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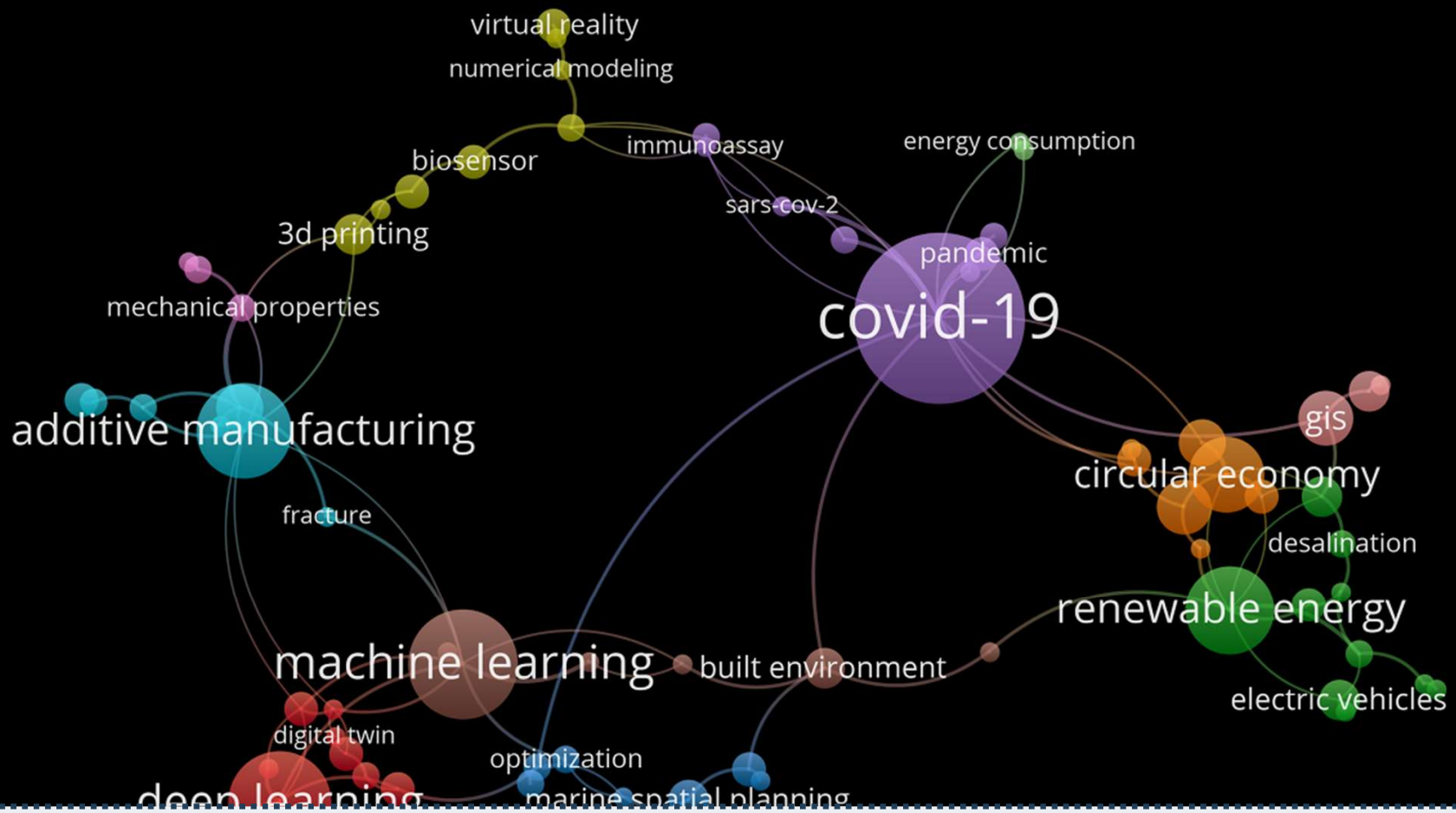


Scientific Forest Management Using Open-Source Geospatial Software

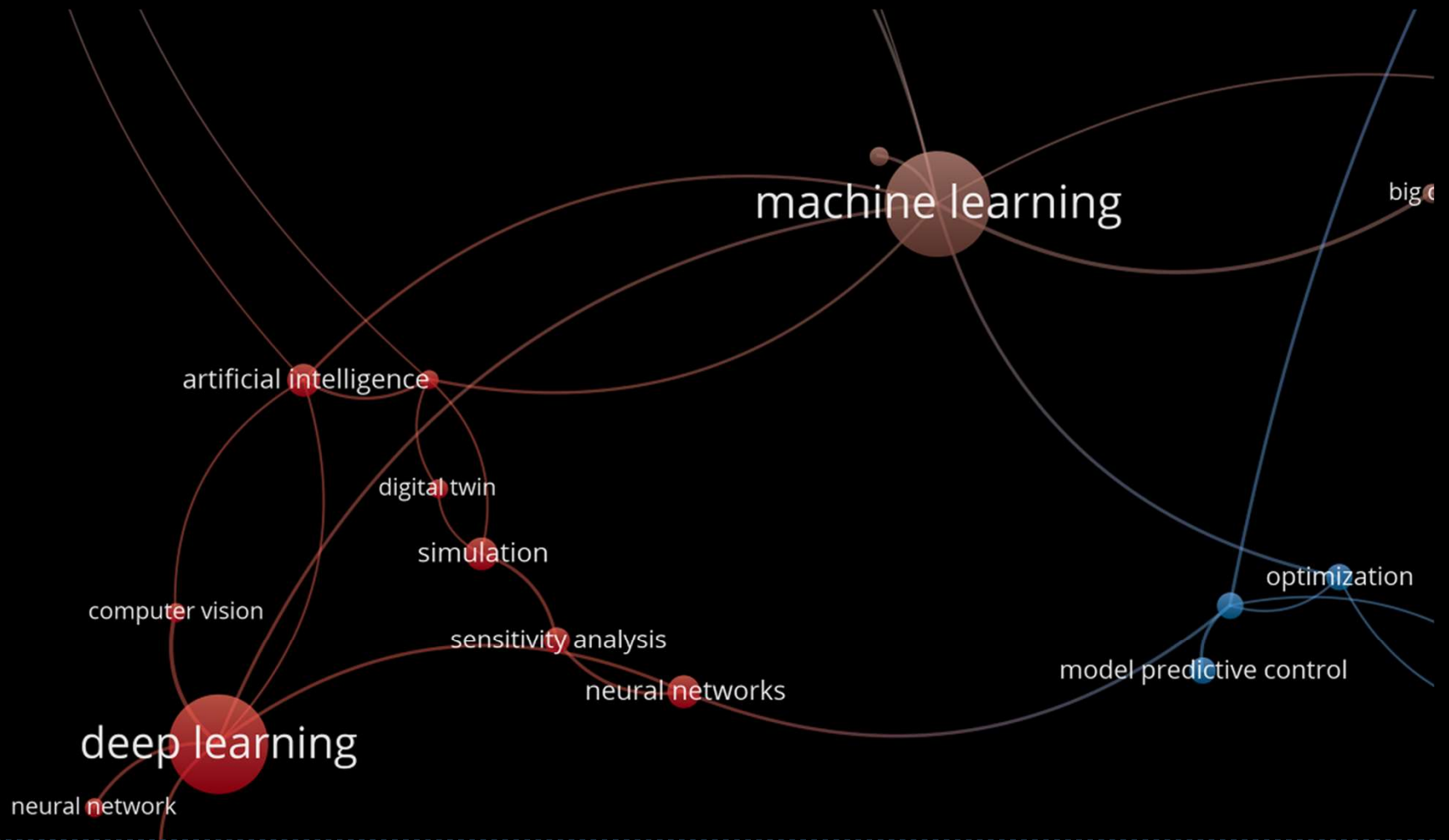
November 2024

Geospatial Data Analyst, Korea National Park Service
Charter Member, OSGeo Foundation

Byeong-Hyeok Yu (bhyu@knps.or.kr)



▪ **Text Mining Results on 1,000 Articles Mentioning National Park in 2021**



- **Text Mining Results on 1,000 Articles Mentioning National Park in 2021**

CONTENTS

Chapter I · Introduction to the Korea National Park Service

Chapter II · The Necessity of Scientific Forest Management

Chapter III · Examples of Open-Source Geospatial Software

Chapter IV · Demonstration of Open-Source GIS Analysis in Asia



Chapter

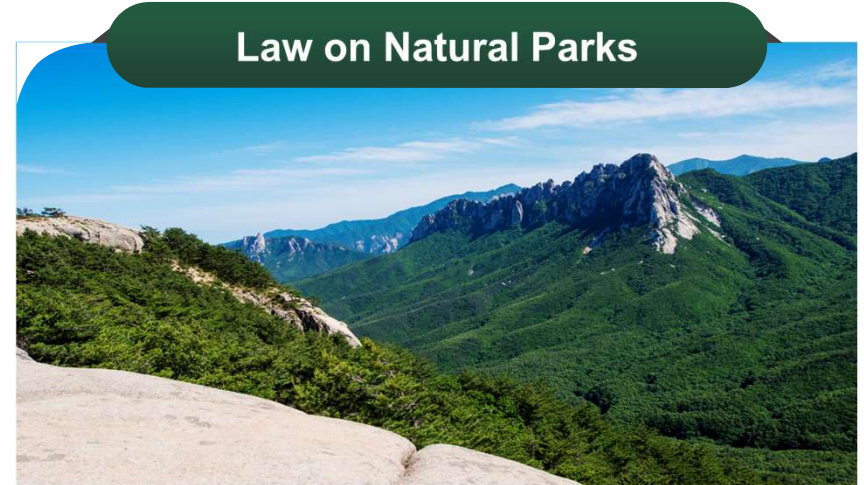
I

Introduction to the Korea National Park Service

01 • National Park



-  A relatively vast area
-  Well-preserved nature
-  A park designated for scientific, educational, and recreational purposes

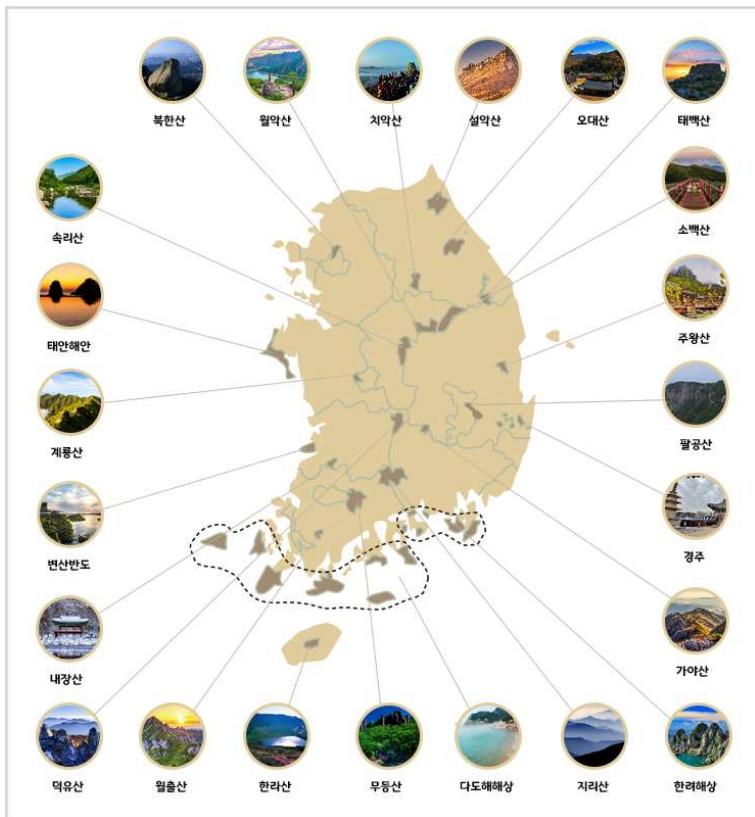


- A park designated by the State as a representative region of the natural ecosystem or the natural and cultural landscape of our country
(article 2, paragraph 2)





02 • Roles of National Parks



Natural Ecosystems
43% of domestic species and 66% of endangered species.



Best Recreational Space
43 million visitors each year.



Ancient History and Culture
42 National Treasures, 164 Cultural Assets, and 74 Natural Monuments.



▪ National Parks provide value in various areas such as nature, tourism, and the economic revitalization of different local communities.

03 • National Park Rangers



- We perform various tasks such as protecting, maintaining, and managing national parks, while providing practical services to the public.

04 • Roles of the Korea National Park Service



Resource Survey



Visitor Culture



Biodiversity Protection



Mutually Beneficial Cooperation



Disaster Safety



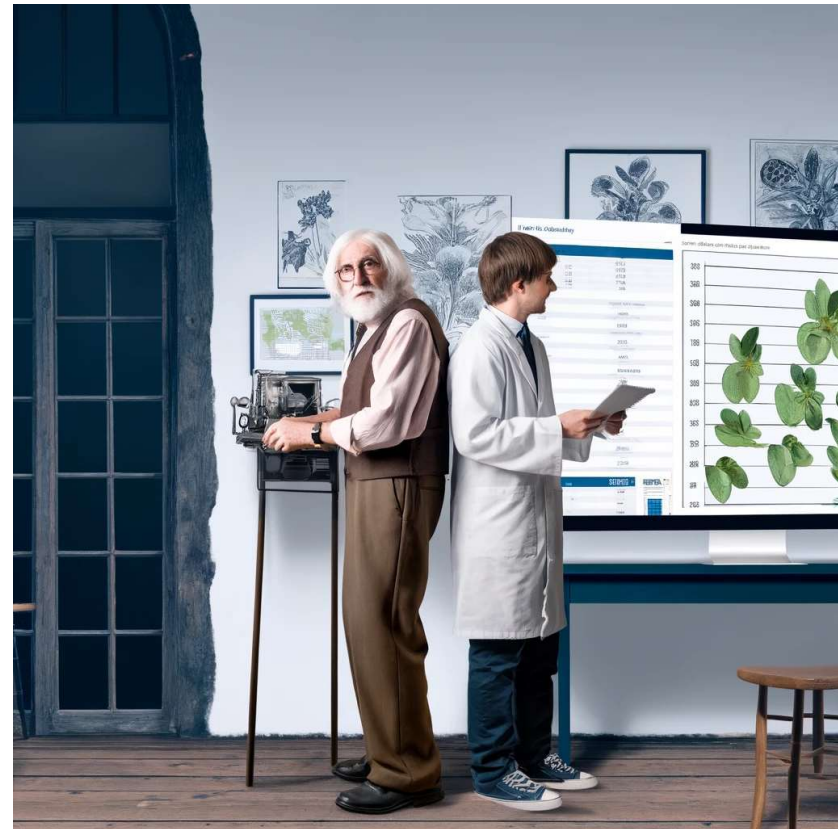
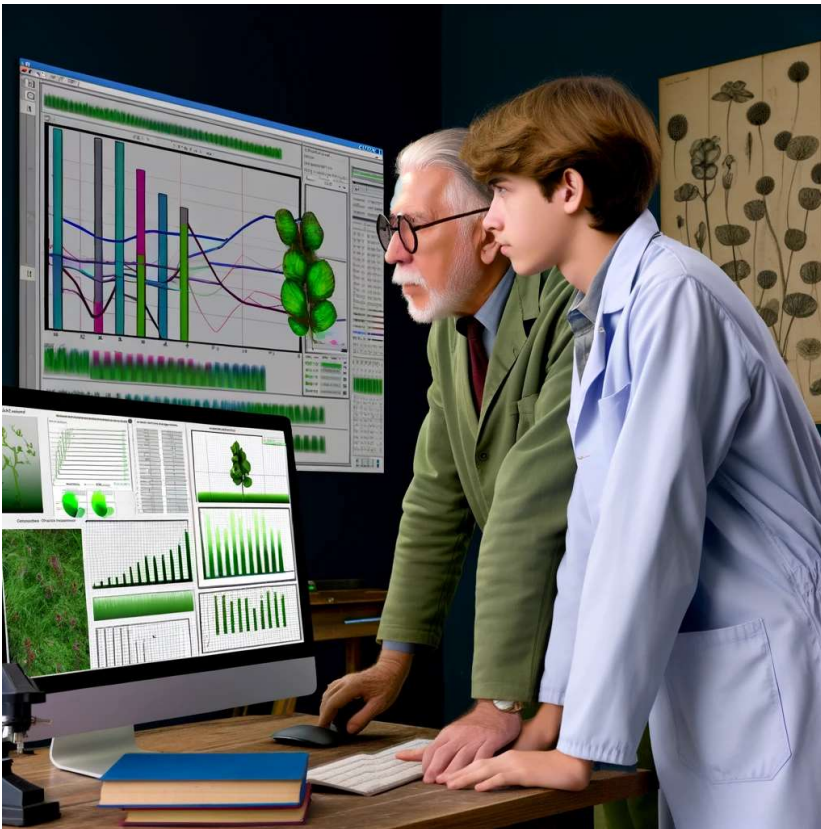
Infrastructure

Chapter

II

The Necessity of Scientific Forest Management

01 • Limitations of Traditional Management Methods



- Managing protected areas requires continuous monitoring and data sharing, which act as a time capsule between the past and the future.

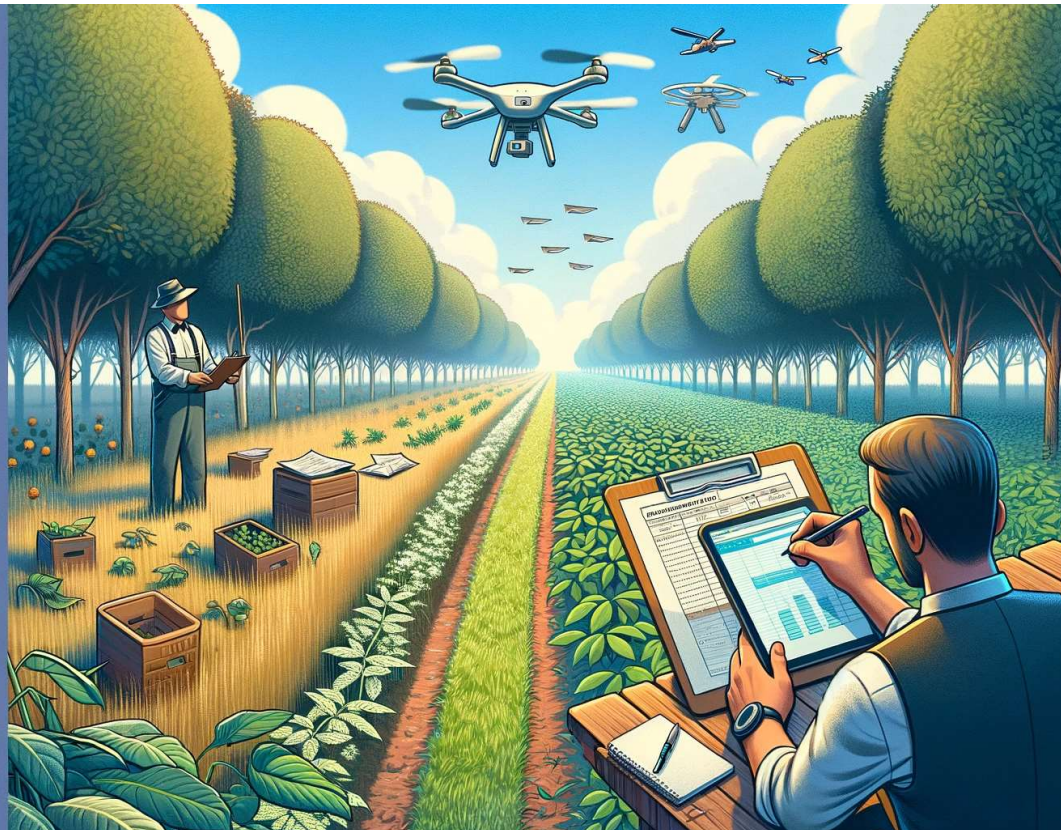
02 • Inevitability of Digital Technologies

Archiving

Managing

Sharing

Analyzing



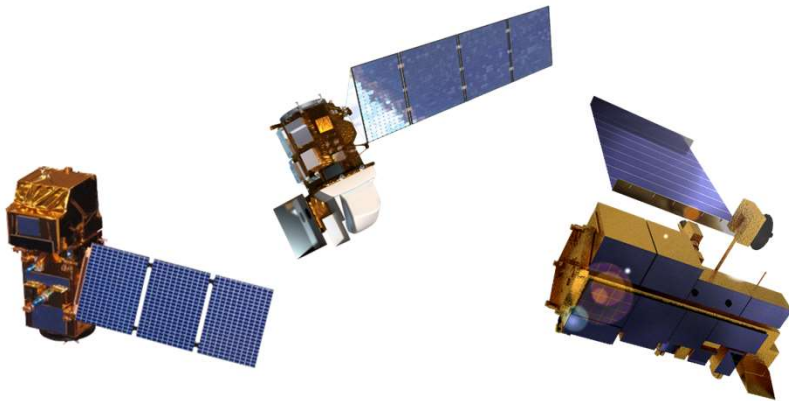
- Modernizing management methods improves the quantity and quality of data. The efficient use of data enables digital innovation.

Chapter

III

Examples of Open-Source Geospatial Software

01 • Forest Disaster Survey by Satellite Images



Monitoring Changes



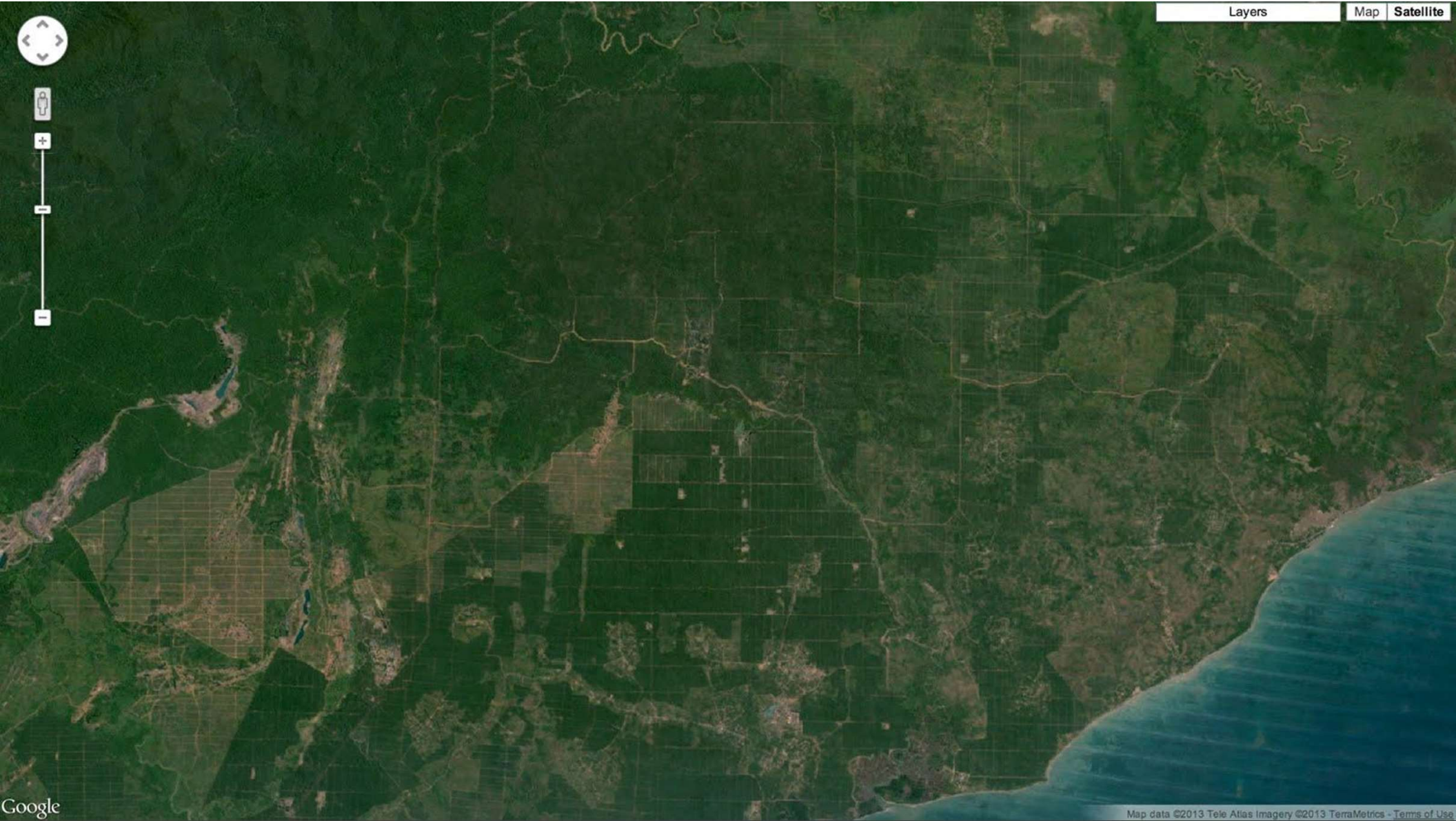
- Various Earth observation satellites that monitor the world daily (over 50 petabytes)



Layers Map Satellite

Google

Map data ©2013 Tele Atlas Imagery ©2013 TerraMetrics - Terms of Use



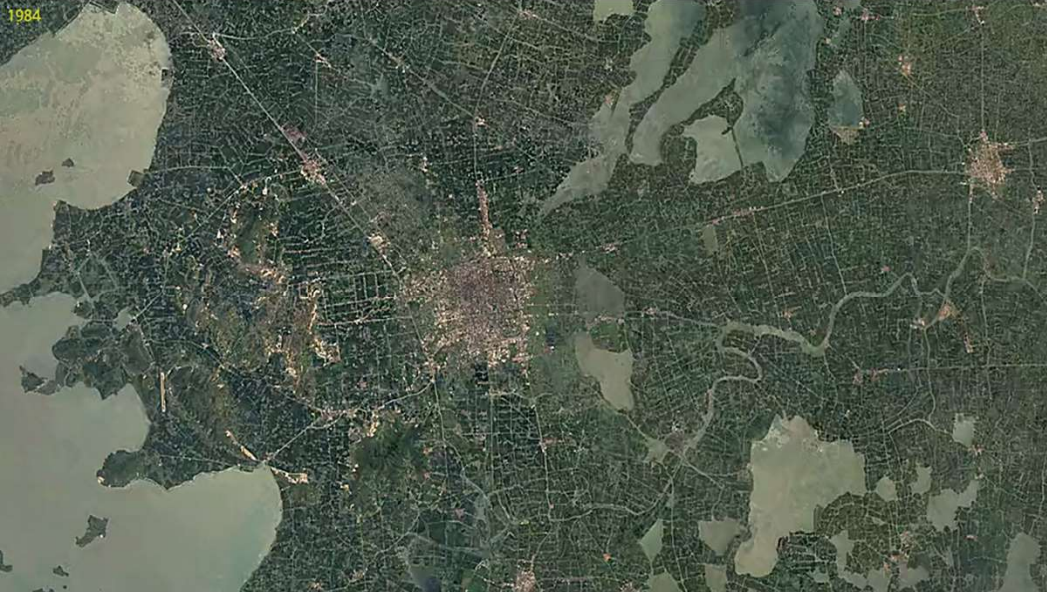
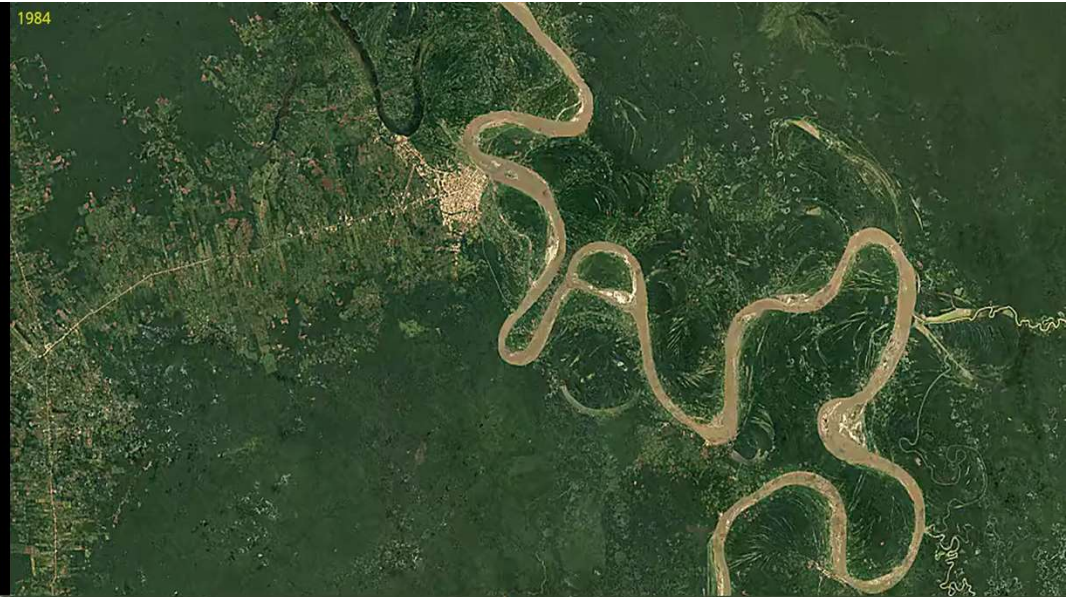
Layers

Map

Satellite

Google

Map data ©2013 Tele Atlas Imagery ©2013 TerraMetrics - Terms of Use



01 • Forest Disaster Survey by Satellite Images



Human Resource-Based Survey



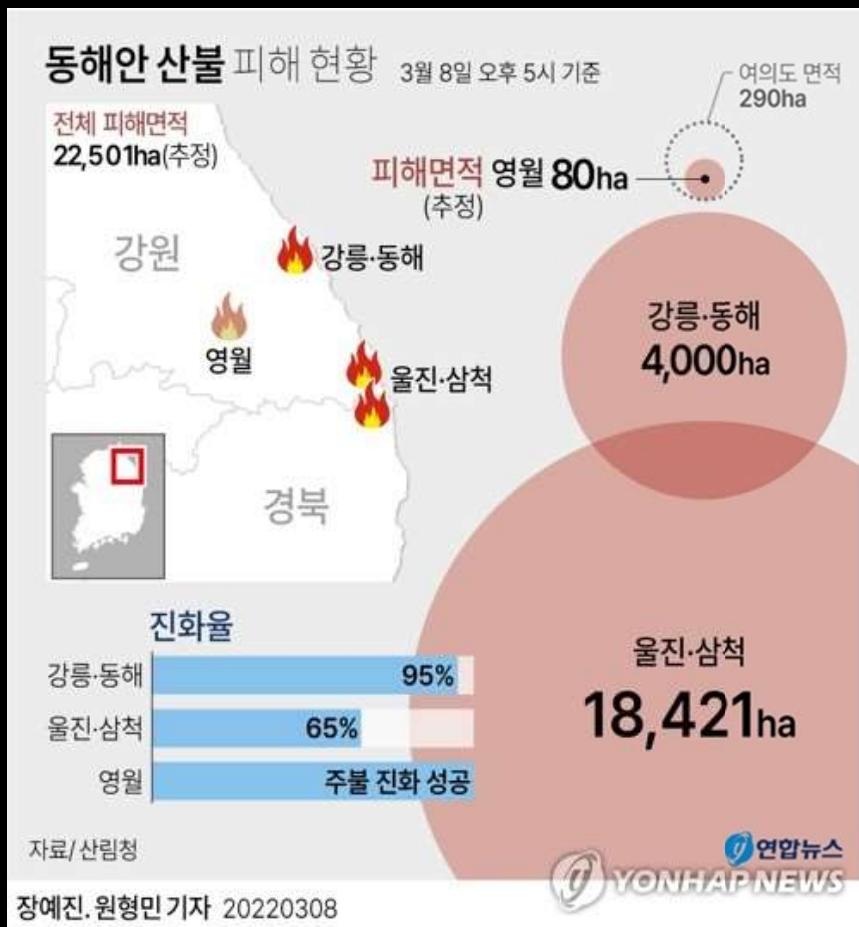
Satellite Image-Based Survey

Forest Disaster Database

- Use of satellite images to quickly investigate forest disaster sites... Supporting damage restoration measures...



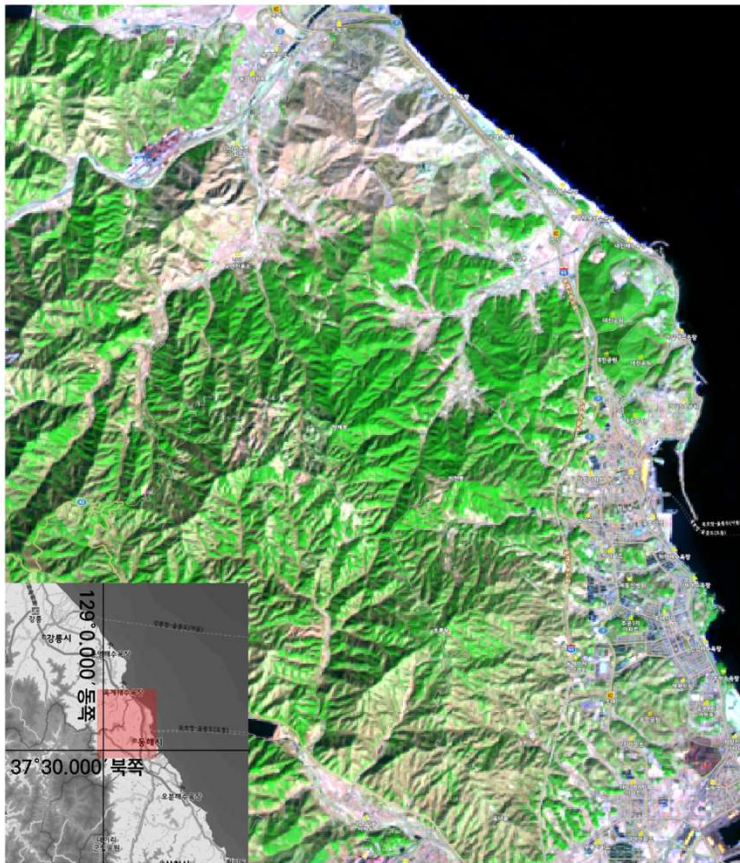
- Example of a Large Forest Fire in Korea...
- Damaged Area: 22,501 hectares (2022, controlled in 90 hours).



- Example of a Large Forest Fire in Korea...
- Damaged Area: 22,501 hectares (2022, controlled in 90 hours).

'강릉 옥계-동해 산불' 전후 비교

지도제작자: 유병혁

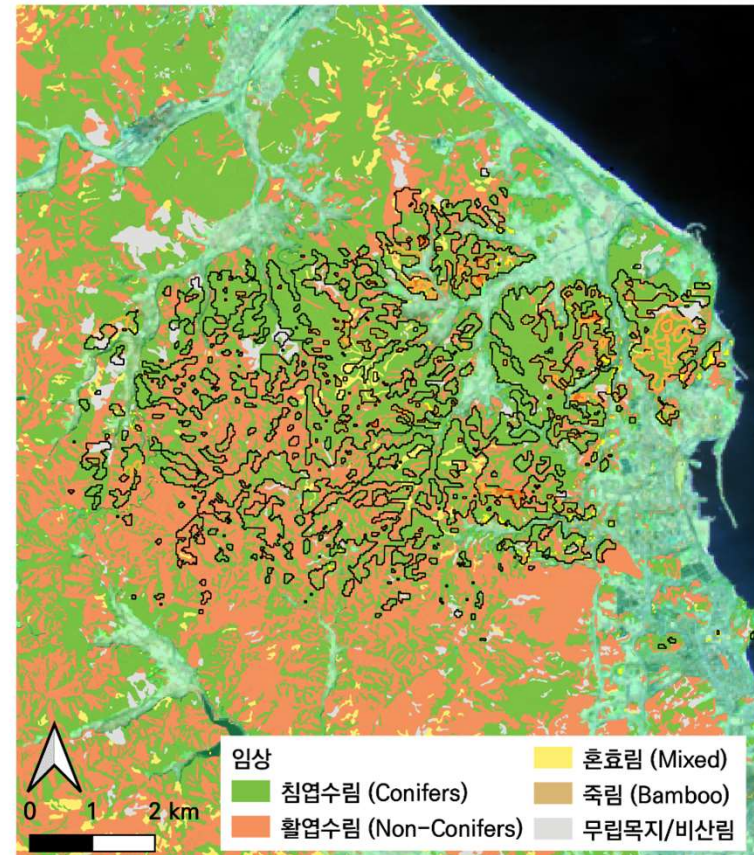
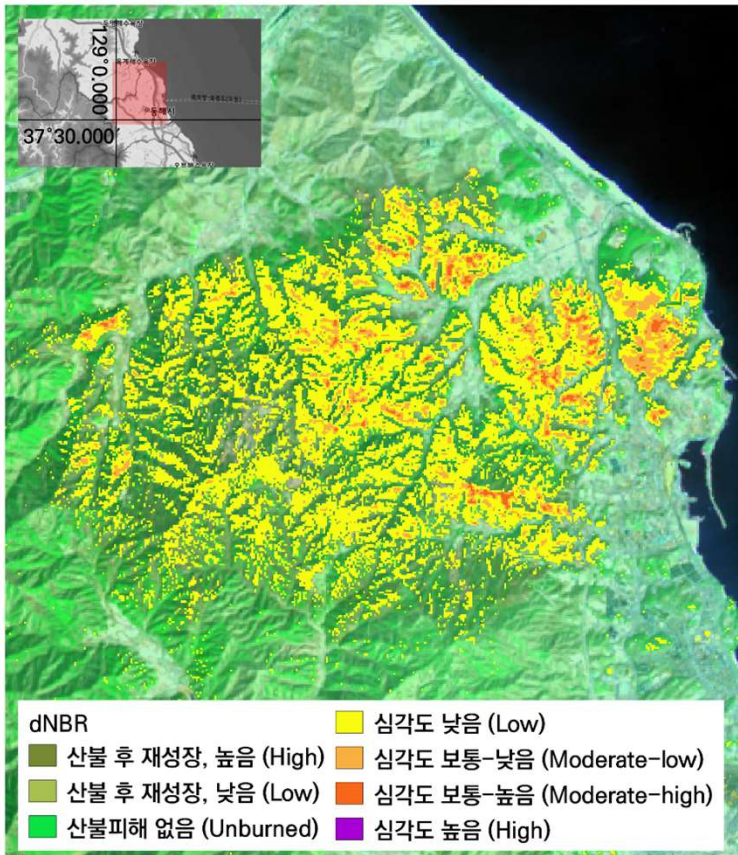


- Mapping Fire Damage Using Free Satellite Data and Open-Source Geospatial Software (QGIS & Python)



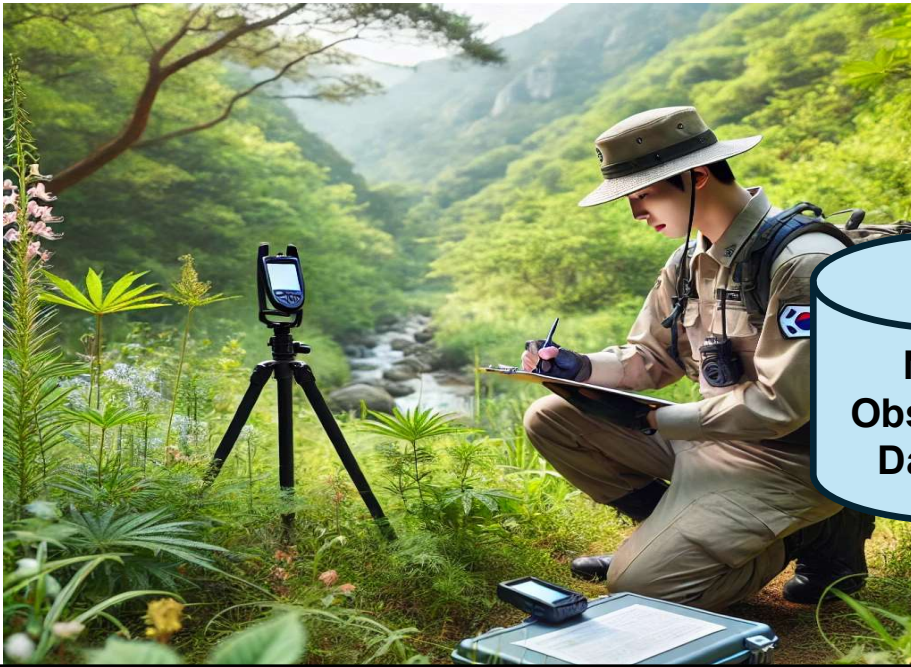
'강릉 옥계-동해 산불피해 심각도' 분석

지도제작자: 유병혁 (<https://blog.daum.net/geoscience/>)



▪ Mapping Fire Damage Using Free Satellite Data and Open-Source Geospatial Software (QGIS & Python)

02 • AI and Big Data for Monitoring Natural Changes



Human Resource-Based Survey

**Nature
Observation
Database**



Satellite Image-Based Survey

- Precise monitoring of local natural resource changes using AI based on Big Data... Enhancing resilience to the climate crisis...

설악산국립공원, 대청봉 일원

1988년과 2017년 랜드셋 자연색(natural color) 비교



랜드셋 5호
1988년 4월 13일

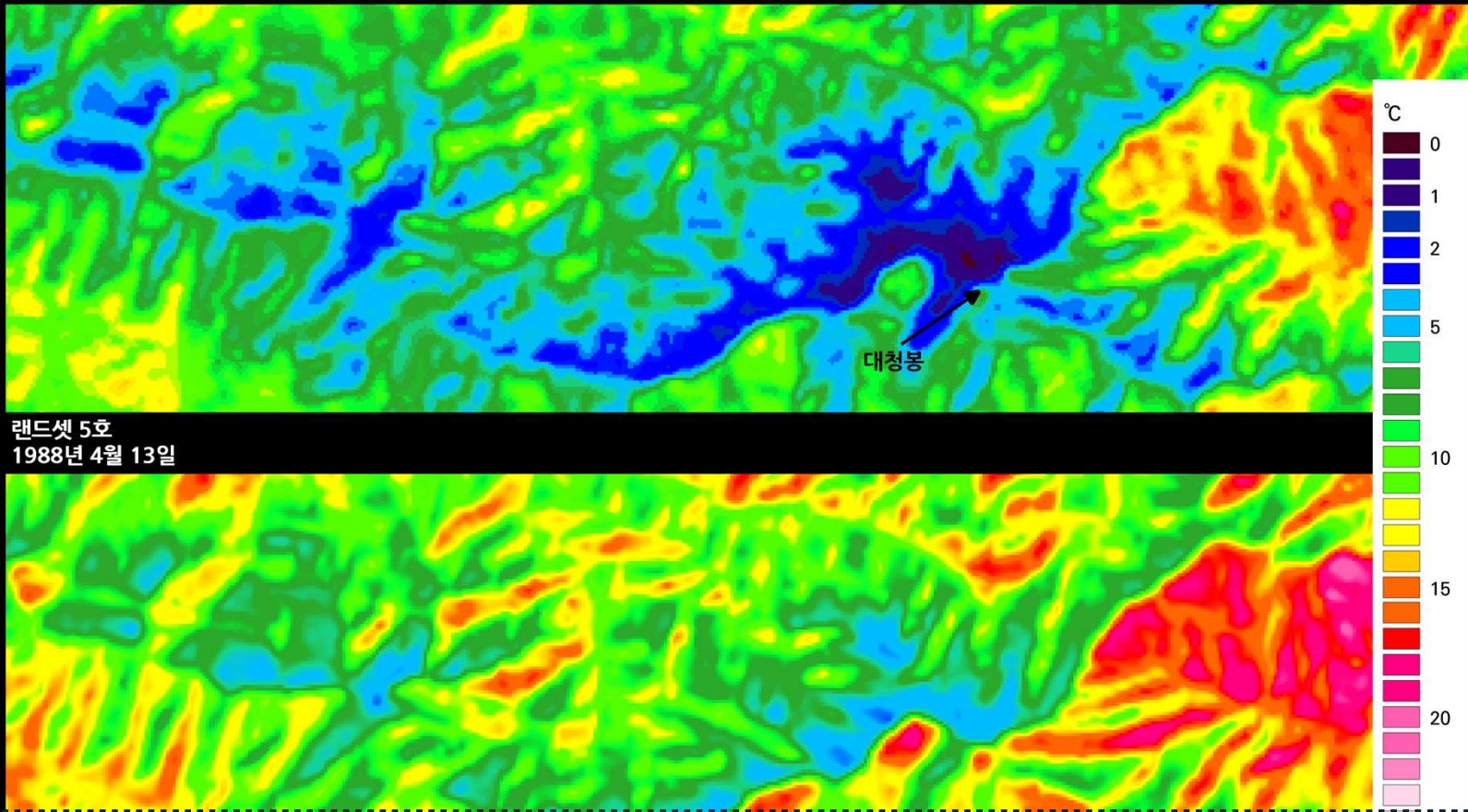


2017년 4월 13일

- Climate Change at the Summit of Seoraksan National Park (Satellite Images from the Same Date in 1988 and 2023)

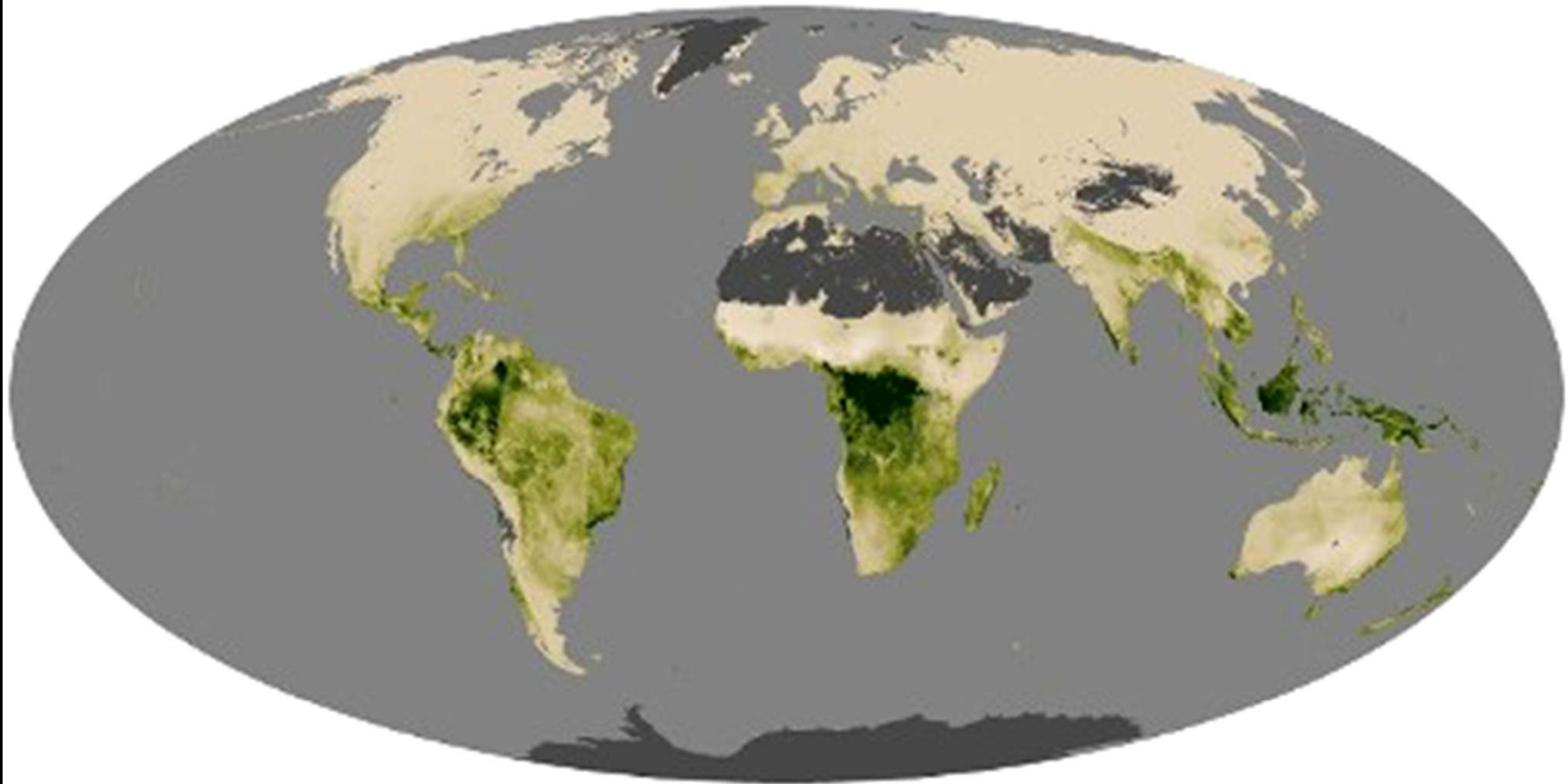
설악산국립공원, 대청봉 일원

1988년과 2017년 랜드셋 지표면 온도(Land Surface Temperature, 줄여서 LST) 비교



- Climate Change at the Summit of Seoraksan National Park (Satellite Images from the Same Date in 1988 and 2023)

2017년 4월 13일

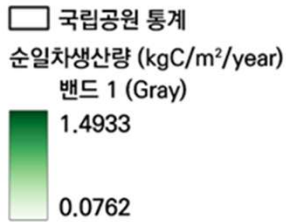


Net Primary Productivity
gC/m²/day

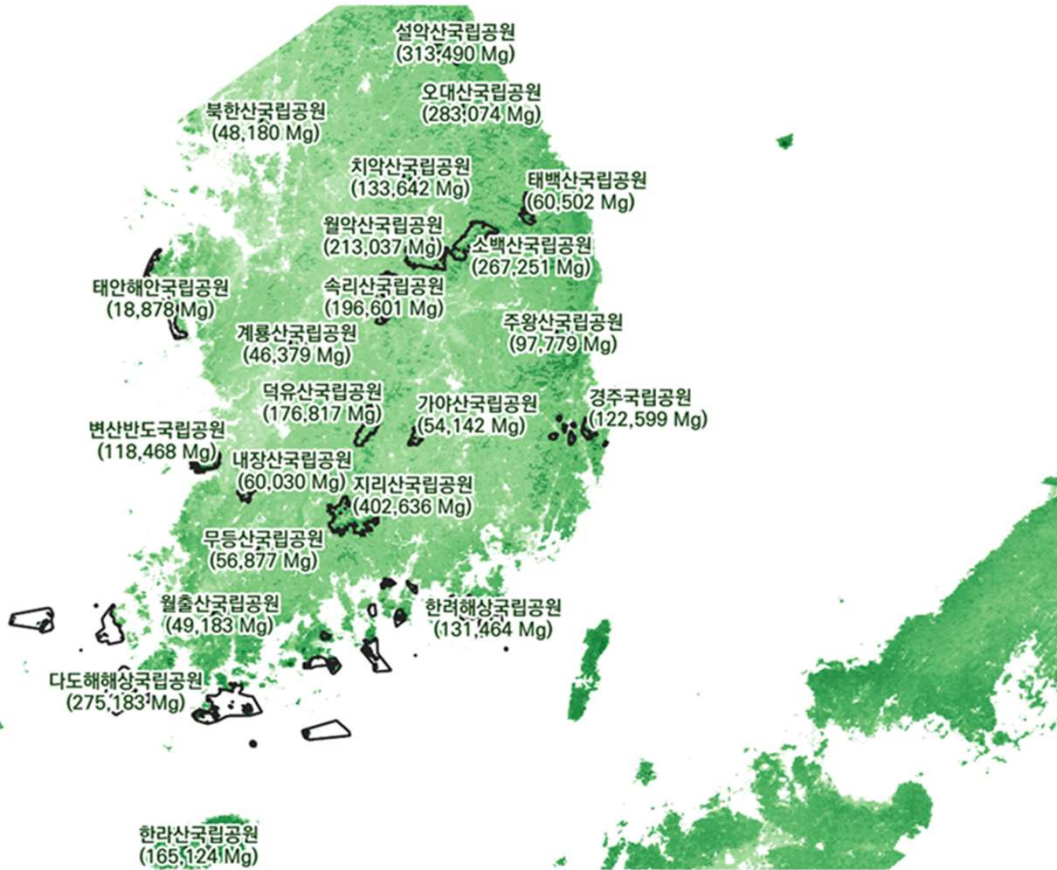
- Net Primary Productivity (NPP): an indicator of the amount of carbon absorbed and stored by plants and ecosystems.

February 2000

국립공원 순일차생산량 현황



0 50 100 km



▪ Net Primary Productivity (NPP) Statistics of Korea's National Parks

03 • Software Development in Collaboration with University Students

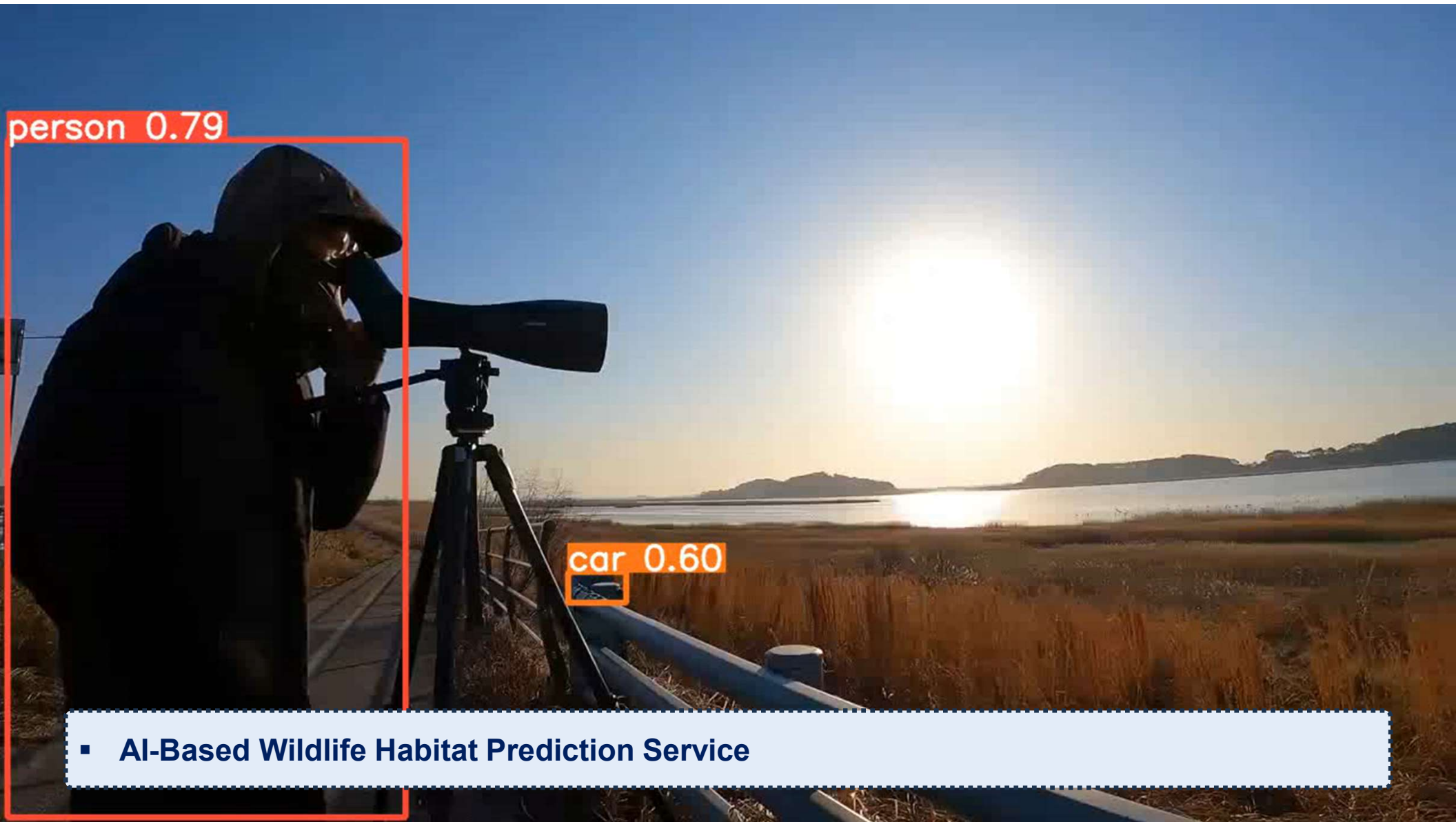


- Development of an AI-Based Prediction Service in Cooperation with Local Universities and Practical Application.

person 0.79

car 0.60

- AI-Based Wildlife Habitat Prediction Service





Google Earth Engine

Search

한국어

Home Guides Reference Support Community Cloud Data Catalog

Filter

Change Detection in GEE - The MAD Transformation (Part 1)
Change Detection in GEE - The MAD Transformation (Part 2)
Change Detection in GEE - The MAD Transformation (Part 3)
Data Converters
Detecting Changes in Sentinel-1 Imagery (Part 1)
Detecting Changes in Sentinel-1 Imagery (Part 2)
Detecting Changes in Sentinel-1 Imagery (Part 3)
Detecting Changes in Sentinel-1 Imagery (Part 4)
Groundwater Recharge Estimation

Home > Products > Google Earth Engine > Community

도움이 되었나요?

Species Distribution Modeling

Send feedback

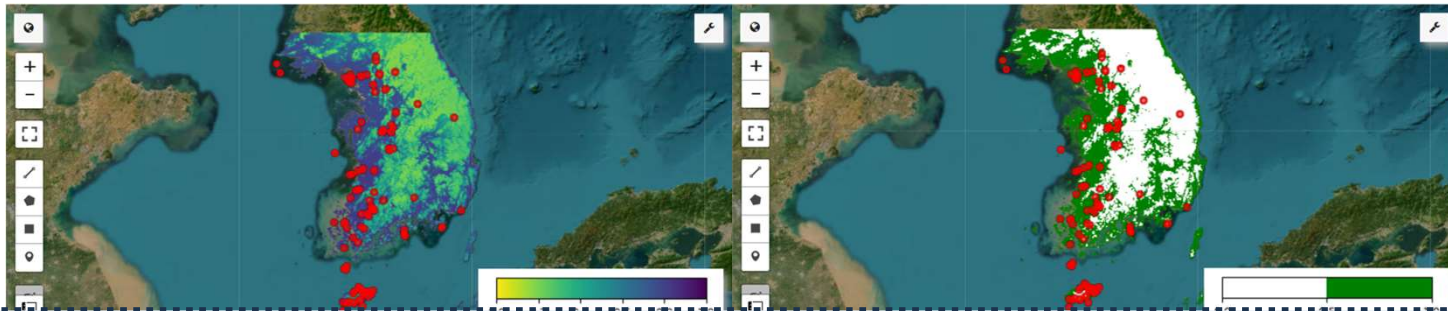
Author(s): osgeokr

★ Tutorials contributed by the Earth Engine developer community are not part of the official Earth Engine product documentation.

Run in Google Colab

View source on GitHub

In this tutorial, the methodology of Species Distribution Modeling using Google Earth Engine will be introduced. A brief overview of Species Distribution Modeling will be provided, followed by the process of predicting and analyzing the habitat of an endangered bird species known



AI-Based Wildlife Habitat Prediction Service

240억 위성 수송 첫 임무

MBN

차세대 소형위성 2호

- ◆ 국내 기술 영상레이더(SAR) 장착
- ◆ 산림 생태 변화·해양오염·북극 해빙 탐지

- SAR Satellite Images of South Korea, Capable of Capturing Data Even in Bad Weather















▪ SAR Satellite Images of South Korea, Capable of Capturing Data Even in Bad Weather

Chapter

IV

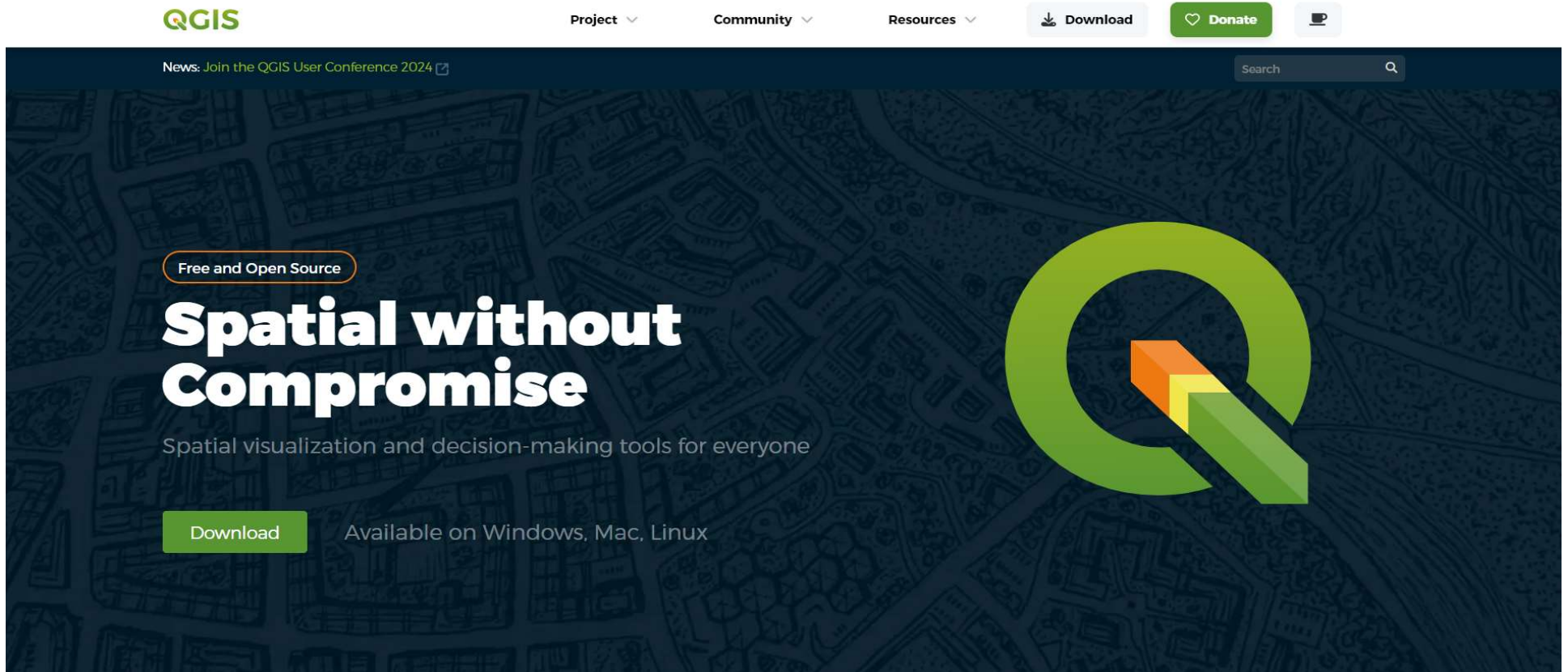
Demonstration of Open-Source GIS Analysis in Asia

01 • Open-Source Geospatial Software vs. Commercial Geospatial Software

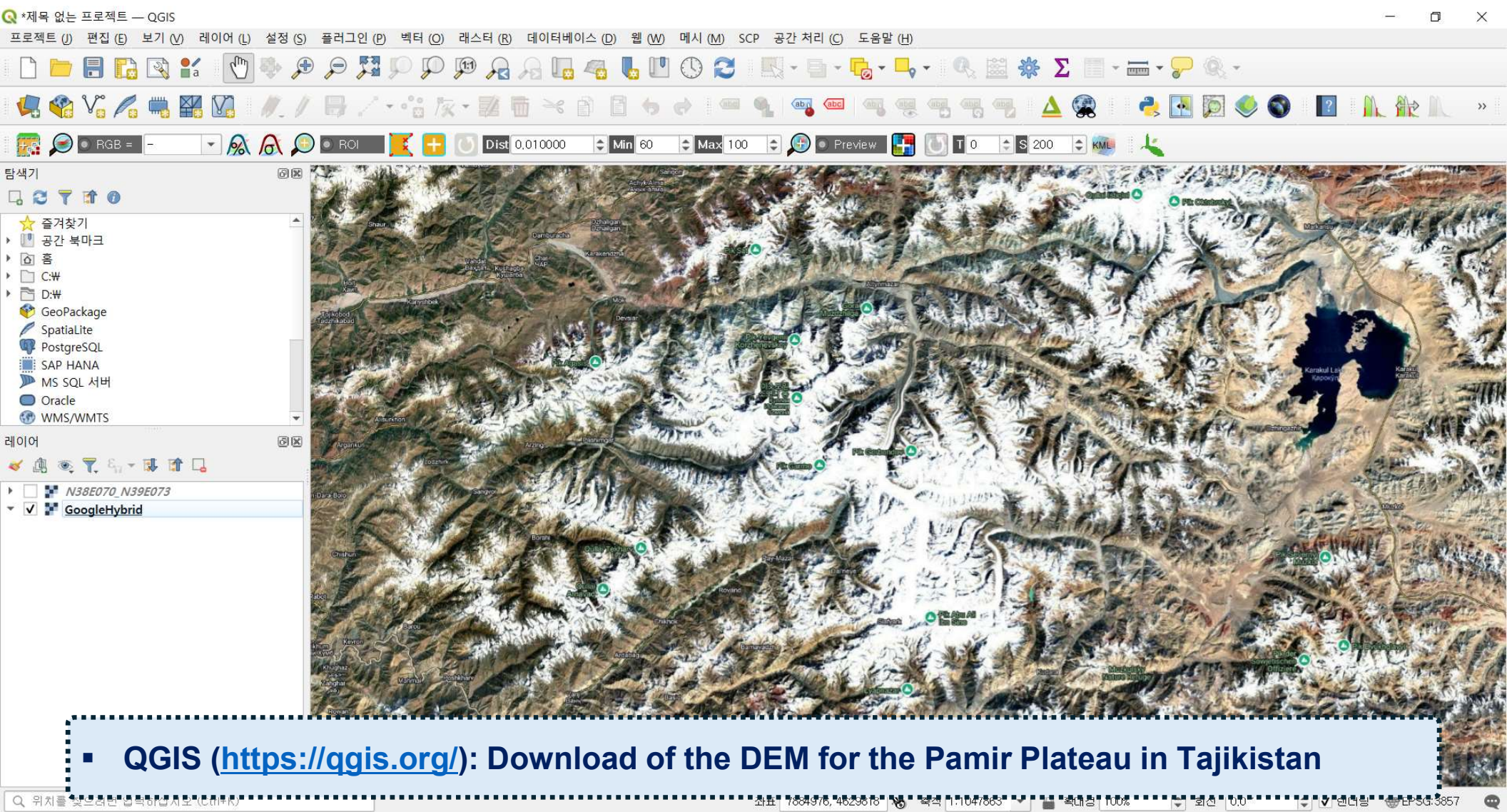
	Open Source	Commercial
Web Development Library		
Desktop Application		
Cloud Server		
Application Server		
Geospatial Database Management System		

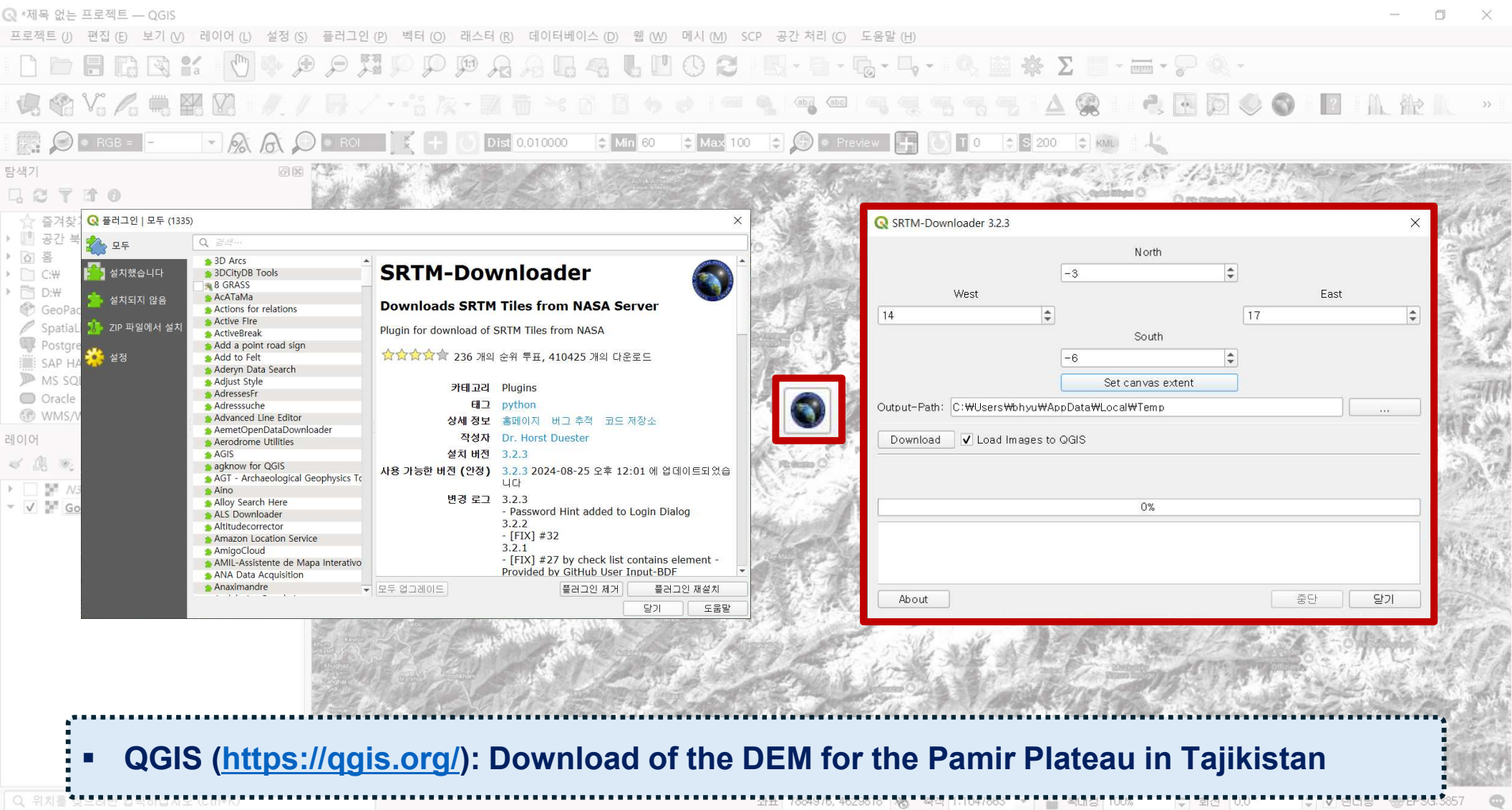
▪ Demonstration of Open-Source GIS Analysis in Asia

02 • QGIS



- **Representative Open-Source Desktop GIS Software Offering Geospatial Data Viewing, Editing, and Analysis Functions**





▪ QGIS (<https://qgis.org/>): Download of the DEM for the Pamir Plateau in Tajikistan

플러그인 | 모두 (1335)

모두

설치했습니다

설치되지 않음

ZIP 파일에서 설치

설정

Qgis2threejs

Qgis2threejs

Qgis2threejs

3D visualization powered by WebGL technology and three.js JavaScript library

This plugin visualizes DEM and vector data in 3D on web browsers. You can build various kinds of 3D objects and generate files for web publishing in simple procedure. In addition, you can save the 3D model in glTF format for 3DCG or 3D printing.

★★★★★ 442 개의 순위 투표, 1045334 개의 다운로드

카테고리 Web

태그 3d, terrain, web, gltf, ar, narrative, story, animation

상세 정보 홈페이지 버그 추적 코드 저장소

작성자 Minoru Akagi

설치 버전 2.7.3

사용 가능한 버전 (안정) 2.7.3 2024-01-31 오전 1:56 에 업데이트되었습니다

변경 로그 Version 2.7.3
- Fixed a regression related to vertical line

모두 업그레이드

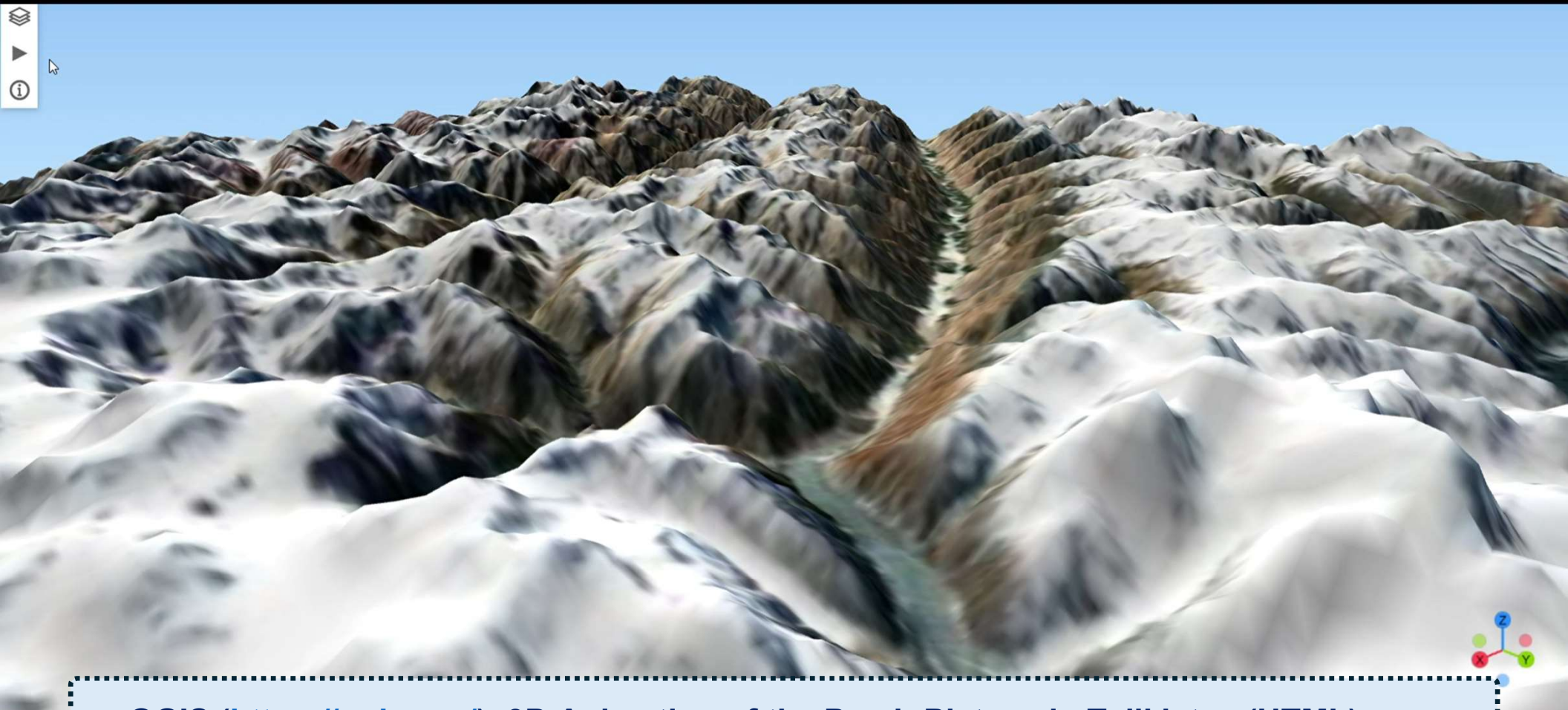
플러그인 제거

플러그인 재설치

닫기

도움말

▪ **QGIS (<https://qgis.org/>): Download of the DEM for the Pamir Plateau in Tajikistan**



- QGIS (<https://qgis.org/>): 3D Animation of the Pamir Plateau in Tajikistan (HTML)

02 • Google Earth Engine, Geemap & Python



Google Earth Engine

Platform Datasets Noncommercial Commercial Timelapse Case Studies FAQ Get started

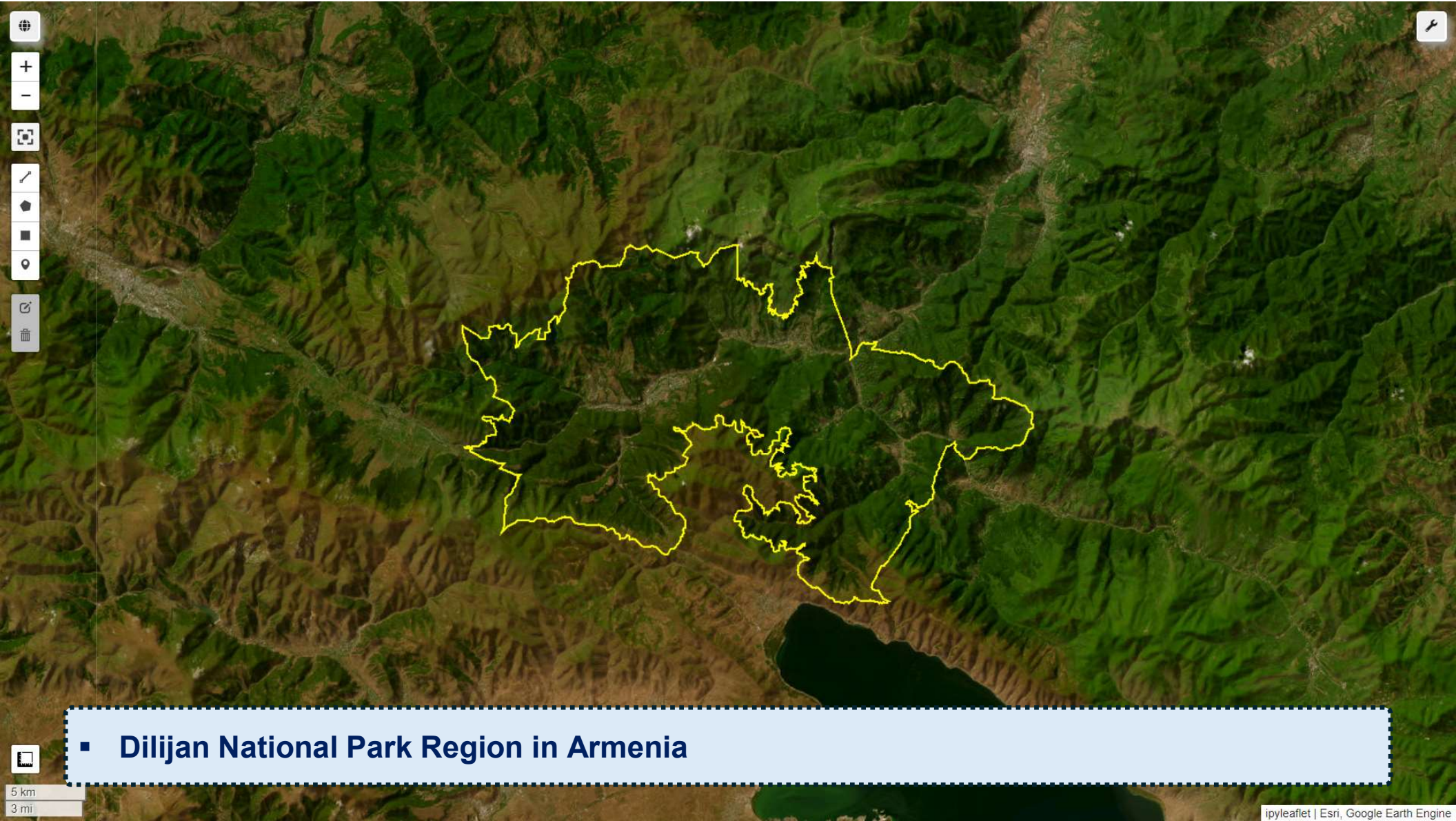
Earth Engine for commercial use: now generally available with Google Cloud. [Get more details here](#)

A planetary-scale platform for Earth science data & analysis

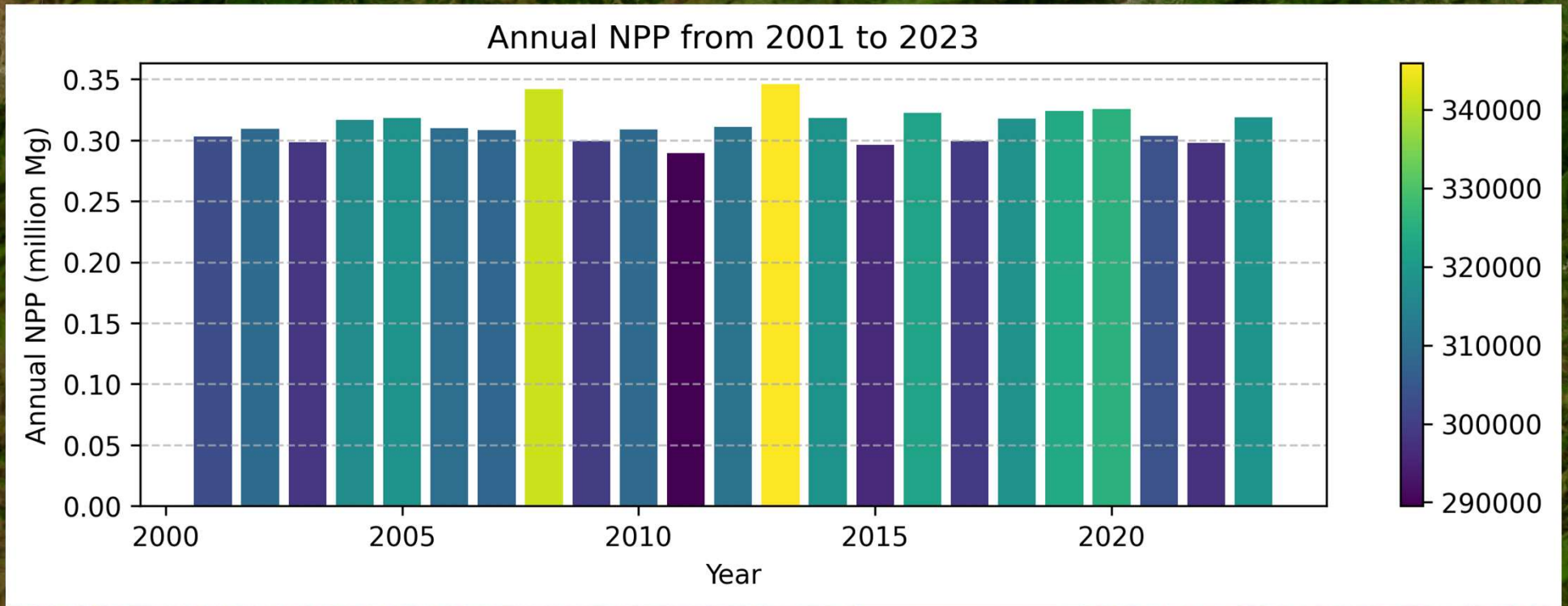
Powered by Google's cloud infrastructure

▶ Watch Video

- Rapid Mapping and Analysis of Various Geospatial Data on a Cloud Platform



▪ **Dilijan National Park Region in Armenia**



▪ **Time Series NPP Measurements for the Dilijan National Park Region from 2001 to 2023 in Armenia (5.22% Variation)**



- Sentinel-2 Image at 10 Meters for the Nur-Sultan in Kazakhstan (2021-2023)

APRIL 22,
2024

ARTIFICIAL INTELLIGENCE • CLIMATE • DATA FOR
GOOD

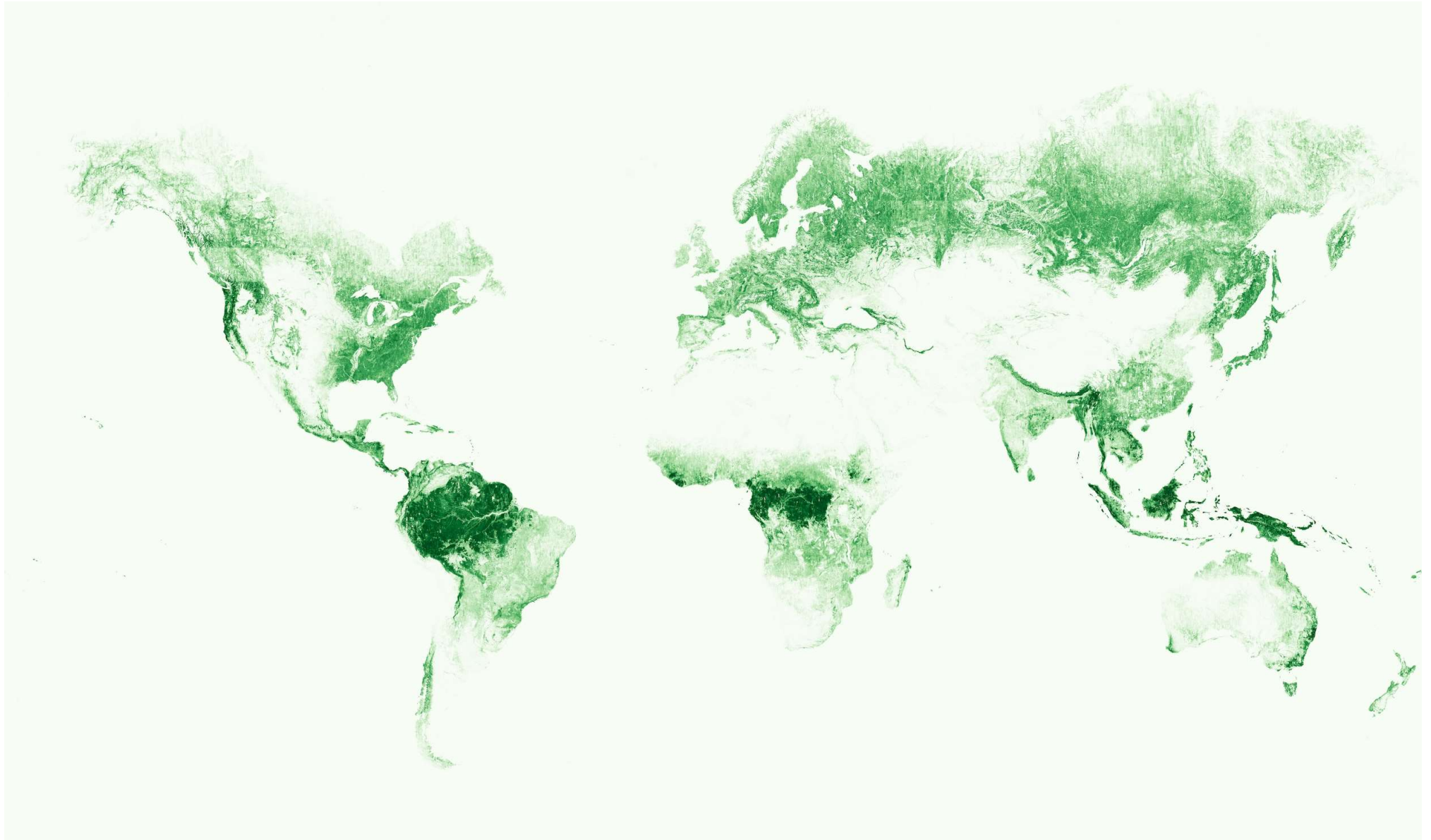
Using Artificial Intelligence to Map the Earth's Forests

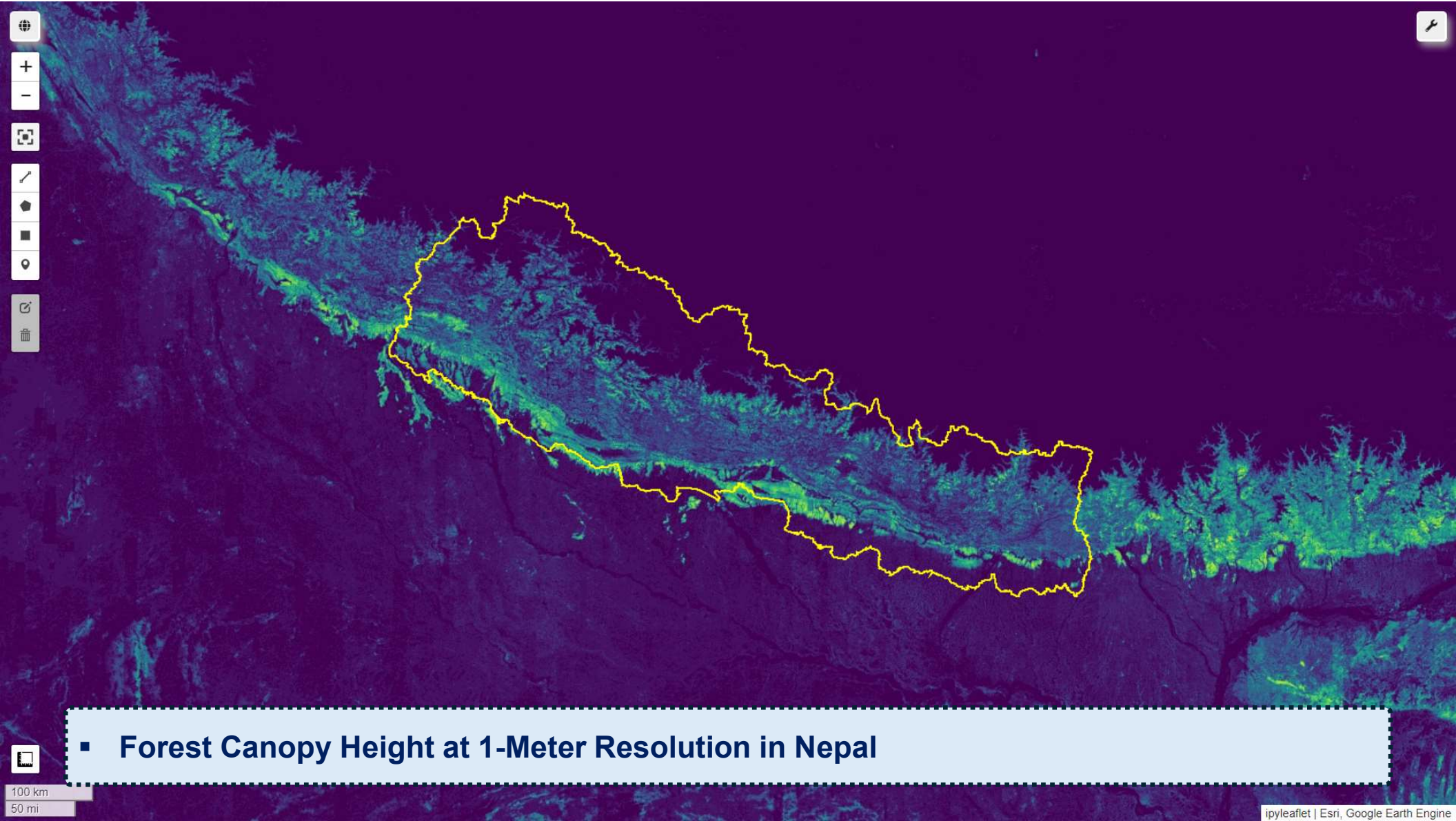
JAMIE TOLAN, CAMILLE COUPRIE, JOHN BRANDT, JUSTINE SPORE,
TOBIAS TIECKE, TRACY JOHNS, PATRICK NEASE

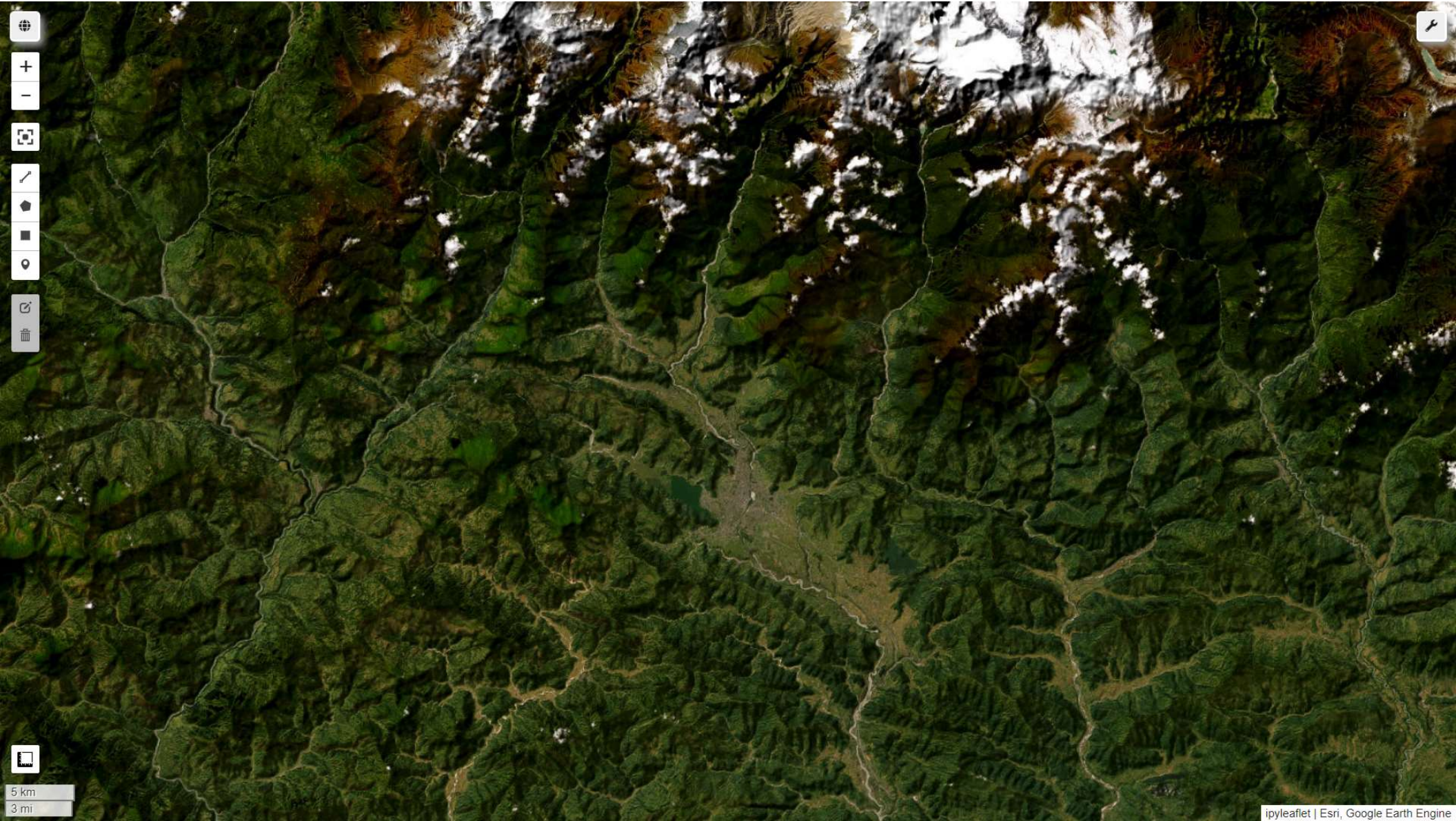
SHARE   



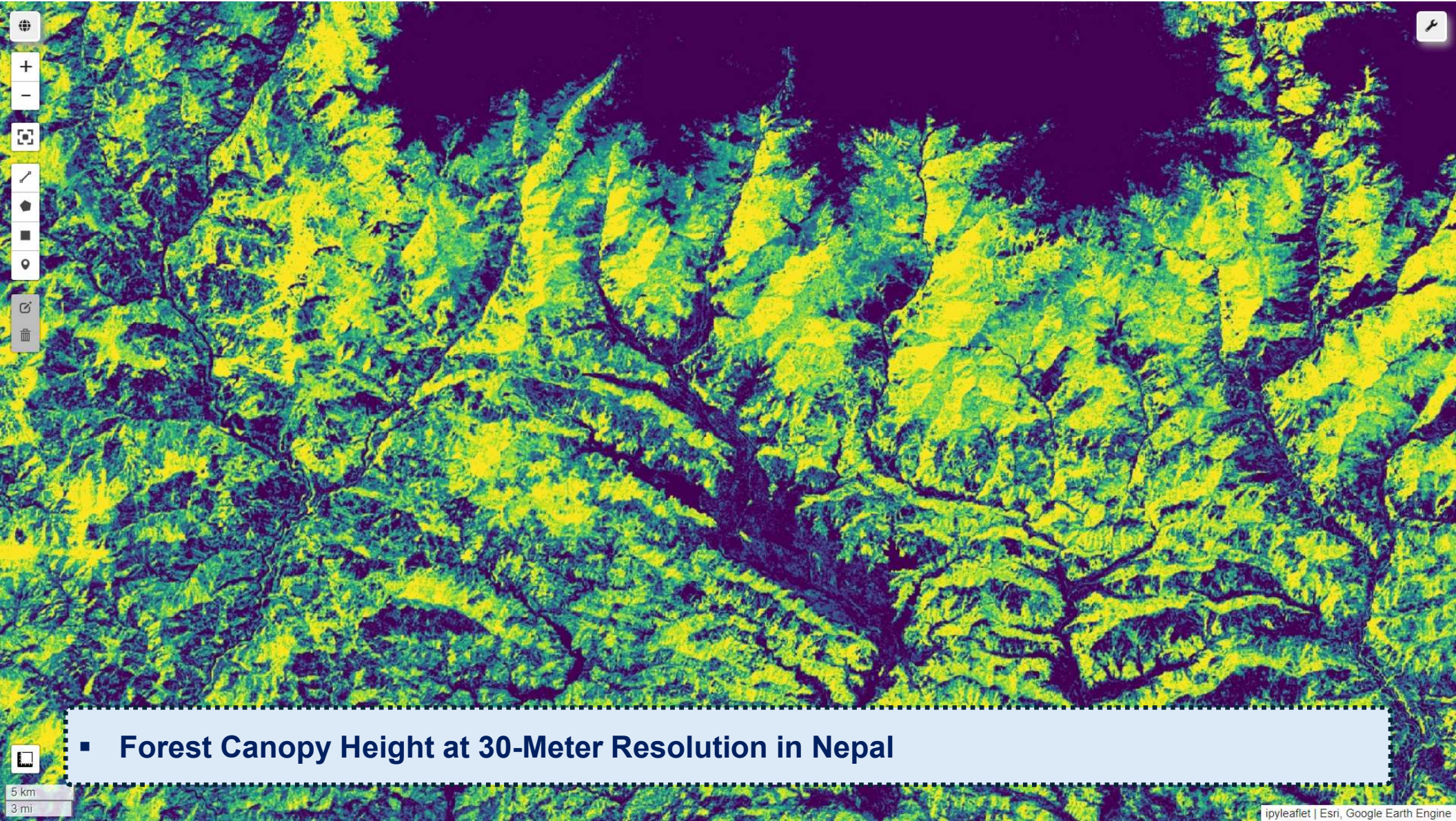
- Provision of Global Forest Canopy Height at 1-Meter Resolution Using Artificial Intelligence Technology



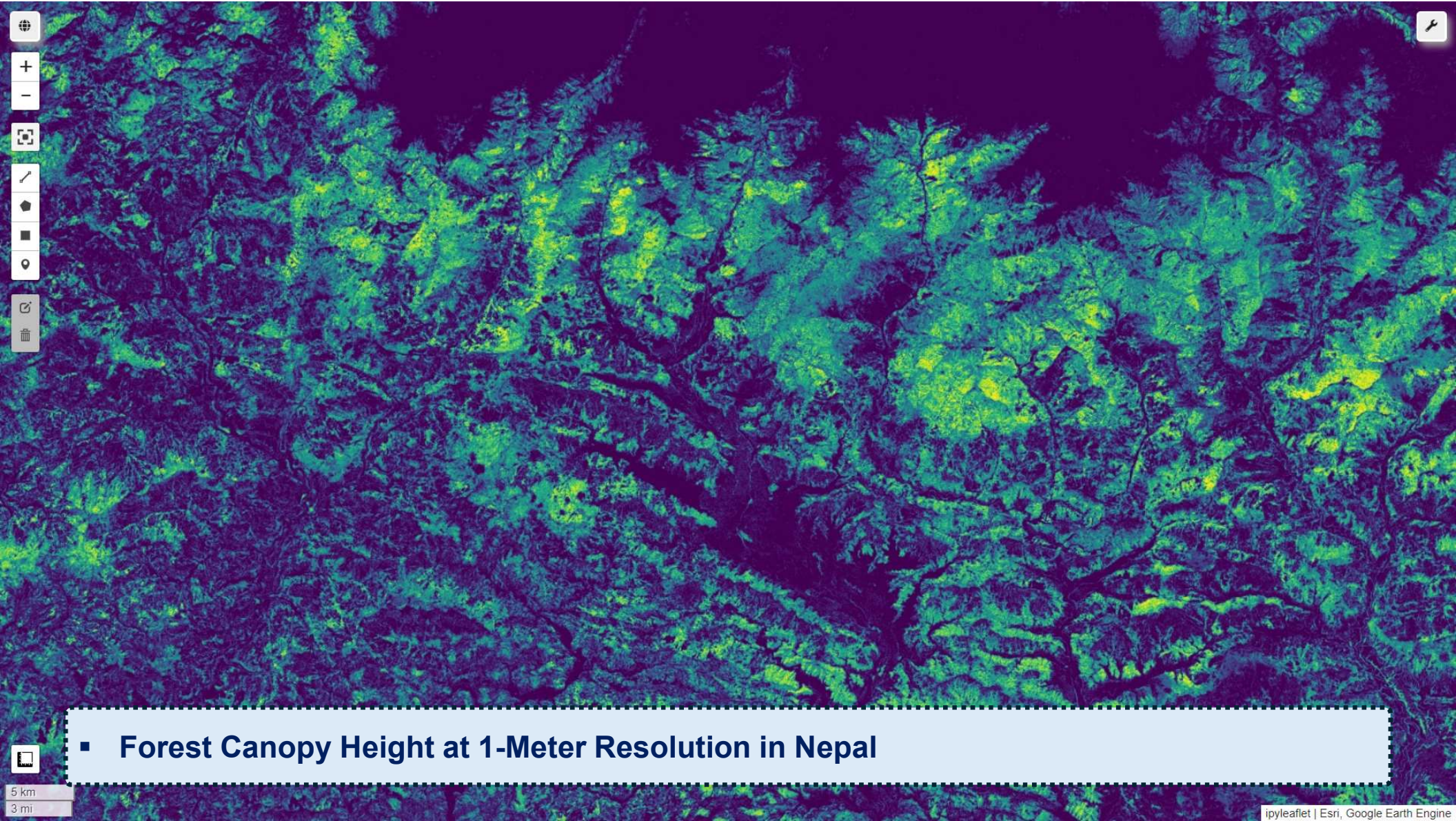




5 km
3 mi

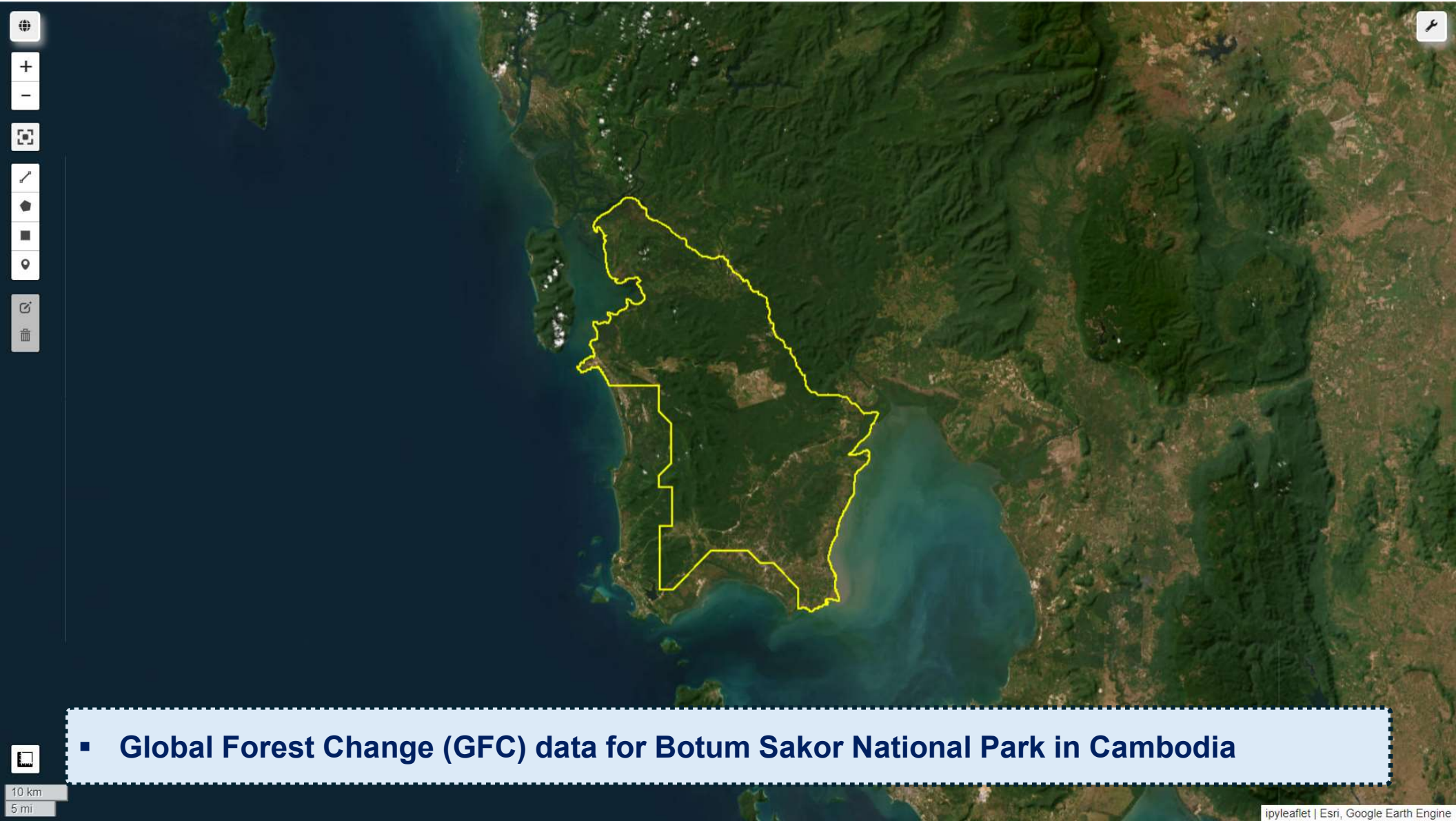


▪ **Forest Canopy Height at 30-Meter Resolution in Nepal**

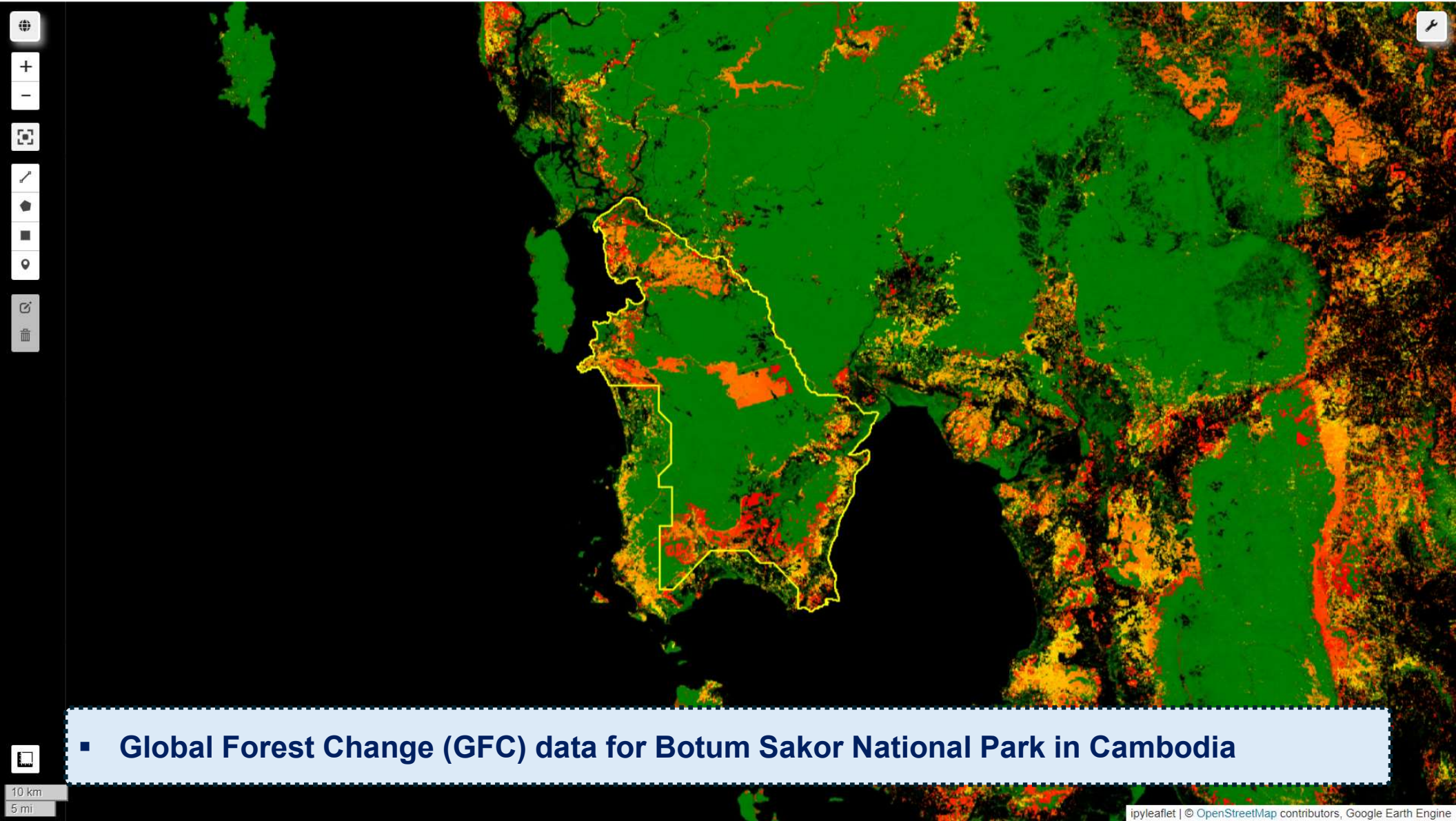


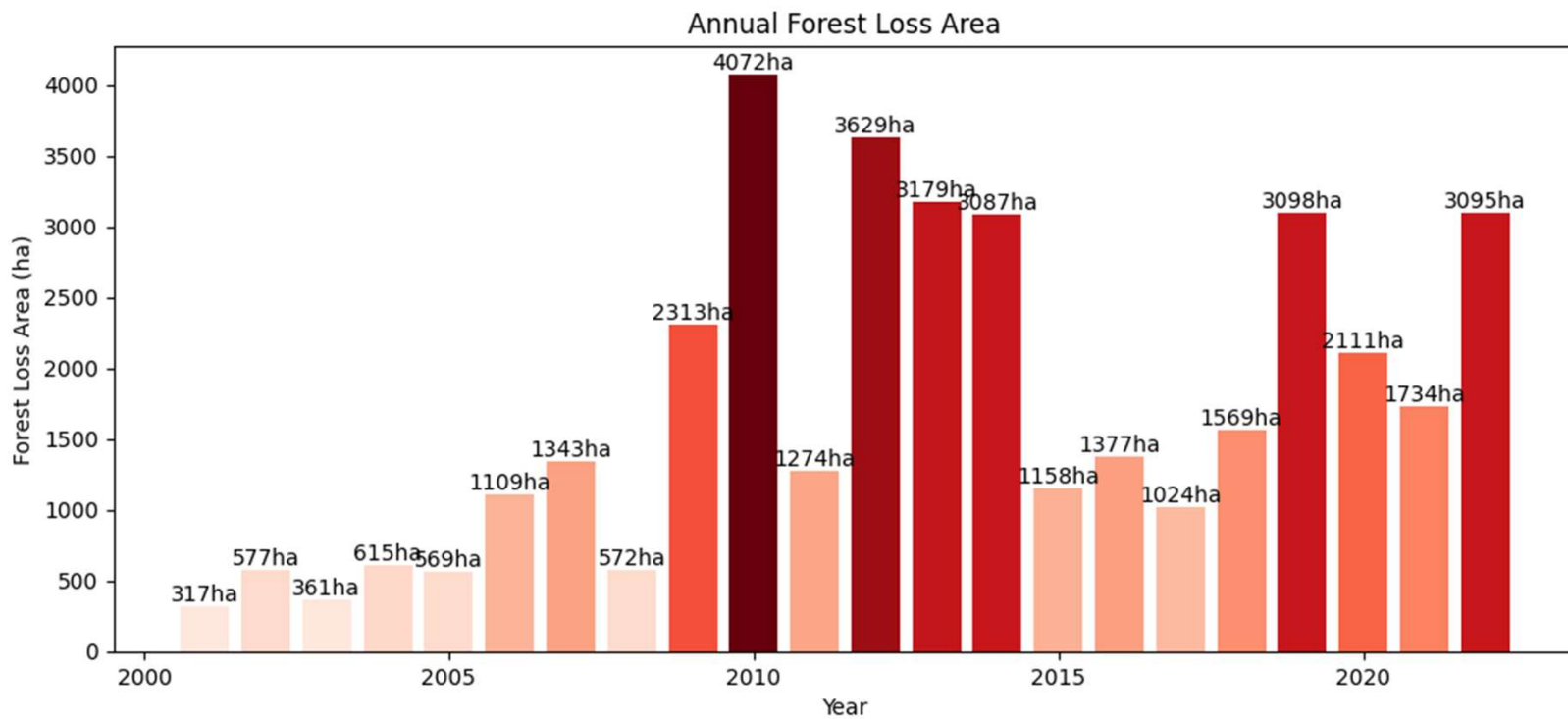
▪ **Forest Canopy Height at 1-Meter Resolution in Nepal**

5 km
3 mi



▪ **Global Forest Change (GFC) data for Botum Sakor National Park in Cambodia**





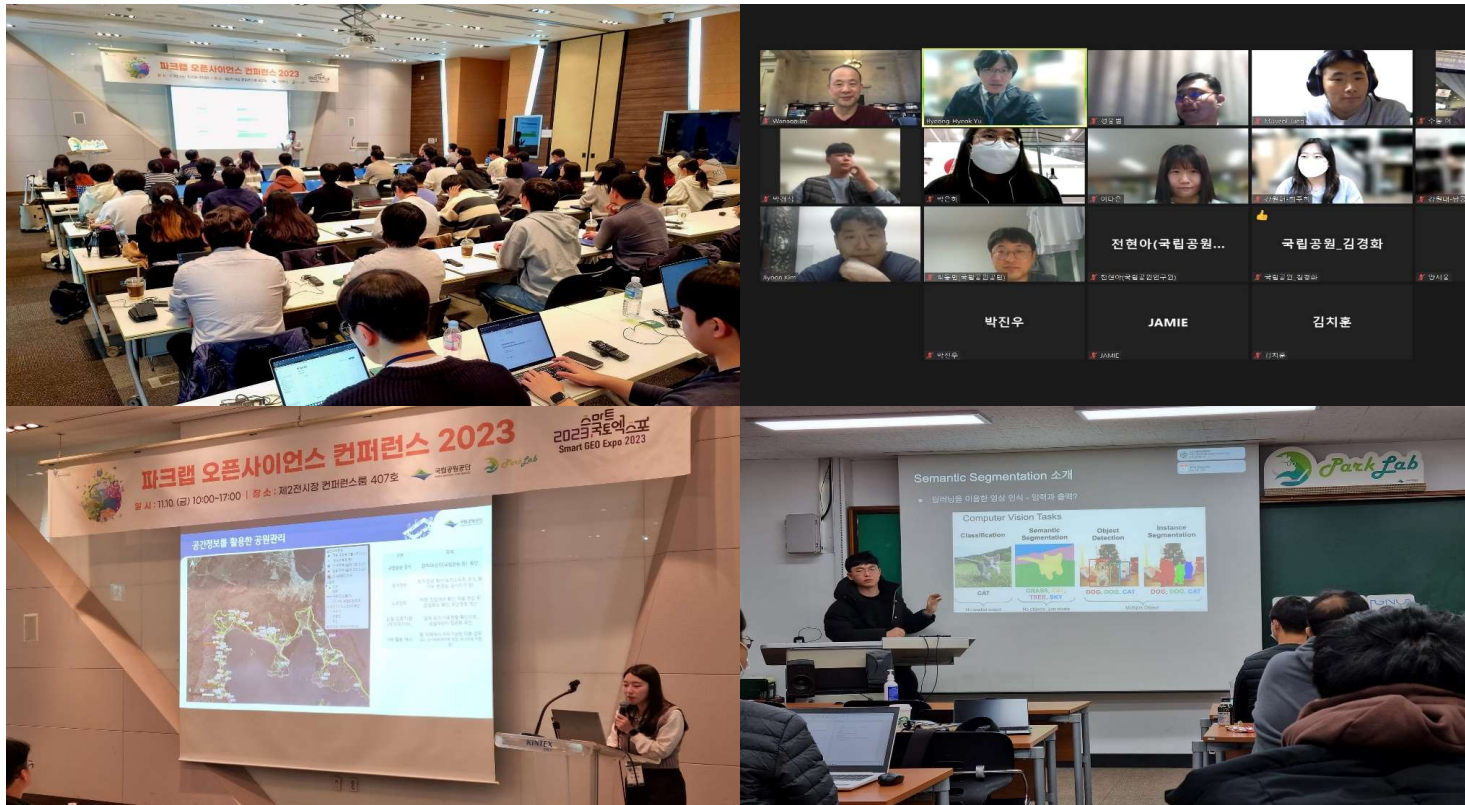
▪ **Time Series Deforestation Statistics for Botum Sakor National Park (2001-2022)**

03 • Open Source: How to Access and Use It?



- Establish a collaborative network among interested individuals and support knowledge-sharing activities that are transparently accessible.

03 • Open Source : Comment y Accéder et l'Utiliser ?



- **ParkLab**: A knowledge-sharing group interested in ICT technologies for nature protection, bringing together researchers, technicians, and students.



- **ParkLab**: A knowledge-sharing group interested in ICT technologies for nature protection, bringing together researchers, technicians, and students.



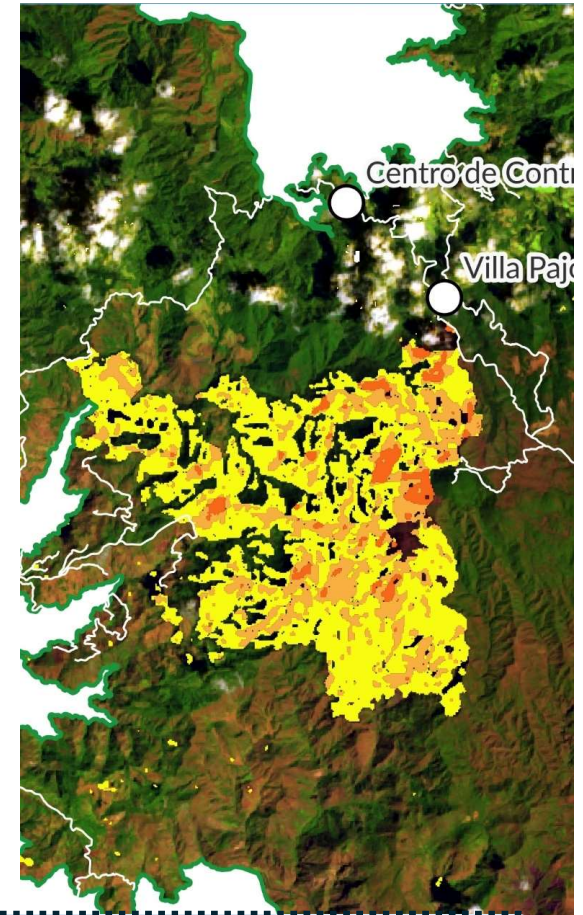
- **Digital ODA:** Establishment and Utilization of Information Systems Based on Open-Source GIS Technologies for Partner Countries (Project Dominican Republic: 2024-2028)

바예 누에보 국립공원

(Valle Nuevo National Park)

-대형 산불: 2023년 2월 25일~3월 6일

-기획조사단 자체 분석 결과 (Landsat 9호 위성영상)



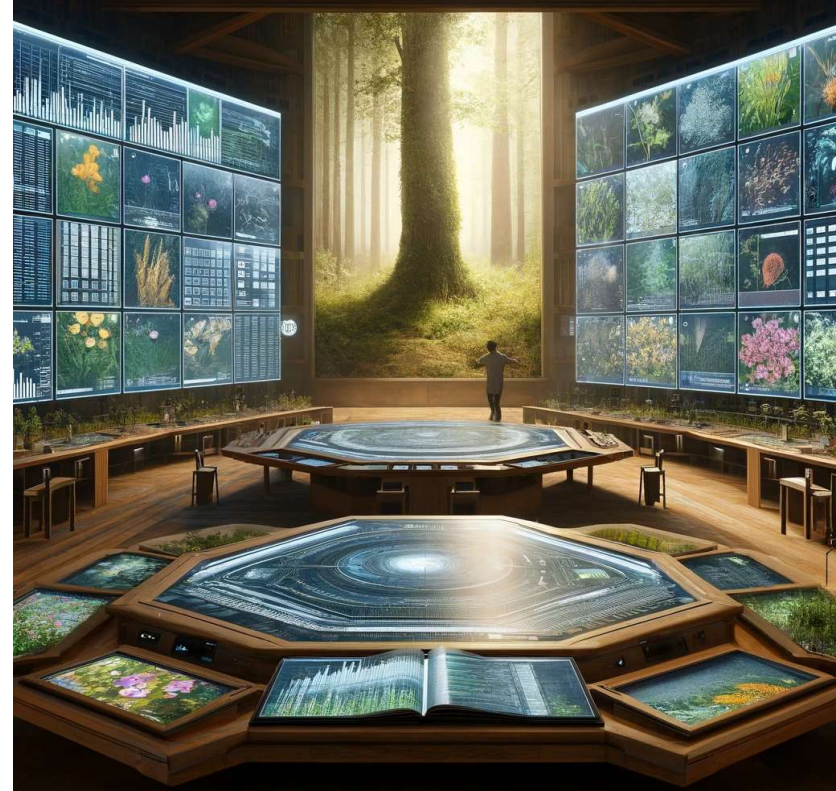
- 3. **Digital ODA: Establishment and Utilization of Information Systems Based on Open-Source GIS Technologies for Partner Countries (Project Dominican Republic: 2024-2028)**

-삼각포, 모닝, 점심 (Moderate mgn, serverny): 1:9 km



- **Digital ODA:** Establishment and Utilization of Information Systems Based on Open-Source GIS Technologies for Partner Countries (Project Dominican Republic: 2024-2028)

04 • Why do we learn technology?



- Research methods and technologies will evolve over time, but the key is to use data for better protection of nature.

WE STAND WITH THE WORLD'S RANGERS

WORLD RANGER DAY - 31 JULY



Thank You