

Tido Strauss, 30.01.2021

### Simulation of water temperature in mesocosms (2013-2019)

Simulation of mesocosm water temperatures in 2013-2019 using weather data from the weather station located 35 km from the mesocosms (mesocosm GmbH, Homberg, Germany).

#### Available data:

Weather data with hourly time resolution needed for the hydrodynamic module in HyLaM:  
global radiation [ $\text{J cm}^{-2}\text{s}^{-1}$ ], air temperature [ $^{\circ}\text{C}$ ], wind speed [ $\text{ms}^{-1}$ ], atmospheric pressure [hPa], and  
air humidity [%].

Data file: Weather-2013-2019\_Station-30km-from-FNU-172mASL-Linden\_MesocosmGmbH-ID:1404-54\_Source-Hessisches-Landesamt-für-Naturschutz-Umwelt-und-Geologie\_Stationnumber:1005\_Stationcode-DEHE042-last-accessed-2020-05-11\_www.hlnug.de

#### Model used:

Hydrodynamic lake model HyLaM (Strauss et al. 2017: The power of hybrid modelling: An example from aquatic ecosystems. Ecological Modelling 364:77-88.

<https://doi.org/10.1016/j.ecolmodel.2017.09.019>)

#### Assumptions:

Water level 1m, Secchi depth: 75 cm.

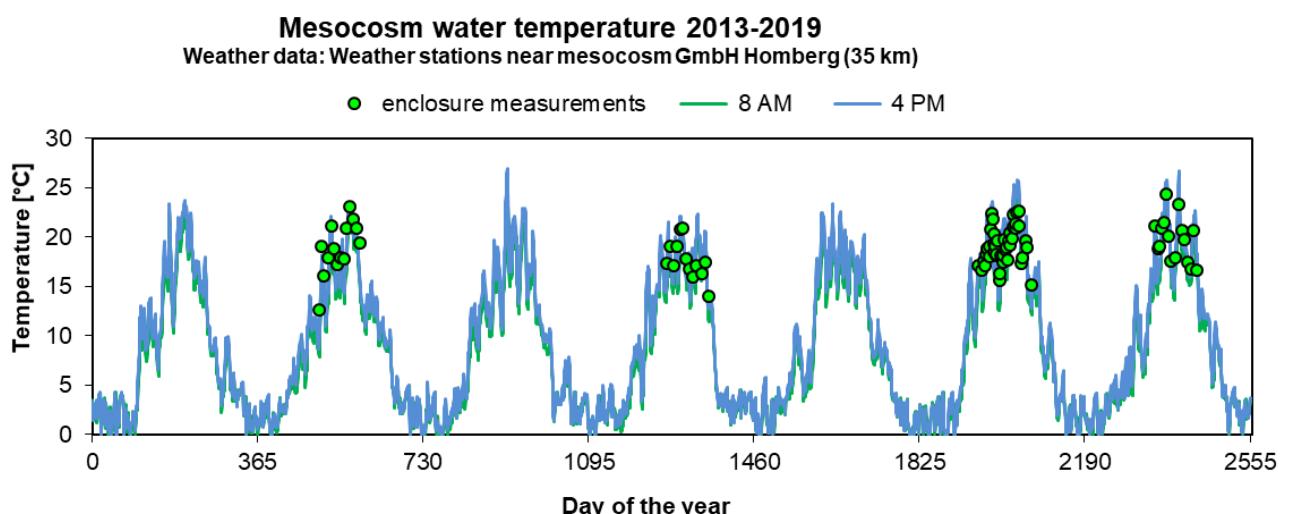
20% reduction of global radiation (e.g. caused by covering by water plants).

#### Results:

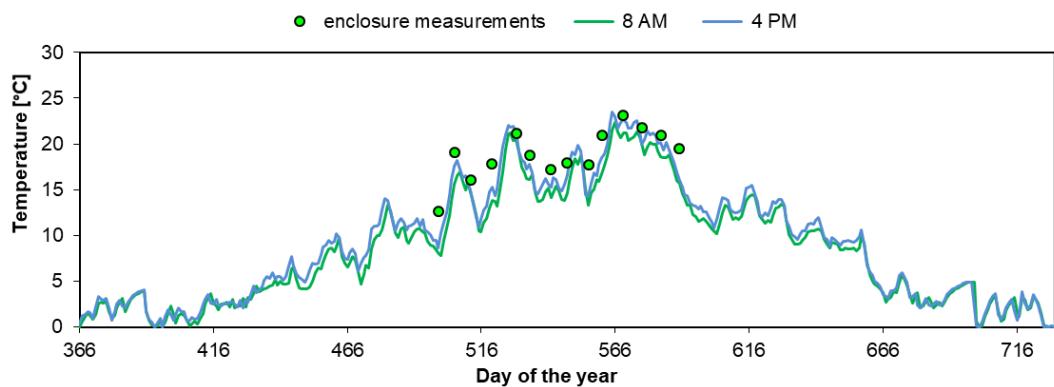
Data output of the simulation at 6 am and 4 pm.

The measured data are mostly well matched by the simulations except for the second half of 2018, when the temperature was slightly overestimated in the simulation.

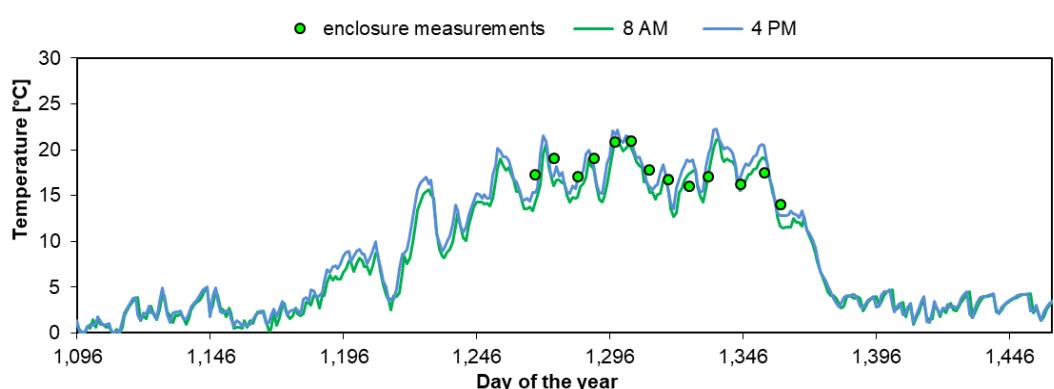
The summed deviations between simulations and measurements are 1.6°C in the morning (8 AM), 1.7°C in the afternoon (4 PM).



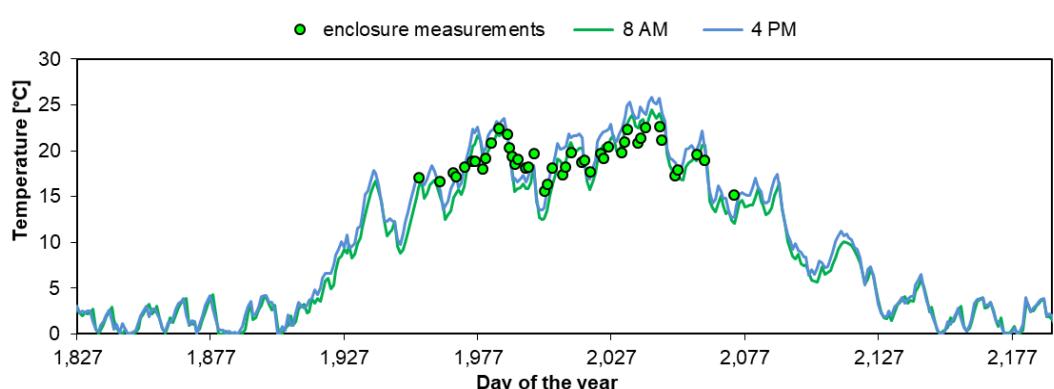
**Mesocosm water temperature 2014**  
Weather data: Weather stations near mesocosm GmbH Homberg (35 km)



**Mesocosm water temperature 2016**  
Weather data: Weather stations near mesocosm GmbH Homberg (35 km)



**Mesocosm water temperature 2018**  
Weather data: Weather stations near mesocosm GmbH Homberg (35 km)



**Mesocosm water temperature 2019**  
Weather data: Weather stations near mesocosm GmbH Homberg (35 km)

