

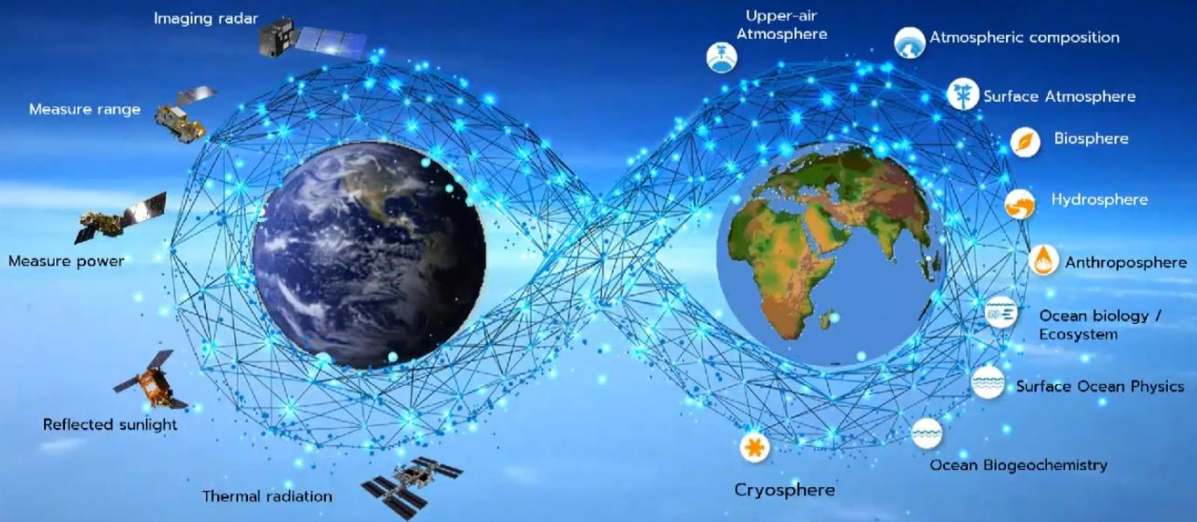
EO OF CARBON FLUXES AND STOCKS: SCIENTIFIC EVIDENCE FROM SPACE ON CARBON EMISSIONS AND REMOVALS

CEOS

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MONITOR THE EFFECTS OF NATURAL AND HUMAN ACTIVITY ON OUR PLANET



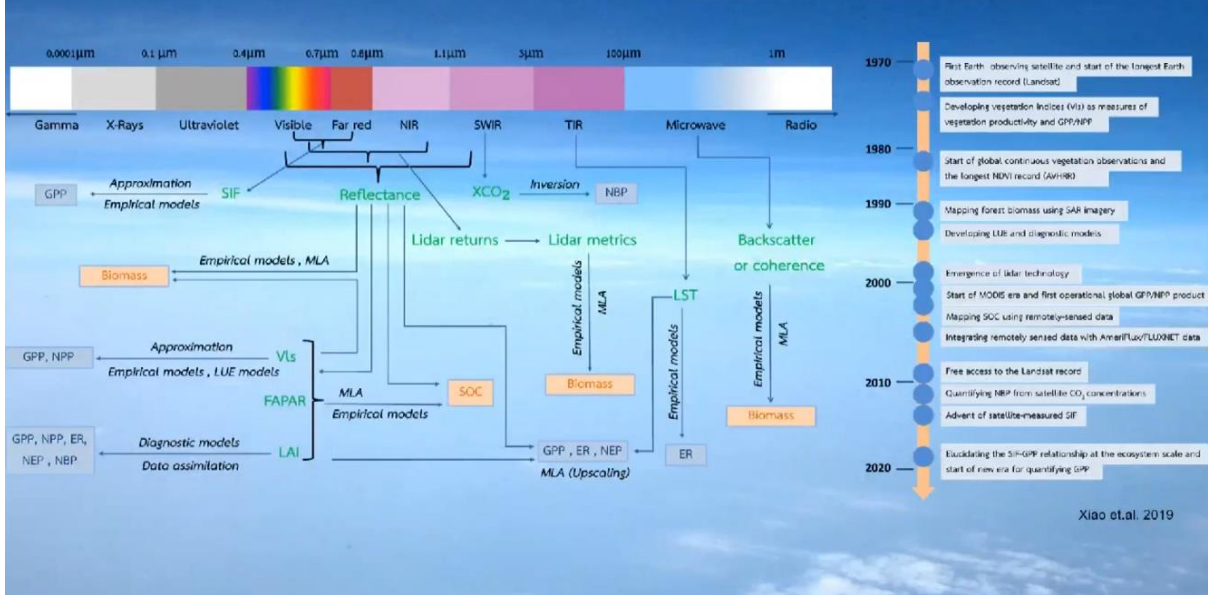
UNDERSTAND THE EFFECTS OF NATURAL AND HUMAN ACTIVITY ON OUR PLANET



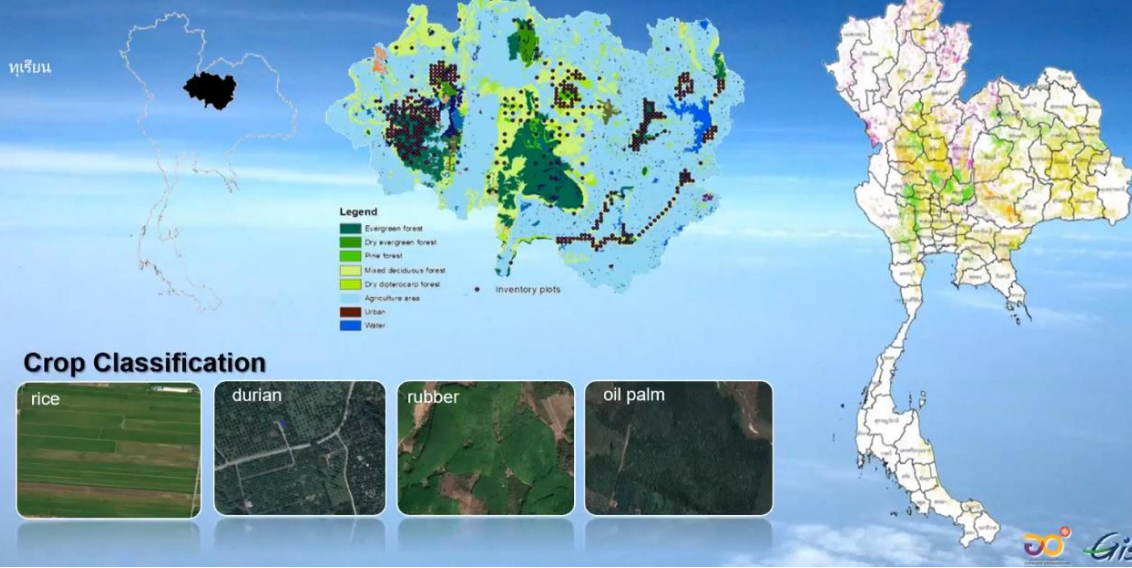
ESSENTIAL CLIMATE VARIABLES (ECVs)



SPECTRUM FOR QUANTIFYING CARBON FLUXES AND CARBON STOCKS



Satellites circle the globe, recording data in multi different wavelengths. The individual wavelength bands can be combined into color images, with different combinations of the multispectral bands revealing different information about the condition of the land cover.



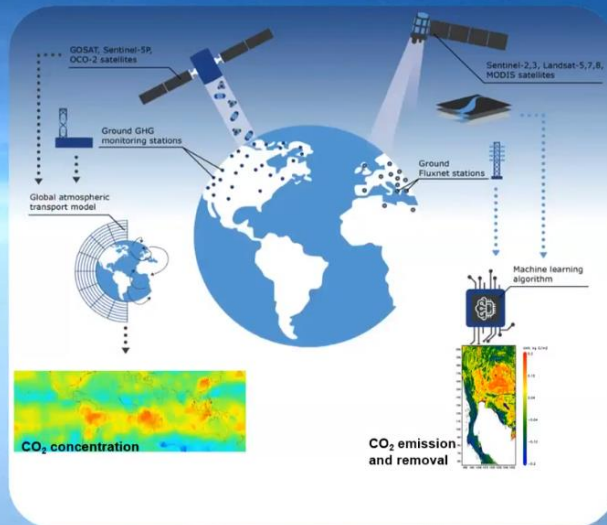
BIOMASS

เจ้าหน้าที่ตรวจวัด

field plots

เครื่อง 3D Scanner

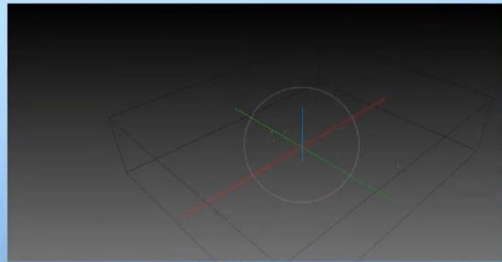
Machine Learning



Terrestrial Laser Scanner; TLS (3D Scanner)



Human



3D Scanner

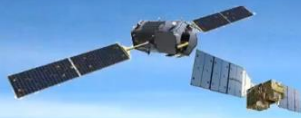
TLS is a laser-based instrument that measures its surroundings using LiDAR for range measurement and precise angular measurements through the optical beam deflection mechanism to derive 3D point observations from the object surfaces.

TLS automatically measures the surrounding three-dimensional (3D) space using millions to billions 3D points. The major advantage of using TLS in forest/rubber tree inventories lies in its capability to document the tree rapidly, automatically and in millimeter-level detail.



GHG EMISSIONS & REMOVALS

Atmospheric GHG Monitoring



Applying earth observation satellites to monitor CO₂ and CH₄ in the atmosphere.

GHG Flux

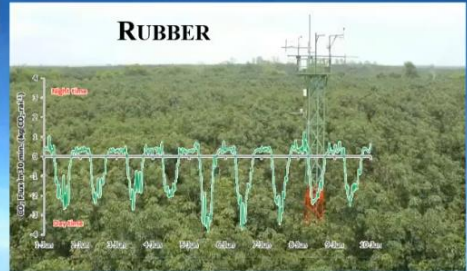


Rubber

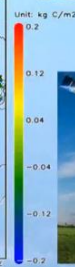
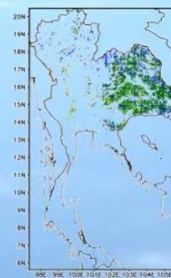
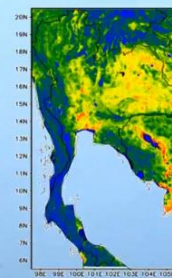
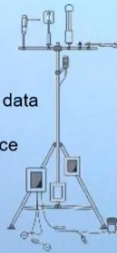


Rice

RUBBER

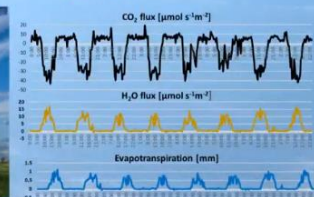


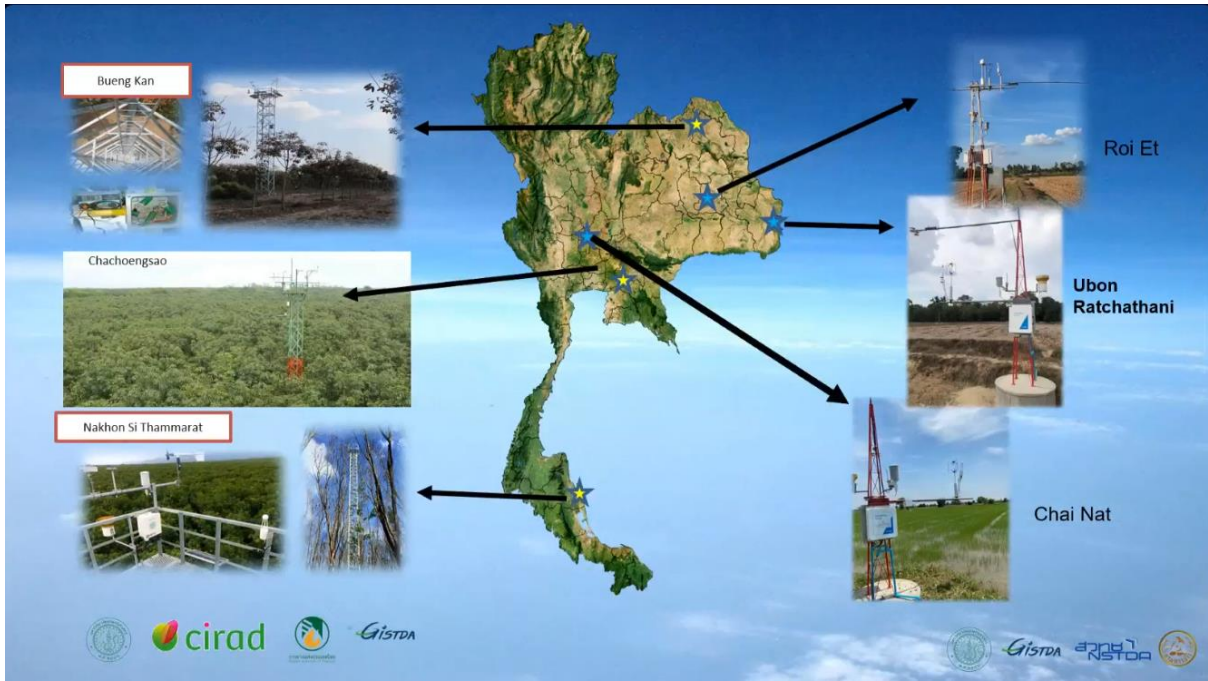
Integrate satellite data and Eddy Covariance method



Net Ecosystem Exchange

RICE





CALIBRATION AND VALIDATION

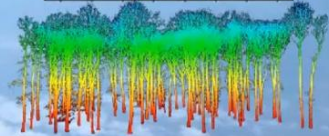
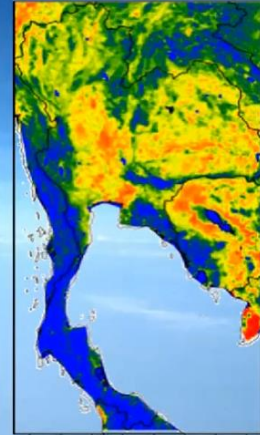
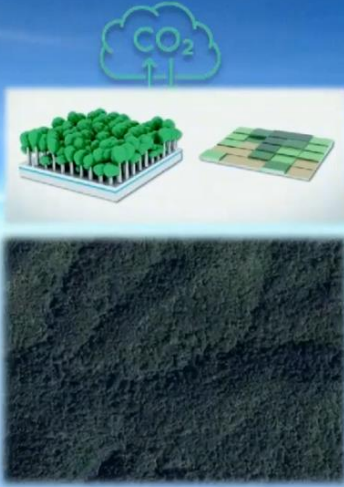
THEOS-2
 Finer-resolution satellite or airborne data can bridge the gap between in situ measurements and coarse-resolution satellite data



Xiao et.al. 2019

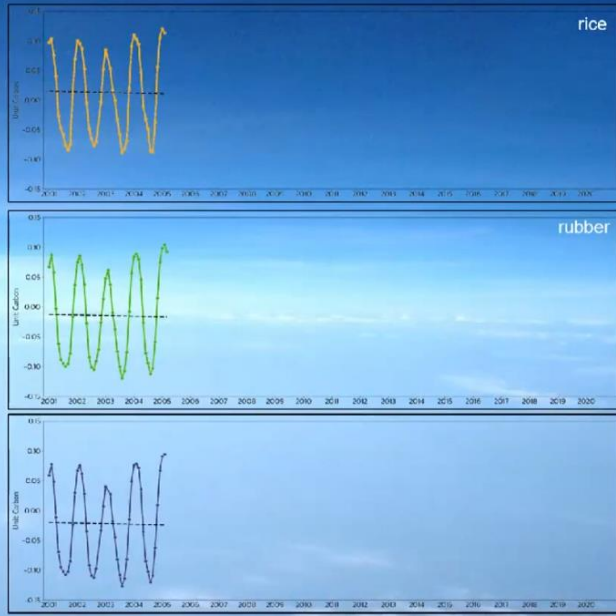
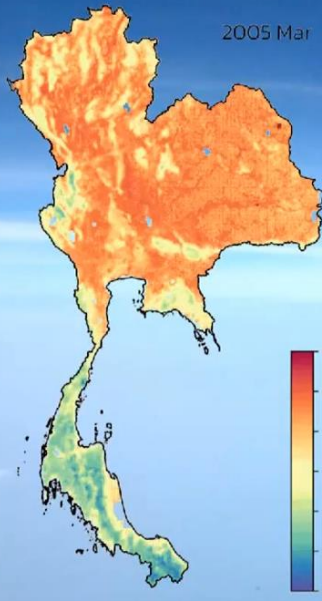
Observation from space inspires and serves humankind in ways that are truly unique. There is tremendous value in measuring and monitoring carbon change

CARBON EMISSIONS AND REMOVALS FROM FORESTS, FARMS, FIELDS, AND OTHER LAND COVER

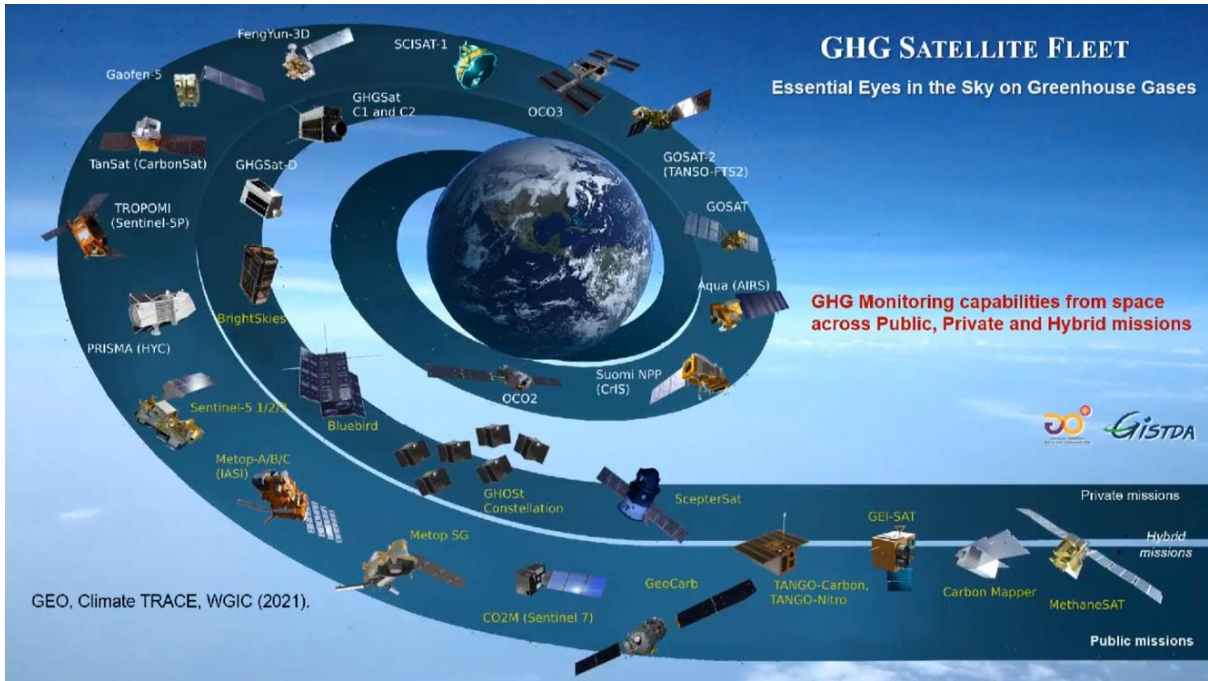


WATCHING THE EARTH BREATHE FROM SPACE AT DIFFERENT SCALES

ประเมินข้อมูลพื้นที่สีเขียวจากดาวเทียมในภาคเทคโนโลยีและทั่วโลก ด้วยประสิทธิภาพของเทคโนโลยีดาวเทียม THFOS 2



ENABLE CARBON FOOTPRINT VISIBLE AND MANAGEABLE



“Carbon Tracking”

Carbon removal and emission monitoring system

GISTDA is investigating the feasibility of developing a simple model based on remote sensing data to estimate the CO₂ balance (NEE) and its component fluxes across different ecosystems such as rubber, forest, and rice, which could be used for upscaling CO₂ fluxes.

4 Major features

- Carbon Emission Data (Monthly): The application provides monthly carbon absorption and release data.
- Carbon Removal and Emission for all provinces and districts across the country.
- 12-Month Historical Data by Province, District, and Subdistrict:
- This feature provides real-time information based on the user's geographic coordinates (x, y).

“Carbon Tracking”



GISTDA is investigating the feasibility of developing a simple model based on remote sensing data to estimate the CO2 balance (NEE) and its component fluxes across different ecosystems such as rubber, forest, and rice, which could be used for upscaling CO2 fluxes.



<https://gistdeportal.gistda.or.th/carbonapp>

ระบบบริหารข้อมูลการติดตามคาร์บอน
ในป่าไม้ประเทศไทย



Mobile Application



“Man must rise above the Earth—to the top of the atmosphere and beyond—for only thus will he fully understand the world in which he lives”



(Socrates 470 BC-399 BC)



Satellite observations are critical for gathering accurate and timely GHG emission data, increasing transparency, and ensuring accountability in mitigating climate change.

Transparent reporting is essential for impactful climate action, and Earth observation (EO) can play a critical role in supporting policy makers at the intersection of science and action.