Forest Digital Twin Component for DestinE

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and the Forest DTC consortium

Destination Earth

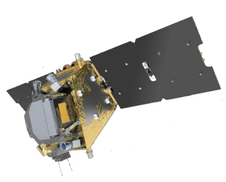
Implemented by ECMWF esa EUMETSAT

Funded by the European Union

Destination Earth (DestinE) is a flagship initiative of the European Commission

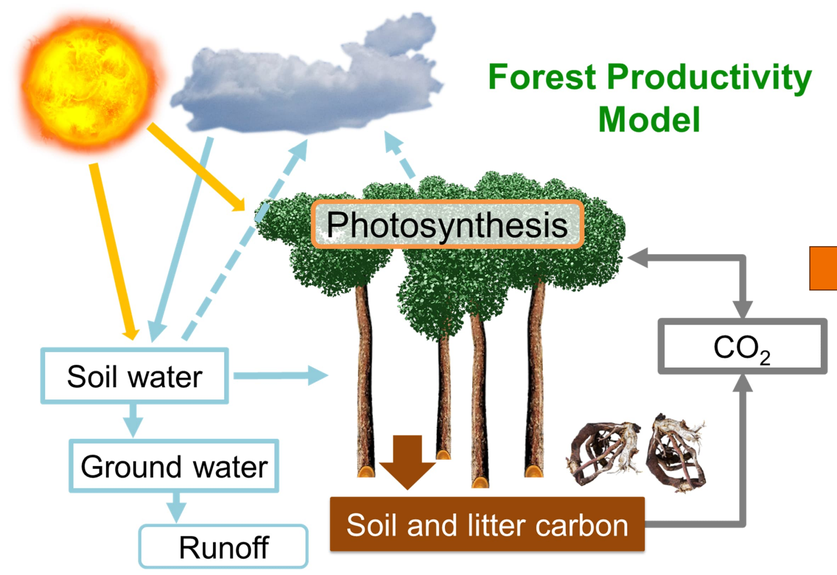
… to develop a highly-accurate digital replica of the Earth – Digital Twin Earth – to model, monitor and simulate natural phenomena, hazards and the related human activities. DestinE is creating several digital replicas covering different aspects of the Earth system based on state-of-the-art simulations and observations. DestinE is being implemented by European Centre for Mid-term Weather Forecast (ECMWF), EUMETSAT and European Space Agency (ESA).

- 2024 — the open digital platform and core Digital Twins online
- 2026 — integration of additional digital twins
  - including a Digital Twin of Forests
- 2030 — full digital replica of the Earth

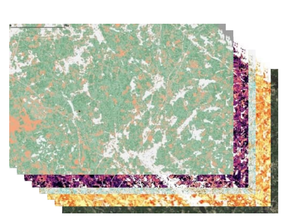


EO-based forest maps
Sentinel-2 EO imagery
+ field plot data

Past and future weather:
DestinE Climate DT /
Copernicus Climate Data Store

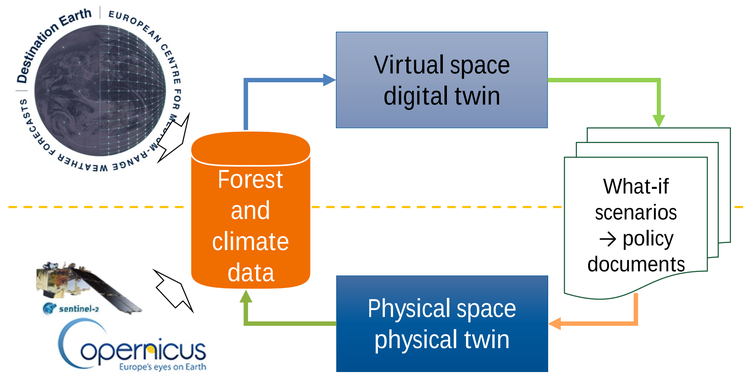


Dynamic forest maps
- ✓Above / below ground biomass
- ✓Gross Primary Production
- ✓Net Ecosystem Exchange
- ✓Growing stock volume
- ✓Tree height, dbh, …
- ✓etc.



Forest Digital Twin Component (DTC)

- One of the seven DTC Lead Development Actions funded by European Space Agency (ESA) for 2024 – 2026
- 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 deployed on the DESP, the DestinE User Platform https://platform.destine.eu/
- More information at www.foresttwin.org



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)

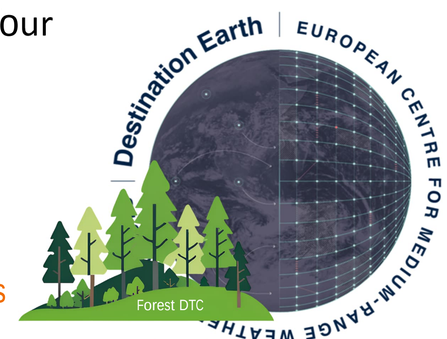
Forest DTC Consortium

Forest Digital Twin Component

- 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)

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.
- Demonstrating the system using four use cases: Czechia, Catalonia, Finland, ICOS flux towers
- available to different user communities



VTT Terramonitor GFZ Helmholtz Centre Potsdam CzechGlobe Global Change Research Institute CAS CTFC Science for Forest Management, Biodiversity & Bioeconomy Change the future, today YUCATROTE forest modelling & analytics