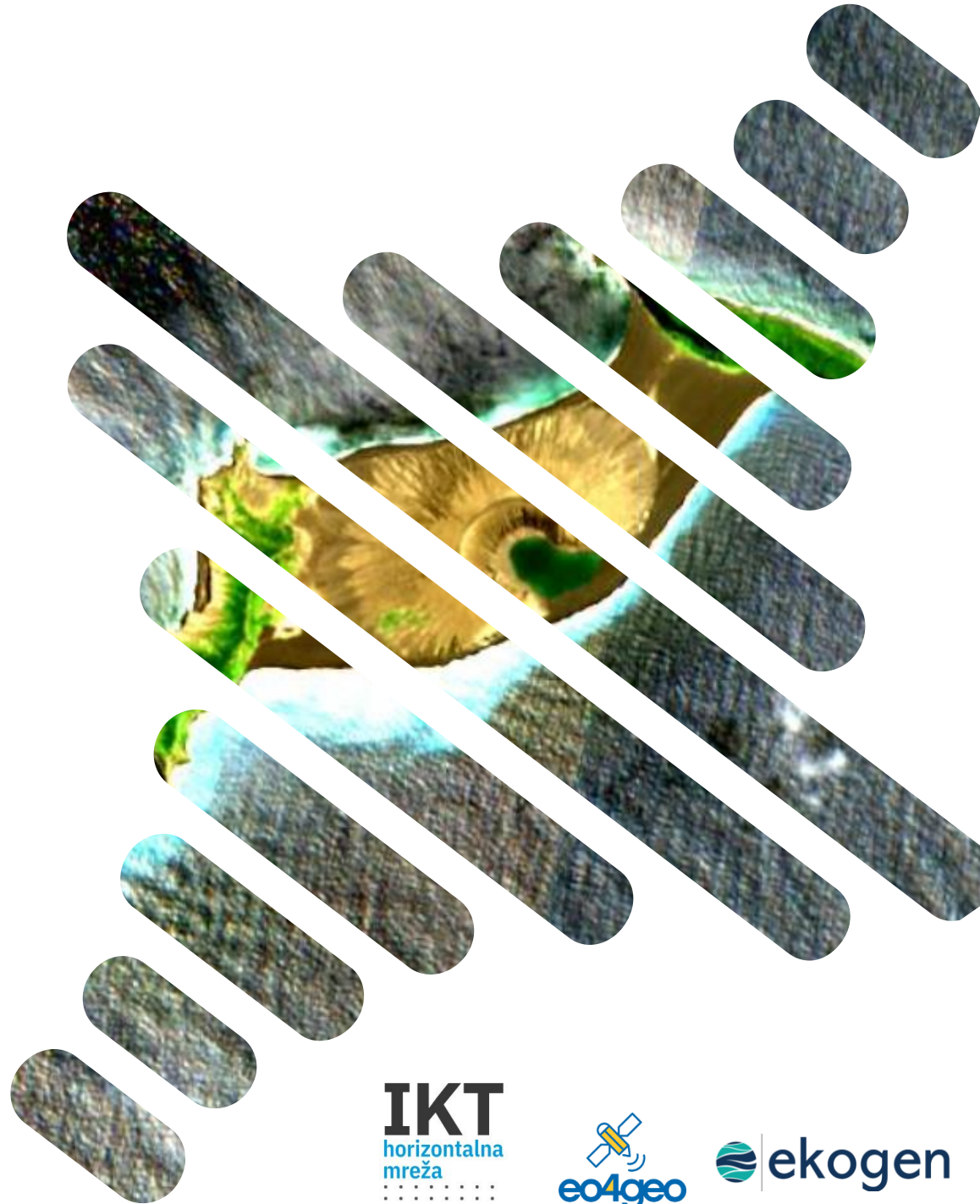


Satelitski podatki – kaj lahko vidimo iz dnevne sobe

Martin Puhar, Igea d.o.o.

8.3.2022



Satelitski podatki

- Vprašalnik:
 - Ali veste, kje so dostopni satelitski podatki
 - Navedite eno spletno mesto ali platformo, kjer so ti podatki dostopni
- Predstavitev
(za uporabnike satelitskih podatkov)
 - EU Sentinel serija satelitov
 - Platforme za uporabo satelitskih podatkov
 - Prikazi podatkov iz platforme EOS Landviewer

EU Sentinel serija satelitov

- Program ESA (Evropska vesoljska agencija) + Copernicus (EU komisija)
- Nadomešča serije „upokojene“ serije (ERS, Envisat)
- Globalno, kontinuirano spremljanje zemeljske površine
- **Sentinel 1** (2014, 2 satelita, radarsko snemanje, 6 dni, 10-25m)
- **Sentinel 2** (2015, 2 satelita, multispektralno snemanje, 5 dni, 10 m)
- Sentinel 3 (2016, 2 satelita, opazovanje oceanov, 27 dni, 300 m)
- Sentinel 4 (v pripravi)
- Sentinel 5 (2017, spremljanje onesnaževanja, < 1dan, 7 km)
- Sentinel 6 (2020, merjenje globine morja, 9 dni, 5 km)



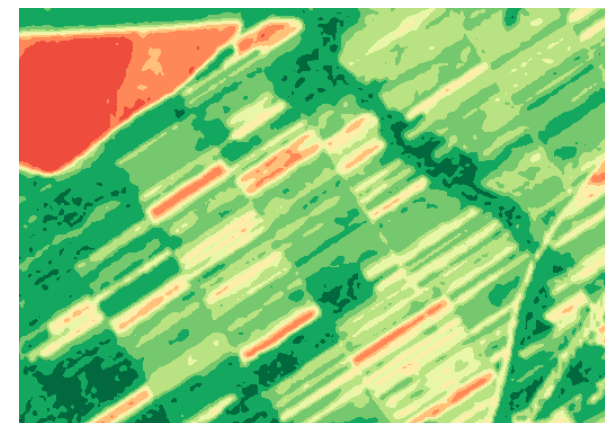
Sentinel 2

- Satelita L2A in L2B, krožita na višini 786 km
- 13 spektralnih kanalov, različne resolucije (10 m, 20m, 60m)



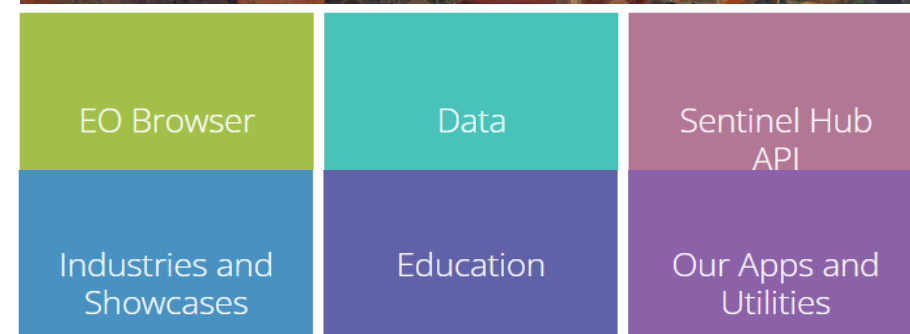
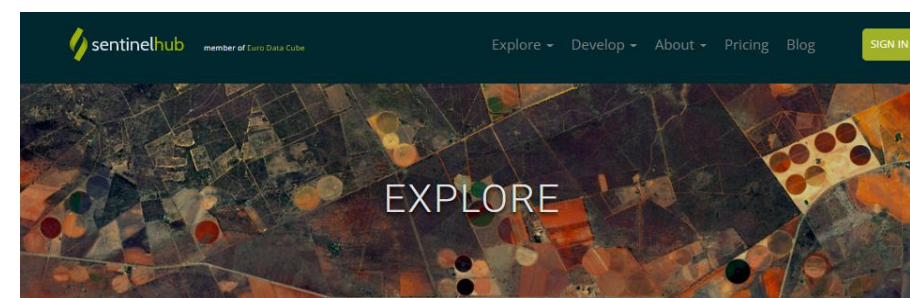
- Barvna slika: B04, B03, B02

- NDVI: $(B8A - B04) / (B8A + B04)$



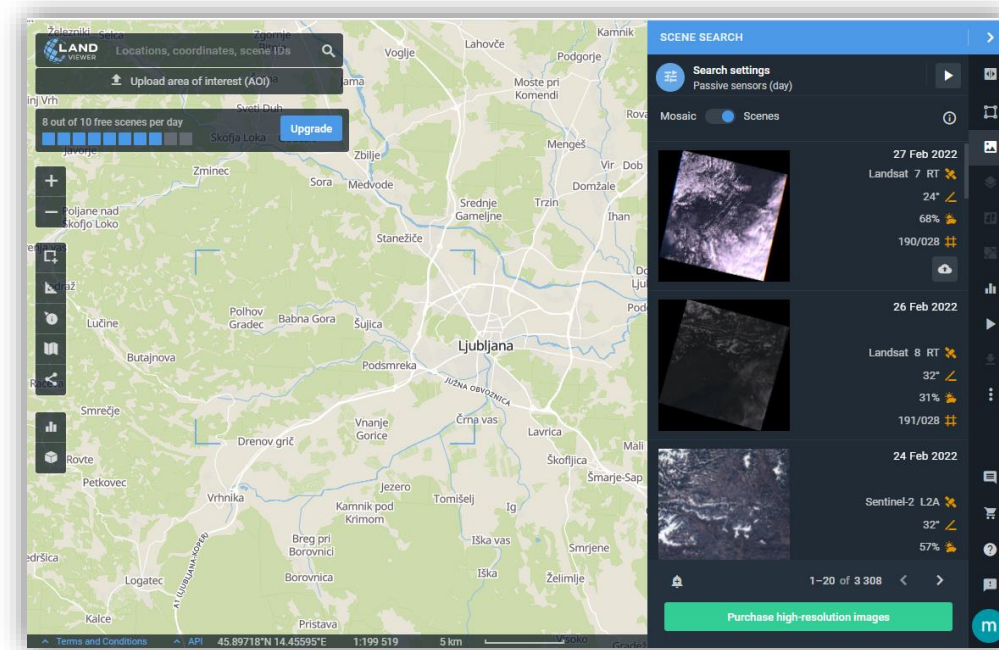
Platforme za dostop do podatkov

- EOS Platform (<https://eos.com/platform/>)
 - Crop Monitoring
 - EOS Storage
 - EOS Vision
 - **EOS Land Viewer**
- Sentinel HUB (<https://www.sentinel-hub.com/>)
- EU DIAS platforme
- ...



EOS Land Viewer

- <https://eos.com/landviewer>
- Prijava
- Plačljivo (50\$ mesečno)
- Prosta uporaba (do 10 satelitskih posnetkov dnevno)
 - Deljenje prikaza
 - Kombiniranje spektralnih kanalov
 - Prikaz levo-desno
 - Merjenje
 - Naročanje visoko-ločljivih posnetkov
 - Omejen prenos podatkov
 - WMS ni mogoč

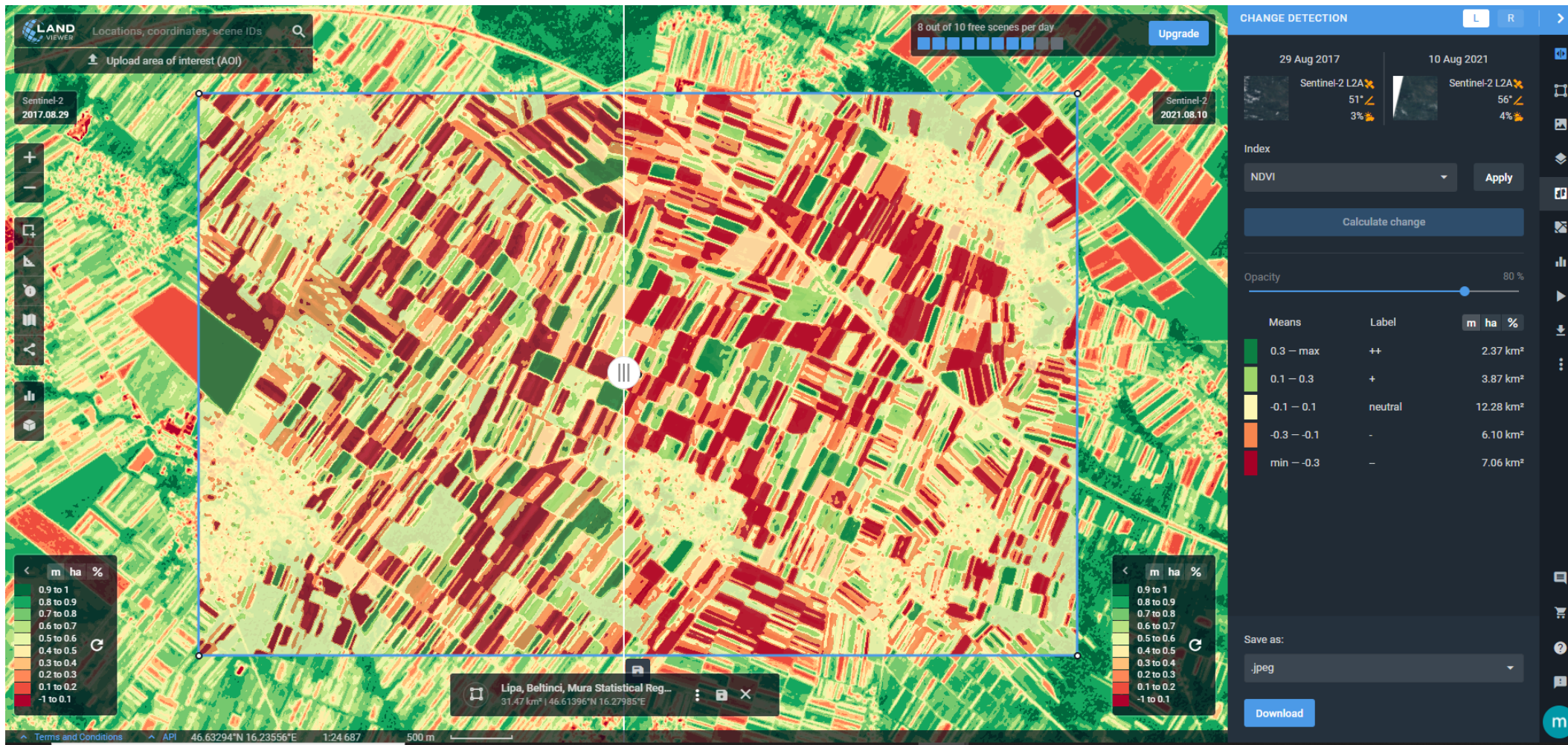


Praktični primeri

- Uporaba EOS Landviewer, registriran uporabnik, brezplačno
- Podatki Sentinel 2 serije (vidni spekter), Sentinel 1 (radar)
- „Zanimivi“ dogodki, pojavi
- Ali jih lahko prepoznamo iz satelitskih podatkov
- Kako dobro jih lahko prepoznamo, tudi če nismo „profesionalci“
- Kakšne so omejitve uporabe serije Sentinel 2/Sentinel 1

Analiza sprememb NDVI

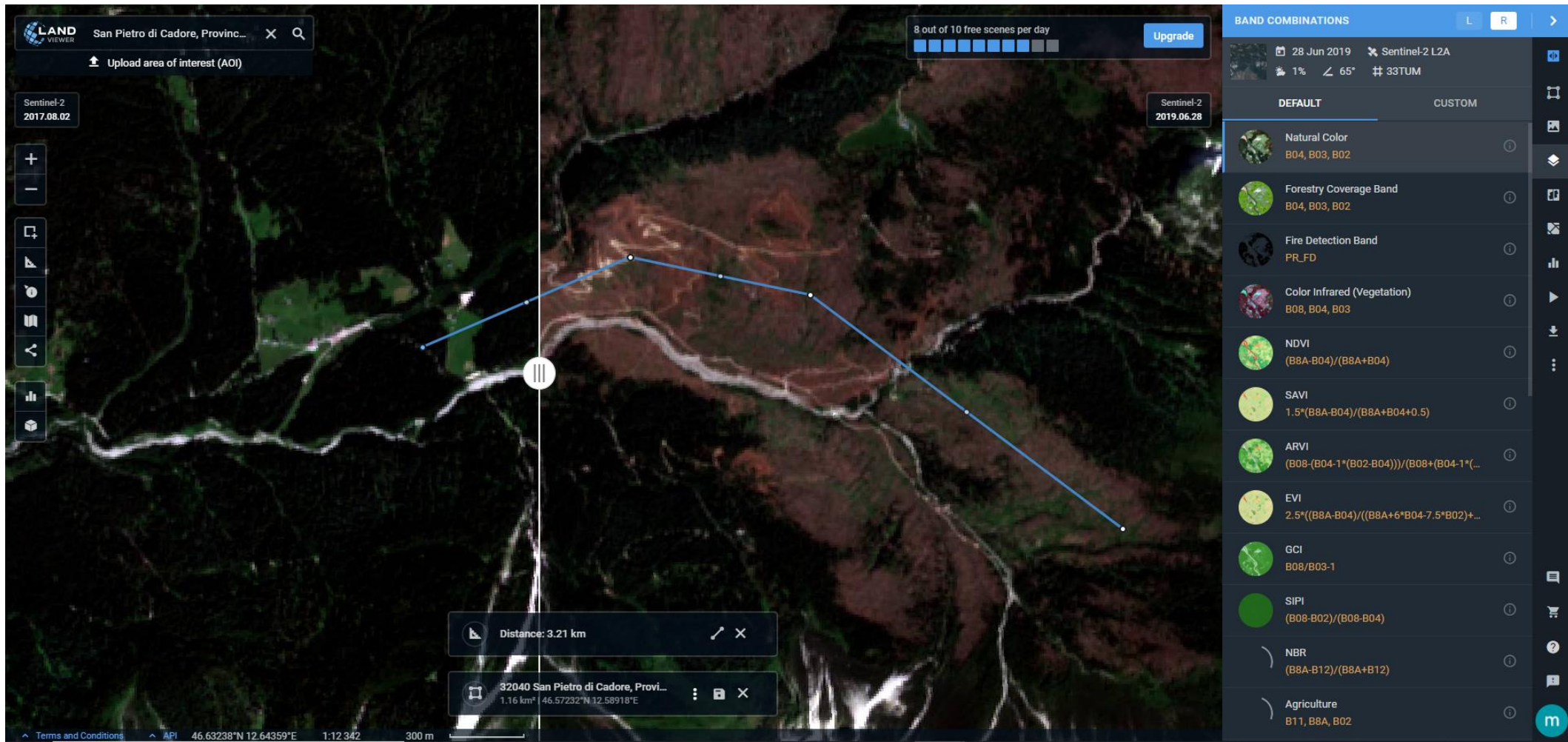
Levo: 2017.08.29 (suša v Prekmurju), desno: 2021.08.20
„Change detection“ na izbranem področju



Vetrolom Val Visdene

Veliko neurje in vetrolom 29. in 30.11.2018 (Adrian)

Alen Mangafić (Geod.vestnik), Identifikacija območij vetroloma na podlagi časovne vrste s podatki C-SAR



Visoka plima pri Benetkah

Levo: 2019.01.05 (Sentinel1), desno: 2019.10.28 (Sentinel1)

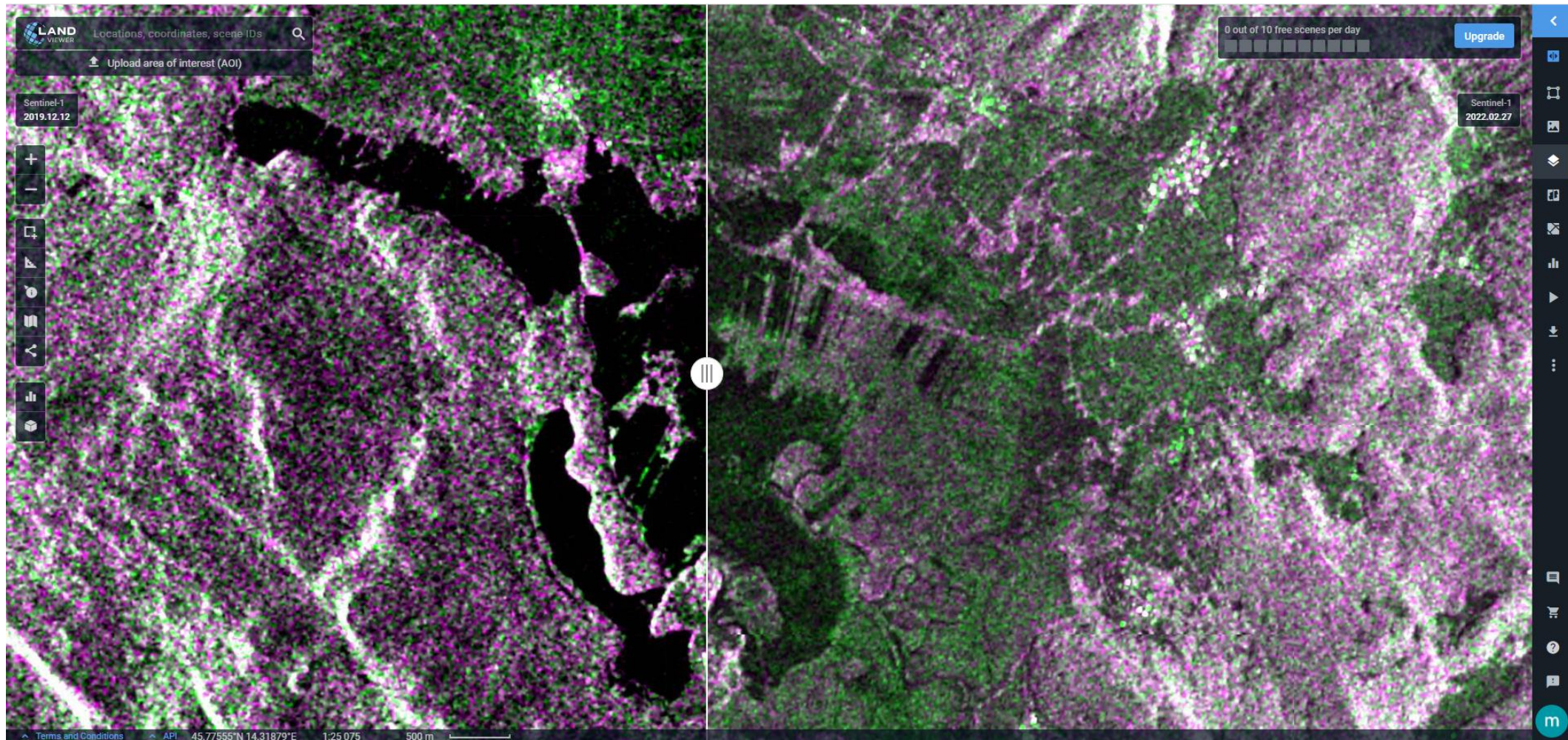
Barene

The screenshot displays the LAND VIEWER interface with the following elements:

- Search Bar:** "LAND VIEWER Locations, coordinates, scene IDs" with a search icon and "Upload area of interest (AOI)" button.
- Map Labels:** "Sentinel-1 2019.01.15" on the left and "Sentinel-1 2018.10.28" on the right.
- Toolbar:** A vertical toolbar on the left with icons for zooming, panning, and other map functions.
- BAND COMBINATIONS Panel:**
 - Header: "BAND COMBINATIONS" with "L" and "R" buttons.
 - Metadata: "28 Oct 2018", "Sentinel-1", "IW", "DV (VV+VH)".
 - Options: "DEFAULT" and "CUSTOM" tabs.
 - List of combinations:
 - Ratio (VV,VH,VV/VH) - VV, VH, VV/VH
 - Band combination VV+VH+VV - VV, VH, VV
 - Single band VV - VV
 - Single band VH - VH
- Status Bar:** "Terms and Conditions", "API", "45.56431°N 12.24358°E", "1:101 272", "2 km".

Cerkniško jezero iz Sentinel1

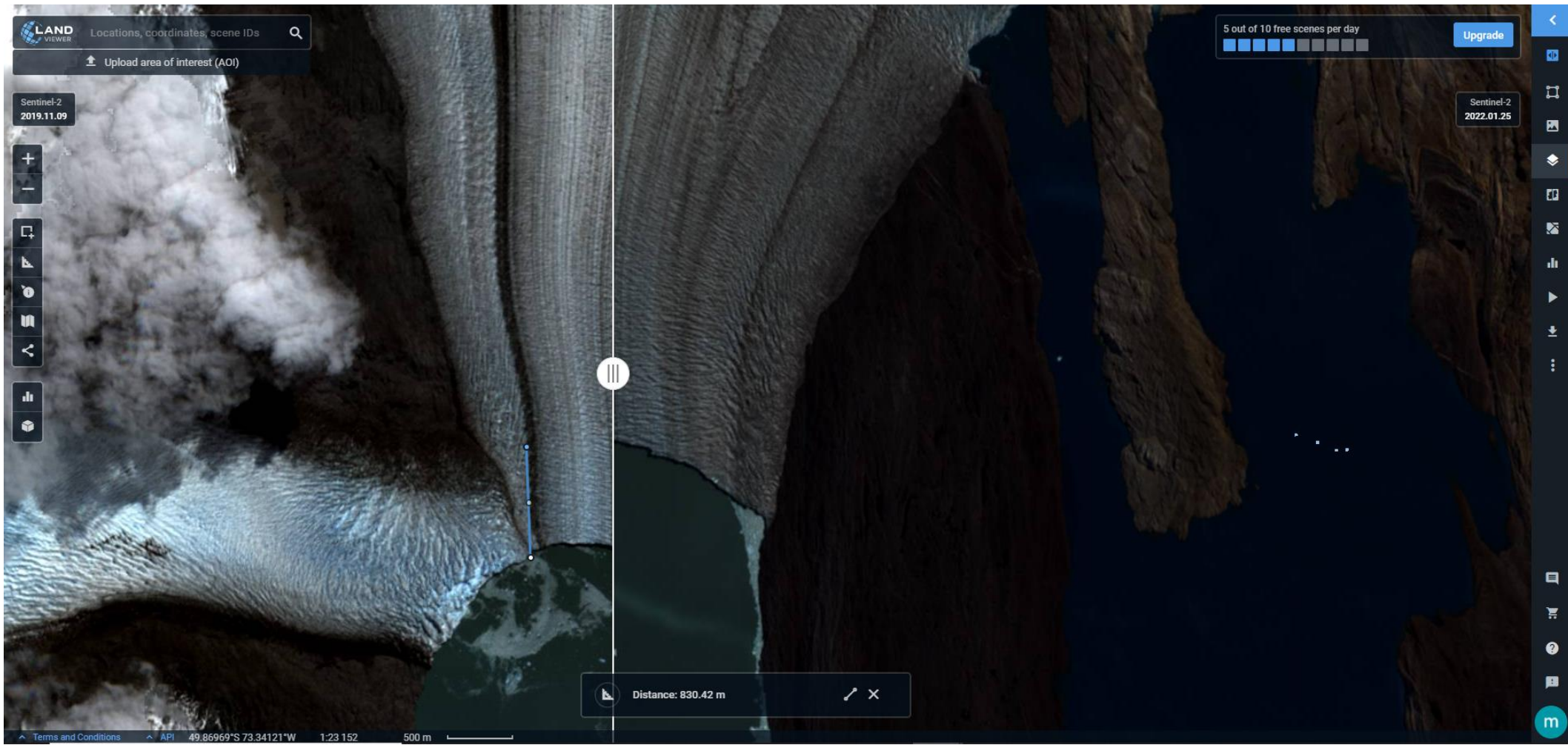
Levo: 2019.12.12 (Sentinel1), desno: 2022.02.27 (Sentinel1)



Topljenje ledenikov

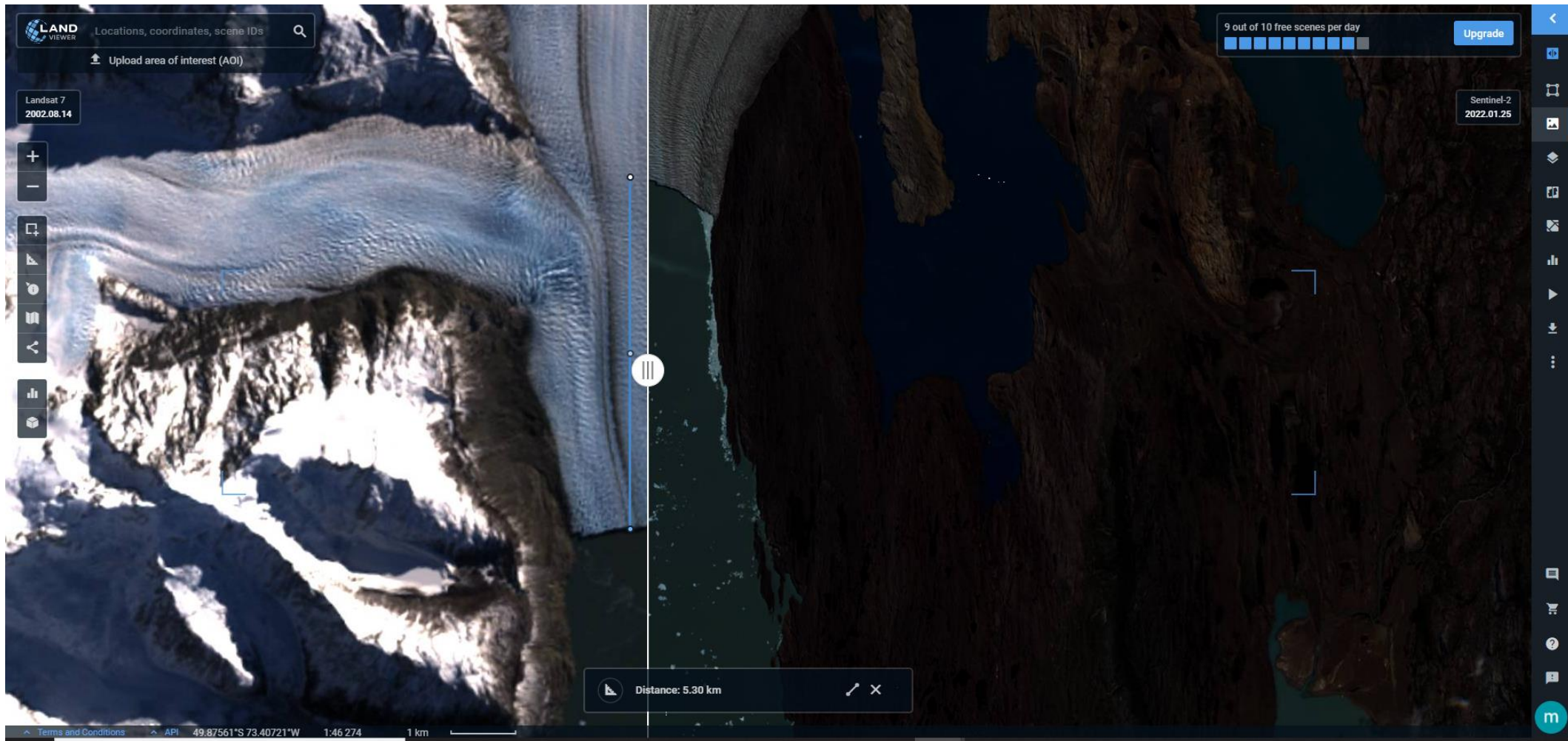
Levo: 2019.11.09, desno: 2022.01.25

Ledenik Perito Moreno, Argentina, delta=830 m



Topljenje ledenikov

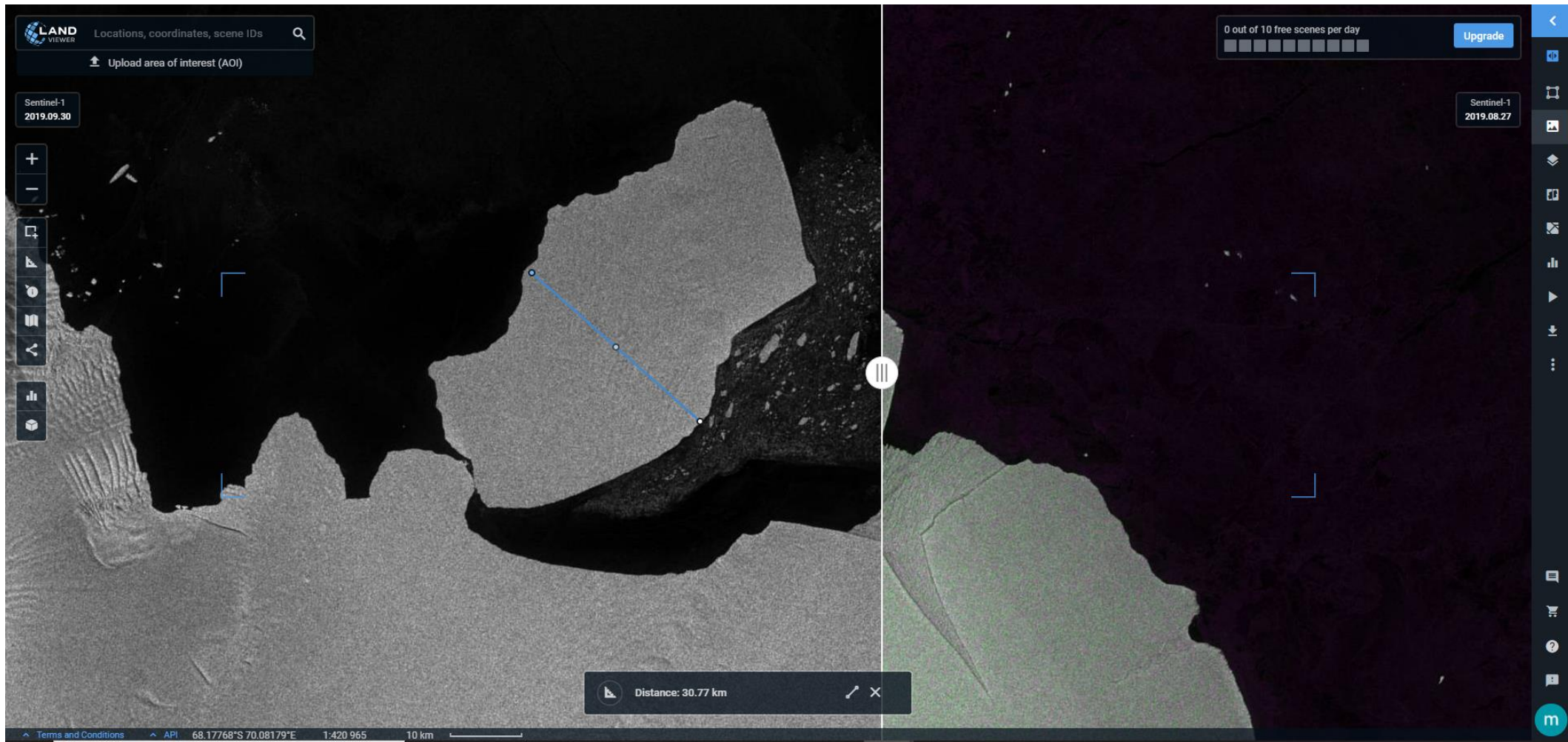
Levo: 2002.08.14 (Landsat), desno: 2022.01.25
Ledenik Perito Moreno, Argentina, delta=5300 m



Odlom ledene plošče na Antarktiki

Levo: 2019.09.30 (Sentinel1), desno: 2019.08.27

60kmx30km



Vulkan Cumbre Vieja, La Palma

Levo: 2021.09.30 (B12-B11-B04), desno: 2021.09.30 (B11, B8A, B02 - Agriculture)

Vulkanski greben Cumbre Vieja, La Palma, Kanarski otoki, 19.9.2021-13.12.2021

LAND VIEWER Locations, coordinates, scene IDs

Upload area of interest (AOI)

Sentinel-2
2021.09.30

10 out of 10 free scenes per day [Upgrade](#)

Sentinel-2
2021.09.30

BAND COMBINATIONS L R

30 Sep 2021 Sentinel-2 L2A
8% 55° 27RYM

← Back

AGRICULTURE
SWIR1, Red8, Blue

This band combination is useful for monitoring agricultural crops. In the image, bright green represents vigorous, healthy vegetation while non-crops, such as mature trees, appear in a dull green. Coniferous forests appear as a dark, rich green while deciduous forests appear as a bright green. Sparsely vegetated and bare areas appear brown and mauve.

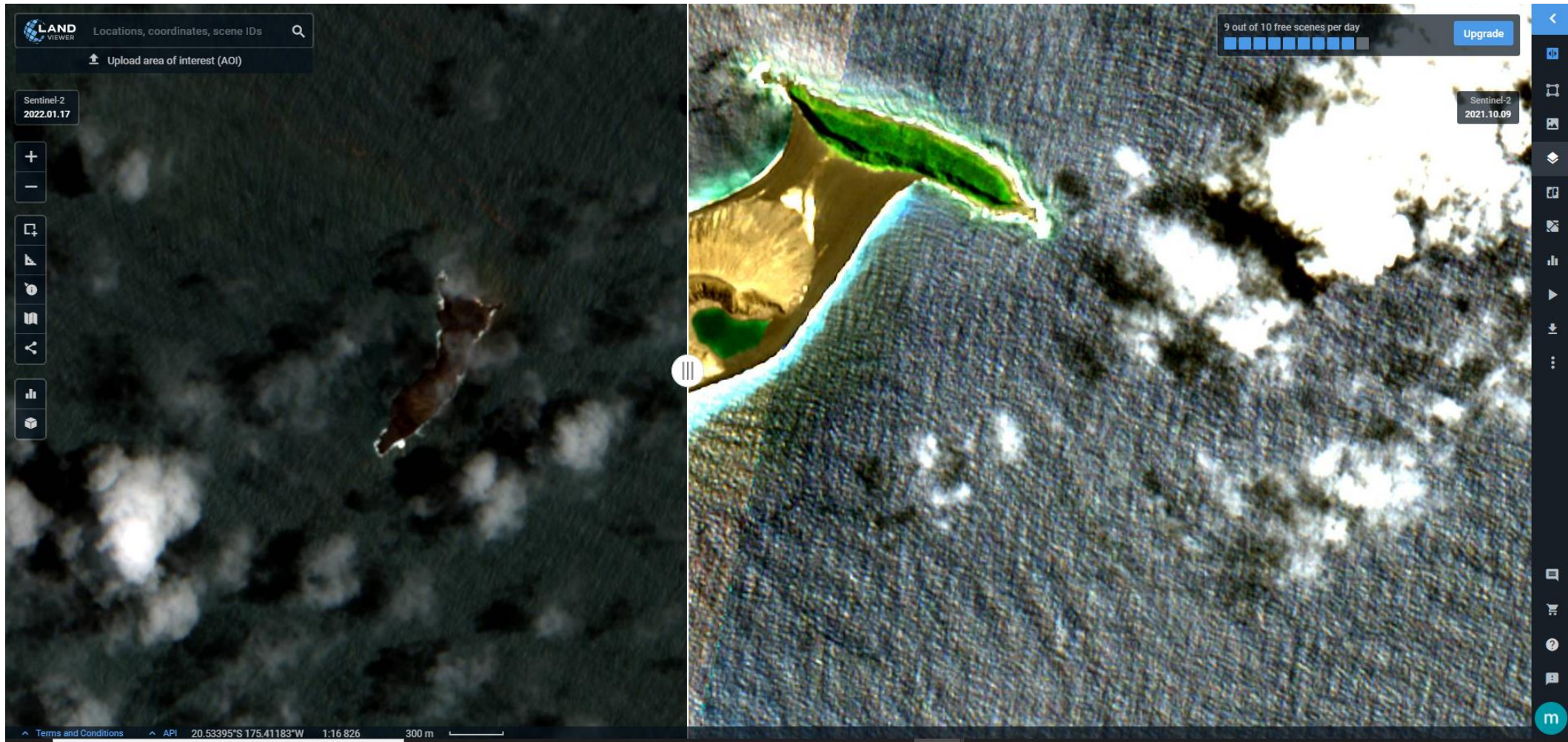
[Use Combinations](#)

Terms and Conditions API 28.63531°N 17.96033°W 1:31 551 500 m

Vulkan Hunga Tonga

Levo: 2022.01.17, desno: 2021.10.09

Hunga Tonga, 15.01.2022



Vulkan Anak Krakatoa

Levo: 2022.02.03, desno: 2021.08.12

Anak Krakatoa, 22.03.2022

The screenshot displays the LAND VIEWER interface for Anak Krakatau Island. The main view is split into two panels: the left panel shows the island on 2022.02.03, and the right panel shows it on 2021.08.12. The interface includes a search bar at the top left, a toolbar on the left side, and a list of band combinations on the right side. The band combinations list includes ARVI, EVI, GCI, SIPI, NBR, Agriculture, False Color (Urban), Land/Water, Healthy Vegetation, Vegetation Analysis, NDWI, and Atmospheric Penetration. The interface also shows a search bar at the top left, a toolbar on the left side, and a list of band combinations on the right side.

LAND VIEWER Anak Krakatau Island, South ...

Upload area of interest (AOI)

Sentinel-2
2022.02.03

Sentinel-2
2021.08.12

2 out of 10 free scenes per day

Upgrade

BAND COMBINATIONS

03 Feb 2022 Sentinel-2 L2A

24% 61° 48MWU

DEFAULT CUSTOM

- ARVI
 $(B08 - (B04 - 1 * (B02 - B04))) / (B08 + (B04 - 1 * (B02 - B04)))$
- EVI
 $2.5 * ((B8A - B04) / ((B8A + 6 * B04 - 7.5 * B02) + 1))$
- GCI
B08/B03-1
- SIPI
 $(B08 - B02) / (B08 - B04)$
- NBR
 $(B8A - B12) / (B8A + B12)$
- Agriculture
B11, B8A, B02
- False Color (Urban)
B12, B11, B04
- Land/Water
B8A, B11, B04
- Healthy Vegetation
B8A, B11, B02
- Vegetation Analysis
B11, B8A, B04
- NDWI
 $(B03 - B08) / (B03 + B08)$
- Atmospheric Penetration
B12, B11, B8A

Anak Krakatau Island, Rajabasa, S...
126.52 km² | 6.12085°S 105.41163°E

Terms and Conditions API 6.04667°S 105.29469°E 1:71 468 1 km

Atol Bikini

2022.01.12, Maršalovi otoki, Tihí ocean

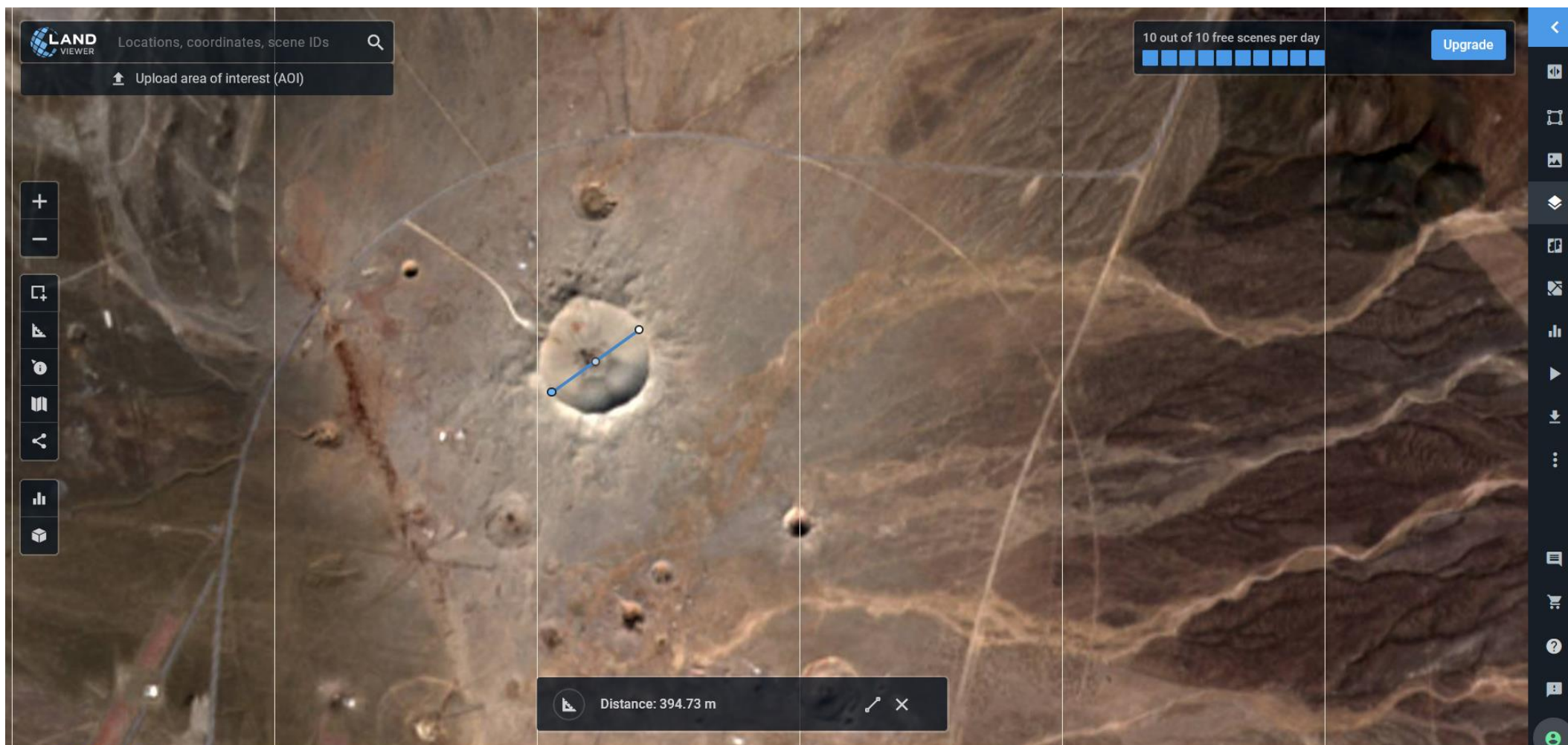
Največja atomska bomba, 1.3.1954, 2.000 m



Sedan crater Nevada

2022.02.17

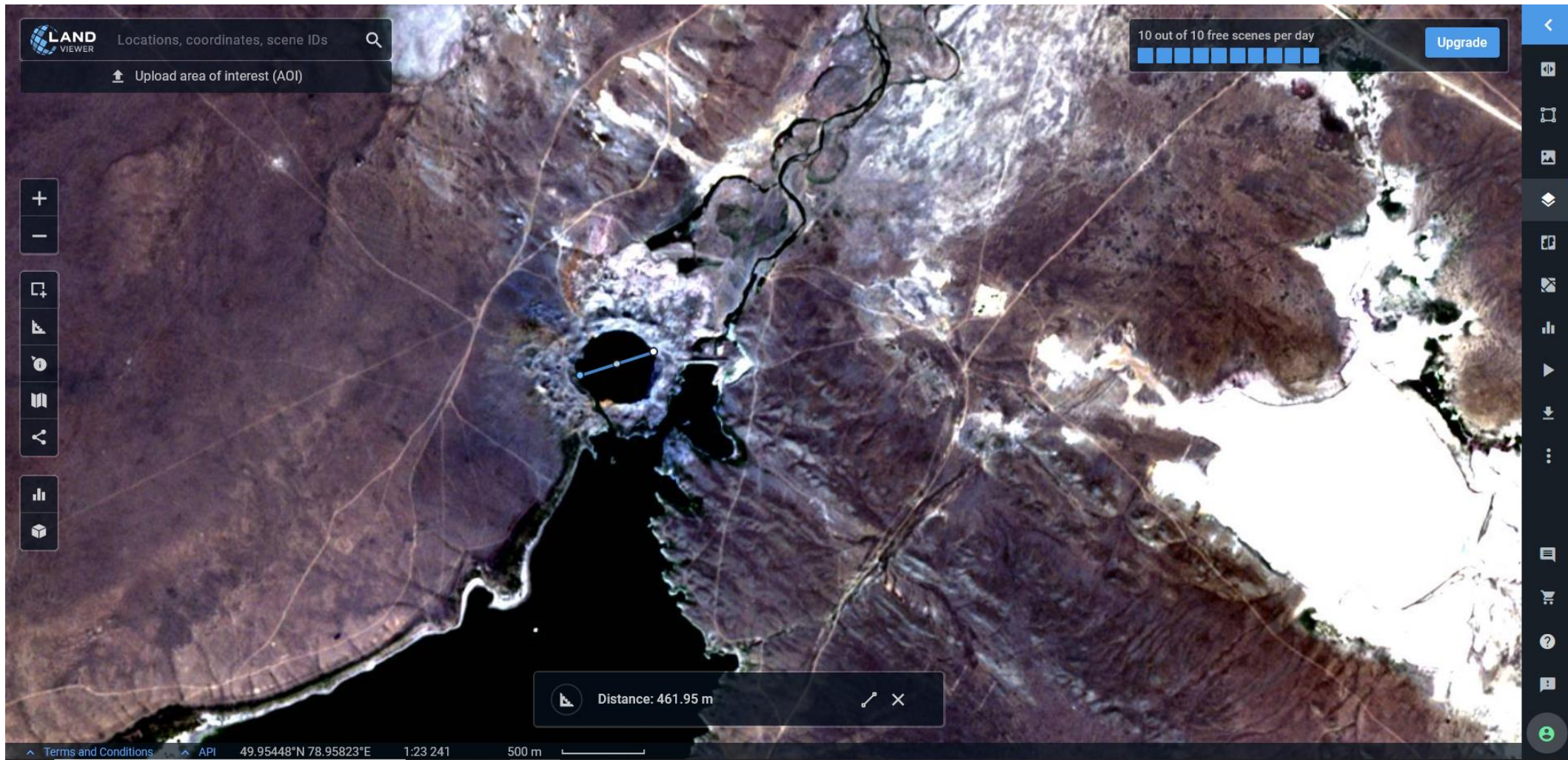
Atomska bomba, 6.7.1962, 390 m



Atomsko jezero

2022.02.17

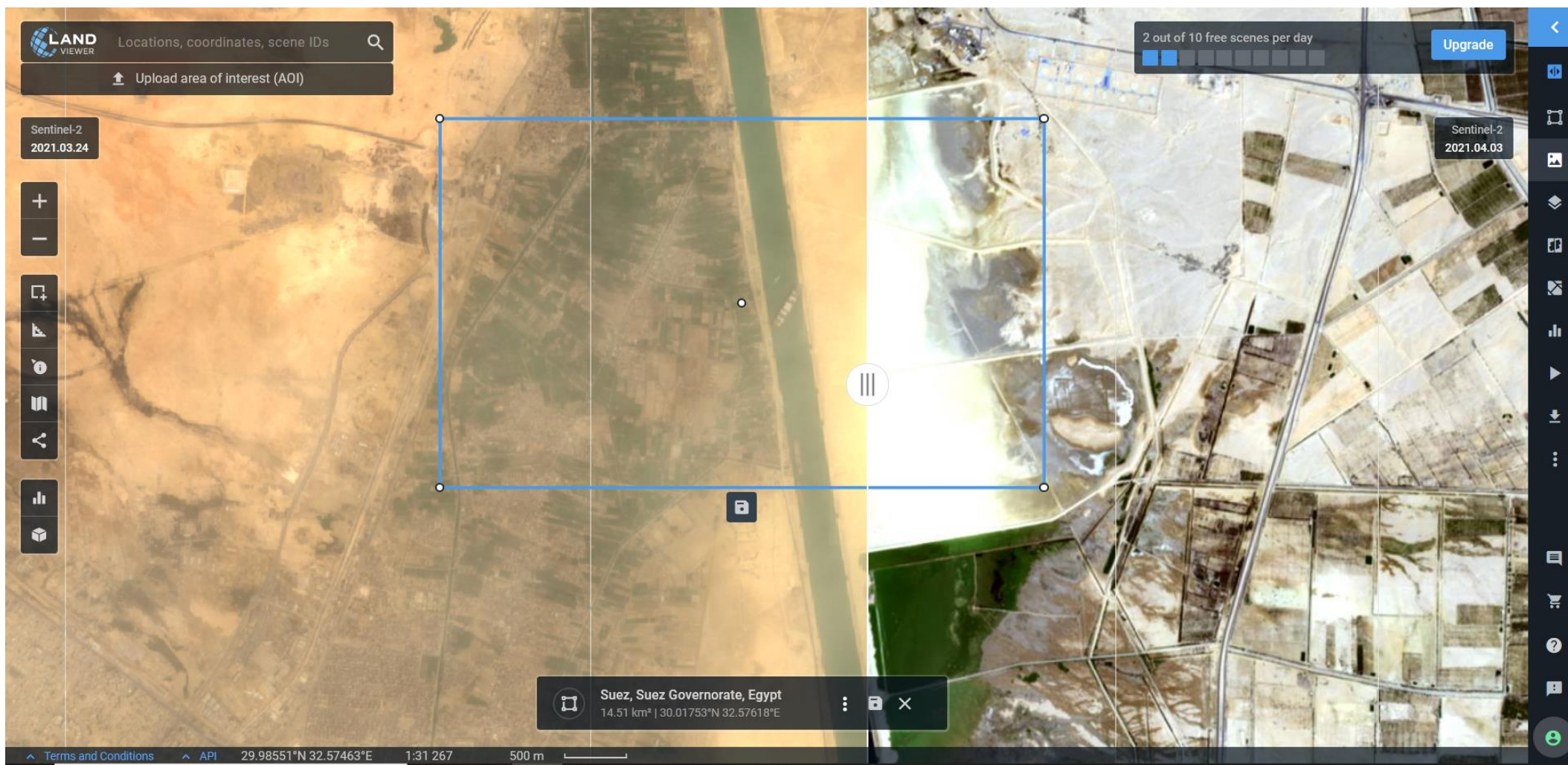
Kazakhstan, Atomska bomba, SZ, 15.1.1965, 400 m



Ladja v Suezu

Levo: 2021.03.24, desno: 2021.04.03

Ladja Ever Given, 400 m, močan veter, blokirala kanal (23.3.2021-29.3.2021)



Solarna elektrarna na Kitajskem

Datong – Sončna elektrarna v obliki 2eh pand

