Regelbare drainage en infiltratie
TKI bijeenkomst

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Datum: 27-03-2023

"*Meer intense en langdurige **droogte**"*

- Environment -

Droughts in Europe expected to worsen

By Rebecca Ochs - 24.04.2018

European Scientist, 2018

"Veenoxidatie leidt tot **bodemdaling** in Nederlandse polders"

NEWS ARTICLE | 22 August 2022 | Joint Research Centre

Summer drought keeps its grip on Europe

Exceptionally hot and dry weather conditions in much of Europe continued to substantially reduce yield outlooks for the EU's summer crops.

Summer crops, such as maize, are in poor condition in the regions affected by drought.
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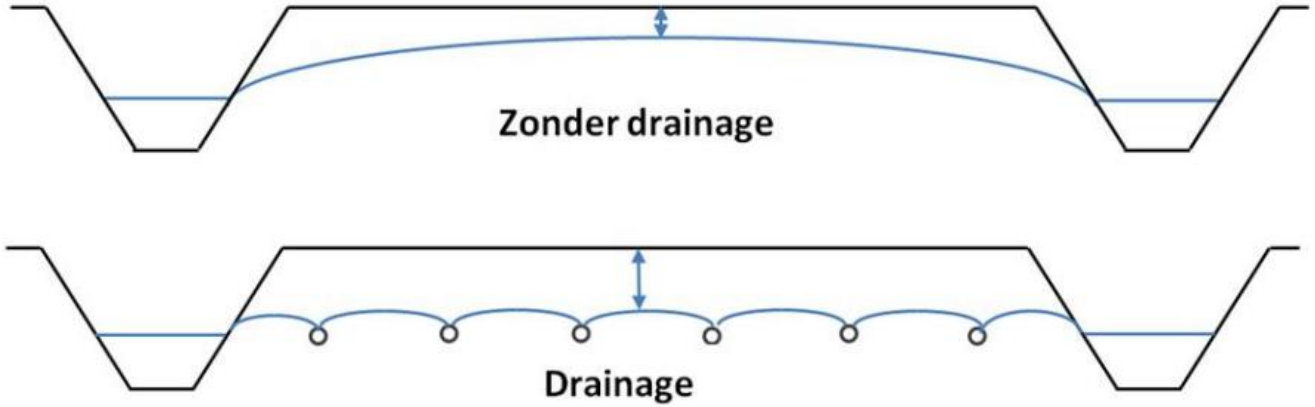
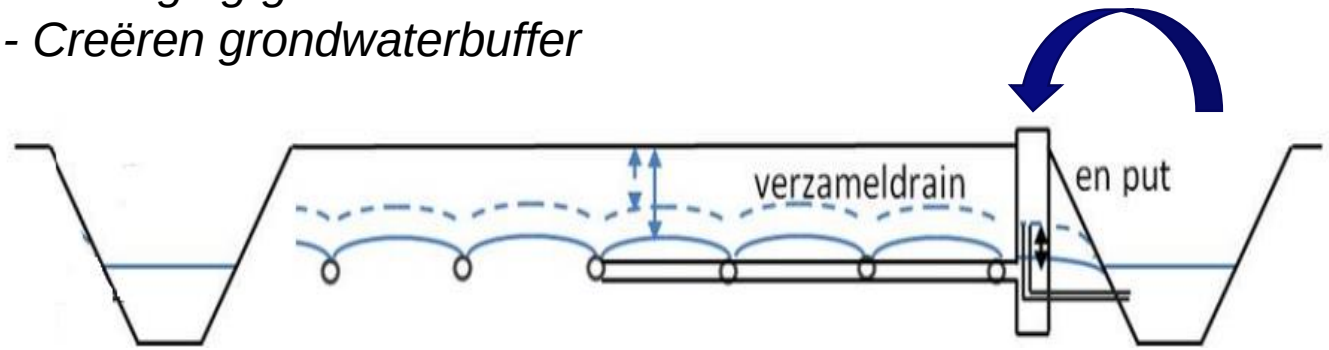
Regelbare drainage en infiltratie - achtergrond



Regelbare drainage is een veelbelovende vorm van buisdrainage om percelen gecontroleerd en optimaal te ontwateren.

- *Verhoging groundwaterstanden*
- *Creëren grondwaterbuffer*



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RDI - doelen

- Prototype *'Regelbare drainage en infiltratie'* opwaarderen.
- Module beschikbaar maken voor Modflow2005 en MODFLOW6.
- Testen in real-case Limburg.
- Aansturing module door iMOD.

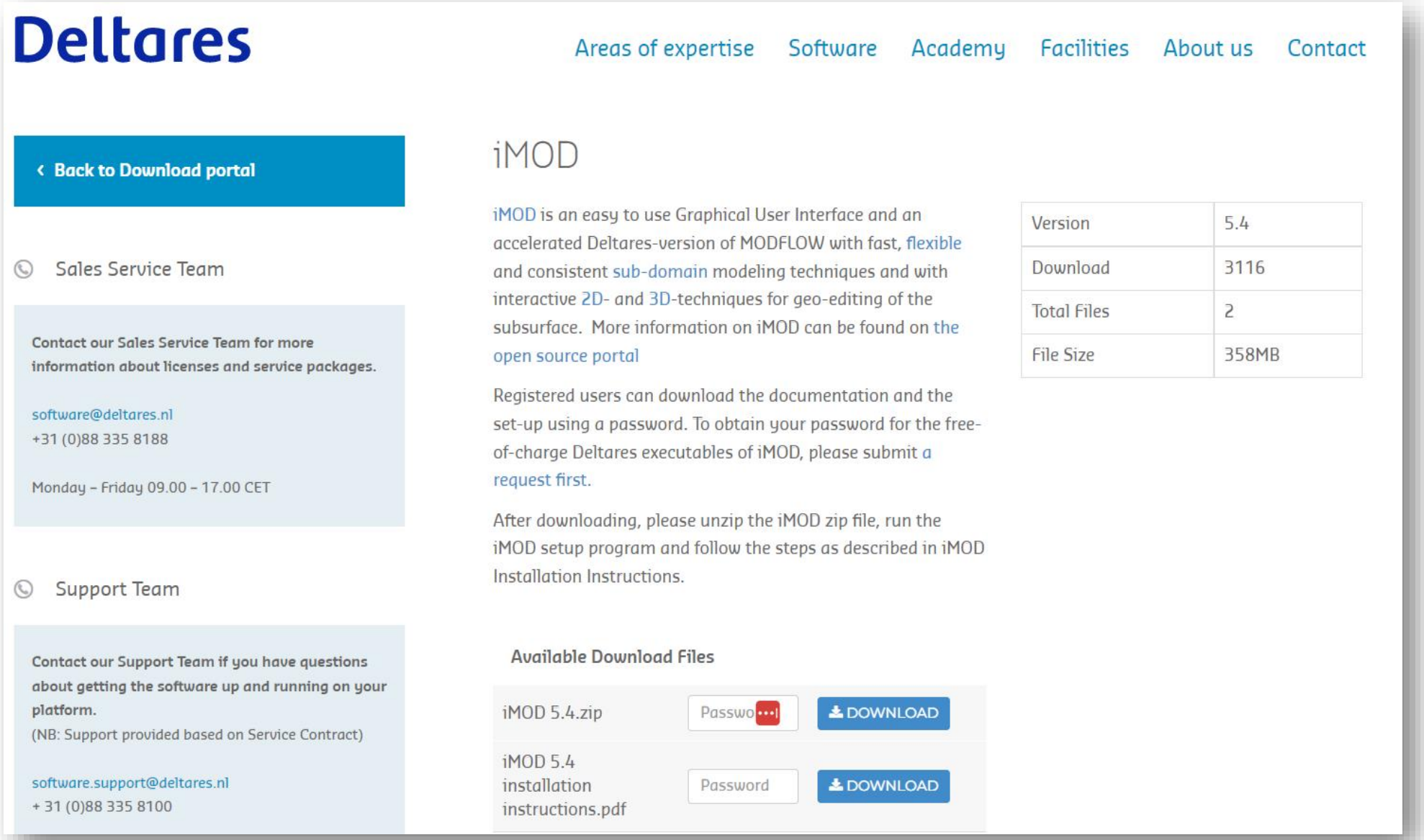
RDI - activiteiten

- Programma van eisen
  - Praktijkwensen m.b.t. sturing drainage en infiltratie
  - Gebruikerswensen software.
  - Technische koppeling MetaSWAP en MODFLOW.
- Implementatie in MetaSWAP.
- Implementatie in iMOD5.4.
- Limburg: testcase & TeamCity testbank
- Documentatie iMOD manual

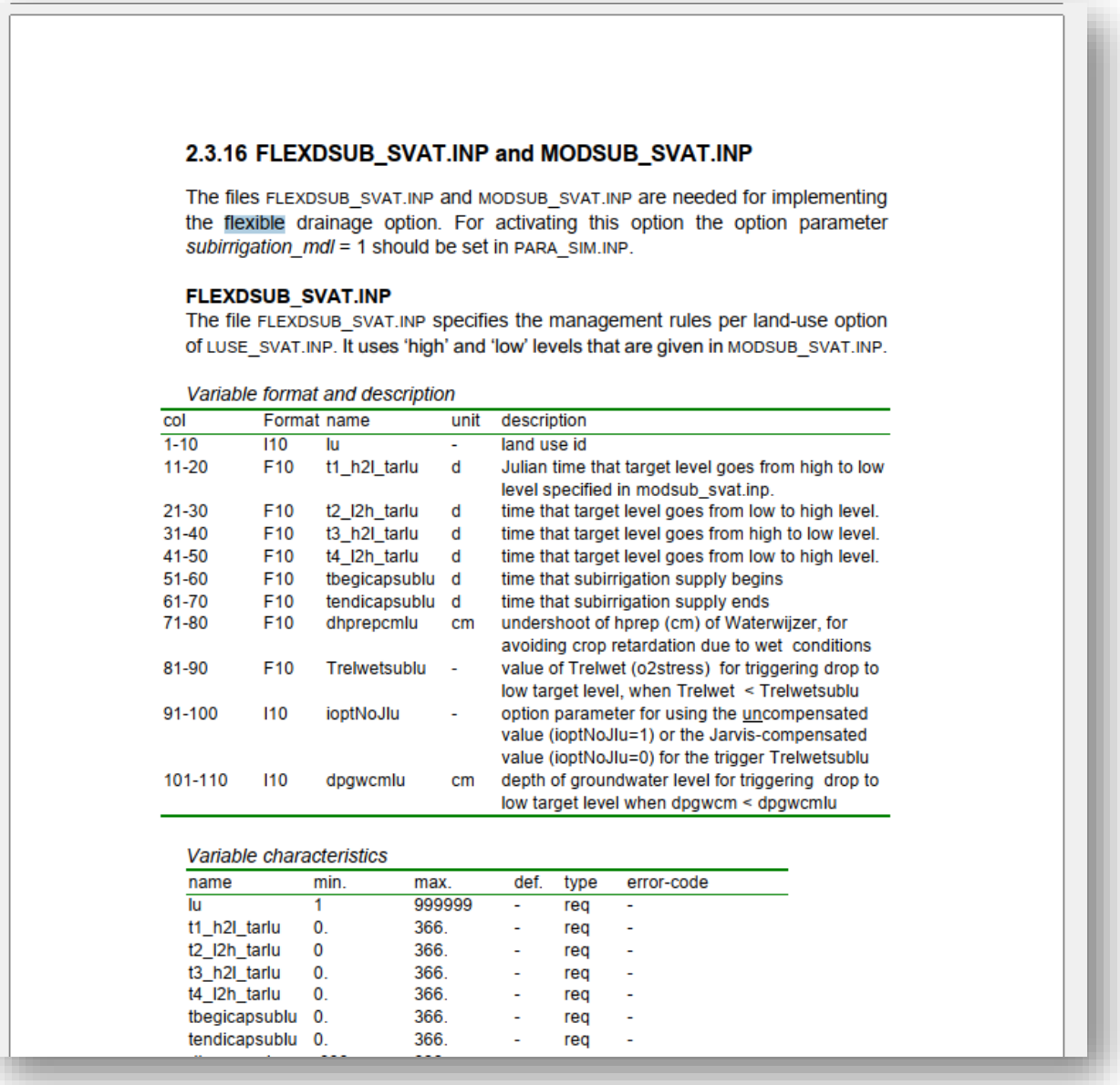
Status:

- Project afgerond.
- Release beschikbaar via https://oss.deltares.nl/web/imod.

RDI: release module in iMOD5.4



RDI: MetaSWAP - documentatie



2.3.16 FLEXDSUB_SVAT.INP and MODSUB_SVAT.INP

The files FLEXDSUB_SVAT.INP and MODSUB_SVAT.INP are needed for implementing the flexible drainage option. For activating this option the option parameter *subirrigation_mdl* = 1 should be set in PARA_SIM.INP.

FLEXDSUB_SVAT.INP

The file FLEXDSUB_SVAT.INP specifies the management rules per land-use option of LUSE_SVAT.INP. It uses 'high' and 'low' levels that are given in MODSUB_SVAT.INP.

Variable format and description

col	Format	name	unit	description
1-10	I10	lu	-	land use id
11-20	F10	t1_h2l_tarlu	d	Julian time that target level goes from high to low level specified in modsub_svat.inp.
21-30	F10	t2_l2h_tarlu	d	time that target level goes from low to high level.
31-40	F10	t3_h2l_tarlu	d	time that target level goes from high to low level.
41-50	F10	t4_l2h_tarlu	d	time that target level goes from low to high level.
51-60	F10	tbegicapsublu	d	time that subirrigation supply begins
61-70	F10	tendicapsublu	d	time that subirrigation supply ends
71-80	F10	dhprepcmlu	cm	undershoot of hprep (cm) of Waterwijzer, for avoiding crop retardation due to wet conditions
81-90	F10	Trelwetsublu	-	value of Trelwet (o2stress) for triggering drop to low target level, when Trelwet < Trelwetsublu
91-100	I10	ioptNoJlu	-	option parameter for using the uncompensated value (ioptNoJlu=1) or the Jarvis-compensated value (ioptNoJlu=0) for the trigger Trelwetsublu
101-110	I10	dpgwcmlu	cm	depth of groundwater level for triggering drop to low target level when dpgwcm < dpgwcmlu

Variable characteristics

name	min.	max.	def.	type	error-code
lu	1	999999	-	req	-
t1_h2l_tarlu	0.	366.	-	req	-
t2_l2h_tarlu	0	366.	-	req	-
t3_h2l_tarlu	0.	366.	-	req	-
t4_l2h_tarlu	0.	366.	-	req	-
tbegicapsublu	0.	366.	-	req	-
tendicapsublu	0.	366.	-	req	-

RDI: iMOD5 - documentatie

Option View Attachment Annotation & Video Sign

Bookmarks

- 11 Theoretical background of iMOD packages
  - 11.1 CAP MetaSWAP Unsaturated zone module
    - 11.1.1 Flexible Drainage and Subirrigation
  - 11.2 BND Boundary conditions
  - 11.3 SHD Starting Heads
  - 11.4 KDW Transmissivity
  - 11.5 VCW Vertical resistances
  - 11.6 KHV Horizontal permeabilities
  - 11.7 KVA Vertical anisotropy for aquifers
  - 11.8 KVV Vertical permeabilities
  - 11.9 STO Storage coefficients
  - 11.10 SPY Specific Yield
  - 11.11 TOP Top of aquifers
  - 11.12 BOT Bottom of aquifers
  - 11.13 PWT Perched water table package
  - 11.14 ANI Horizontal anisotropy module
  - 11.15 HFB Horizontal flow barrier module
  - 11.16 IBS Interbed Storage package
  - 11.17 SFT Streamflow thickness package
  - 11.18 WEL Well package
  - 11.19 DRN Drainage package
  - 11.20 RIV River package
  - 11.21 EVT Evapotranspiration package
  - 11.22 GHB General-head-boundary package
  - 11.23 RCH Recharge package
  - 11.24 OLF Overland flow package
  - 11.25 CHD Constant-head package
  - 11.26 FHB Flow and Head Boundary package
  - 11.27 ISG iMOD Segment package
  - 11.28 SFR Surface water Flow Routing Package
  - 11.29 LAK Lake Package

11.1.1 Flexible Drainage and Subirrigation

This MetaSWAP module is optional and available for Modflow2005 and MODFLOW6. It gives the opportunity to define flexible drainage levels for defined areas, so called Water Management Units (WMU). The drainage level in these WMU's is flexible through connections of all drains to a single stilling well or a surface water channel with a level control mechanism (see Figure 11.2).

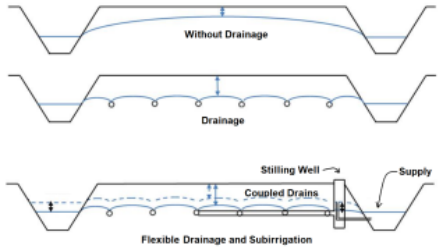


Figure 11.2: Concept of Flexible Drainage and Subirrigation

It is an option to extend the flexible drainage function with the option of subirrigation. Therefore the WMU is connected to an external source of water supply. The supply can be from surface water or from ground water. The ground water can be extracted from any location in the model.

For each WMU one Steering Location is defined. On this location the model provides feedback necessary to decide whether the low or high target level must be activated. The high target level can be intermittently lowered based on feedback from the simulation. These situations include 1) oxygen stress, 2) shallow groundwater levels and 3) pressure head in the period preceding the planting of the crop.

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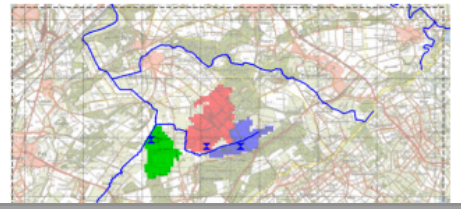
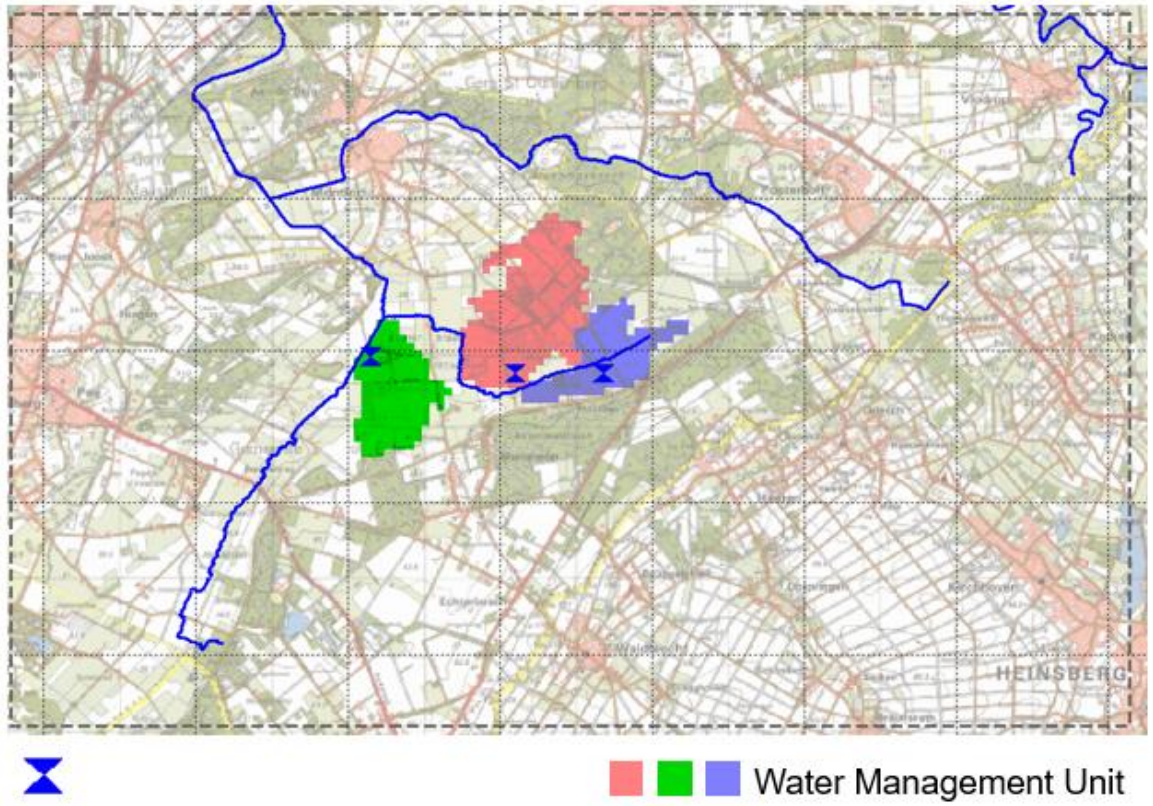
iMOD, User Manual

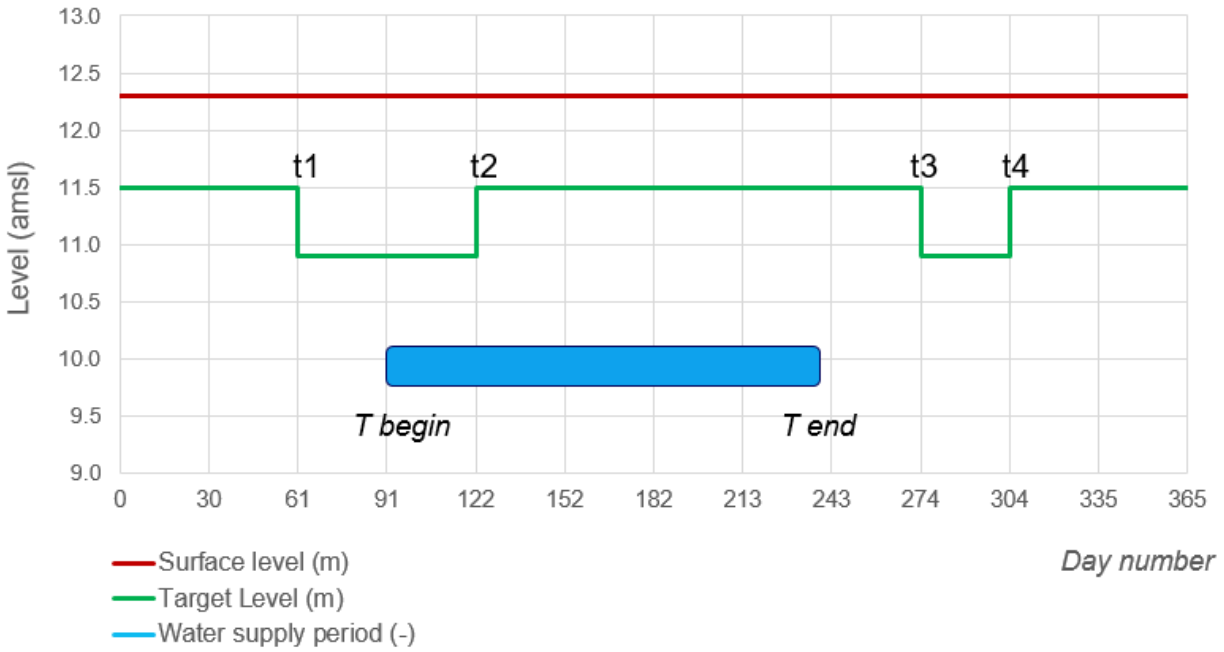
Model input iMOD

To activate this module, iMOD only needs the input of 3 IDF files and 1 IPF file in the project file (RUN file is not supported). A general explanation of this input is presented in the figure below. A more detailed description of the content of these 4 files is given in the section with the PRJ input requirements (section 9.3.3).
iMOD transforms the input files into the MetaSWAP input file: MODSUB_SVAT.INP.

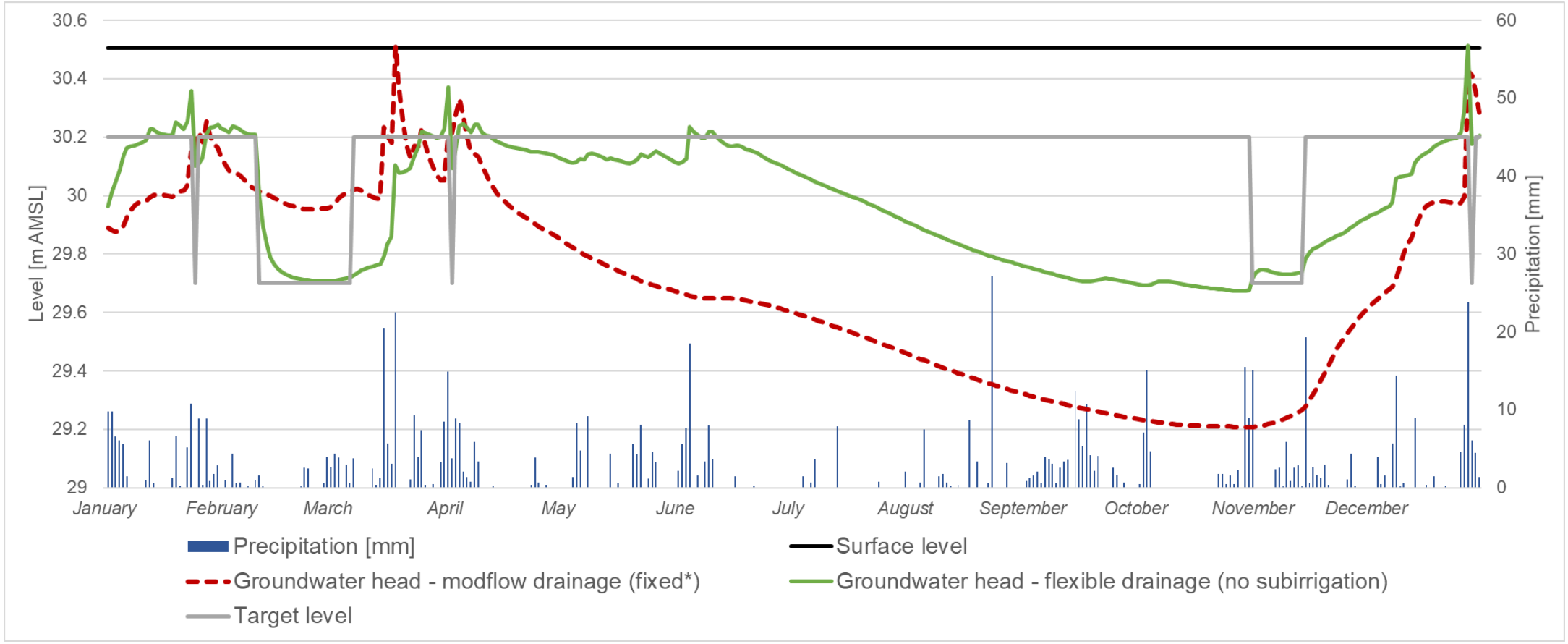


RDI: toepassing - gebruiker

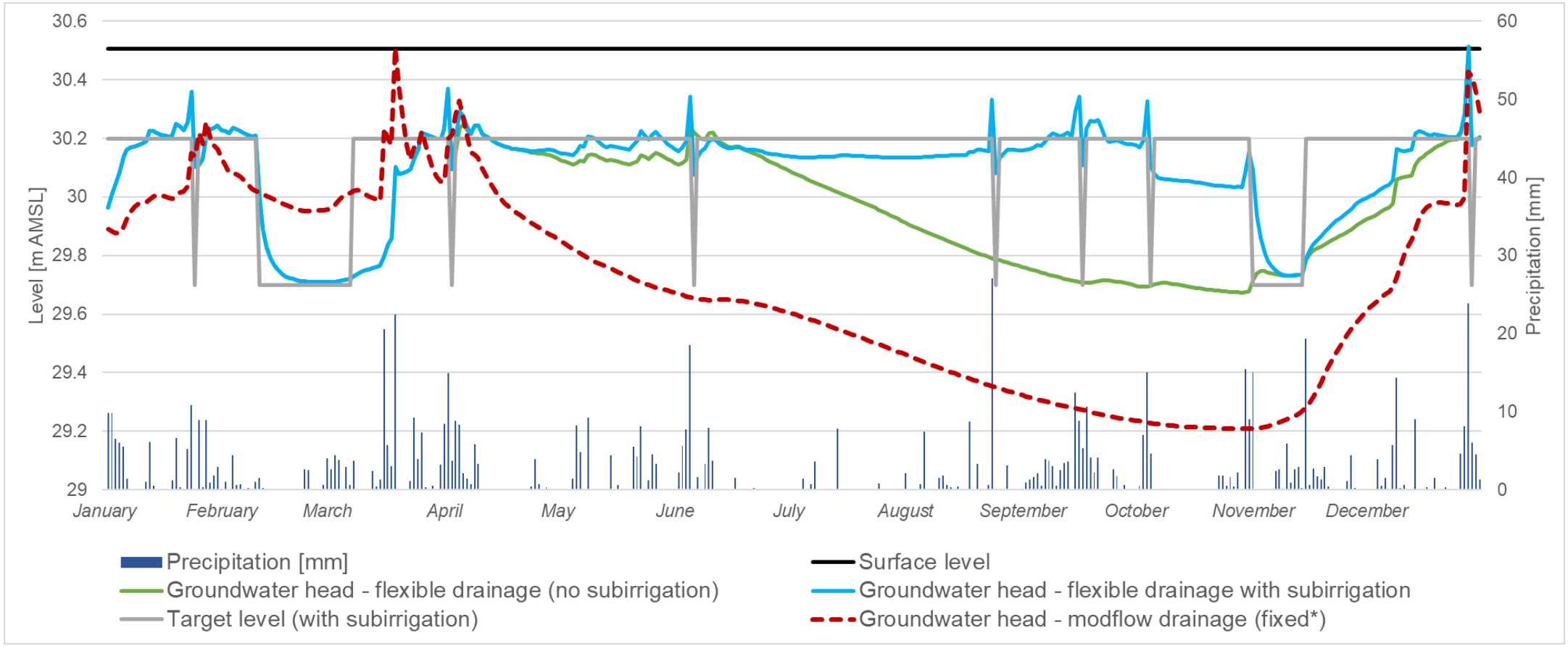




RDI: toepassing - gebruiker



RDI: toepassing - gebruiker



Regelbare drainage en infiltratie: discussie

- RDI is een nuttige en bruikbare module, en nu verder…

Vervolg:

- Software: mogelijk maken dynamische uitwisseling met oppervlaktewater.
- Praktijktoepassing: waterschap Aa en Maas, waterschap Limburg.
- Verbreding, meer gebruikers aan zet. Doorontwikkeling.