The Daisy Model Newsletter
Department of Plant and Environmental Sciences
University of Copenhagen

Daisy Newsletter no. 18

1 The Daisy code, v. 5.74

Version 5.74 is still the last version published on several platforms.

2 Courses

The one-week PhD-course on basic use of Daisy at the end of August is described on https://daisy.ku.dk/courses/. Please consult the Daisy homepage for details and link to the sign-up portal.

3 Recent articles where Daisy have been used

Seidel et al. (2019) have compared four different methods of generating Kc-values used for estimation of evapotranspiration for irrigation purposes. The methods comprise the FAO-56-approach, the FAO-56-approach adjusted to frequency of wetting and the climatic conditions of the growth stages, the locally used Geisenheim irrigation scheduling approach (Germany) and Kc-values generated using Daisy simulations for common bean at two sowing dates and white cabbage. The Daisy-curves were generated based on 300 years of synthetic weather to allow inclusion of annual variation. It is quite impressive to see how different the values generated by the different approaches are, and it is clear that the simpler approaches could benefit from the suggested updates.

Trolle et al. (2019) combined end-of-the-century climate change projections from four different climate models, four contrasting land use scenarios ("Agriculture for nature", "Extensive agriculture", "High-tech agriculture" and "Market driven agriculture") and two different eco-hydrological models (Daisy/MIKE SHE and SWAT) with the aim of analyzing the potential future ecological state of Odense Fjord estuary, Denmark.

The different land use scenarios were the most significant sources of uncertainty in the projections of future ecological state, followed, in order, by eco-hydrological models and climate models, albeit all three sources caused high variability in the simulated outputs. Therefore, when projecting the future state of aquatic ecosystems in a global warming context, one should at the very least consider to evaluate an ensemble of land use scenarios (nutrient loads) but ideally also include multiple eco-hydrological models and climate change projections.

Even the most nature-friendly land use scenario where a proportion of the intensive agricultural area was converted to forest, may not be enough to counteract the negative effects of a future warmer climate on the ecological state of the estuary.

4 Other articles of interest

Lutz et al. (2019) reviewed approaches to include N_2O-generation from agricultural fields in models. Their goal is to include such processes in global models, but the article provide nice overviews of the level of detail for specific processes included in a range of field scale N-models (incl. Daisy).

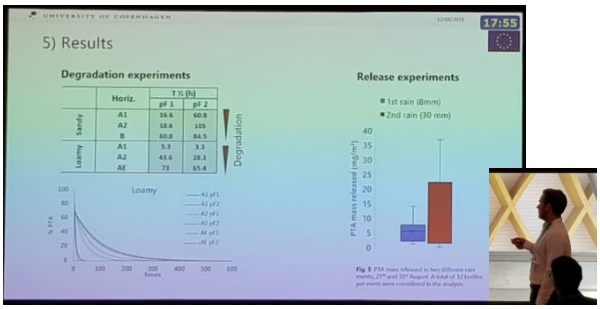
Mboh et al. (2019) compared a simple 1-D root model with a different root model (Somma) which considers root system architecture when simulating root length density. The new soil model improved both water uptake and crop growth simulations, and the study thus points towards a possible improvement of crop models.

5 Conference participation

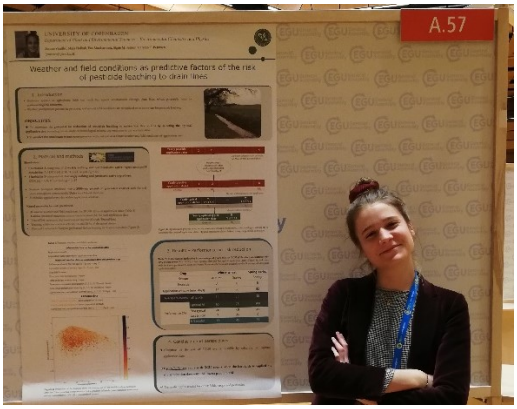
The Daisy group had two presenting participants at EGU 2019 (7-12 April, Vienna). Maja Holbak (&E. Diamantopoulos) talked about "Modelling pesticide leaching to drains with the agro-

hydrological model Daisy" in session SSS8.5/BG2.67/HS8.3.15 - Soils as a non-point source of contamination by emerging contaminants, including pesticides or their degradation products.

Daniel Garcia-Jorgensen (& Diamantopoulos, E. & Hansen, H.C.B.) had an oral presentation with the name: Modelling the fate of the natural toxins ptaquiloside at pedon-scale. From source to groundwater in session HS10.6/BG2.70/SSS4.16 – Water, isotope and solute fluxes in the soil-plant-atmosphere interface: Investigations from the canopy to the root zone. The aim of that project is to develop a modelling approach to study the fate of natural toxins, with special focus on predicting leaching concentrations.



Jeanne Vuaille and Maja Holbak participated in the International Interdiciplinary Conference on Land Use and Water Quality, Aarhus, Denmark, 3-6 June 2019 with posters. The titles were: "Effect of pesticide application timing on pesticide leaching to drains: predicting the optimum application date" (by J. Vuaille, M. Holbak, P.



Abrahamsen and C. T. Petersen) and "Calibration of the Biopore-module in the Daisy model for pesticide leaching" (by M. Holbak and E. Diamantopoulos).

6 References

6.1 Daisy

Seidel, S.J., Barfus, K., Gaiser, T., Nguyen, T.H. and Lazarovitch, N. (2019). The influence of climate variability, soil and sowing date on simulation-based crop coefficient curves and irrigation water demand. Agricultural Water Management 221: 73-83.

Trolle, D., Nielsen, A., Andersen, H. E., Thodsen, H., Olesen, J. E., Børgesen, C. D., Refsgaard, J. C., Sonnenborg, T. O., Karlsson, I. B., Christensen, J. P., Markager, S. and Jeppesen, E. (2019). Effects of changes in land use and climate on aquatic ecosystems: Coupling of models and decomposition of uncertainties. Science of the Total Environment 657, 627-633.

6.2 General interest

Lutz, F., Stoorvogel, J. J. and Muller, C. (2019). Options to model the effects of tillage on N2O emissions at the global scale. Ecological modelling 392: 212-225.

Mboh, C. M., Srivastava, A. K., Gaiser, T. and Ewert, F. (2019). Including root architecture in a crop model improves predictions of spring wheat grain yield and above-ground biomass under water limitations. J Agro Crop Sci. 205:109–128.