Forest Digital Twin Component for DestinE

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**and the Forest DTC consortium**

Forest Digital Twin Component (DTC)

- Implemented for integration with DestinE with funding from the European Space Agency (ESA), European Union and the Research Council of Finland.
- Process-physical forest growth and productivity model initialized with EO-based forest data
- Modular architecture to enable different models and user processes (disturbances, management scenarios)
- Will be integrated with the DESP, the DestinE Core Service Platform https://platform.destine.eu/
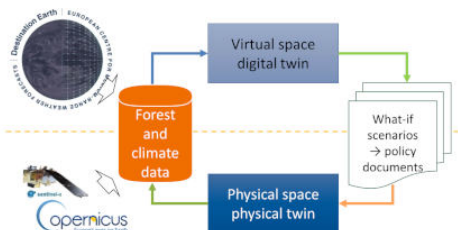- More information at www.foresttwin.org

Projects and activities

- TerraDT (coordinated by CSC – IT Center for Science, Finland), funded by Horizon Europe, 2025 – 2028)
- Forest DTC: one of the seven DTC Lead Development Actions funded by European Space Agency (ESA, 2024 – 2026)
- *Forest Digital Twin Earth Precursor*, funded by ESA 2020 – 2021
- *Artificial Intelligence for Twinning the Diversity, Productivity and Spectral Signature of Forests* (ARTISDIG, Academy of Finland, 2022 – 2024)
- *DestinE Data Lake Biodiversity Use Case* (EUMETSAT, 2024) https://destination-earth.eu/use-cases/forest-biodiversity/
+ many forest-related projects at VTT and elsewhere
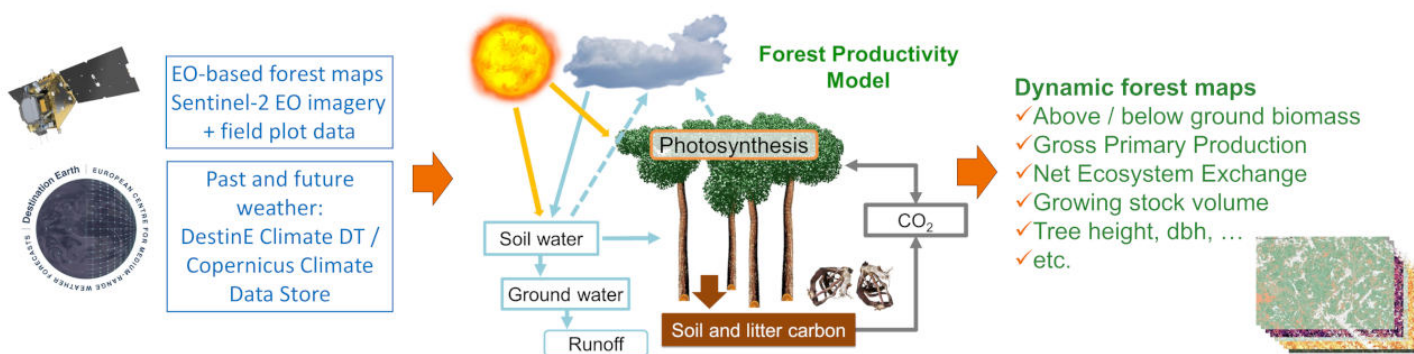
Data in Forest DTC

- Making maximum use of (open) forest data provided by other-projects and activities
- Forest productivity data for model calibration
- Possibility to update forest variable maps using latest EO imagery
- Climate data input from the DestinE Digital Twin for Climate Change Adaptation (Climate DT)

Forest DTC Contributors

- VTT Technical Research Centre of Finland
- Terramonitor (Finland)
- GFZ, German Research Centre for Geosciences
- CzechGlobe (Global Change Research Institute, Czechia)
- CTFC, Forest Science and Technology Centre of Catalonia
- Yucatrote (Portugal)
- Jyväskylä University (Finland)
- University of Helsinki (Finland)

Role of Forest DTC in DestinE

- Providing unique process-based understanding on the circulation of carbon and water among the different forest elements (soil, canopy components).
- Including variables not directly accessible by land surface models, e.g., detailed radiation balance.
- at spatial resolutions relevant to users – approx. 10 m – not possible using generic land surface models.
- based on state-of-the-art Earth Observation data
- implemented on a cloud platform close to data with a web interface and API access.
- Integration with the Land Surface models used by Climate DT for coherent predictions.
- Forest DTC available to different user communities.

Development timeline

- 2020: Forest DTE Precursor started.
- 2024: Development of Forest DTC started.
- 2026: pre-operational version of Forest DTC integrated with the DestinE Core Service Platform (DESP).
- 2028: Forest DTC fully integrated with the DestinE system.
- 2030: Forest DTC available as a part of the Destine Digital Twin Earth for decisionmakers, researchers, forest and wood industry, and the general public.