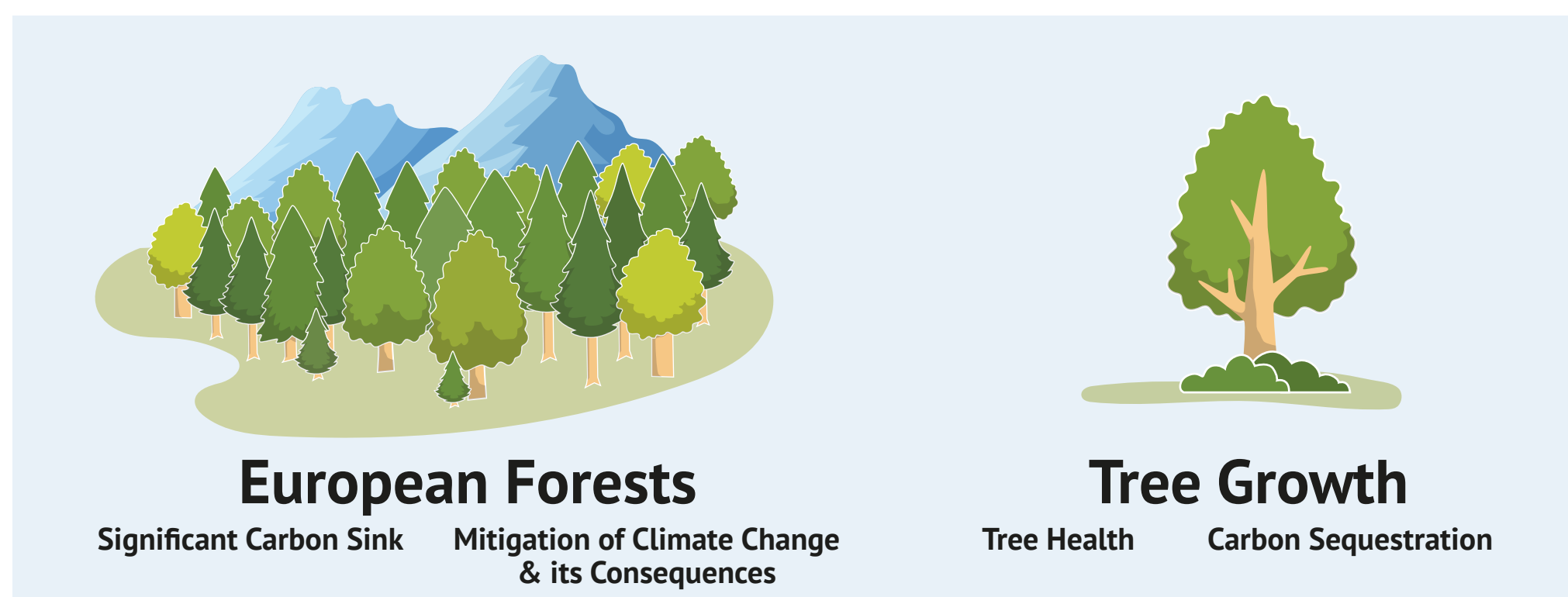# AI4 Trees – AI for climate sensitive tree growth modelling

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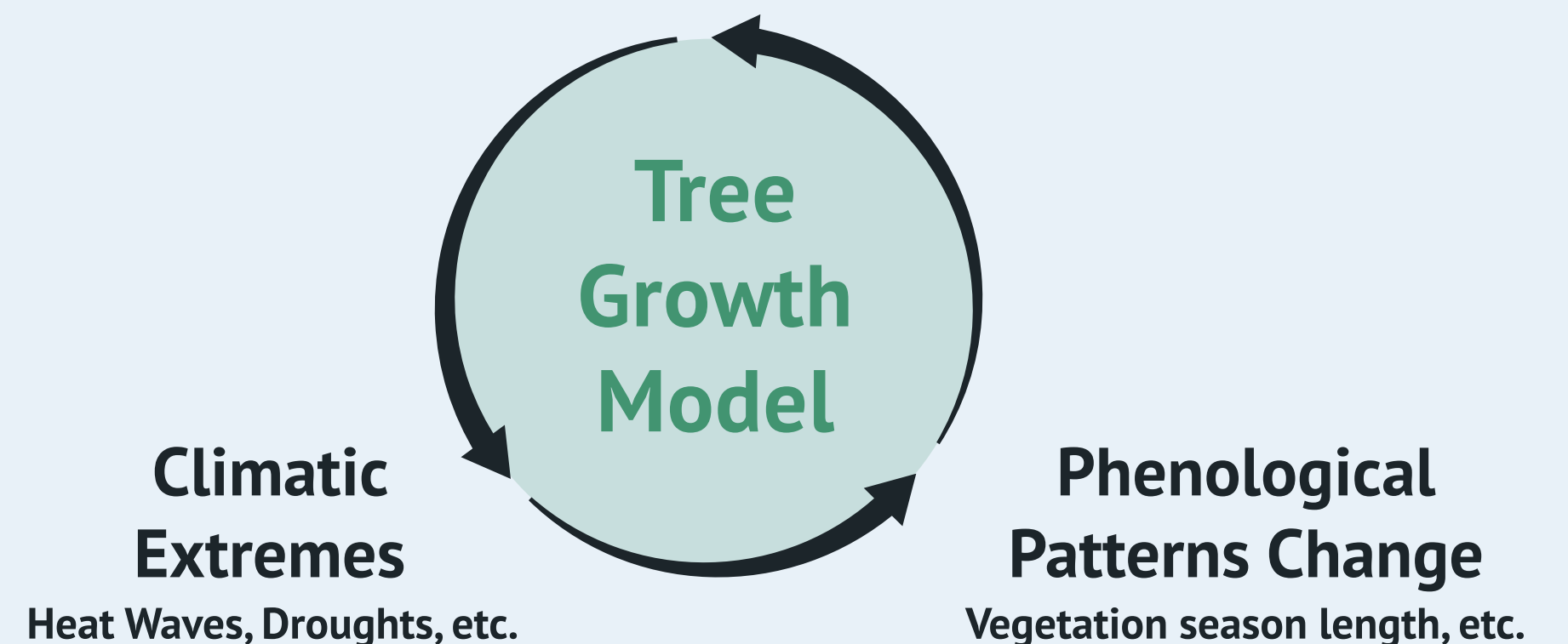
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MOTIVATION

Changing climatic circumstances have a significant impact on forests: besides higher temperatures, more intensive and frequent storms and drought spells are major challenges for forest conservation and management in the future. European Forests have been a significant carbon sink within the last decades, allowing for natural carbon dioxide removal from the atmosphere and so aiding in the mitigation of climate change and its consequences. Modelling tree growth is key for better understanding tree health and carbon sequestration.
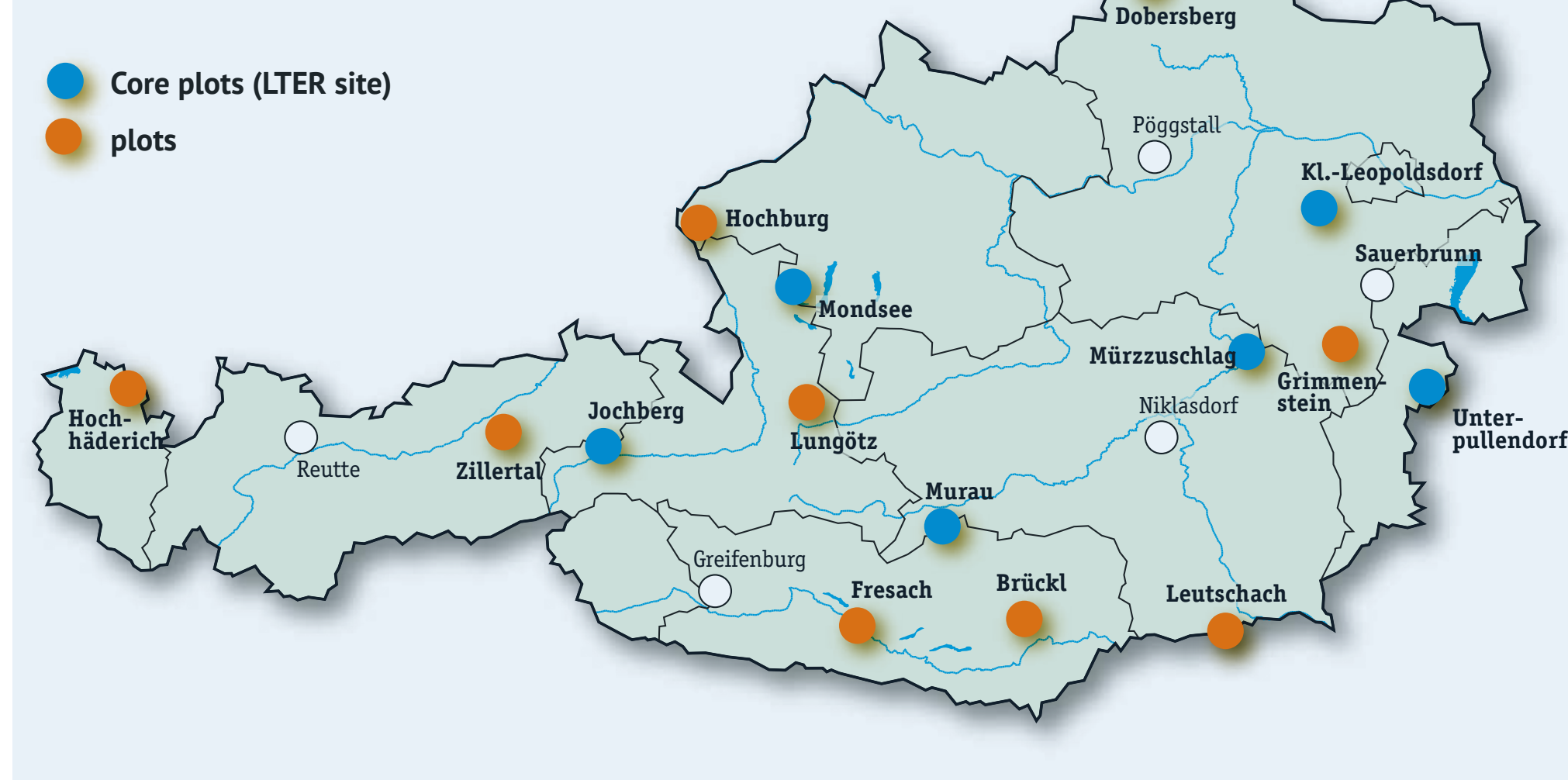
European Forests
Significant Carbon Sink   Mitigation of Climate Change & its Consequences

Tree Growth
Tree Health   Carbon Sequestration

Location of the monitoring plots

- ● Core plots (LTER site)
- ● plots

Dobersberg
Pöggstall
Kl.-Leopoldsdorf
Hochburg
Sauerbrunn
Mondsee
Mürzzuschlag
Grimmen-stein
Hoch-häderich
Niklasdorf
Jochberg
Lungötz
Unter-pullendorf
Reutte
Zillertal
Murau
Greifenburg
Fresach   Brückl   Leutschach

FOREST MONITORING

The basis for modelling tree growth are long time datasets covering relevant ecological and climatic parameters at the Austrian ICP forest network locations by combining hourly single tree measurements and weather station data (high frequency) with stand characteristics from terrestrial laser scanning (TLS) and satellite data (low frequency), we building a unique data inventory for researchers we building a unique data inventory for researchers.

PARTNER ROLES

AIT AUSTRIAN INSTITUTE OF TECHNOLOGY TOMORROW TODAY	Projekt coordination, Explainable artificial intelligence
BFW. Bundesforschungszentrum für Wald	Tree growth sensor data
umwelt○data	Laser Scanning, Point cloud monitoring
KNOW Center	Probabilistic learning, Data science
E.C.O. Institut für Ökologie	Model evaluation, Error analysis, Validation
GeoVille	Earth Observation for vegetation and change detection

Growth Dynamics & Underlying Physiological Processes

Tree Growth Model

Climatic Extremes
Heat Waves, Droughts, etc.

Phenological Patterns Change
Vegetation season length, etc.

PROJECT GOAL

Growth dynamics and underlying physiological processes are of great complexity and and can be challenging for traditional statistical modelling approaches the aim of the AI 4 Trees project is to derive single tree growth models, which are sensitive to climate change, hazardous disturbance, and human intervention in forest ecosystems.
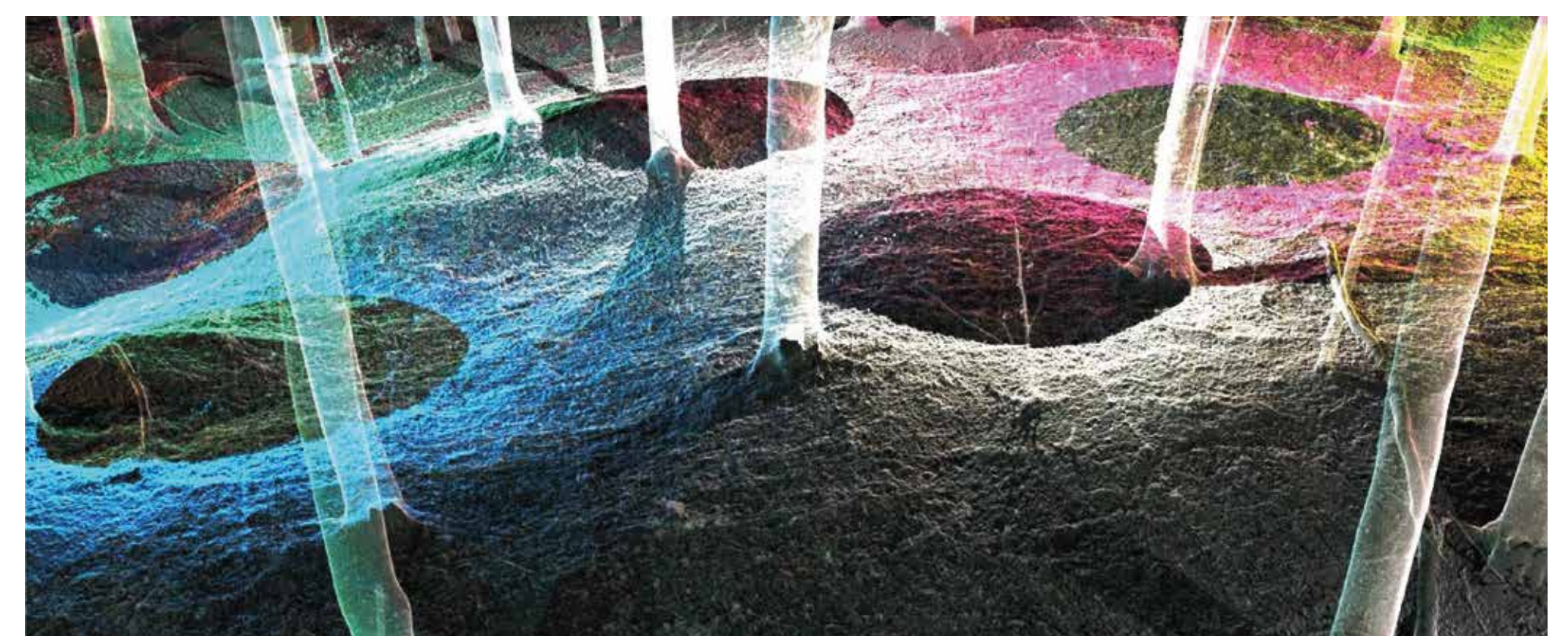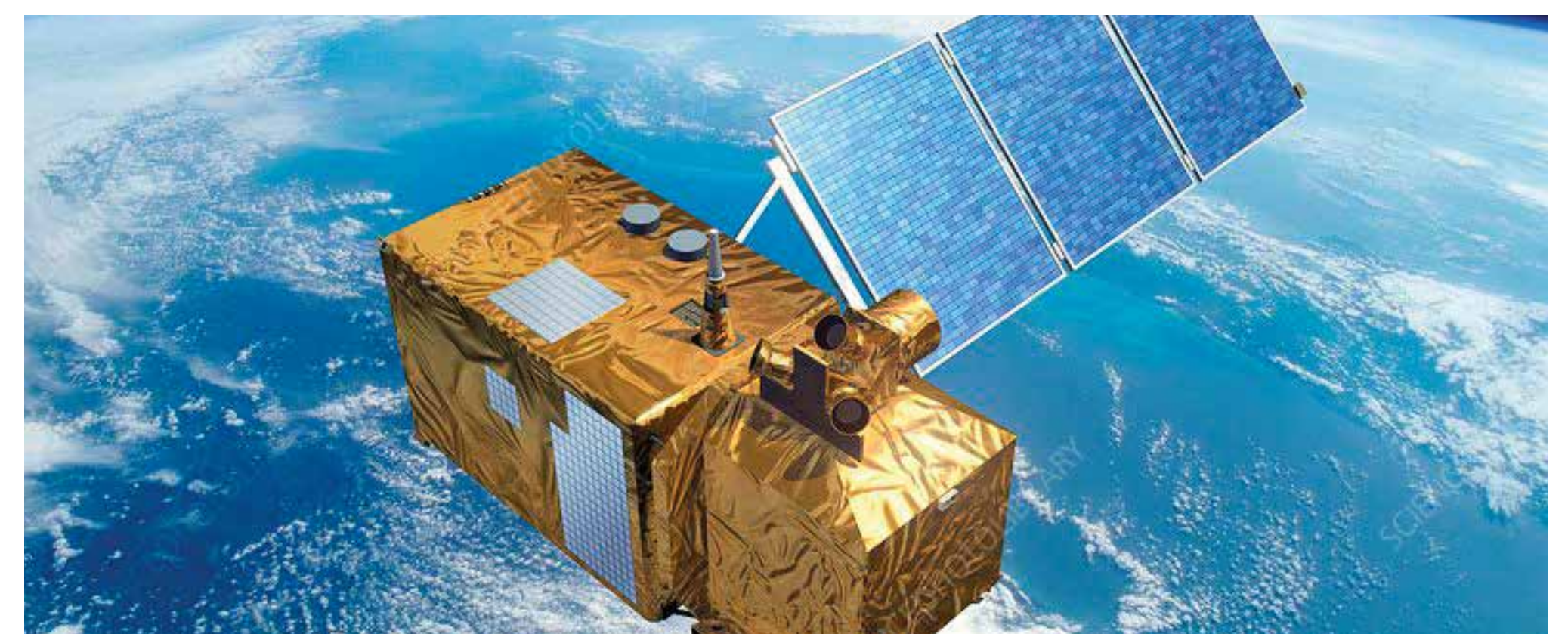
DATA SOURCES AND METHODOLOGY

Terrestrial Laser Scans (TLS)

Sentinel-2 Satellite Imagery

Artificial Intelligence and Machine Learning

FFG Promoting Innovation.

Bundesministerium Klimaschutz, Umwelt, Energie, Mobilität, Innovation und Technologie

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