Daisy Newsletter no. 44

1 The Daisy code, v. 7.1.5

Daisy version 7.1.12 is the latest official release. Get it here: https://github.com/daisy-model/daisy/releases/tag/v7.1.12

From this version you can specify models for max exfiltration at the soil surface. The four main models are:

(Surface original (max_exfiltration Hansen))
(Surface original (max_exfiltration Theta))
(Surface original (max_exfiltration Theta (h_crit 6 [pF])))
(Surface original (max_exfiltration steady-state))

The first three all uses Darcy's Equation formulated on θ for estimation of the max infiltration. The difference is the estimation of water content at the surface. The *Hansen* model assume only residual water (Theta_res), or zero for hydraulic models with no residual water. The *Theta* model assume water content corresponding to h_crit, or by default h_atm. The last model, the *steady-state* model, assumes steady state flow from the top node to the surface. The h_crit parameter can also be applied to this model. This model only makes sense if your hydraulic function includes vapor flow, such as the *hyprop* function.

In addition, several bugs in the hydraulic *hyprop* function have been fixed. If you are running simulations using the *hyprop* function we therefore highly recommend that you download and apply the newest Daisy version. Alternatively, use the 'table' model and have hyfit (the METER software) generate the tables.

Lastly, a new root component have replaced the the *RootSystem* submodule. This has led to a change in log definitions. Thus, if you have defined your own log files including root information, such as root depth, you have to update these when installing the newest version of Daisy.

For additional information and details of the latest changes see NEWS: daisy/NEWS at main · daisy-model/daisy · GitHub or Releases: Releases · daisy-model/daisy · GitHub.

We recommend that all users run Daisy from Visual Studio Code using the Daisy VScode extension. A guide for setting up Visual Studio Code for Daisy can be found here. For installation and configuration with textpad follow this guide.

2 Courses

This year's Daisy PhD summer course will take place from 31 August to 4 September at the University of Copenhagen. Read more here: Daisy PhD Course 2026 – University of Copenhagen.

3 Daisy uses meetings

In the spring, we had three interesting talks at our user meetings:

- Ryan Douglas (The James Hutton Institute): *Calibrating Scottish spring barley.*
- Celine Rendboe Grønning (UCPH): *Predicting air-filled porosity to drive N_2O models.*
- Anna Leed Madsen (UCP): *Modelling the effect of surface plant residues on water and carbon dynamics under conservation agriculture.*

We will continue the meetings in the autumn. They are held on the first Wednesday of each month from 12:30–13:30, both in person (Thorvaldsensvej 40, Room T532) and online (write to daisy@ku.dk for a link).

If you would like to present a project or suggest topics for the lunch meetings, please contact daisy@ku.dk.

4 Recent article where Daisy have been used

A new review paper *"The Daisy model: A tool for simulating agricultural systems – Recent (2012-2025) developments, calibrations and validations"* (Holbak et al., 2026) , has been published. It presents the current state of the model, with a focus on new developments such as modelling of N_2O production, the effects of surface residues, inclusion of cover crops, and the fate of PFAS. In addition, it reviews ∼120 studies documenting the performance of Daisy across agricultural systems and pedoclimates.

Delhez et al. (2026) applied a Pareto-based multi-objective calibration approach to optimise Daisy using the sun–shade–open canopy (SSOC) Soil–Vegetation–Atmosphere Transfer (SVAT) model and the biochemical photosynthesis model of de Pury and Farquhar (1997). The target objectives were dry matter production, net ecosystem exchange, and latent heat flux for five growing seasons of winter wheat. They found that the optimal parameter set (22 calibrated parameters) resulted in satisfactory performance for all objectives. However, a strong trade-off was observed between dry matter production and net ecosystem exchange, while the trade-offs between latent heat and net ecosystem exchange indicated issues of equifinality due to the challenges of evapotranspiration partitioning.

Rashid et al. (2025) evaluated the agronomic (dry matter yield and nitrogen yield) and environmental (nitrogen losses to air and water) performance of eight bio-based fertilizers in six European cropping systems under three nitrogen replacement strategies (agronomic, environmental, and intermediate). The environmental strategy led to yield reductions (<10%) while keeping nitrogen losses similar to the baseline (mineral fertilizer) and potentially improving soil quality. In contrast, the agronomic strategy maintained or increased yields but also increased nitrogen losses compared to the baseline.

Jakobsen et al. (2026) simulated the fate of four PFAS: perfluorooctanesulfonic acid (PFOS), perfluorooctanoic acid (PFOA), perfluorohexanoic acid (PFHxA), and perfluorobutanoic acid (PFBA), in agricultural soil under diffuse atmospheric deposition. Two approaches to solid-phase sorption were tested: normalizing *Kd* to organic carbon (K_{oc}), and a method including both organic carbon and clay content ($K_{oc} + K_{clay}$). In addition, sorption at the air–water interface was implemented. In sandy soil, PFAS were primarily retained in the A horizon, with K_{clay} increasing the retention of short-chain PFAS and K_{AWI} increasing the retention of long-chain PFAS. In sandy loam, PFAS were retained throughout the soil column when adsorption to clay was included. In contrast, sorption at the air–water interface was negligible because the interface disappeared under saturated conditions during the simulated wet winter months.

5 References

Delhez, L., Laloy, E., Beauclaire, Q., Longdoz, B., 2026. Interpreting carbon-water trade-offs in Daisy crop model using Pareto-based calibration. Biogeosciences 23, 2079–2099. https://doi.org/10.5194/bg-23-2079-2026

Holbak, M., Svane, S., Grønning, C.R., Magdalena, S., Tobias, K., Styczen, M., Abrahamsen, P., Diamantopoulos, E., 2026. The Daisy Model: A Tool for Simulating Agricultural Systems – Recent (2012-2025) developments, calibrations and validations To be published in: Agricultural Systems. Agric. Syst. Accepted for puplication.

Jakobsen, C., Holbak, M., Svane, S.F., Abrahamsen, P., Strobel, B.W., 2026. Modeling per- and polyfluoroalkyl substances fate in agricultural soils: Clay and air-water interface adsorption. Vadose Zone J. 25, e70114. https://doi.org/10.1002/vzj2.70114

Rashid, M., Wester-Larsen, L., Agostini, L., Jensen, L., 2025. Modelling agronomic and environmental effects of bio-based nitrogen fertilisers in Europe. Nutr. Cycl. Agroecosystems 132. https://doi.org/10.1007/s10705-025-10463-z