

GEE遥感训练营出品

Google Earth Engine

Google Earth Engine教学

基本概念I

Day 1

基本内容

- ✓认识GEE
- ✓基本数据类型
- ✓Image
- ✓ImageCollection

GEE遥感训练营

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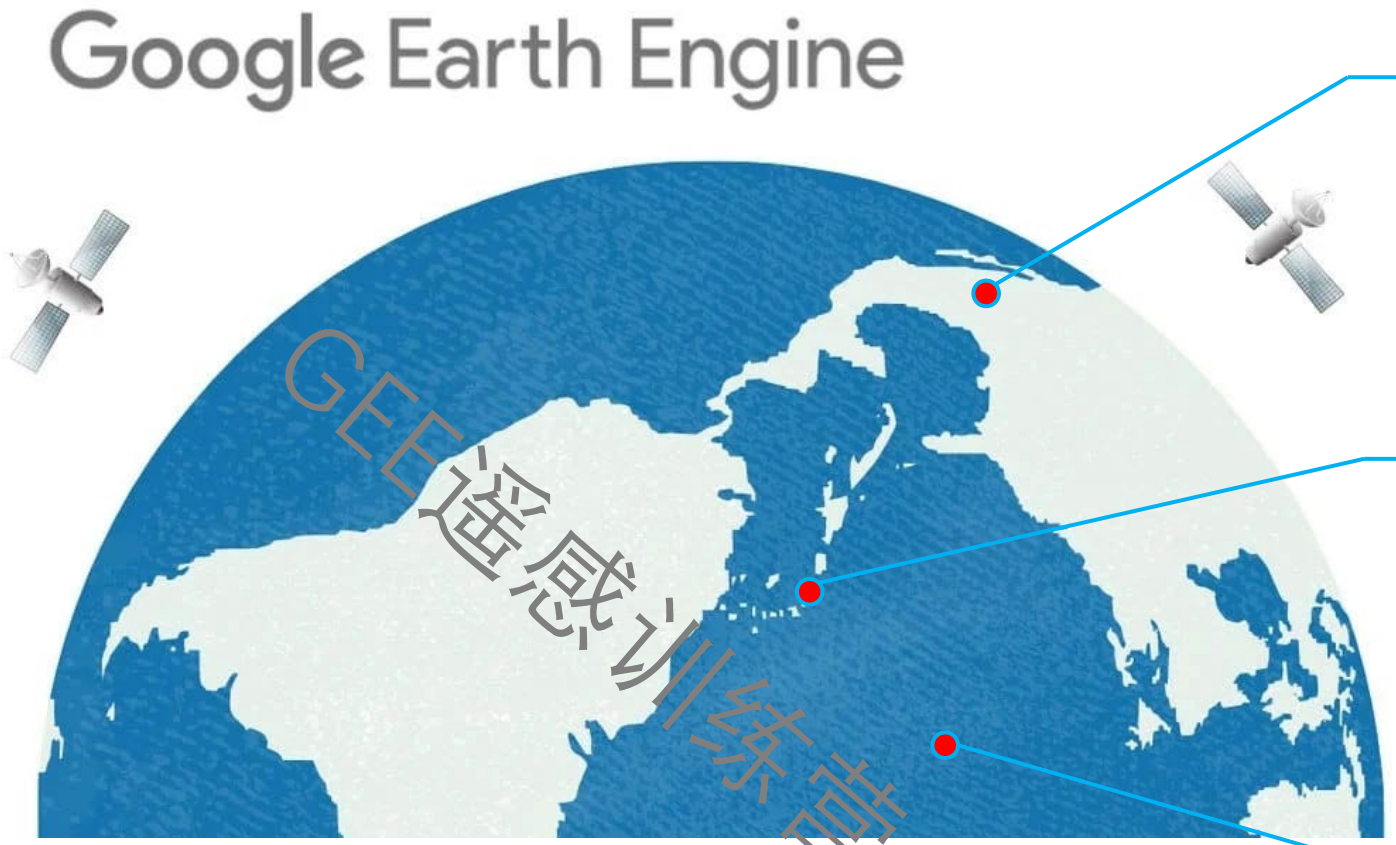
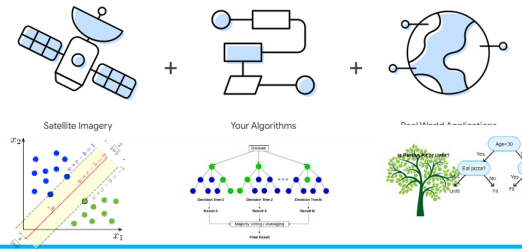
Why GEE



海量遥感数据



集成众多算法



大范围处理能力



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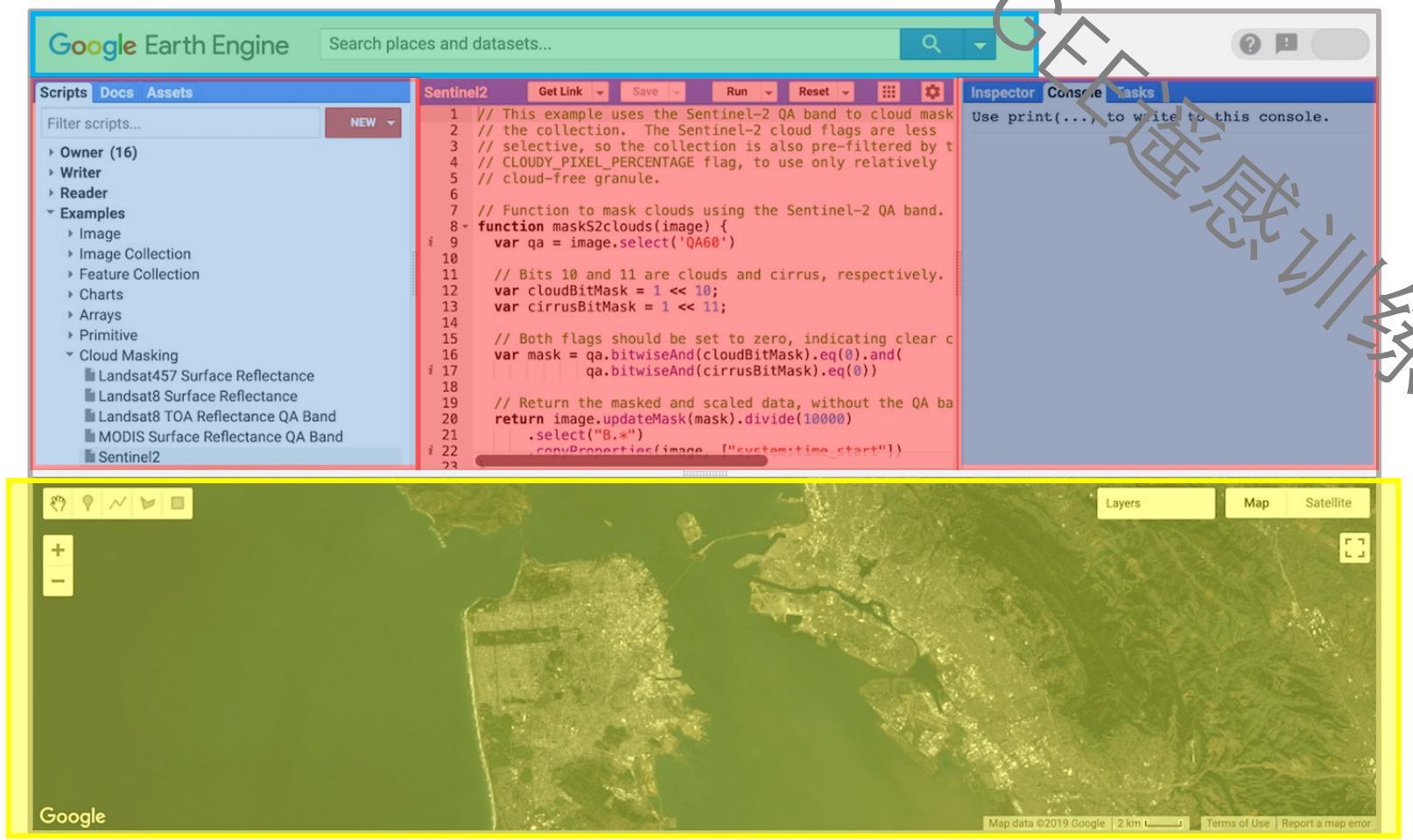
主界面



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基本功能

- 写代码
- 显示、查错
- 搜资源
- 代码保存块
- 看结果

快捷键

- Ctrl+/
- Ctrl+ H
- Ctrl+ space
- Ctrl+Enter

Note, 在ENG输入法环境下

https://code.earthengine.google.com/

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基本语法

Javascript语法

```
var demoStr = ‘Hello, GEE’;
var number = 42;
var demoList = [0, 1, 1, 2, 3, 5];
var object = {
    foo: 'bar',
    baz: 13,
    stuff: ['this', 'that', 'the other thing']
  };
var reflect = function(element) {
    return element;
  };
print('Hello World!')
```

GEE语法

```
var demoStr =ee.String( ‘Hello, GEE’);
var demoNum=ee.NUmber(42);
var demoList = ee.List([0,1,2,3]);
var demoDictionary = ee.Dictionary({
    e: Math.E,
    pi: Math.PI,
    phi: (1 + Math.sqrt(5)) / 2
  });
Function  function(element) {
   return element;
}
```

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Image和ImageCollection

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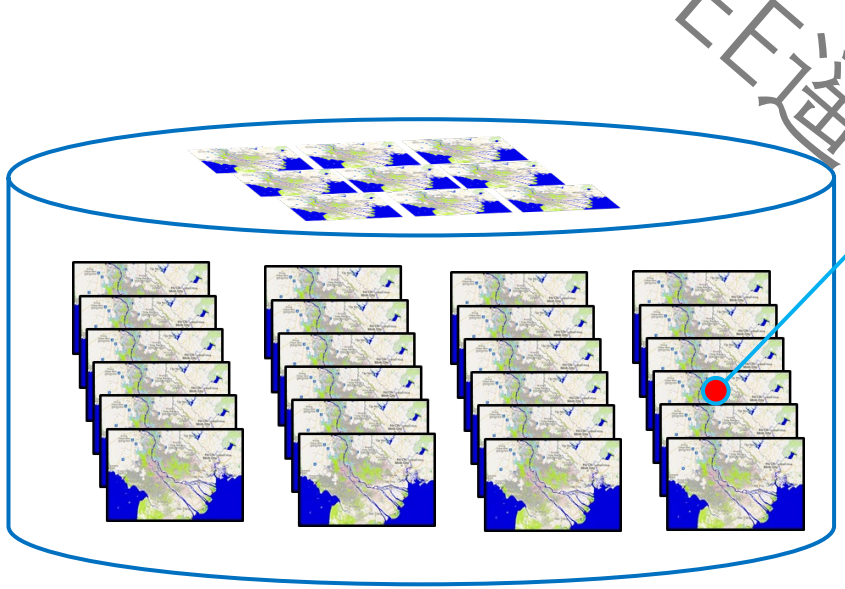


Image collection
(ee.ImageColelction)

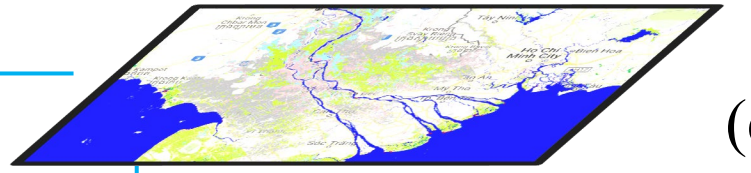
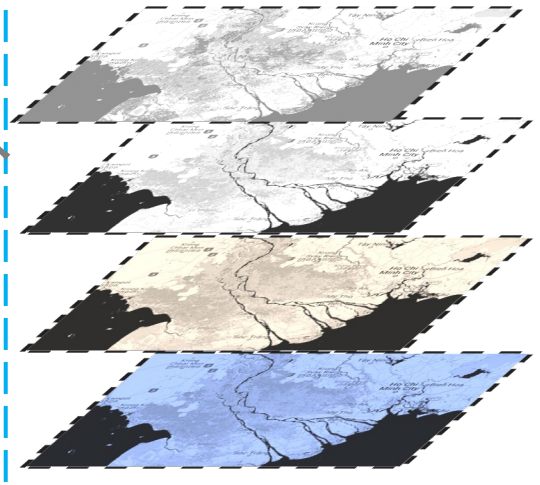


Image
(ee.Image)



Band1

Band2

Band3

Band4

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Image

- **方式1—使用image ID**

```
var loadedImage = ee.Image('JAXA/ALOS/AW3D30/V2_2');
```

- **方式2—使用imageCollection**

```
var first = ee.ImageCollection('COPERNICUS/S2_SR')
              .filterBounds(ee.Geometry.Point(-70.48, 43.3631))
              .filterDate('2019-01-01', '2019-12-31')
              .sort('CLOUDY_PIXEL_PERCENTAGE')
              .first();
Map.addLayer(first, {bands: ['B4', 'B3', 'B2'], min: 0, max: 2000}, 'first');
```

- **方式3—自己创造**

```
// Create a constant image.
var image1 = ee.Image(1);
print(image1);
```

```
// Concatenate two images into one multi-band image.
var image2 = ee.Image(2);
var image3 = ee.Image.cat([image1, image2]);
print(image3);
```

https://code.earthengine.google.com/bc4f7b618768a497a65edcc0b4d4364c

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Image之加载影像

```
// Load an image.
var image =
ee.Image('LANDSAT/LC08/C01/T1_TOA/LC08_044034_20140318');

// Define the visualization parameters.
var vizParams = {
  bands: ['B5', 'B4', 'B3'],
  min: 0,
  max: 0.5,
  gamma: [0.95, 1.1, 1]
};

// Center the map and display the image.
Map.setCenter(-122.1899, 37.5010, 10); // San Francisco Bay
Map.addLayer(image, vizParams, 'false color composite');
```

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https://code.earthengine.google.com/d4537cc7118476b60eb2cd2a022c2d70

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Image之指数计算

- **常用指数的计算**
  - ✓ NDVI
  - ✓ MNDWI
  - ✓ EVI
- **影像显示**
  - ✓ 设置palette
  - ✓ selfMask
  - ✓ Mask
- API文档

https://developers.google.com/earth-engine/apidocs

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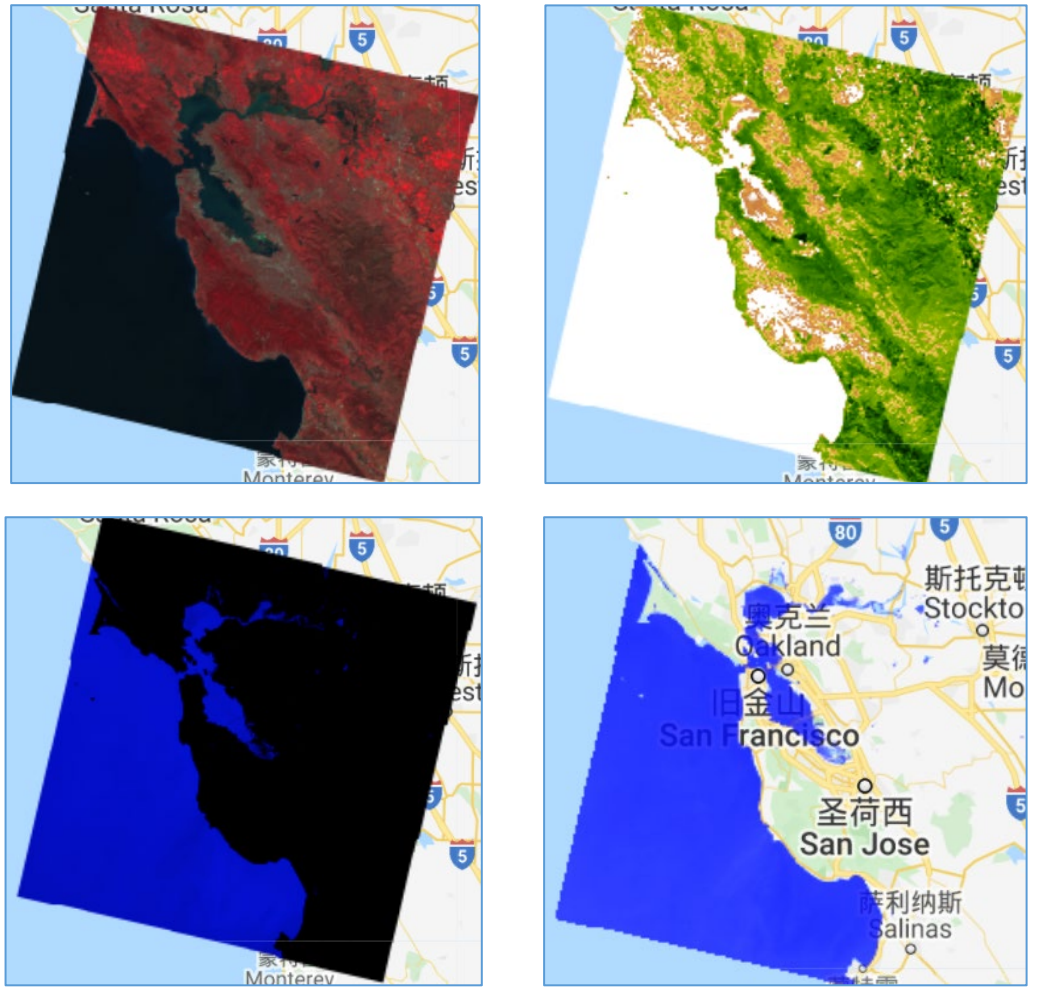

https://code.earthengine.google.com/fdc8b714383eecd66931e2afd55f0ca0

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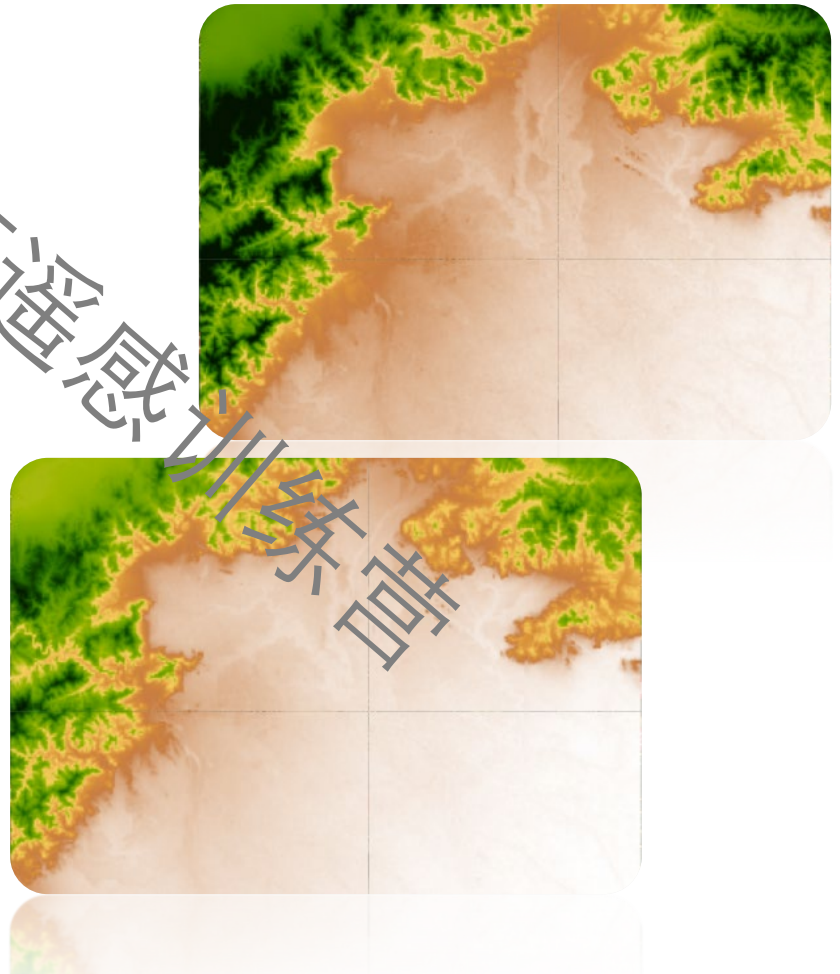
Image之归一化

unitScale

Scales the input so that the range of input values [low, high] becomes [0, 1]. Values outside the range are NOT clamped. This algorithm always produces floating point pixels.

where

For each pixel in each band of 'input', if the corresponding pixel in 'test' is nonzero, output the corresponding pixel in value, otherwise output the input pixel.



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https://code.earthengine.google.com/87108ce069098ac6b333ea9cc194edb6

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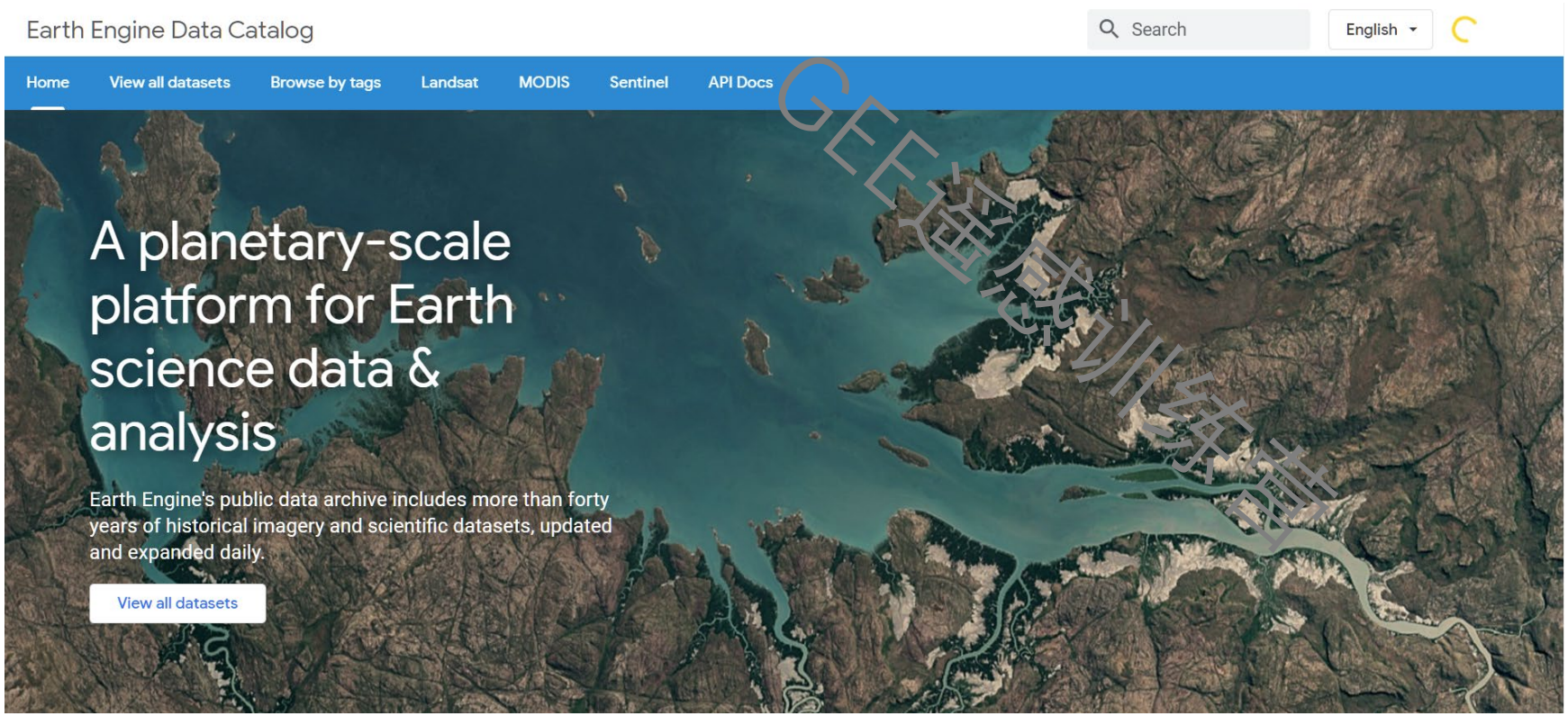
ImageCollection



- Landsat
- Sentinel-2
- Sentinel-1
- MODIS
- Cropland Datasets

https://developers.google.com/earth-engine/datasets

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ImageCollection—常 用 函 数

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first

Returns the first entry from a given collection.

size

Returns the number of elements in the collection

mean

Reduces an image collection by calculating the mean of all values at each pixel across the stack of all matching bands. Bands are matched by name.

median

Reduces an image collection by calculating the median of all values at each pixel across the stack of all matching bands. Bands are matched by name.

https://code.earthengine.google.com/2e0edbedd335e325357171f3bb8b6903

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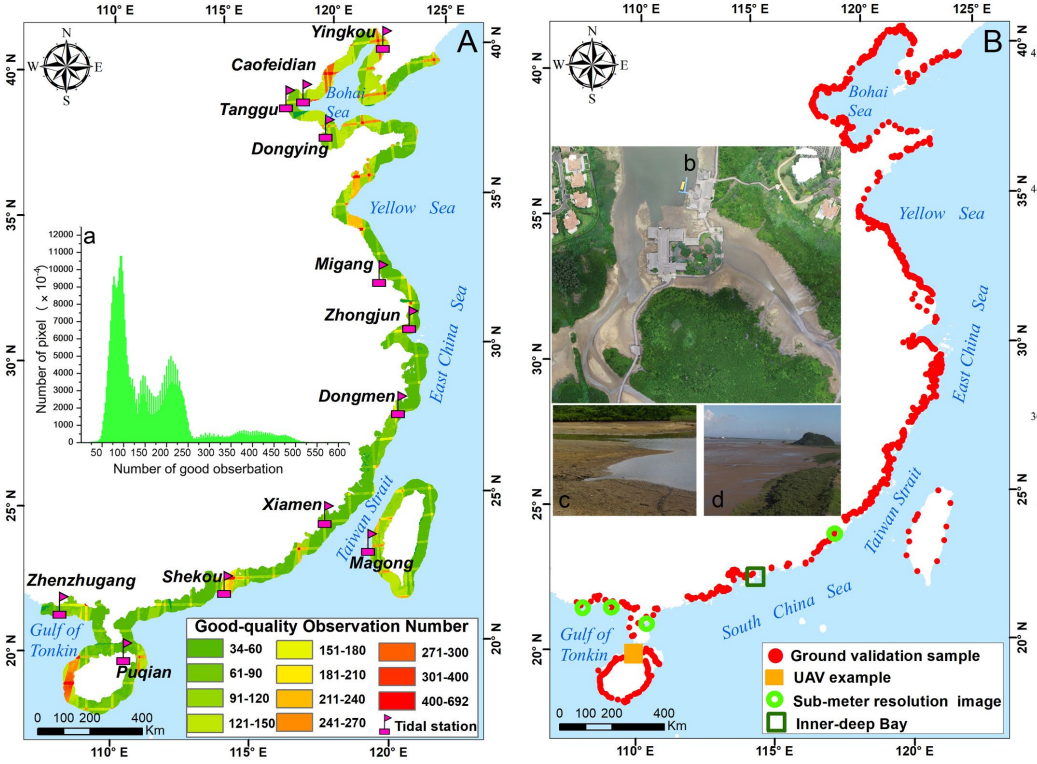
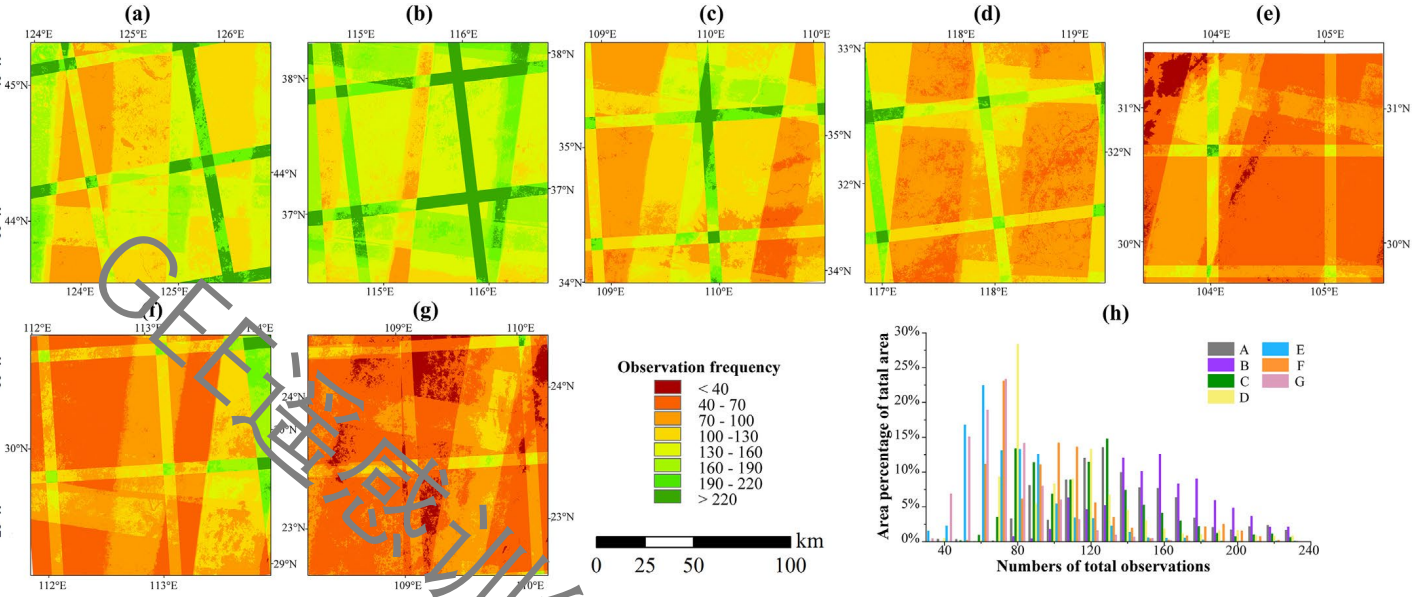
ImageCollection—count函数



(Jia et al. 2021)



(Liu et al. 2020)

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https://code.earthengine.google.com/47a1e992699827d4c825df07778d6b44

Liu, L., Xiao, X., Qin, Y., Wang, J., Xu, X., Hu, Y., & Qiao, Z. (2020). Mapping cropping intensity in China using time series Landsat and Sentinel-2 images and Google Earth Engine. ***Remote Sensing of Environment***, *239*, 111624

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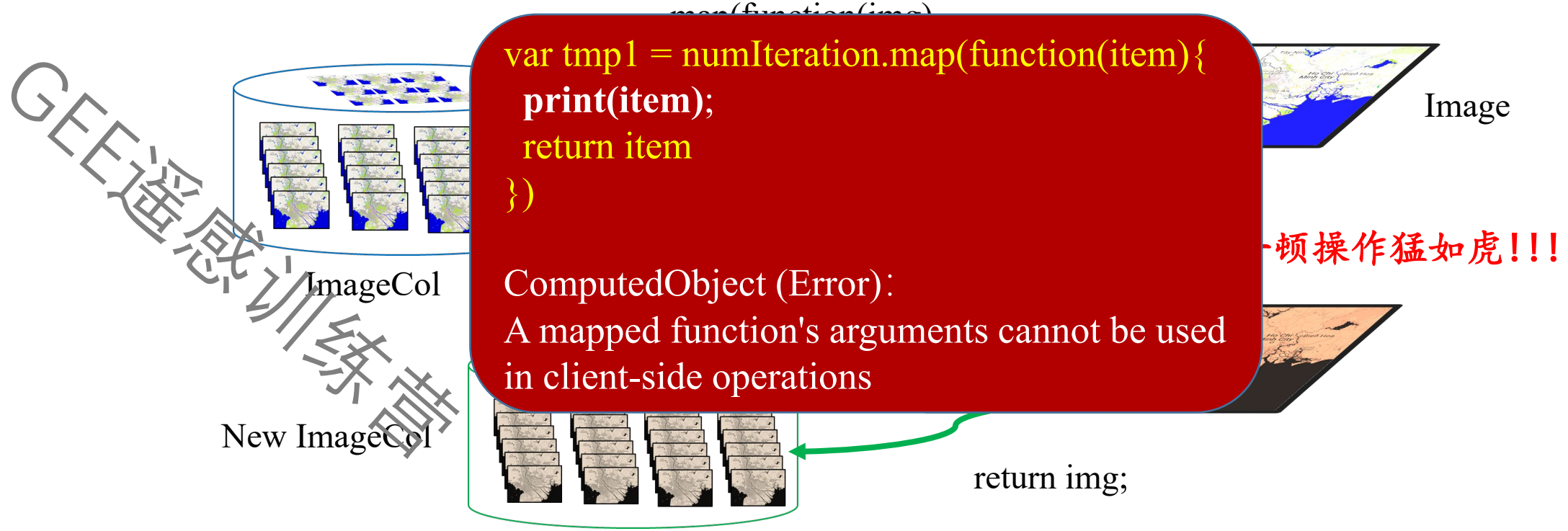
ImageCollection—map功能

To apply a function to **every Image** in an ImageCollection use imageCollection.map(). The only argument to map() is **a function** which **takes one parameter**: an ee.Image



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https://code.earthengine.google.com/6b7ed3c32ed240143ea0be024caa4193

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Note: print, Map.addLayer等属于本地函数，最好不要出现在GEE等服务器代码里

Thanks for your attention

您的关注、点赞和传播将对我们意义重大

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