Cloud-basierte Fernerkundung, 14./15. Februar 2020

Google Earth Engine

Übersicht Freitag, 14. Februar 2020

10:45 – 12:45

- Einführung und Hintergründe zur Google Earth Engine
- Vorstellung der wichtigsten Datenformate
  - Strings, Lists, Dictionaries, Images, Image Collections
- Images und ImageCollections
  - Auswahl, Visualisierung, Metadaten und allgemeiner Umgang
- Ziel: Erste simple Zeitreihe!

13:15 – 15:00

- Eigenständig objekstspezifische Methoden finden und anwenden
- Einführung in selbstgeschriebene Funktionen
- Mapping von Funktionen
- Ziel: Change Detection!

15:15 – 17:00

- Flächenauswertung mit ee.Reduce();
- Map Algebra
- Iterating von Funktionen
- Ziel: nicht nur visualisieren, sondern auch quantifizieren!

Multitemporal

Land Cover Change/
Land Cover Dynamics

Time Series

Automation

„New Technologies“

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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Data democratization

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.

https://www.sciencedirect.com/science/article/pii/S0034425717302900

Noel Gorelick über OBIA in der GEE:
https://www.youtube.com/watch?v=2R0aTaMtYTY&t=2386s

https://github.com/Geo-Uni-Tuebingen/GEE

- Skripte
- Dokumentation
- Assets

JavaScript Code Editor

- Inspector
- Konsole
- Tasks

Google Earth Engine

Search places and datasets...

Scripts | Docs | Assets

Filter scripts...

NEW

- Owner (4)
  - users/albremoteforest/codes
  - users/albremoteforest/DontDelete
  - users/albremoteforest/Felix
  - users/albremoteforest/Thesis
    - 10_fold_accuracy
    - Load Sentinel Data
    - Look Through Sentinel Data
    - Look_individual_images
    - Main_Code
    - main_classification_results
    - replace_band
- Writer
- Reader (3)
  - users/devinrouth/share
    - KFoldCrossValidationWithConvolv...
    - k-Fold_Cross_Validation.js
  - users/eeblogdemos/moduleDemo
    - composites
    - main

New Script

Get Link | Save | Run | Reset

1

Inspector | Console | Tasks

```
Use print(...) to write to this console.
```

Google Earth Engine

Search places and datasets...

Scripts | Docs | Assets

Normalized Difference

- ee.Image
  - normalizedDifference(*bandNames*)

Presentation *

Get Link | Save | Run | Reset

```
// Load Images.
var imageCollection = ee.ImageCollection("COPERNICUS/S2")
.filterDate('2019-06-01', '2019-10-30')
.filterBounds(ee.Geometry.Point([9.4914, 48.4116]))
.sort('CLOUDY_PIXEL_PERCENTAGE')
.first();

var image = ee.Image("COPERNICUS/S2/20190629T103031_20190629T103537_T32UNU");


// Manipulate Images.
// Clip Image.
var clippedImage = image.clip(ee.FeatureCollection('users/albremoteforest/grenzen_rough_WGS1984'));
// Compute NDVI.
var clippedImage_NDVI = clippedImage.normalizedDifference(['B8', 'B4']);


// Print Images.
print('First Image from Collection', imageCollection);
print('Direct Image', image);


// Add Images to Map.
Map.addLayer(image, {bands: ['B4', 'B3', 'B2'], min: 0, max: 3000}, 's2 image');
Map.addLayer(clippedImage_NDVI, {palette: ['red', 'yellow', 'green'], min: -0.2, max: 1}, 's2 NDVI');
```

Inspector | Console | Tasks

Use print(...) to write to this console.

First Image from Collection JSON

Image COPERNICUS/S2/20190629T103031_20190629T103537_T32UNU… JSON

```
type: Image
id: COPERNICUS/S2/20190629T103031_20190629T103537_T32UNU
version: 1561916481974745
bands: List (16 elements)
properties: Object (66 properties)
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Direct Image JSON

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Google Earth Engine

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Waldbrände Australien 2020

ee.Image();

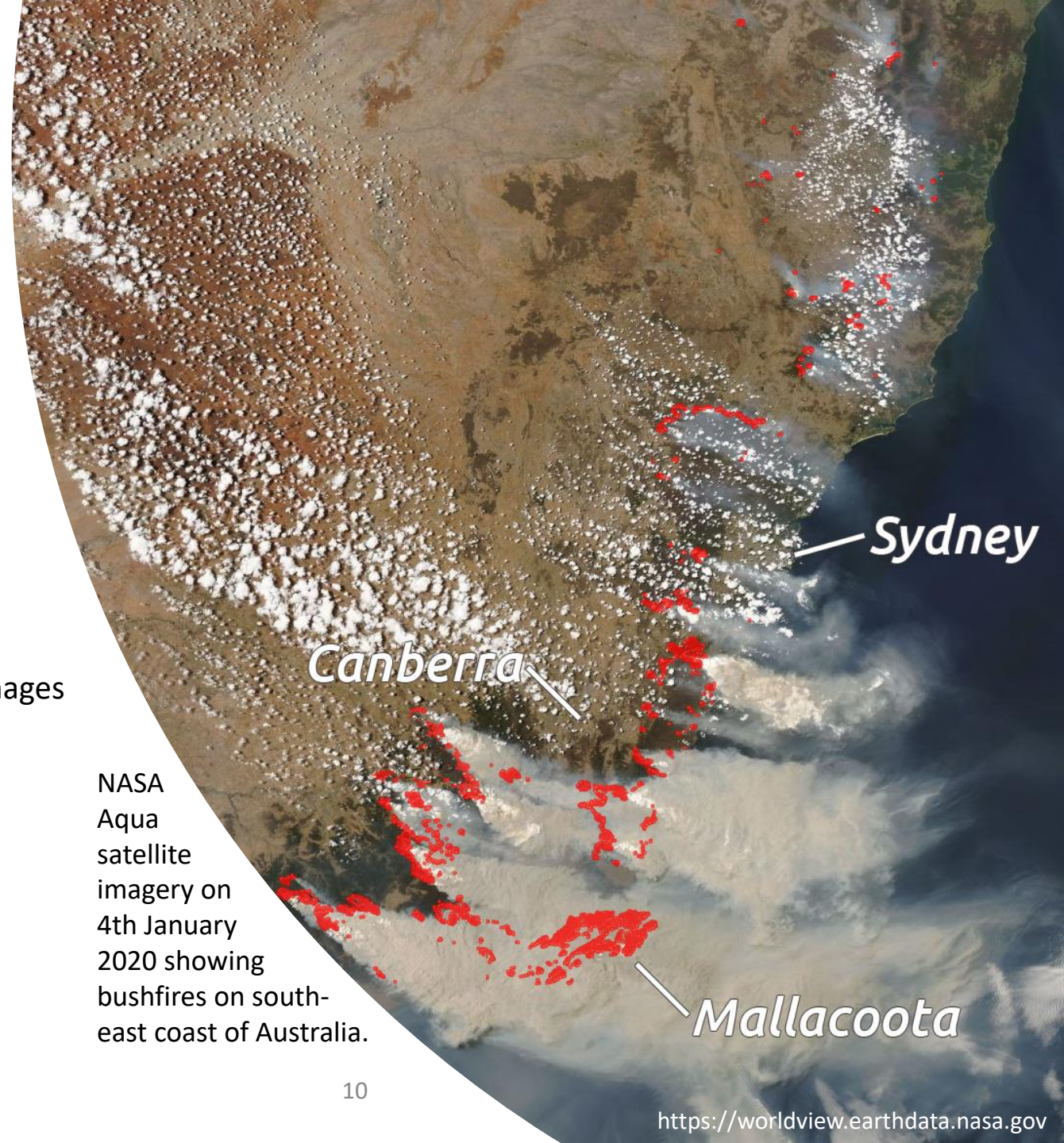
- Darstellen von ee.Images() im Kartenbereich
- Metadaten anzeigen, und als Variable speichern
- Relevante Bänder auswählen (Inspector) und visualisieren

ee.ImageCollection();

- Erstellung einer ee.ImageCollection() aus vorgegebenen Images
- Erstellen eines Mosaiks
- Filtern einer ee.ImageColletion() nach Ort, Datum…
- Time Series Charts aus Image Collections

ee.Geometry.Point();

- Interaktives Erstellen und Erstellen mit Java Script



NASA Aqua satellite imagery on 4th January 2020 showing bushfires on south-east coast of Australia.

https://worldview.earthdata.nasa.gov

Forstwirtschaft in Rotorua, NZ

ee.Methods();

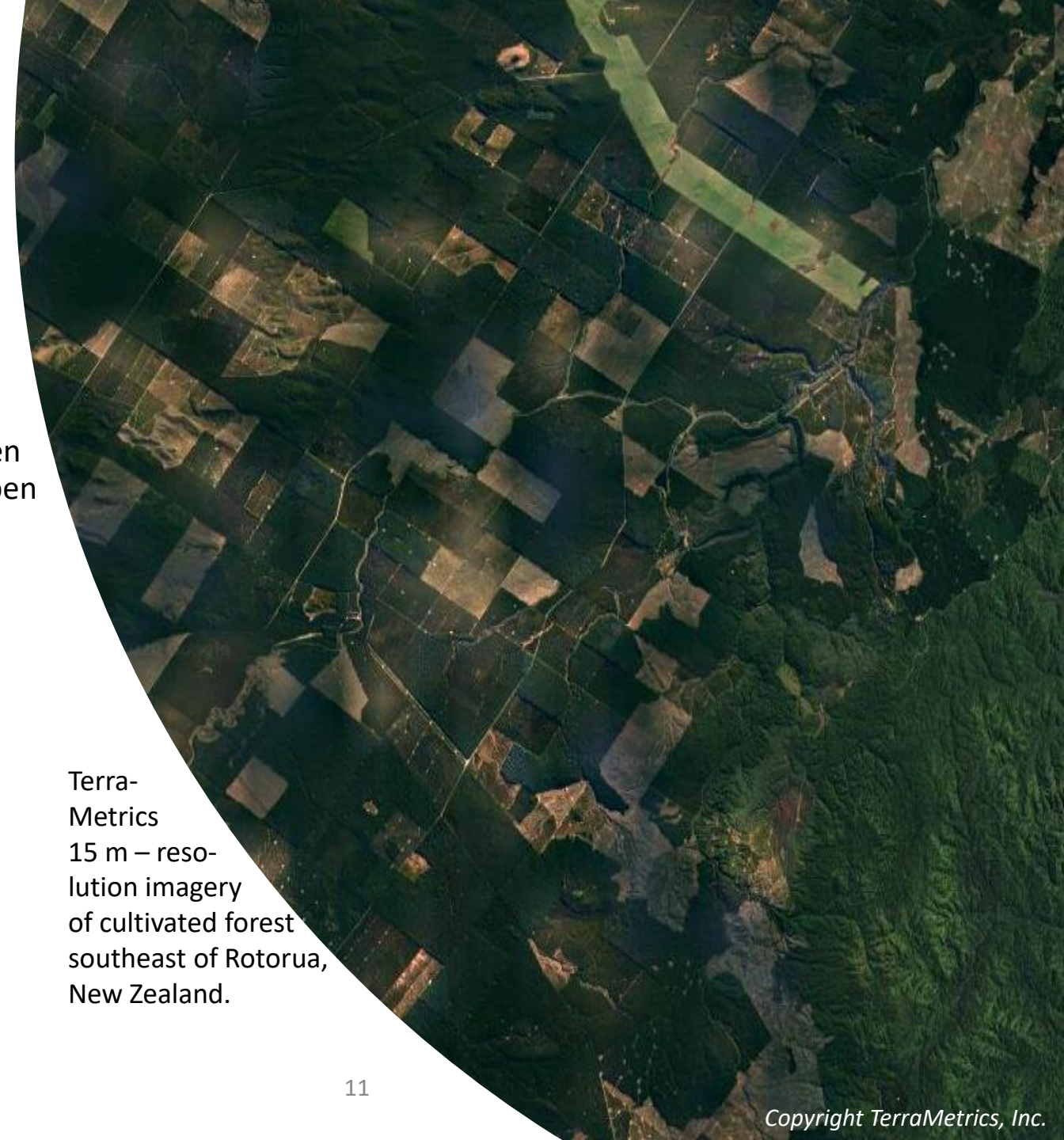
- eigenständiges Finden und Anwenden von objektbezogenen Methoden mit Hilfe der Docs → NDVI berechnen und clippen
- Maskieren

Funktionen

- genereller Aufbau von, und Umgang mit Funktionen
- Lokale vs. Globale Variablen
- Mapping von Funktionen
- Iterating von Funktionen

ee.Reducer();

- quantitave Auswertungen bisheriger Ergebnisse
- Flächen berechnen



Terra-Metrics 15 m – reso-lution imagery of cultivated forest southeast of Rotorua, New Zealand.