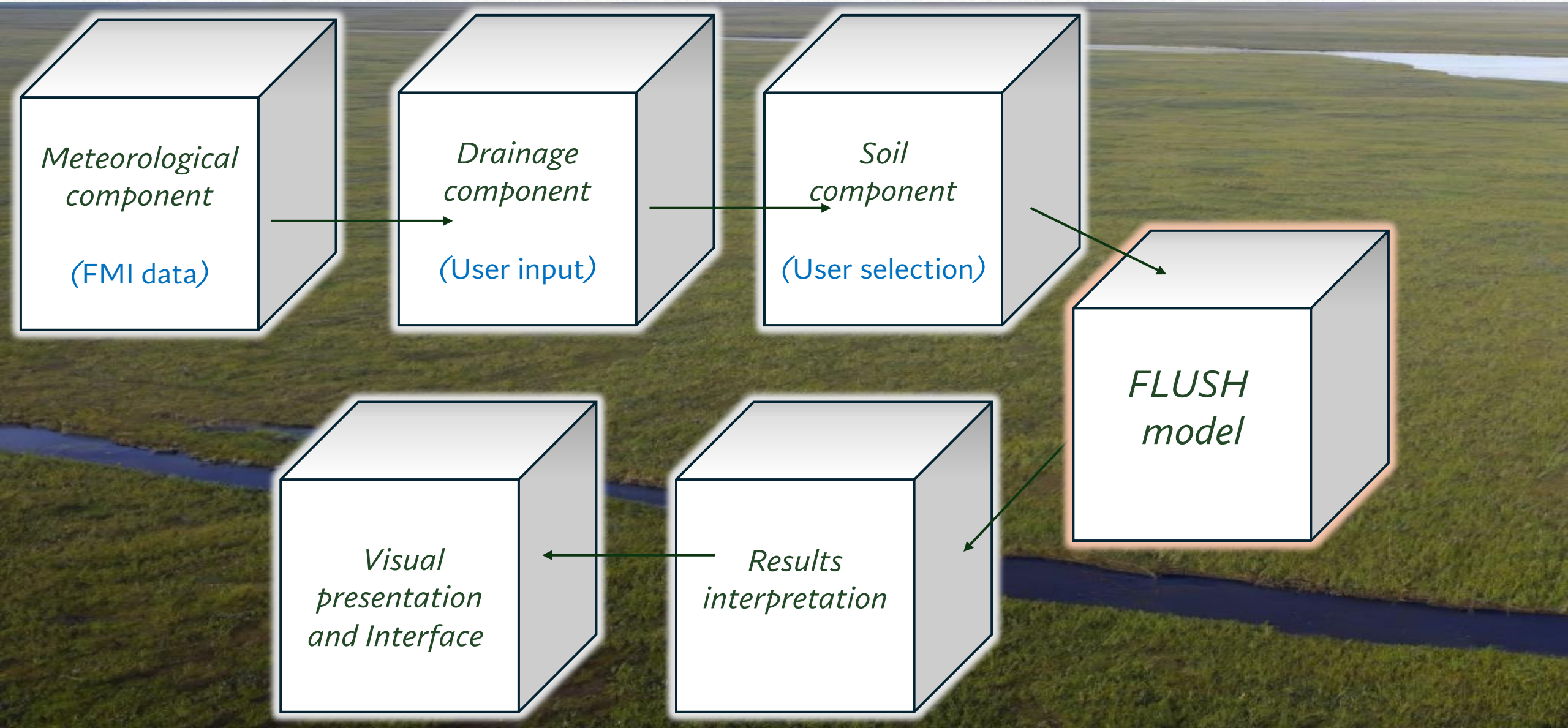
- Desktop tool based on FLUSH hydrological model
- Retrospective modelling (limited by meteorological observations)
- Time frame – 1 year default modelling
- Daily timestep

- Generate user-friendly output plots of:
  - water balance components
  - water level in soil
  - water inflow to ditch/drains
  - snow period

Why?

Produce **a tool** that can be used **for simulating field hydrology at any location in Finland** and for testing possibilities of different drainage options. The tool produces **useful information about field water management** for different end users

How?


Meteorological component
(FMI data)
Drainage component
(User input)
Soil component
(User selection)
FLUSH model
Results interpretation
Visual presentation and Interface

Mockup Design

Development of an agricultural field drainage modeling tool

Step 1 Time, Location and Drainage settings — Step 2 Wether data — Step 3 Soil settings — Step 4 Input files — Step 5 Plotting

Modeling year

2012

Tarkasteltava vuosi

Field coordinates

N 6674107

Field coordinates

E 379039

in ESPG 3067

Sijainti

Drain spacing

15 m

Salaojaväli

Slope

0,1 %

Pellon kaltevuus

Depth of subsurface drainage pipes

1,2 m

Salaojasyvyys

Open ditch

On Off

Onko pellon lähellä valtaojia?

Drainage type

Conventional Subsurface Drain...

Control Drainage

Conventional Subsurface Drainage

Kuivatusmuoto

Clear data Next step

Development of an agricultural field drainage modeling tool

Step 1 ✓ Time, Location and Drainage settings — Step 2 Weather data — Step 3 Soil settings — Step 4 Plotting

Download FMI data or Proceed with stored data

Add path

path

Back Next step

Development of an agricultural field drainage modeling tool

Step 1 ✓ Time, Location and Drainage settings — Step 2 ✓ Weather data — Step 3 Soil settings — Step 4 Plotting

Use available soil libraries | Customize soils

Top soil layer

Pintamaan maalaji

- (•) Clay
- ( ) Silt
- ( ) Peat

Top soil macropores size

Makrohuokosten määrä pintamaassa

- (•) High
- ( ) Low

Bottom soil layer

Pohjamaan maalaji

- (•) Clay
- ( ) Silt
- ( ) Peat

Bottom soil macropores size

Makrohuokosten määrä pohjamaassa

- (•) High
- ( ) Low

Back | Start flush modeling | 20 sec left

Development of an agricultural field drainage modeling tool

Step 1 ✓ Time, Location and Drainage settings — Step 2 ✓ Weather data — Step 3 Soil settings — Step 4 Plotting

Use available soil libraries | Customise soils

Top soil layer

- (•) Clay
- ( ) Silt
- ( ) Peat

Top soil macropores size

- (•) High
- ( ) Low

Bottom soil layer

- (•) Clay
- ( ) Silt
- ( ) Peat

Bottom soil macropores size

- (•) High
- ( ) Low

Back | Next | ✓ Process finished

Development of an agricultural field drainage modeling tool

Step 1 ✓ Time, Location and Drainage settings — Step 2 ✓ Weather data — Step 3 ✓ Soil settings — Step 4 Plotting

Add to the plot name

- [x] location
- [x] year
- [x] soils

Plot

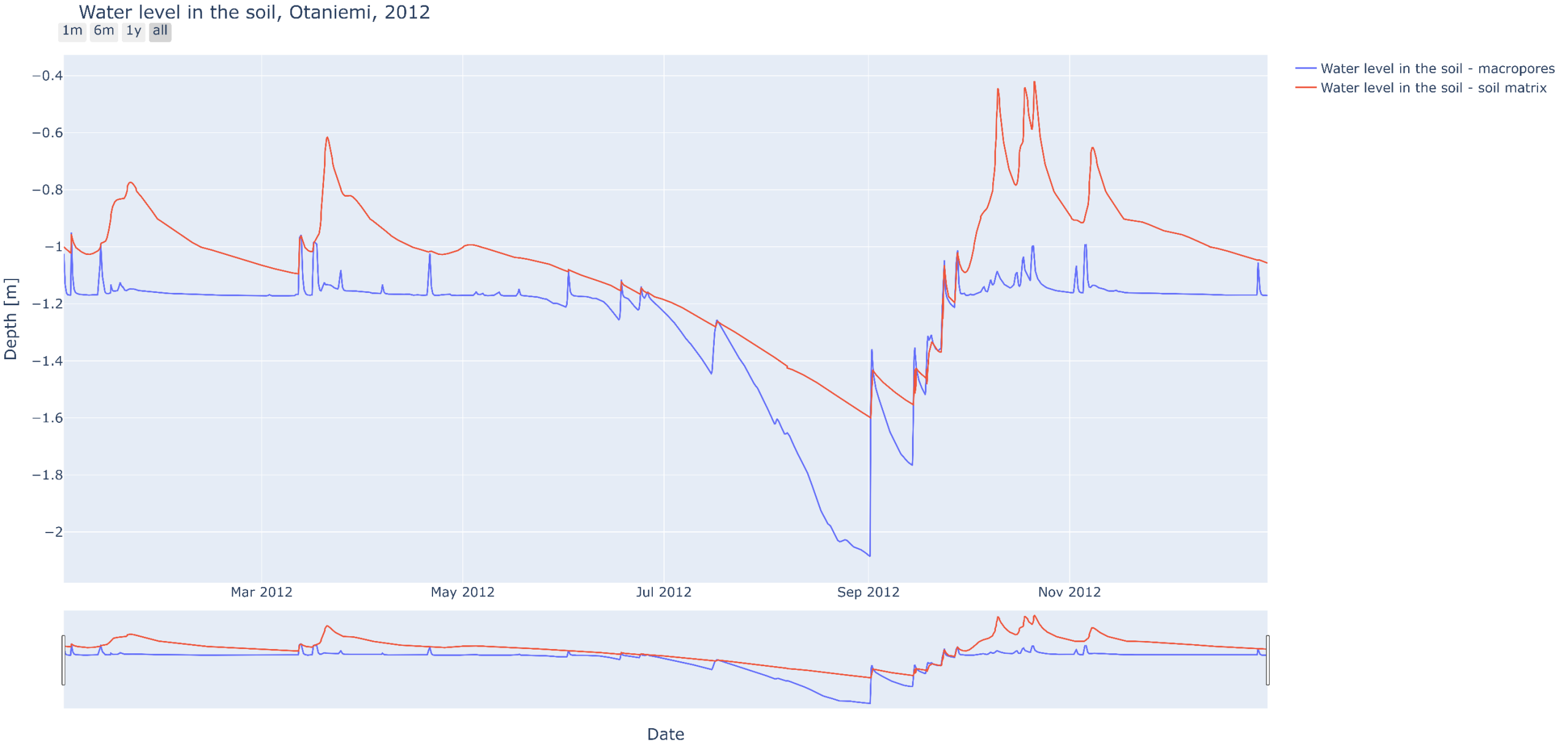
- (•) Water level in soil
- ( ) Snow water equivalent
- ( ) Total water balance

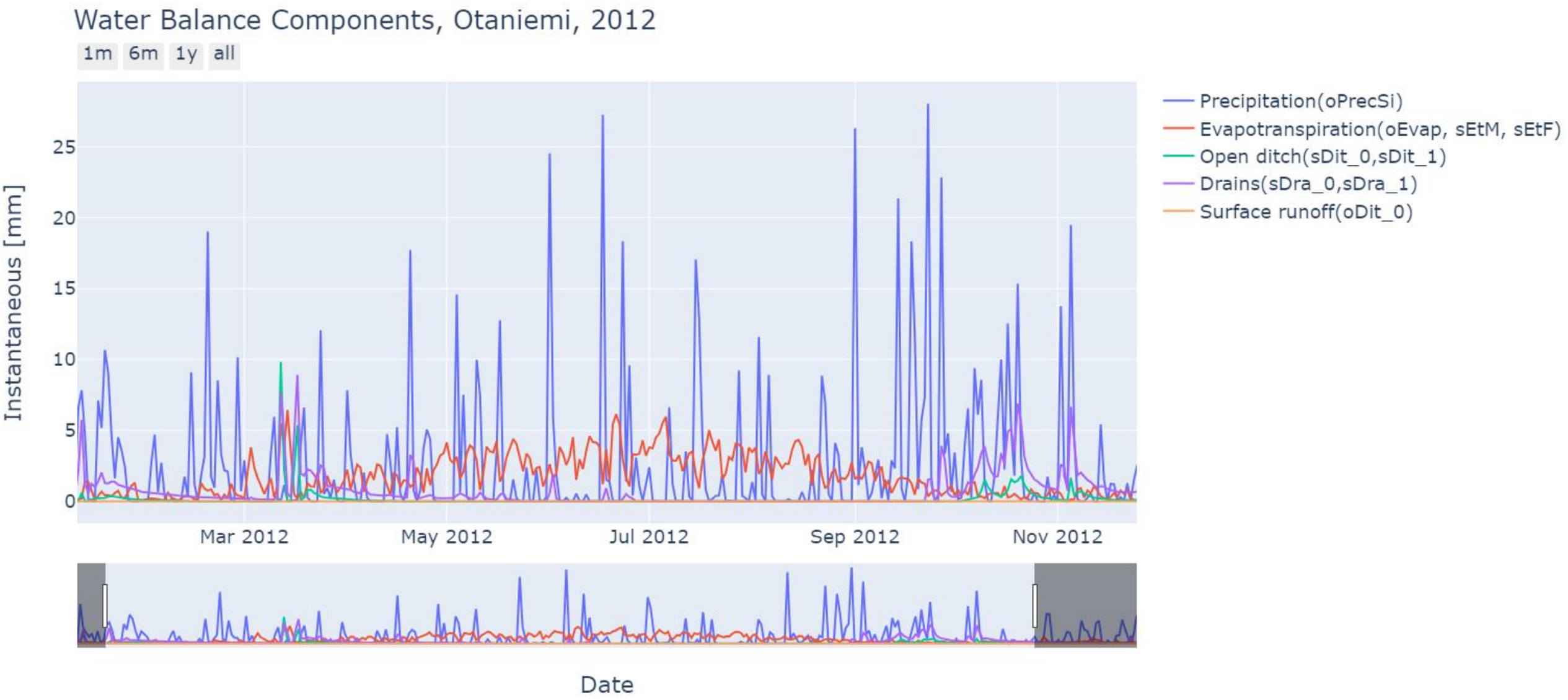
Value

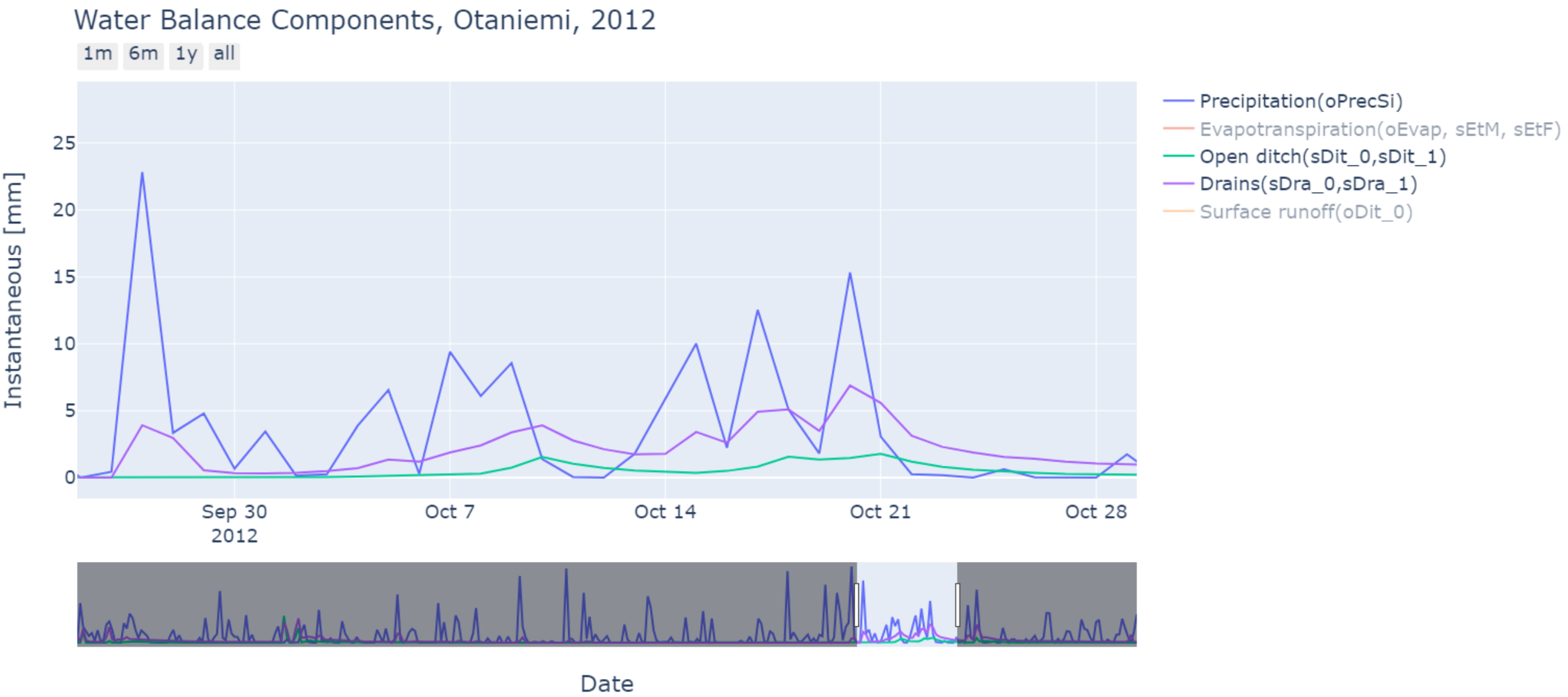
- (•) Instantaneous
- ( ) Cumulative

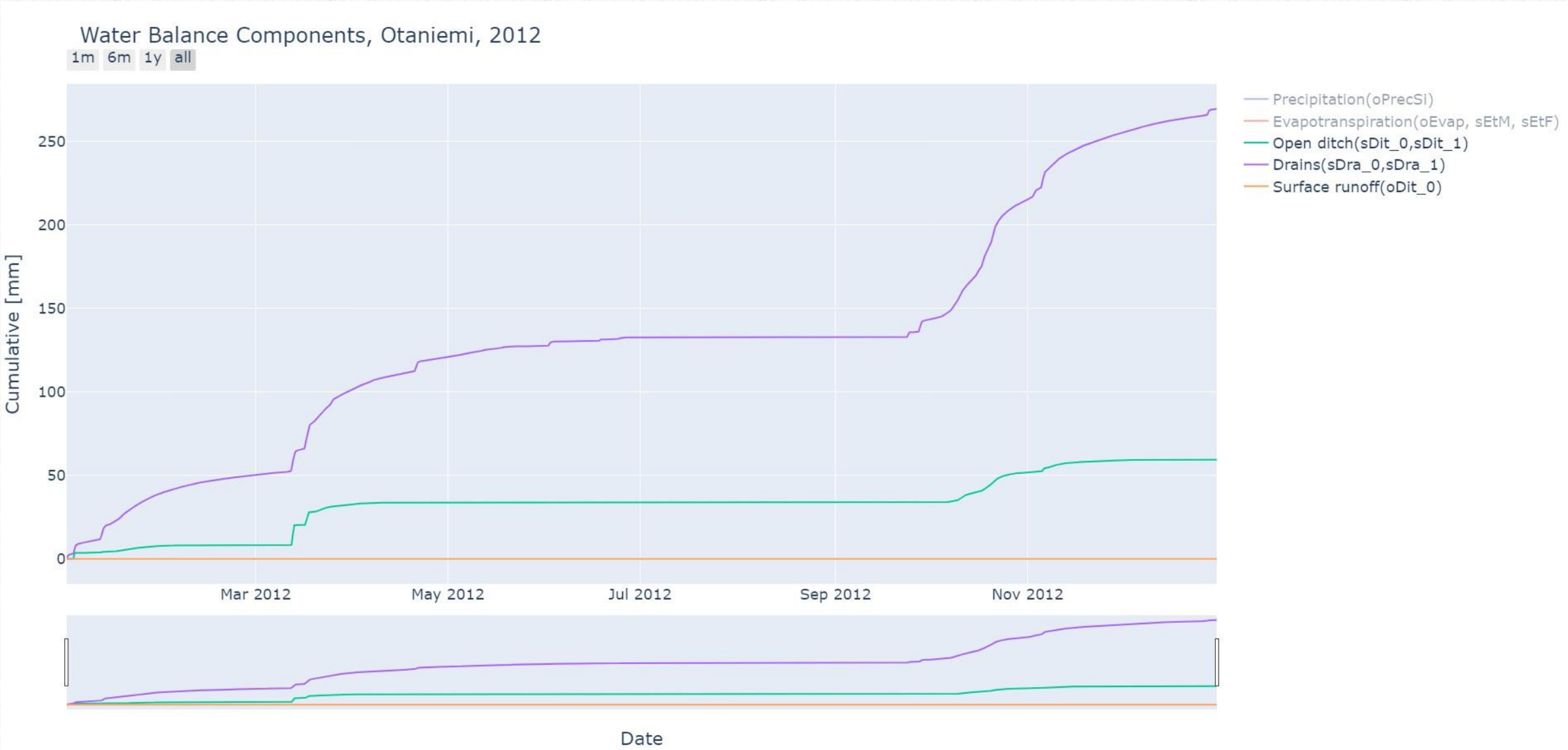
Period

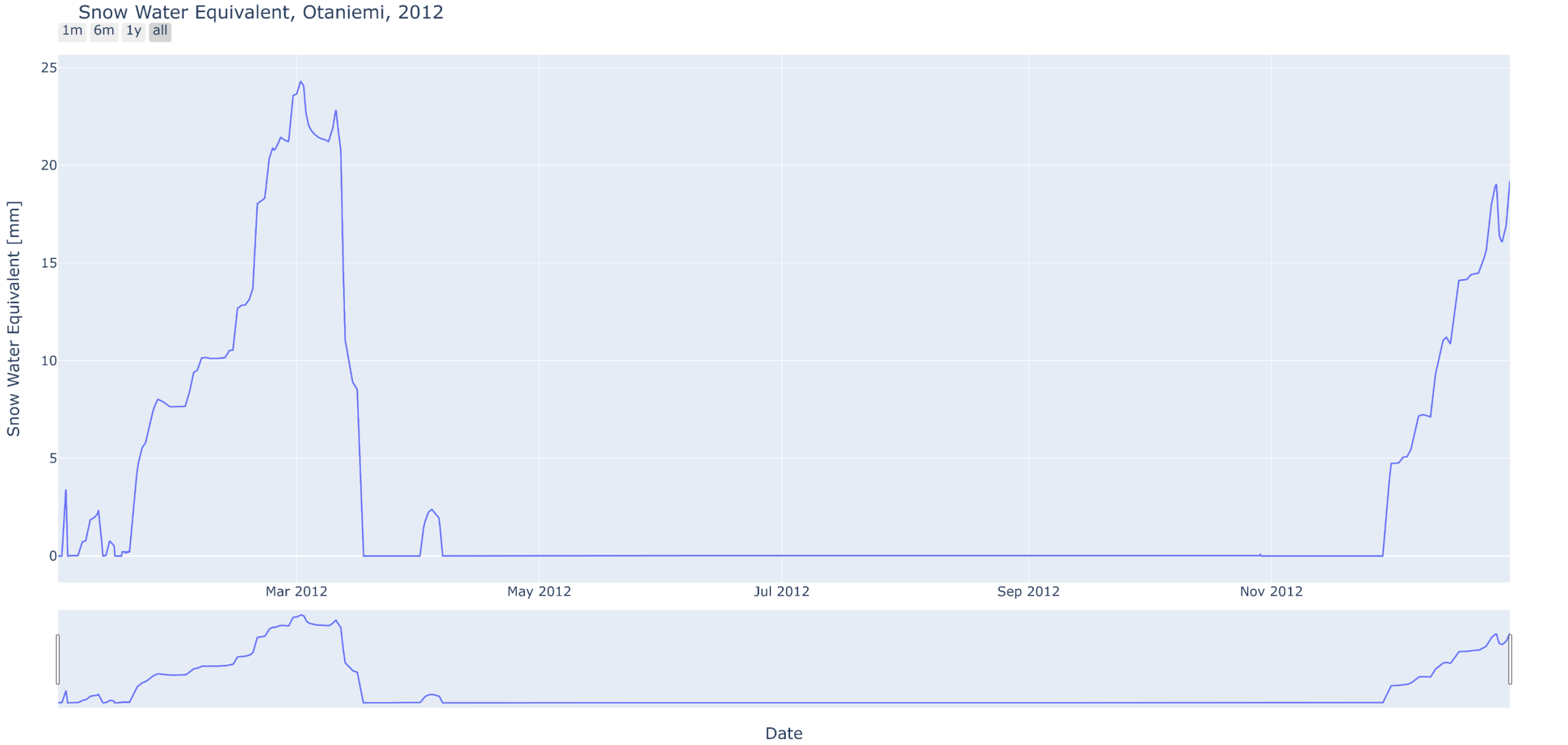
Jan 2012 - Dec 2012


Water level in the soil, Otaniemi, 2012
1m
6m
1y
all
Water level in the soil - macropores
Water level in the soil - soil matrix
Depth [m]
−0.4
−0.6
−0.8
−1
−1.2
−1.4
−1.6
−1.8
−2
Mar 2012
May 2012
Jul 2012
Sep 2012
Nov 2012
Date


Water Balance Components, Otaniemi, 2012
1m
6m
1y
all
Instantaneous [mm]
25
20
15
10
5
0
Mar 2012
May 2012
Jul 2012
Sep 2012
Nov 2012
Date
Precipitation(oPrecSi)
Evapotranspiration(oEvap, sEtM, sEtF)
Open ditch(sDit_0,sDit_1)
Drains(sDra_0,sDra_1)
Surface runoff(oDit_0)


Water Balance Components, Otaniemi, 2012
1m
6m
1y
all
Instantaneous [mm]
25
20
15
10
5
0
Sep 30
2012
Oct 7
Oct 14
Oct 21
Oct 28
Date
Precipitation(oPrecSi)
Evapotranspiration(oEvap, sEtM, sEtF)
Open ditch(sDit_0,sDit_1)
Drains(sDra_0,sDra_1)
Surface runoff(oDit_0)


Water Balance Components, Otaniemi, 2012
1m
6m
1y
all
Cumulative [mm]
250
200
150
100
50
0
Mar 2012
May 2012
Jul 2012
Sep 2012
Nov 2012
Date
Precipitation(oPrecSi)
Evapotranspiration(oEvap, sEtM, sEtF)
Open ditch(sDit_0,sDit_1)
Drains(sDra_0,sDra_1)
Surface runoff(oDit_0)


Snow Water Equivalent, Otaniemi, 2012
1m
6m
1y
all
Snow Water Equivalent [mm]
25
20
15
10
5
0
Mar 2012
May 2012
Jul 2012
Sep 2012
Nov 2012
Date

How?

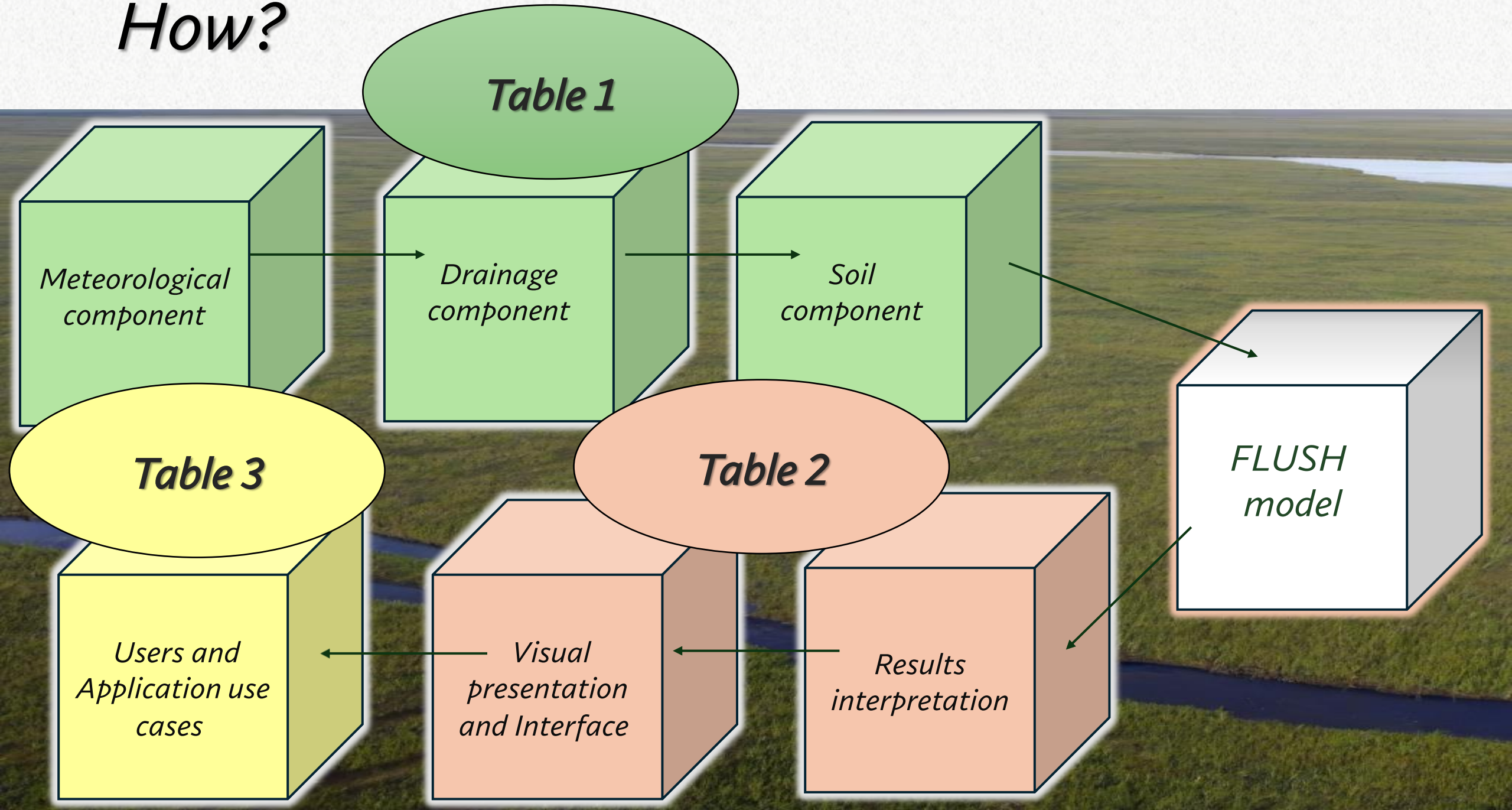


Table 1
Meteorological component
Drainage component
Soil component
FLUSH model
Table 3
Table 2
Users and Application use cases
Visual presentation and Interface
Results interpretation

We kindly ask you to complete a short questionnaire to help us develop our application further

Thank you!

Kiitos!