Webinar "Harnessing the power of Destination Earth: Anticipating solar energy risks using Europe's massive Digital Twin"

Q&A

Answers by THU, OHB Digital Services, and Reuniwatt

EO4ER Digital Twin

Q. What is an active grid operation for low voltage grids?

A. THU: Active low voltage (LV) grid operation involves the use of new technologies and real-time control to make the electricity grid more stable, efficient, and responsive to the growing number of distributed energy resources (DERs) like solar systems and battery storage. Instead of passive operation, this approach uses data from grid sensors, smart algorithms, and communication networks to manage devices like power generators, accumulators, and electric vehicles in real time. Key aspects include dynamic voltage control (Q(U) control), active power injection to maintain grid frequency, and congestion management to prevent bottlenecks.

Q. What are the limits? Can your tool be extended to simulate a whole region (e.g. Bavaria) or a whole country?

A. OHB DS: There are no inherent technical boundaries. The current solution focuses on the low-voltage grid of Hittistetten, mainly due to the close collaboration with local stakeholders. However, the service architecture is designed to be scalable — other grid models can be uploaded and integrated, enabling the same functionalities for larger regions or different areas. Technically, in the current version of the prototype, the grid model management follows the specifications of the established PandaPower framework.

Q. Will the system be extended to other energy domains e.g. water production and distribution, natural gas, district heating?

A. THU: The project focused on Earth observation for energy risks, was designed as a one-year demonstration for PV energy systems. However, the system has been developed with scalability in mind, and we are open to extending it to other energy domains in future phases. This expansion would enable a broader assessment of energy-related risks and support integrated resource management using Earth observation data.

Q. What are the temporal and spatial resolution of the solar forecast based on MTG? Is real-time possible or is there a delay due to aerosol climatology data?

A. Reuniwatt: MTG offers a temporal resolution of 10 minutes, compared to MSG's quarterly input data. As for the spatial resolution, it all depends on the location. At the nadir, the spatial resolution is of 0.250 km². There is no lag to obtain our forecasts updated every 10 minutes.

Q. Do you use a physical model for the pv installations? If so, do you plan to also enable a machine learning approach so that the energy forecasts automatically adjusts in case of new or retired pv plants?

A. THU: Yes, we used a physical model for the PV power forecast, which relies on meteorological inputs such as solar irradiance, temperature, and wind speed to estimate power output. However, we are open to applying machine learning techniques in future or larger-scale projects to improve forecasting accuracy, capture complex nonlinear relationships, and enhance the overall reliability of the power prediction.

Automatically adjusting to new or retired PV plants is not planned yet, however this could be technically feasible using the API of Germany's core energy market data register.

Q. How to model the impact of temperature and wind on power lines ?

A. THU: In power lines for grid, temperature affects conductor resistance. As temperature rises, conductor resistance increases leading to higher losses and greater risks: However, in this version of our DTC, we are not directly modeling the impact of temperature on power lines, but it can be explored in a future follow-up project.

Q. How does wind speed influence power production?

A. THU: Wind speed influences power production mainly through its cooling effect on solar panels. As wind speed increases, it enhances convective heat transfer from the panel surfaces, lowering their operating temperature. Since PV module efficiency decreases with rising temperature, this cooling helps maintain higher voltage and overall efficiency. Therefore, while wind speed does not directly generate power in PV systems, it indirectly improves power output and reliability by preventing thermal losses and overheating.

Q. Are soil temperature models for the earth under beton, asphalt, etc. available via the DestinE platform?

A. THU: This is not yet clear. More details will be available on the DestinE platform soon.

Q. When will the final version of your tool be online? Will it be possible to freely access DestinE Digital Twin data?

A. OHB DS: The evaluation of the EO4ER project by ESA, which will inform potential follow-up activities within the DestinE environment, is scheduled for February 2026. Therefore, the final version is expected to be available by the end of January 2026. However, the DestinE platform already offers a selection of operational services available to all registered users. These services can include access to Digital Twin data. For more advanced features and data, such as high-resolution climate simulations, users are required to apply for upgraded access. This level of access is typically granted to specific user categories, including public authorities, academia, research organizations, SMEs, and start-ups, provided their activities align with the objectives and scope of DestinE.