Google Earth Engine

Overview

Dimodifikasi dari materi googleearthengineoutreach2019

Sumber: UNEP Atlas of Our Changing Environment

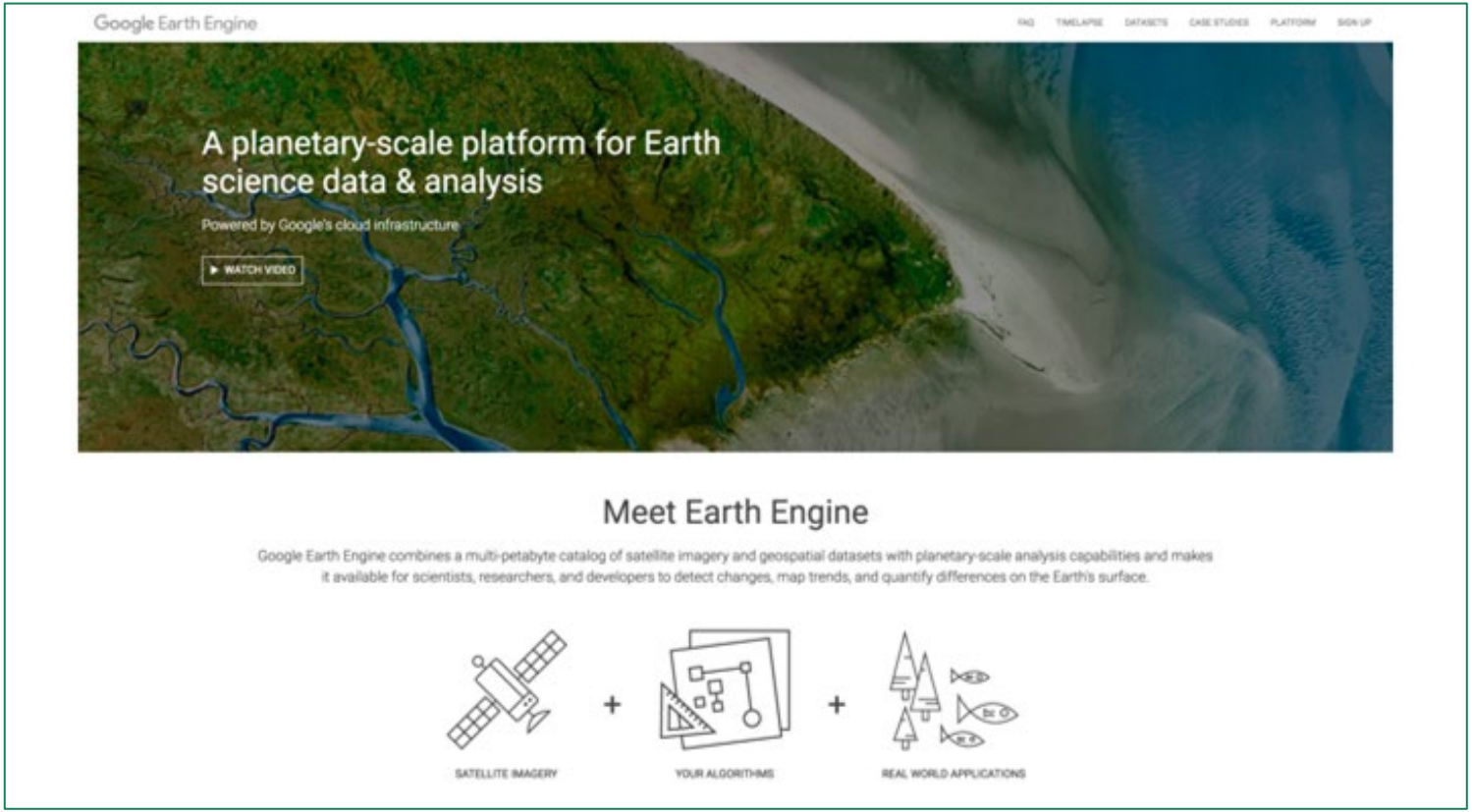
- Kita bisa “melihat” deforestasi dalam skala global.

- Selanjutnya adalah memetakan, mengukur, dan memantau permukaan planet.

- Deforestasi di Amazon (1 juta hektar per tahun) terjadi di tempat-tempat terpencil.

- Terlalu banyak data untuk diproses untuk menyediakan sistem peringatan.

Peluncuran resmi Google Earth Engine di COP-16, 2010



earthengine.google.com

Earth Engine adalah cloud platform Google
Untuk analisis citra satelit dan data geospasial
lainnya dengan skala petabyte yang mudah

Mengoperasikan NASA Earth Science Missions

Sumber : NASA

COPERNICUS AND ITS SENTINELS

European Earth Observation Programme Copernicus: observing our planet for a safer world

Known as **GMES** until 2012 - Global Monitoring for Environment and Security

30 Public and Private missions are also contributing data

16 years of development and testing

Sentinel-Missions at the heart of the space component

Civil Security. Allowing early warning and crisis prevention in conflict and disaster areas

Emergency Management. Accurate and timely data for emergency plans and rescue for disaster management

Land Surface Monitoring. Geographical information on land cover, related variables and urban development

Marine Environmental Monitoring. Observations and forecasts on the state of the physical oceans and regional seas

Climate Change Monitoring. Helps to understand the reason for climate change, rising sea levels and melting ice caps

Earth Atmosphere Monitoring. Daily information on the global atmospheric composition and when Sentinel-4 is in service this will be hourly

SENTINEL-1

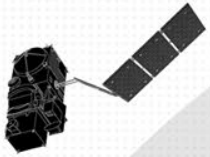
- **All-weather, day-and-night radar imaging satellite for land and ocean services**
- Able to "see" through clouds and rain
- Data delivery within 1 hour of acquisition
- Airbus Defence and Space developed C-band radar instrument

SENTINEL-2

- **Medium Res Multispectral optical satellite for observation of land, vegetation and water**
- 13 spectral bands with 10, 20 or 60 m resolution and 290 km swath width
- Global coverage of the Earth's land surface every 5 days
- Airbus Defence and Space prime contractor for satellites and instruments

SENTINEL-3

- **Measures sea-surface topography with a resolution of 300 m, sea and land surface temperature and colour with a resolution of 1 km**
- Measures water vapour, cloud water content and thermal radiation emitted by the Earth
- Determines global sea surface temperatures with an accuracy greater than 0.3 K
- Airbus Defence and Space supplies Microwave Radiometer



SENTINEL-5P

- **Global observation of key atmospheric constituents, including ozone, nitrogen dioxide, sulphur dioxide and other environmental pollutants**
- Improves climate models and weather forecasts
- Provides data continuously during five-year gap between the retirement of Envisat and the launch of Sentinel-5
- Airbus Defence and Space prime contractor for satellite and TROPOMI instrument

SENTINEL-4

- **Provides hourly updates on air quality with data on atmospheric aerosol and traces gas concentrations**
- Spatial sampling is 8 km and spectral resolution between 0.12 nm and 0.5 nm
- Airbus Defence and Space prime contractor for spectrometer
- Carried aboard EUMETSAT's Meteosat Third Generation (MTG) satellites

SENTINEL-5

- **Measures air quality and solar radiation, monitors stratospheric ozone and the climate**
- Global coverage of Earth's atmosphere with an unprecedented spatial resolution
- Airbus Defence and Space prime contractor for instrument
- Carried aboard EUMETSAT's MetOp Second Generation satellites

SENTINEL-6

- **Observes changes in sea surface height with an accuracy of a few centimeters**
- Global mapping of the sea surface topography every 10 days
- Enables precise observation of ocean currents and ocean heat storage; vital for predicting rises in sea levels
- Airbus Defence and Space prime contractor for satellite

2014 — 2020

Citra Satelit

Satu citra Landsat 8

- 64M piksel (resolusi 30m)
- 10 spectral bands
- 12 bits/band
- 600 citra/hari

LEBIH DARI **6 JUTA** CITRA DARI **46 TAHUN** LANDSAT BEROPERASI.

Banyak satelit lain dengan kombinasi resolusi spasial yang berbeda, band spektral, frekuensi pengumpulan

6 juta citra Landsat *(19722018)*
2+ Petabytes disimpan dalam kaset di USGS

Arsip Data Pengamatan Bumi

Earth Engine

Co-locate

- Big Data
- Komputasi Masif
- Algoritma Ilmiah

Earth Engine

Co-locate

- Big Data
- Massive Computation
- Scientific Algorithms

Disesuaikan untuk data geospasial

API untuk pengembangan aplikasi


Layers
Map
Satellite
Isle of Mull - Inggris
Google
Imagery ©2013 TerraMetrics - Terms of Use
Report a map error

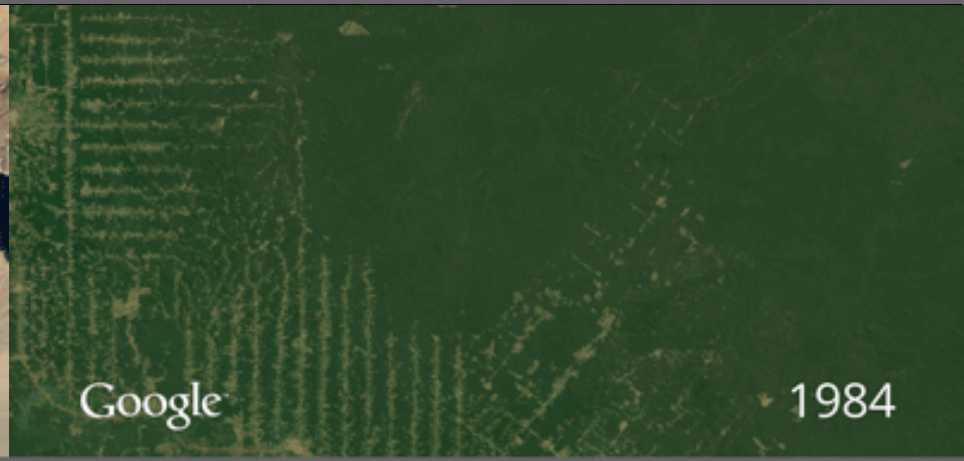
Google Maps & Earth (2013 -Sekarang)

Animasi Timelapse Landsat Global

Columbia Glacier Retreat, 1984-2011

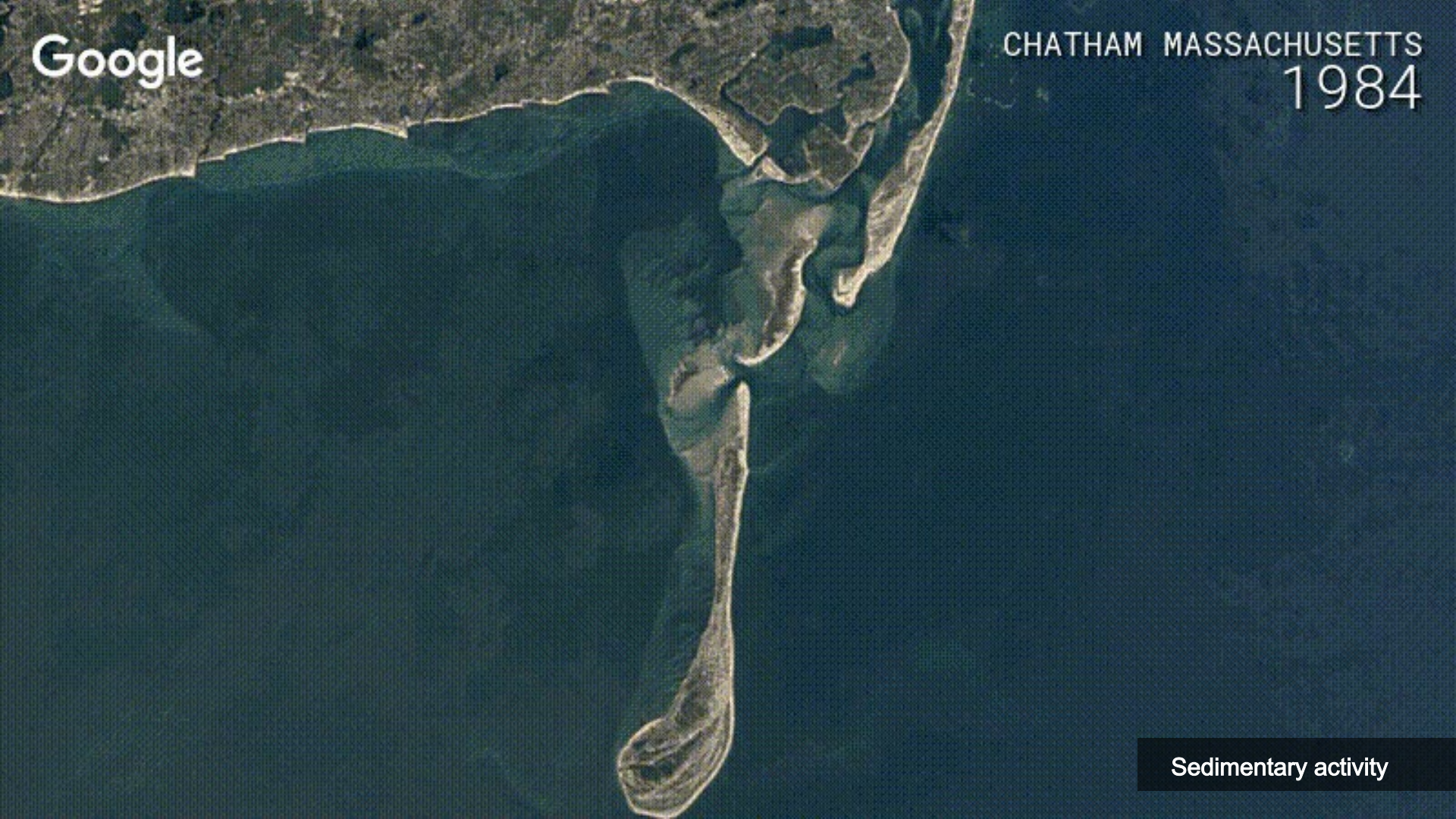
Saudi Arabia Irrigation, 1984-2012

Las Vegas Urban Growth, 1986-2012



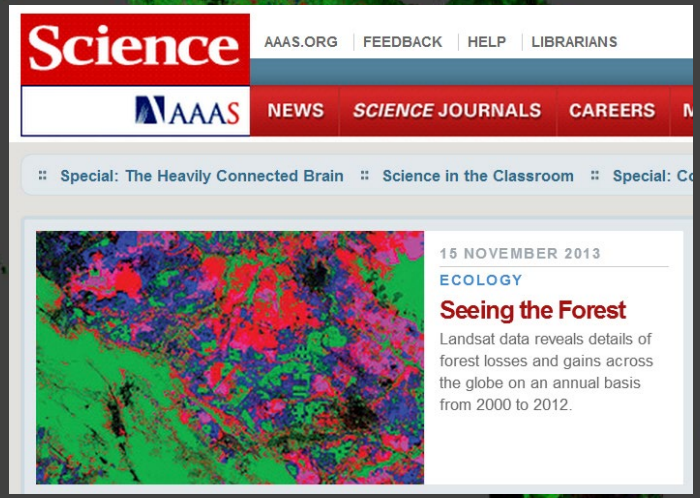
Brazilian Amazon Deforestation, 1984-2012


Las Vegas - Lake Mead


Google
CHATHAM MASSACHUSETTS
1984
Sedimentary activity


Google
MIRUIXIANG TIBET
1984
Sungai berkelok


TIMELAPSE POWERED BY Google
SHARE
WEBBY AWARD WINNER
2014
PEOPLE'S VOICE WINNER
35 tahun
data satelit
5,000,000+
Landsat scenes dianalisis
3
quadrillion pi ksel
Lebih dari 2 juta jam komputasi dari 66,000 komputer
Waktu yang dibutuhkan : ~1.5 hari untuk membangun mosaik
TIMELAPSE
decades of satellite photography
Pictured: The megacity of Dubai grows in the desert, from 1984 to today
DUBAI · COLUMBIA GLACIER · THE AMAZON · LAS VEGAS · EXPLORE THE WORLD



REPORT

High-Resolution Global Maps of 21st-Century Forest Cover Change

M. C. Hansen[1,*], P. V. Potapov[1], R. Moore[2], M. Hancher[2], S. A. Turubanova[1], A. Tyukavina[1], D. Thau[2], S. V. Stehman[3], S. J. …
+ See all authors and affiliations

Science 15 Nov 2013:
Vol. 342, Issue 6160, pp. 850-853
DOI: 10.1126/science.1244693

Article | Figures & Data | Info & Metrics | eLetters | PDF

You are currently viewing the abstract. View Full Text

Forests in Flux

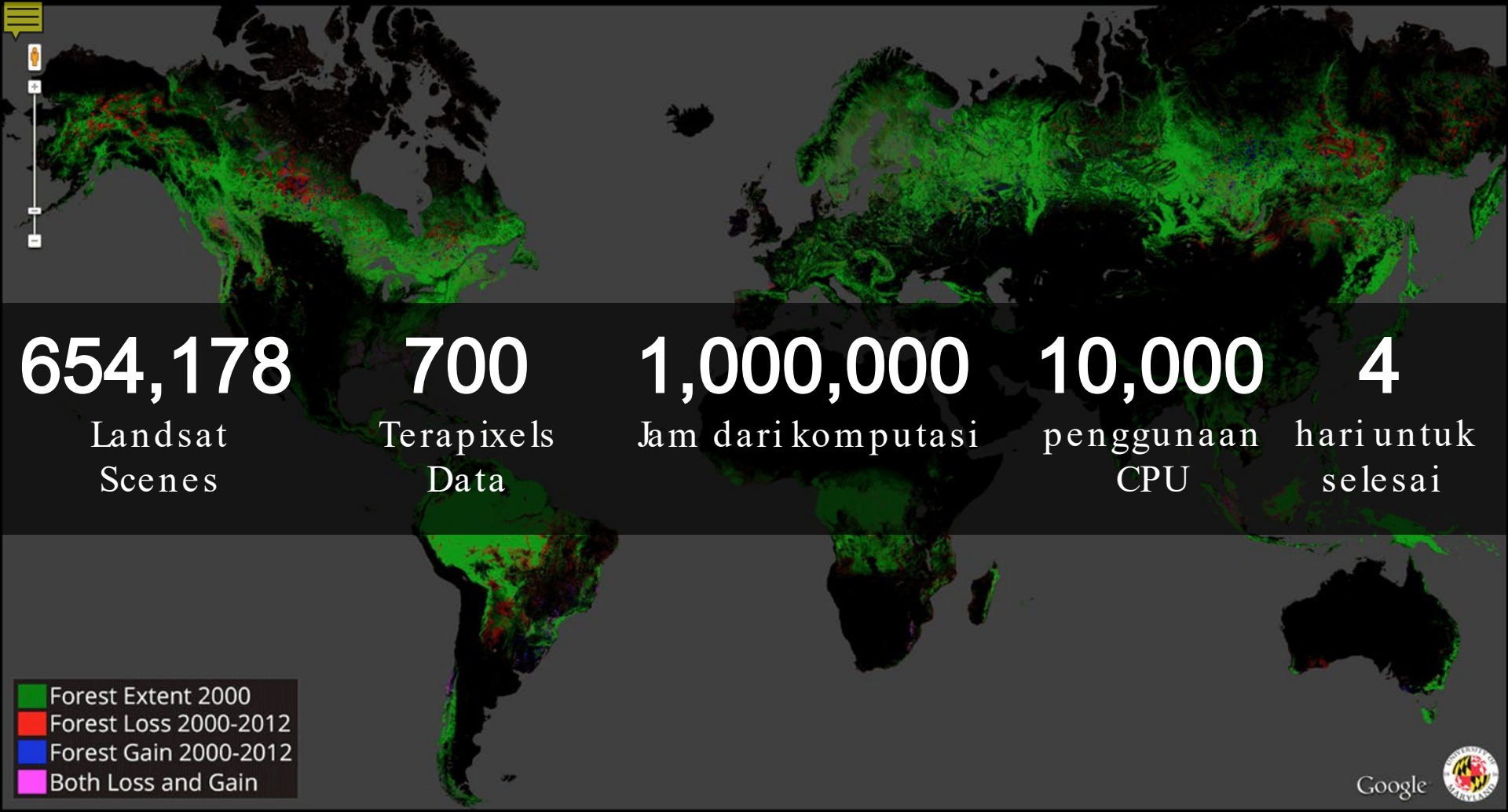
Forests worldwide are in a state of flux, with accelerating losses in some regions and gains in others. **Hansen *et al.*** (p. **850**) examined global Landsat data at a 30-meter spatial resolution to characterize forest extent, loss, and gain from 2000 to 2012. Globally, 2.3 million square kilometers of forest were lost during the 12-year study period and 0.8 million square kilometers of new forest were gained. The tropics exhibited both the greatest losses and the greatest gains (through regrowth and plantation), with losses outstripping gains.

Abstract

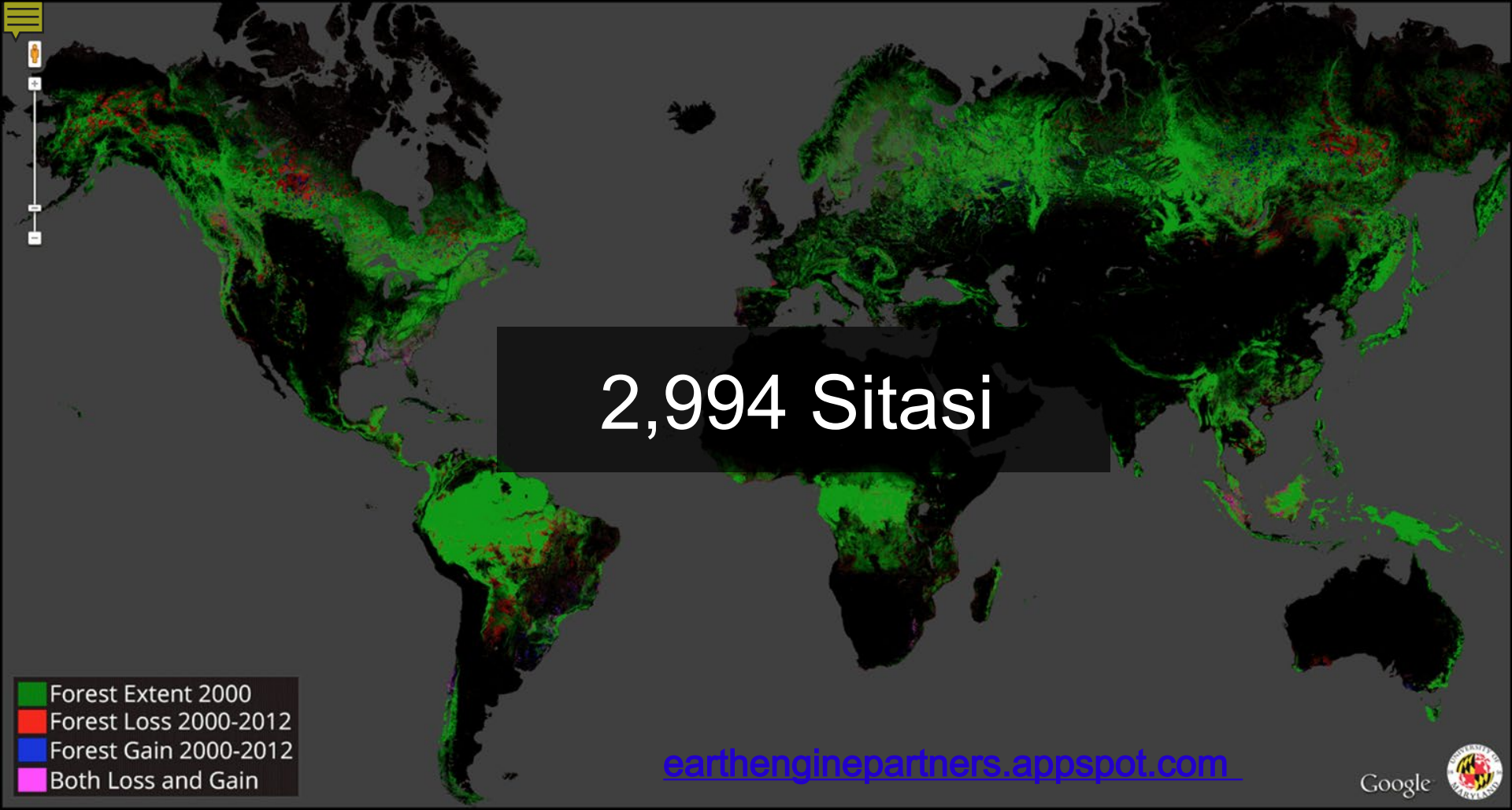
Quantification of global forest change has been lacking despite the recognized importance of forest ecosystem services. In this study, Earth observation satellite data were used to map

Forest Extent 2000
Forest Loss 2000-2012
Forest Gain 2000-2012
Both Loss and Gain

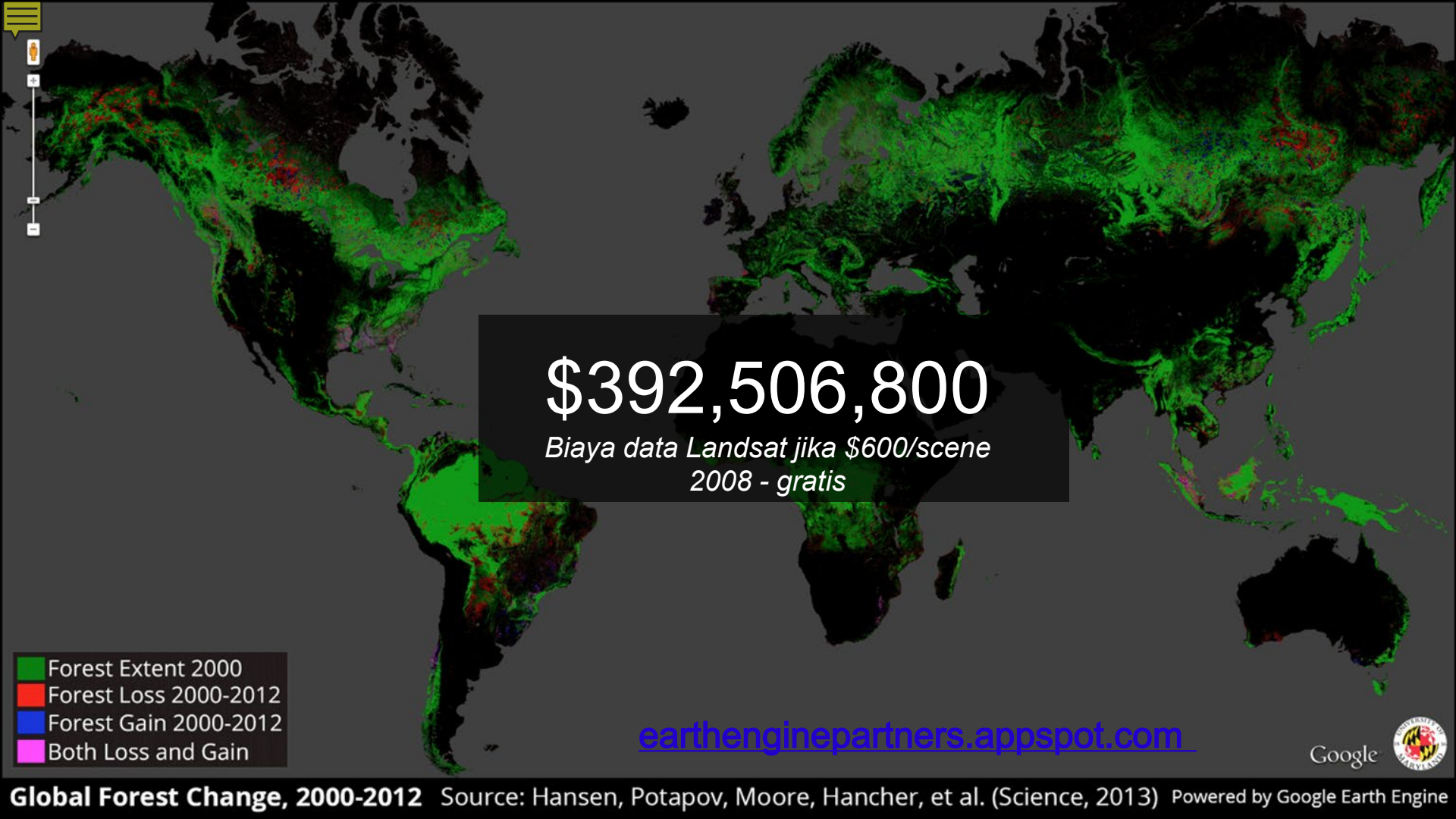
Global Forest Change, 2000-2012 Source: Hansen, Potapov, Moore, Hancher, et al. (Science, 2013) Powered by Google Earth Engine

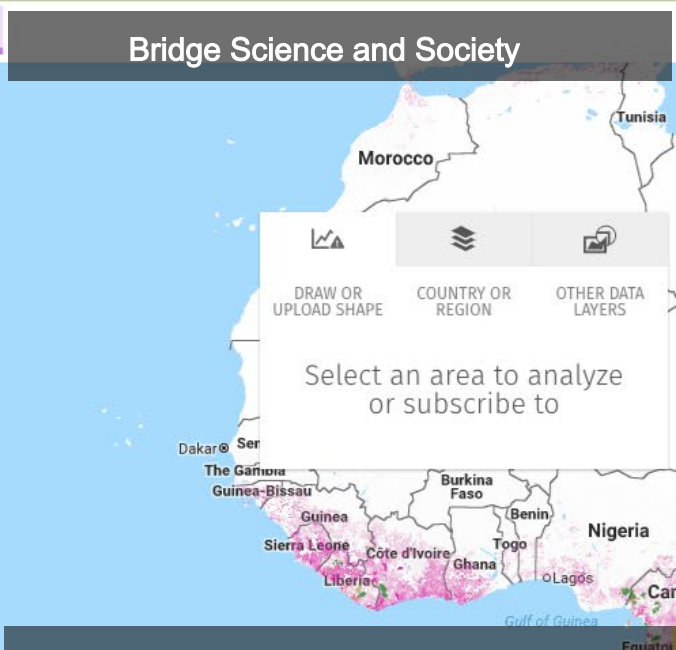


Global Forest Change, 2000-2012 Source: Hansen, Potapov, Moore, Hancher, et al. (Science, 2013) Powered by Google Earth Engine



Global Forest Change, 2000-2012 Source: Hansen, Potapov, Moore, Hancher, et al. (Science, 2013) Powered by Google Earth Engine


$392,506,800
Biaya data Landsat jika $600/scene
2008 - gratis
Forest Extent 2000
Forest Loss 2000-2012
Forest Gain 2000-2012
Both Loss and Gain
earthenginepartners.appspot.com
Google
Global Forest Change, 2000-2012
Source: Hansen, Potapov, Moore, Hancher, et al. (Science, 2013)
Powered by Google Earth Engine



"Dengan ... peringatan deforestasi di Global Forest Watch, kami dapat mendeteksi penambangan emas ilegal dan penebangan di kawasan lindung dalam beberapa hari. Dengan memberikan informasi yang tepat waktu dan tepat ke tangan pembuat kebijakan, kami telah melihat otoritas pemerintah di lapangan mengambil tindakan dalam waktu 24-48 jam setelah menerima peringatan."

Remote Sensing of Environment 202 (2017) 18–27

Contents lists available at ScienceDirect

Remote Sensing of Environment

journal homepage: www.elsevier.com/locate/rse

Google Earth Engine: Planetary-scale geospatial analysis for everyone

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ARTICLE INFO

Article history:
Received 9 July 2016
Received in revised form 5 June 2017
Accepted 27 June 2017
Available online 6 July 2017

Keywords:
Cloud computing
Big data
Analysis
Platform
Data democratization
Earth Engine

ABSTRACT

Google Earth Engine is a cloud-based platform for planetary-scale geospatial analysis that brings Google's massive computational capabilities to bear on a variety of high-impact societal issues including deforestation, drought, disaster, disease, food security, water management, climate monitoring and environmental protection. It is unique in the field as an integrated platform designed to empower not only traditional remote sensing scientists, but also a much wider audience that lacks the technical capacity needed to utilize traditional supercomputers or large-scale commodity cloud computing resources.

1. Introduction

Supercomputers and high-performance computing systems are becoming abundant (Cossu et al., 2010; Nemani et al., 2011) and large-scale cloud computing is universally available as a commodity. At the same time, petabyte-scale archives of remote sensing data have become freely available from multiple U.S. Government agencies including NASA, the U.S. Geological Survey, and NOAA (Woodcock et al., 2008; Loveland and Dwyer, 2012; Nemani et al., 2011), as well as the European Space Agency (Copernicus Data Access Policy, 2016), and a wide variety of tools have been developed to facilitate large-scale processing of geospatial data, including TerraLib (Câmara et al., 2000), Hadoop (Whitman et al., 2014), GeoSpark (Yu et al., 2015), and GeoMesa (Hughes et al., 2015).

Unfortunately, taking full advantage of these resources still requires considerable technical expertise and effort. One major hurdle is in basic information technology (IT) management: data acquisition and storage; parsing obscure file formats; managing databases, machine allocations, jobs and job queues, CPUs, GPUs, and networking; and using any of the multitudes of geospatial data processing frameworks.

This burden can put these tools out of the reach of many researchers and operational users, restricting access to the information contained within many large remote-sensing datasets to remote-sensing experts with special access to high-performance computing resources.

Google Earth Engine is a cloud-based platform that makes it easy to access high-performance computing resources for processing very large geospatial datasets, without having to suffer the IT pains currently surrounding either. Additionally, and unlike most supercomputing centers, Earth Engine is also designed to help researchers easily disseminate their results to other researchers, policy makers, NGOs, field workers, and even the general public. Once an algorithm has been developed on Earth Engine, users can produce systematic data products or deploy interactive applications backed by Earth Engine's resources, without needing to be an expert in application development, web programming or HTML.

2. Platform overview

Earth Engine consists of a multi-petabyte analysis-ready data catalog co-located with a high-performance, intrinsically parallel computation service. It is accessed and controlled through an Internet-accessible application programming interface (API) and an associated web-based interactive development environment (IDE) that enables rapid prototyping and visualization of results.

The data catalog houses a large repository of publicly available geospatial datasets, including observations from a variety of satellite and aerial imaging systems in both optical and non-optical wavelengths, environmental variables, weather and climate forecasts and hindcasts, land cover, topographic and socio-economic datasets. All of this data is preprocessed to a ready-to-use but information-preserving form that allows efficient access and removes many barriers associated with data management.

Users can access and analyze data from the public catalog as well as their own private data using a library of operators provided by the Earth Engine API. These operators are implemented in a large parallel

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http://dx.doi.org/10.1016/j.rse.2017.06.031

July 2017

Publikasi paper dasar Earth Engine
di Remote Sensing of Environment

Paper ini dapat dikutip ketika anda membutukan
referensi untuk Earth Engine.


Google Earth Engine

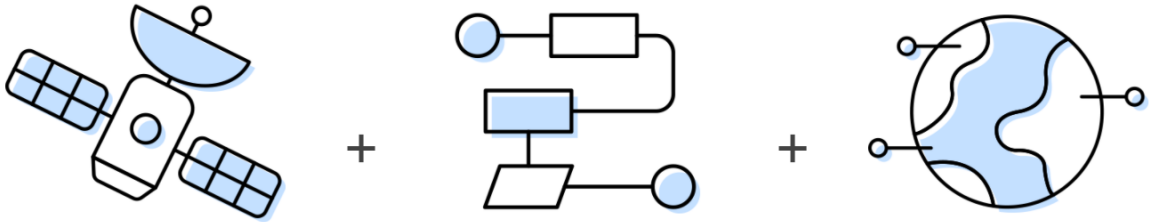
earthengine.google.com

Google Earth Engine

Platform Datasets Commercial Timelapse Case Studies FAQ Sign Up

Meet Earth Engine

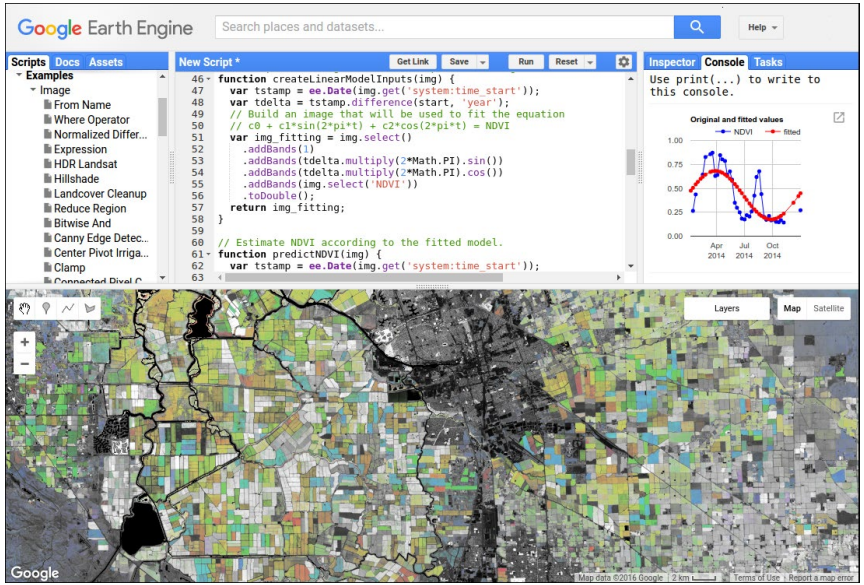
Google Earth Engine combines a multi-petabyte catalog of satellite imagery and geospatial datasets with planetary-scale analysis capabilities. Scientists, researchers, and developers use Earth Engine to detect changes, map trends, and quantify differences on the Earth's surface. Earth Engine is now available for commercial use, and remains free for academic and research use.



Satellite Imagery + Your Algorithms + Real World Applications

Bagaimana Saya Menggunakannya ?

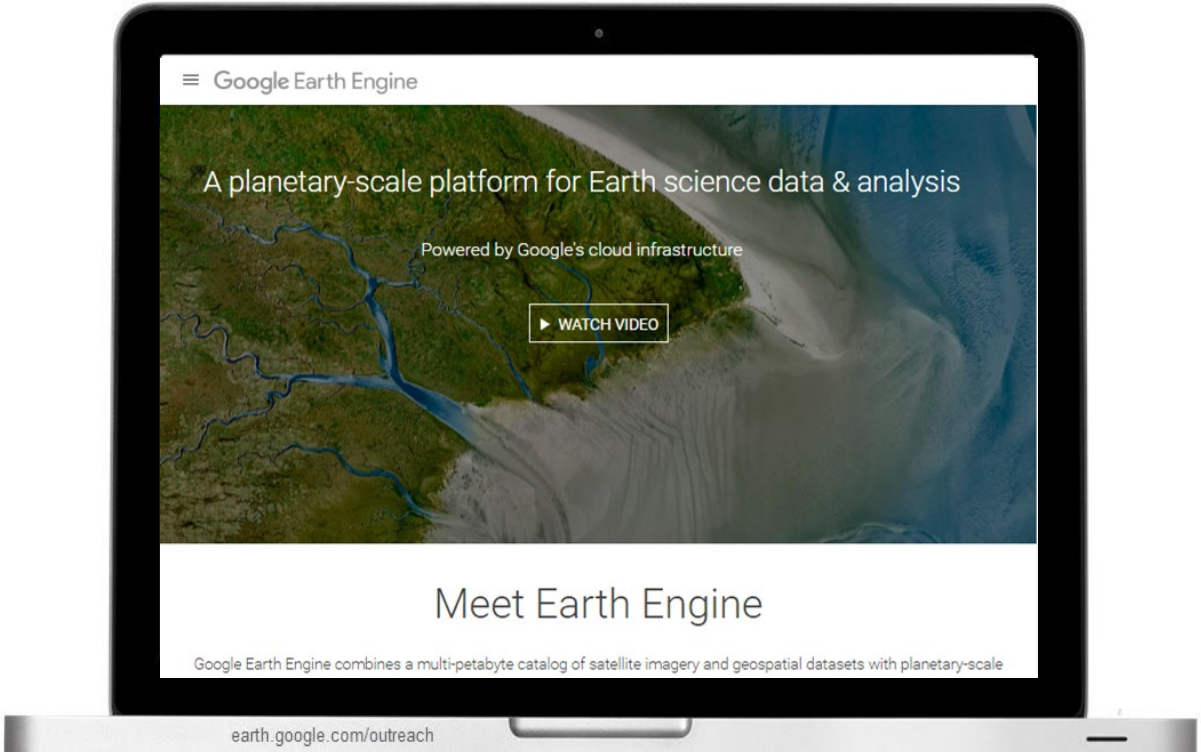
- **Timelapse**
  - Melihat perubahan di darat selama periode waktu tertentu
- **Code Editor**
  - Antarmuka interaktif untuk menggunakan fungsi penuh GEE
  - Javascript API
- **Dataset**
  - Basis data spasial
  - Tidak terbatas pada data PJ



Code Editor

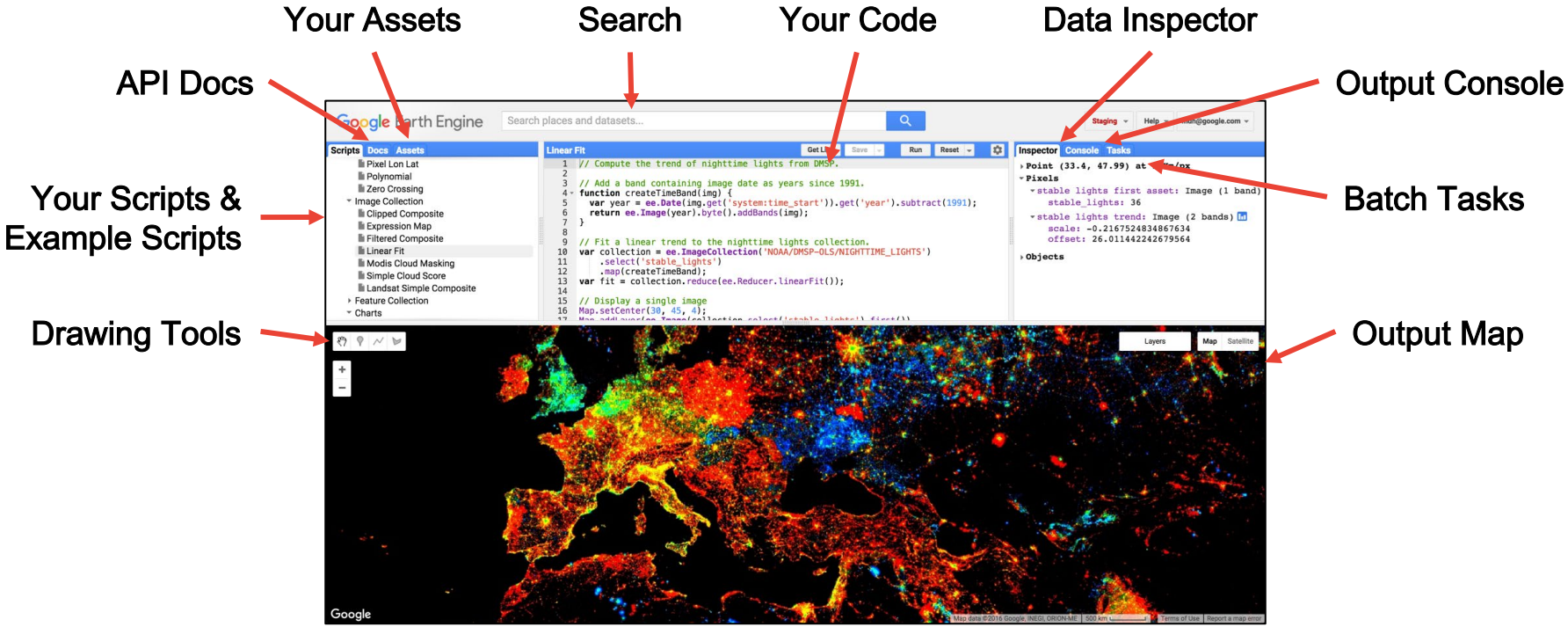
Google Earth Engine

Go to earthengine.google.com

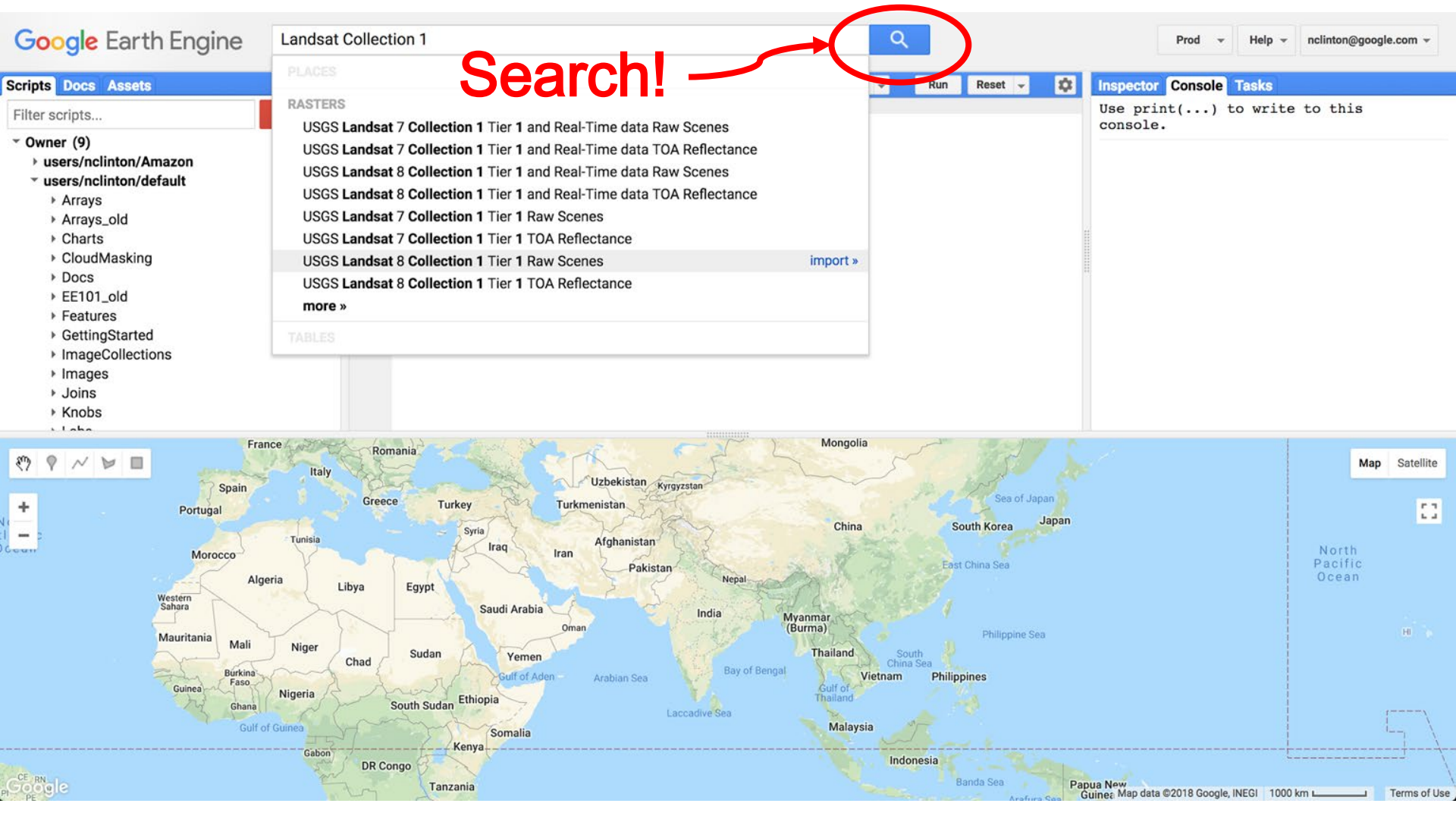


Platform > Code Editor

The Earth Engine Code Editor



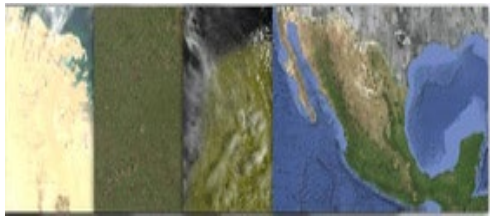
code.earthengine.google.com


Google Earth Engine
Landsat Collection 1
Search!
Prod
Help
nclinton@google.com
Scripts
Docs
Assets
Filter scripts...
Owner (9)
users/nclinton/Amazon
users/nclinton/default
Arrays
Arrays_old
Charts
CloudMasking
Docs
EE101_old
Features
GettingStarted
ImageCollections
Images
Joins
Knobs
PLACES
RASTERS
USGS Landsat 7 Collection 1 Tier 1 and Real-Time data Raw Scenes
USGS Landsat 7 Collection 1 Tier 1 and Real-Time data TOA Reflectance
USGS Landsat 8 Collection 1 Tier 1 and Real-Time data Raw Scenes
USGS Landsat 8 Collection 1 Tier 1 and Real-Time data TOA Reflectance
USGS Landsat 7 Collection 1 Tier 1 Raw Scenes
USGS Landsat 7 Collection 1 Tier 1 TOA Reflectance
USGS Landsat 8 Collection 1 Tier 1 Raw Scenes
import »
USGS Landsat 8 Collection 1 Tier 1 TOA Reflectance
more »
TABLES
Run
Reset
Inspector
Console
Tasks
Use print(...) to write to this console.
Map
Satellite
France
Romania
Mongolia
Italy
Spain
Portugal
Greece
Turkey
Uzbekistan
Kyrgyzstan
Turkmenistan
Sea of Japan
China
South Korea
Japan
Tunisia
Syria
Iraq
Iran
Afghanistan
Morocco
Pakistan
Algeria
Libya
Egypt
Nepal
East China Sea
North Pacific Ocean
Western Sahara
Saudi Arabia
India
Myanmar (Burma)
Mauritania
Mali
Niger
Chad
Sudan
Oman
Yemen
Thailand
Philippine Sea
Burkina Faso
Guinea
Nigeria
Gulf of Aden
Arabian Sea
Bay of Bengal
South China Sea
Vietnam
Philippines
Ghana
South Sudan
Ethiopia
Gulf of Thailand
Laccadive Sea
Gulf of Guinea
Somalia
Malaysia
Kenya
Gabon
DR Congo
Indonesia
Tanzania
Banda Sea
Papua New Guinea
Map data ©2018 Google, INEGI
1000 km
Terms of Use
Google

Permintaan

Hasil

Dataset Geospasial



add

filter

mosaic

distance

join

convolve

focal_min

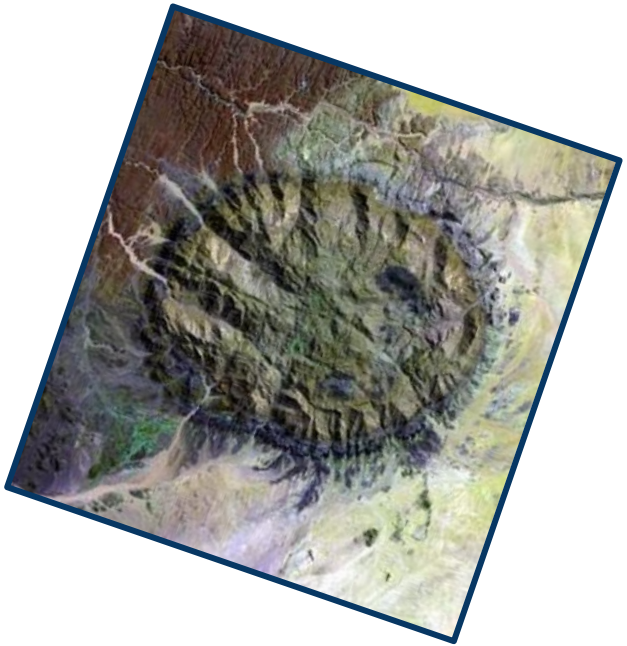
reduce

Algoritma Primitif

Penyimpanan dan Perhitungan

Apa yang dapat Anda lakukan dengan Earth Engine?

Dapatkan Citra

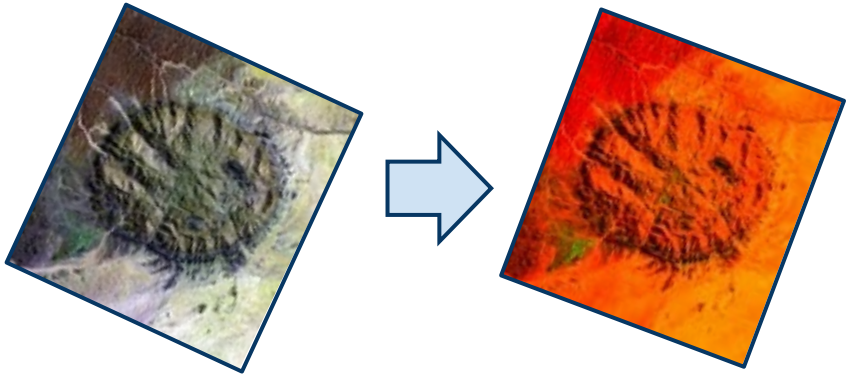


Pilih: Projection, resolution, bands, bounding-box, visualization

Apa yang dapat Anda lakukan dengan Earth Engine?

Dapatkan citra

Terapkan algoritma ke citra



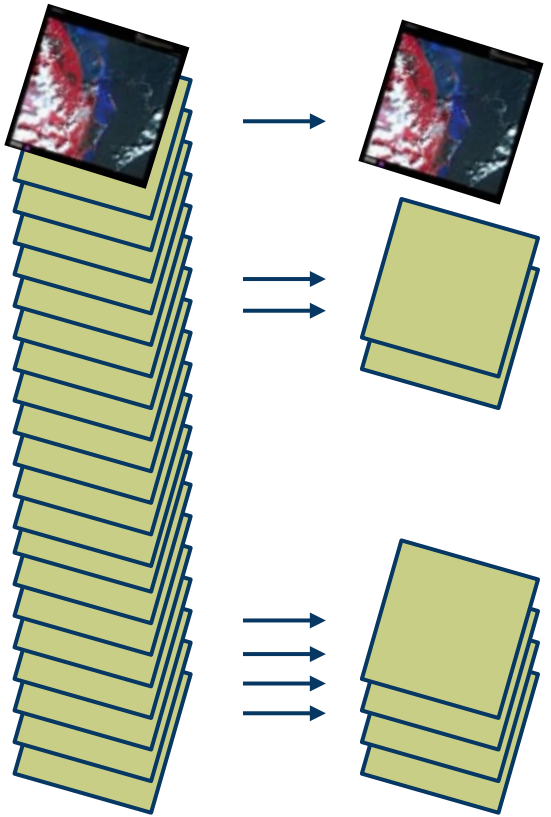
Fungsi Library atau skrip Anda sendiri.

Apa yang dapat Anda lakukan dengan Earth Engine?

Dapatkan citra

Terapkan algoritma ke citra

Filter koleksi



Pencarian Waktu, Ruang & Metadata

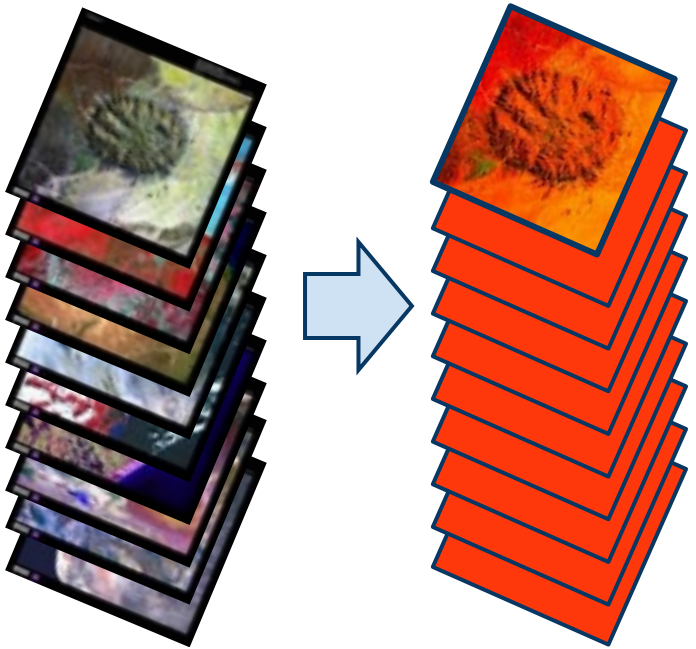
Apa yang dapat Anda lakukan dengan Earth Engine?

Dapatkan citra

Terapkan algoritma ke citra

Filter koleksi

Memetakan algoritma di atas koleksi



N → N

Apa yang dapat Anda lakukan dengan Earth Engine?

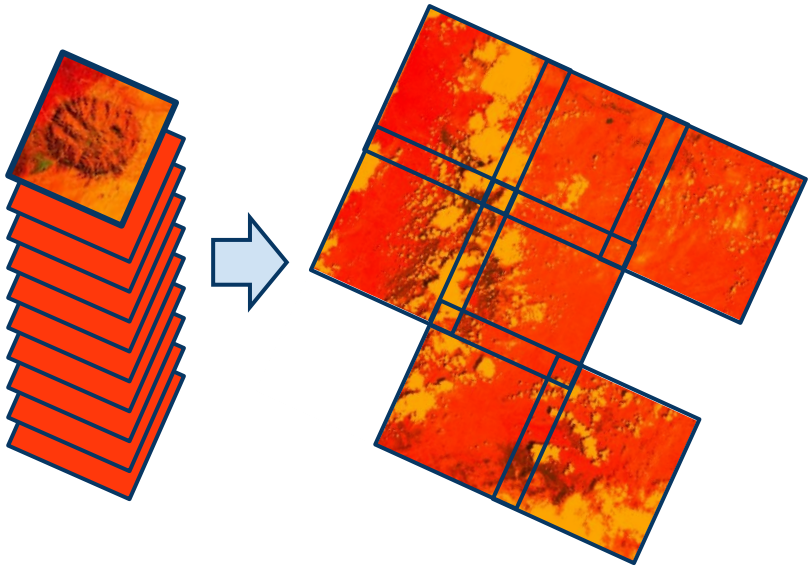
Dapatkan citra

Terapkan algoritma ke citra

Filter koleksi

Memetakan algoritma di atas koleksi

Kurangi koleksi



N → 1 or N → M

Apa yang dapat Anda lakukan dengan Earth Engine?

Dapatkan citra

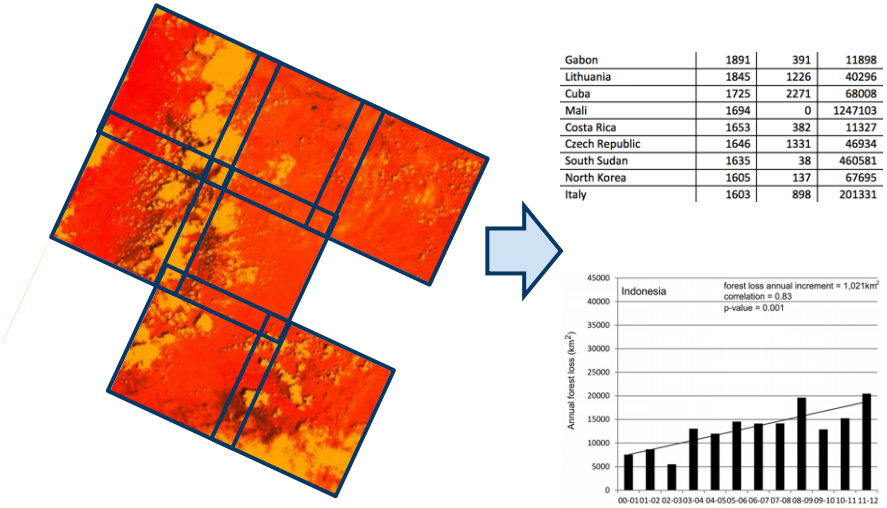
Terapkan algoritma ke citra

Filter koleksi

Memetakan algoritma di atas koleksi

Kurangi koleksi

Hitung statistik agregat

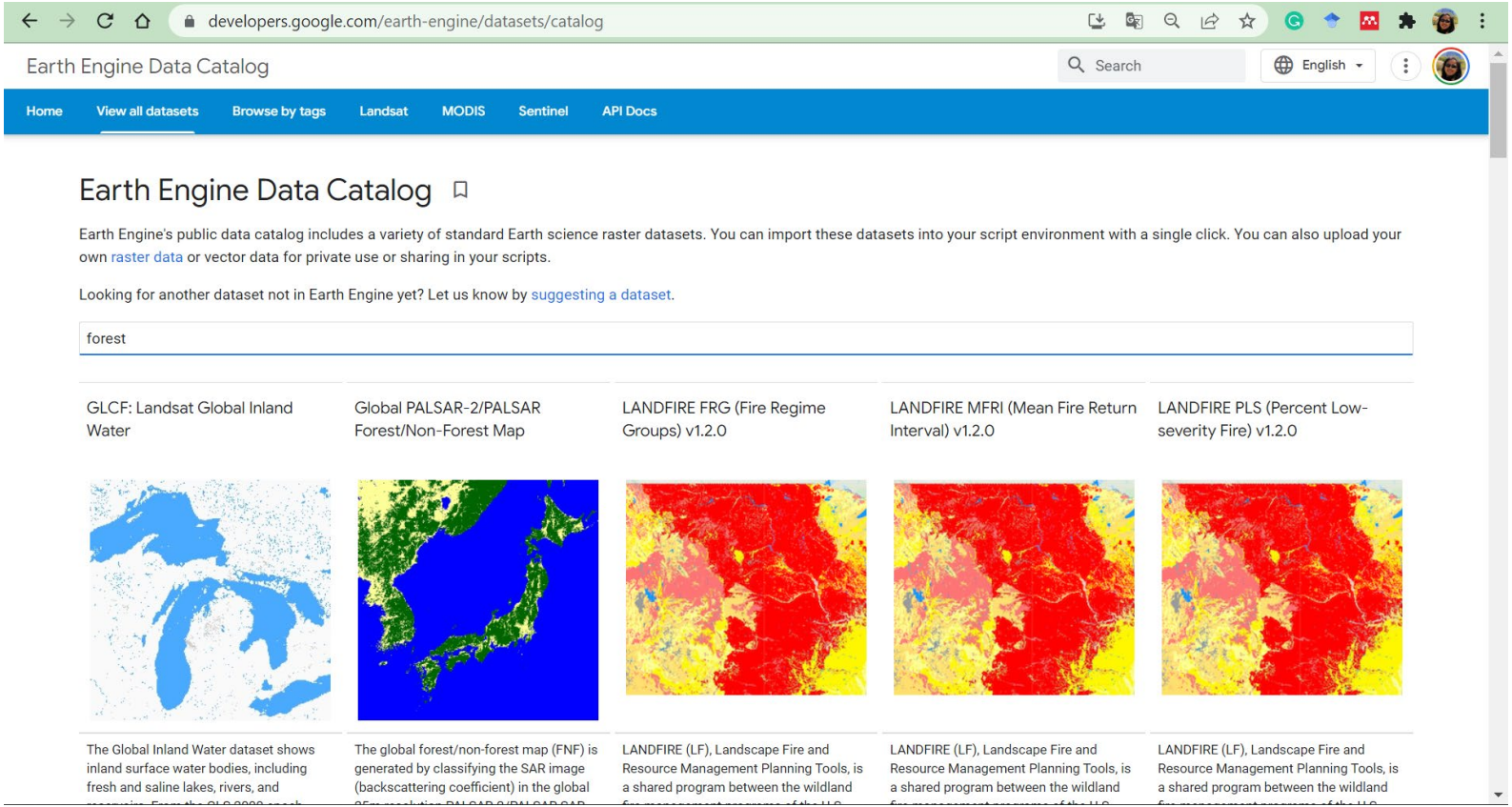


Gabon	1891	391	11898
Lithuania	1845	1226	40296
Cuba	1725	2271	68008
Mali	1694	0	1247103
Costa Rica	1653	382	11327
Czech Republic	1646	1331	46934
South Sudan	1635	38	460581
North Korea	1605	137	67695
Italy	1603	898	201331

Dataset

Google Earth Engine

Dataset

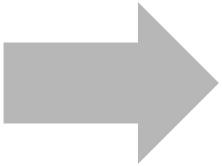

developers.google.com/earth-engine/datasets/catalog
Earth Engine Data Catalog
Search
English
Home
View all datasets
Browse by tags
Landsat
MODIS
Sentinel
API Docs
Earth Engine Data Catalog
Earth Engine's public data catalog includes a variety of standard Earth science raster datasets. You can import these datasets into your script environment with a single click. You can also upload your own raster data or vector data for private use or sharing in your scripts.
Looking for another dataset not in Earth Engine yet? Let us know by suggesting a dataset.
forest
GLCF: Landsat Global Inland Water
Global PALSAR-2/PALSAR Forest/Non-Forest Map
LANDFIRE FRG (Fire Regime Groups) v1.2.0
LANDFIRE MFRI (Mean Fire Return Interval) v1.2.0
LANDFIRE PLS (Percent Low-severity Fire) v1.2.0
The Global Inland Water dataset shows inland surface water bodies, including fresh and saline lakes, rivers, and
The global forest/non-forest map (FNF) is generated by classifying the SAR image (backscattering coefficient) in the global
LANDFIRE (LF), Landscape Fire and Resource Management Planning Tools, is a shared program between the wildland
LANDFIRE (LF), Landscape Fire and Resource Management Planning Tools, is a shared program between the wildland
LANDFIRE (LF), Landscape Fire and Resource Management Planning Tools, is a shared program between the wildland

Data Catalog pada GEE

Pertimbangan tentang data set

Pertimbangkan:

- Revisit (temporal)
- Resolusi spasial
- Band
- Akses ke data
- Latensi data



Tidak ada data set yang “sempurna”

Pikirkan tujuan Anda

Revisit

Atau dikenal sebagai resolusi temporal, ini adalah seberapa sering satelit memindai Bumi.

- MODIS - 2x sehari
- Landsat - setiap 16 hari, untuk masing-masing satelit
- Sentinel-2 – setiap 5 hari
- PlanetScope – mendekati setiap hari
- WorldView-4 – setiap hari

Resolusi spasial

Resolusi spasial menentukan detail yang dapat Anda lihat dengan sensor tertentu.

- **MODIS** (255-500m) - baik untuk daerah perkotaan, analisis regional
- **Landsat** (15-30m) - dapat memilih bangunan besar, stadion, dll.
- **Sentinel-2** (10m), perkotaan, perubahan penggunaan lahan, tanggap bencana, pemantauan pertanian
- **PlanetScope** (3-5m) - kelompok mobil dan rumah individu
- **SkySat** (0.8m) - dapat melihat masing-masing mobil, tetapi tidak dapat mengidentifikasinya
- **DG Worldview 3 & 4** (30cm)

Bands

Band penting karena jenis analisis yang ingin Anda lakukan menentukan data mana yang akan Anda gunakan. Resolusi spektral (interval panjang gelombang) vs rentang panjang gelombang juga dapat dipertimbangkan.

- Visible light
- Near Infrared - kandungan biomassa dan garis pantai
- Shortwave Infrared - kadar air tanah dan vegetasi, menembus awan tipis
- Thermal Infrared - perkiraan kelembaban tanah, suhu permukaan
- Synthetic Aperture Radar (SAR) - dapat menembus awan, vegetasi dan tanah, pemantauan es, ketinggian hutan, biomassa, penggundulan hutan, pemantauan lingkungan (tumpahan minyak), deformasi gempa, gunung berapi

Akses data / keterbatasan pemrosesan

Open Data Berkat komitmen data terbuka oleh Pemerintah AS, Uni Eropa, dan pemerintah lain di seluruh dunia, ada banyak data gratis di luar sana.

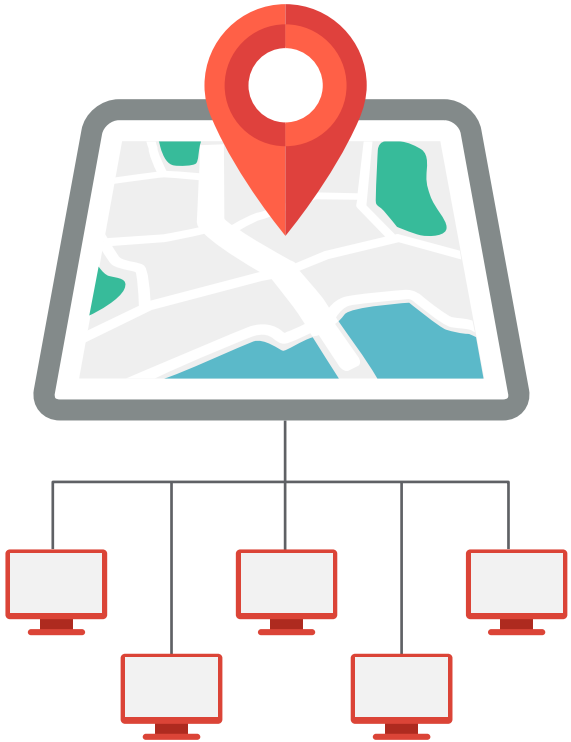
Paid data: Terkadang kumpulan data yang tepat hanya tersedia dari penyedia komersial. Harus membayar untuk citra berdampak pada berapa banyak citra yang dapat Anda analisis secara realistis.

Accessible data: Gratis tidak selalu berarti dapat diakses, tetapi dalam 5 tahun terakhir, data terbuka menjadi jauh lebih mudah diakses (Google Cloud, AWS, Earth Engine, dll)

Akses data / keterbatasan pemrosesan

Pemrosesan data penginderaan jauh dapat menjadi mahal secara komputasi, baik dalam arti moneter maupun waktu menunggu.

Pemrosesan secara paralel dapat membantu mengurangi waktu pemrosesan secara keseluruhan, tetapi memerlukan upaya rekayasa di muka dan pemeliharaan.



Latensi data

Seberapa cepat Anda dapat menganalisis data setelah diperoleh?

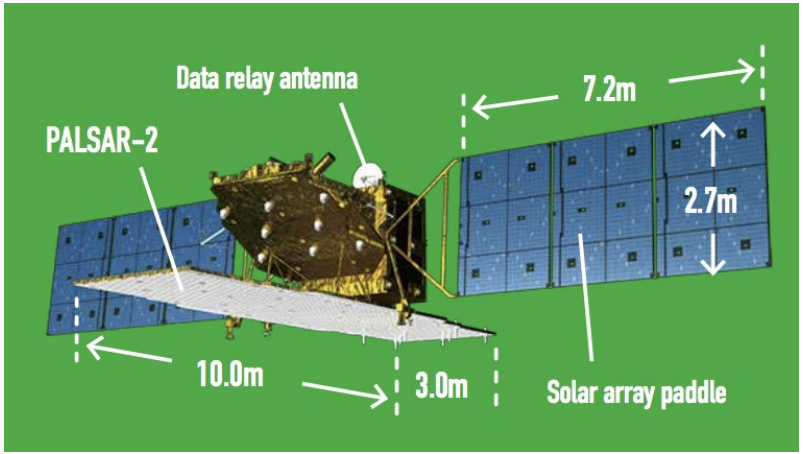
Tergantung pada banyak faktor:

- Pemrosesan oleh penyedia data atau distributor data
- Waktu tunggu politik untuk akuisisi sensitif
- dll.

Poin tambahan

- Resolusi tinggi vs area yang lebih luas
- Penyimpanan data dan relai
- Mencakup dunia atau area tertentu
- Rasi bintang

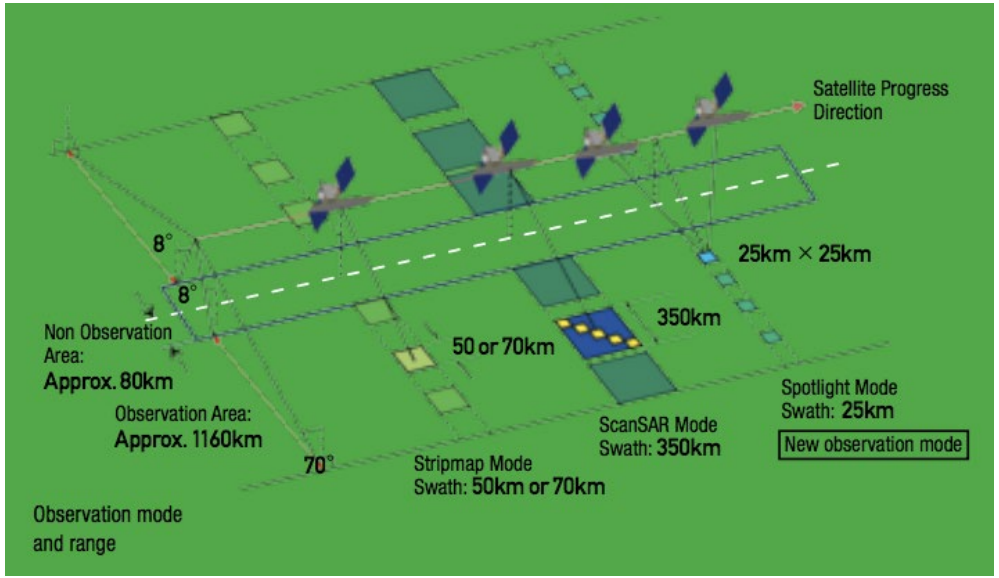
Contoh: ALOS-2, JAXA



Design life	5 years (target: 7 years)
Launch date	24 May 2014
Launch vehicle	H-IIA launch vehicle No. 24
Launch site	Tanegashima Space Center
Orbit (altitude)	628 km (on the equator)
Orbit period	Approx. 100 min
Repeat cycle	14 days
Satellite mass	Approx. 2,100 kg
Satellite size (on orbit)	Approx. 10.0 m × 16.5 m × 3.7 m
Mission data transmission	Direct transmission, and via data relay satellite
PALSAR-2 (Frequency)	L-band (1.2 GHz band)

"ALOS-2 solution book 3rd Edition" JAXA (website, PDF download)

Contoh: ALOS-2, JAXA



Observation mode	Resolution	Swath
Spotlight	1m (Az) × 3m (Rg)	25km (Az) × 25km (Rg)
Stripmap	3m	50km
	6m	50km
	10m	70km
ScanSAR	100m	350km
	60m	490km

*"Az" means azimuth direction (Satellite progress direction). "Rg" means range direction (radio wave irradiation).

"ALOS-2 solution book 3rd Edition" JAXA (website, PDF download)

Menyatukan semuanya: menemukan data yang tepat untuk analisis Anda.

Fenomena apa yang ingin Anda analisis?

Berapa skala fitur/peristiwa yang ingin Anda analisis?

Apa periode waktu yang ingin Anda analisis?

Band mana yang Anda butuhkan?

Bagaimana memperluas pengetahuan Anda?

Earth Engine Developers' List

- **Earth Engine developers' list adalah komunitas global yang didiskusikan dan Tanya Jawab oleh pengguna GEE dan tim teknik GEE**
  - Ini adalah komunitas global untuk terhubung dengan para ahli dan teknisi Google (8000+ anggota)
  - Anda dapat segera mendapatkan akses dengan melihat ke dalam arsip.
  - Nilai di GEE tidak hanya produk, tetapi akses ke komunitas ini.

- Banyak pertanyaan dapat dijawab dengan mencari diskusi sebelumnya di Earth Engine developers' list

- Saat Anda memposting pertanyaan ke Earth Engine developers' list:
  - Cari jika ada pertanyaan serupa di masa lalu.
  - Tambahkan tautan ke code Anda
  - "Get link" button

Bagaimana cara mendapatkan bantuan ?

- Periksa dokumen bantuan
  - Help -> User Guide (Upper right button in Code Editor)
  - Where to get Help page
- Cari the User Guide
- Lihat debugging guide
- Manfaatkan komunitas global
  - Cari diskusi di Earth Engine developers' list
  - Posting pertanyaan Anda di daftar pengembang
  - Jangan lupa untuk mendapatkan tautan code Anda saat mengajukan pertanyaan .

Sumber

- Data Catalog -Easy to search data sets
- Medium posts - Interesting cases, news from GEE team
- Case Studies - Details of cases
- GIS Specialists training deck - sample codes
- Scholar search - Search for papers
- Earth Engine Timelapse
- Google Fusion Tables Turndown - Some guides of alternatives
- Brief survey of applications (*ca.* 2016)
- Demo Scripts
- GEE Users summit 2018 session slides, videos

Google Scholar "earth engine"

Articles About 1,810 results (0.07 sec) My profile

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Multitemporal settlement and population mapping from Landsat using Google Earth Engine [PDF] semanticscholar.org
NN Patel, E Angiuli, P Gamba, A Gaughan... - International Journal of ..., 2015 - Elsevier
Abstract As countries become increasingly urbanized, understanding how urban areas are changing within the landscape becomes increasingly important. Urbanized areas are often the strongest indicators of human interaction with the environment, and understanding how
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[HTML] Google Earth Engine: Planetary-scale geospatial analysis for everyone [HTML] sciencedirect.com
N Gorelick, M Hancher, M Dixon, S Ilyushchenko... - Remote Sensing of ..., 2017 - Elsevier
Abstract Google **Earth Engine** is a cloud-based platform for planetary-scale geospatial analysis that brings Google's massive computational capabilities to bear on a variety of high-impact societal issues including deforestation, drought, disaster, disease, food security,
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Google earth engine
N Gorelick - AGU Fall Meeting Abstracts, 2012 - adsabs.harvard.edu
Abstract The Google **Earth Engine** platform is a system designed to enable petabyte-scale, scientific analysis and visualization of geospatial datasets. **Earth Engine** provides a consolidated environment including a massive data catalog co-located with thousands of
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Mapping paddy rice planting area in northeastern Asia with Landsat 8 images, phenology-based algorithm and Google Earth Engine [HTML] europepmc.org
J Dong, X Xiao, MA Menarguez, G Zhang, Y Qin... - Remote sensing of ..., 2016 - Elsevier
Abstract Area and spatial distribution information of paddy rice are important for understanding of food security, water use, greenhouse gas emission, and disease transmission. Due to climatic warming and increasing food demand, paddy rice has been
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Google Earth Engine: a new cloud-computing platform for global-scale earth observation data and analysis
RT Moore, MC Hansen - AGU Fall Meeting Abstracts, 2011 - adsabs.harvard.edu
Abstract Google **Earth Engine** is a new technology platform that enables monitoring and measurement of changes in the earth's environment, at planetary scale, on a large catalog of


Terima kasih!