The Daisy Model Newsletter
Department of Plant and Environmental Sciences
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Daisy Newsletter no. 34

1 The Daisy code, v. 6.32

The last official release for all platforms is still 6.32. However, if you are interested in trying the new functions for running many simulations ("spawn") and summarising many simulations ("nwaps"), you need to download version 6.36, which is only available for Windows so far.

2 Courses

The PhD-summer course "Short course on Daisy" will run from 28th August to 1st September 2023. See our homepage for more information and enrolment. This year, special arrangements have been made to be able also to enroll MSc's.

3 Events

Per Abrahamsen presented the two new functions "spawn" and "nwaps" in the Daisy lunch meeting on 31st May. In case you would like to volunteer to present a project or would like to discuss a subject with other Daisy modellers, please write to styczen@plen.dk.

4 Daisy on linkedin

Daisy now has a linkedin-page (linkedin.com/company/daisy-soil-plant-atmosphere-system-model/).

5 Progress on AgroEco-HPM

The first meeting of Core Collaborators was held on the 8th of May, with good attendance and many good suggestions. A steering committee for the project was selected and consists of Associate Prof. Sander Bruun (PLEN, UCPH), Senior Scientist Finn Plauborg (AGRO, AU), Special Consultant Mette Kramer Langgaard/Director Mikkel B. Buchvardt, SEGES, Prof. Efstathios Diamantopoulos, Univ. of Bayreuth, a person from the Danish Agricultural Agency and XX from DIKU, UCPH.

Figure 1. Group discussions concerning how to cooperate in the future.

Presently, we are in the process of establishing a range of working groups to help guide the project on databases to implement, advanced methods of optimisation, sensitivity analyses etc. to implement, gaps to be filled and educational support.

Some of the immediate improvements so far would be a clean-up of the homepage, steps forward with the documentation (Chapter 3, including surface processes related to water, heat, and solute transport) on the surface are now described and released, together with appendices on the new mulch module, generation of colloids and FOCUS-options for pesticide simulations).

The new functions mentioned above are part of the work on "ParaDaisy", which will facilitate

running of simulations in parallel and managing output data.

We have started the work to link databases to the new platform. A script already allows retrieval of DMI-data, but this will become more useful when DMI releases corrected precipitation data sometime in the autumn.

Some of the "invisible" work that has started, has to do with quality control of the code, where Institute of computer science (DIKU) subjects us to meticulous scrutiny.

Figure 2. The team, left to right: Sune Darkner, Merete Styczen, Maja Holbak, Sarah Niebe and Per Abrahamsen.

6 Recent articles where Daisy has been used

Christiansen et al. (2023) have carried out a comprehensive study, using a range of databases, to improve estimation of denitrification in the groundwater, with the aim of providing a tool that can be used for decision making on-farm. Daisy is only involved as generator of water flow for the NLES5-model. The costs of such an exercise were estimated and an assessment of where such detailed information could prove useful. For groundwater, the MUDFLOW model was used. The study is very relevant for people working at catchment scale.

7 Other articles

Xing et al. (2023) have provided a very useful comparison of algorithms for simulation of N_2O in six widely used agro-ecological models. The comparisons showed that environmental factors impact nitrification and denitrification differently in each model. Reasons include the inability to apportion the total N_2O flux to the specific N transformation rates used to validate and calibrate the simplifications represented in the model algorithms, and incomplete understanding of the multiple interactions between processes and modifying factors as these are generally not quantified in field experiments. Rather, N_2O flux data is reported as total or net N_2O emissions without attributing emissions to gross and/or net rates for specific N processes or considering changes that occur between production and emissions.

The study points towards a huge need to consolidate knowledge in this field, as the way the models handle the effects of environmental factors results in extremely different estimates.

8 References

8.1 Daisy

Christiansen, A.V., Frederiksen, R.R., Vilhelmsen, T.N., Christensen, S., Maurya, P.K., Hansen, B., Kim, H., Høyer, A-S., Aamand, J., Jakobsen, R., Børgesen, C.D., Jacobsen, B.H., and Auken, W. (2023): N-Map: High-resolution groundwater N-retention mapping and modelling by integration of geophysical, geological, geochemical, and hydrological data. Journal of Environmental Management 343, 118126. https://doi.org/10.1016/j.jenvman.2023.118126.

8.2 Other articles of general interest

Xing, H., Smith, C.J., Wang, E., Macdonald, B. and Wårlind, D. (2023). Modelling nitrous oxide emissions: comparing algorithms in six widely used agro-ecological models. Soil Research. https://doi.org/10.1071/SR22009.