

Master Thesis (Agri) – Modelling crop growth in Agrophotovoltaic systems

Background

Agrophotovoltaic (APV) is a new form of photovoltaic systems that, in addition to electricity generation, allows agricultural use of the same area in order to achieve a resource-efficient use of agricultural land. To assess the potential of renewable energy sources, such systems are currently being investigated at the **Fraunhofer Institute for Solar Energy Systems (ISE), Freiburg**, with research focusing on the shadow tolerance of crops, intelligent light management and synergy effects through dual land use.

For predicting plant growth, water, energy, and matter fluxes in the soil-vegetation-atmosphere continuum, numerical models are commonly used. An encompassing model library is the agro-ecosystem model Expert-N which will be applied in the context of this Master thesis to analyze possible effects of the photovoltaic devices on the growth and yield formation of different field crops.

Your tasks are

- Review of the agroecosystem model Expert-N v5
- Development of a conceptual crop growth model for APV applications
- Collection and preparation of input data on soils, crops, weather, and agricultural management
- Derivation and set up of input parameters for Expert-N v5 with a special focus on light regime and wind field
- Performing the simulations
- Visualization of results and discussion

What we expect

- Studies in Agricultural or Environmental Sciences, Bioenergy or comparable
- Very high interest in renewable energies, sustainability and resource efficiency
- Participation in the module Plant & Crop Modelling or independent familiarization with the Expert-N model package
- Ability to work in a team, reliable, committed and very self-reliant way of working, willingness to travel to Freiburg several times

The Master thesis will be carried out in cooperation of the Department of Biogeophysics with the Fraunhofer Institute for Solar Energy Systems (ISE), Freiburg (www.ise.fraunhofer.de)

General Information

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Examiners:

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Further information
www.agrophotovoltaik.de