

Examples of Codes Applied to Google Earth Engine

EE406: Contemporary Economic Issues
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Faculty of Economics, Thammasat University

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Main Console of Google Earth Engine

The screenshot displays the Google Earth Engine web interface. At the top, the Google Earth Engine logo is on the left, a search bar in the center, and a user profile dropdown on the right. Below the search bar, there are tabs for 'Scripts', 'Docs', and 'Assets'. The 'Scripts' tab is active, showing a list of scripts under the 'Owner (1)' section, including 'Area Computation', 'Bangkok_Nighttime Light', 'DMSP OLS', 'Example_where()_command', 'LA_Low NDVI and low NDWI', 'LandSurfaceTemp', 'MODIS Classification', 'MODIS Land Cover Yearly Global 500m', 'Nattapong_GIS_Province_LST', and 'Nattapong TH GIS Province'. The 'TH_NDVI *' script is selected, and its code is visible in the editor. The code defines a region, calculates NDVI, and adds it to the map. The map below shows a satellite view of Southeast Asia, with a green and purple region highlighted in Thailand. The 'Inspector' panel on the right shows the 'Console' tab, which is currently empty. The bottom of the map shows the Google logo and a scale bar.

Google Earth Engine

Search places and datasets...

Help nattapong@econ.tu.ac.th

Scripts Docs Assets

Filter scripts... NEW

Owner (1)

- users/nattapong/NDVI
 - Area Computation
 - Bangkok_Nighttime Light
 - DMSP OLS
 - Example_where()_command
 - LA_Low NDVI and low NDWI
 - LandSurfaceTemp
 - MODIS Classification
 - MODIS Land Cover Yearly Global 500m
 - Nattapong_GIS_Province_LST
 - Nattapong TH GIS Province

TH_NDVI *

```
17 var TS5 = Chart.image.seriesByRegion(collection01, small_region, ee.Reducer.mean(), 'NDVI', 500, 'system:time_start')
18 title: 'NDVI Long-Term Time Series',
19 vAxis: {title: 'NDVI'},
20 });
21 print(TS5);
22 //Short-Term Time Series
23 var TS1 = Chart.image.seriesByRegion(collection01, small_region, ee.Reducer.mean(), 'NDVI', 500, 'system:time_start')
24 title: 'NDVI Short-Term Time Series',
25 vAxis: {title: 'NDVI'},
26 });
27 print(TS1);
28 //Set Center of Map & Add Clipped Image Layer + Global NDVI
29 Map.setCenter(102, 15, 5); //long, lat, zoom
30 Map.addLayer(clipped01, {min: 0.0, max: 1, palette: ['FFFFFF', 'CC9966', 'CC9900', '996600', '33CC00', '009900', '006600']});
31 Map.addLayer(collection01, {min: 0.0, max: 1, palette: ['FFFFFF', 'CC9966', 'CC9900', '996600', '33CC00', '009900', '006600']});
32
```

Inspector Console

Click on the map to inspect the layers.

Layers แผนที่ ดาวเทียม

Google

ศรีลังกา

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Example #1: NO₂ density

Imports (2 entries) 

▶ **var BKK:** Polygon, 21 vertices  
▶ **var EEC:** Polygon, 13 vertices  

```
1 var regions = ee.FeatureCollection([
2   ee.Feature( // BKK
3   BKK, {label: 'BKK'}),
4   ee.Feature( // EEC
5   EEC, {label: 'EEC'}),
6   ]);
7
8 var collection = ee.ImageCollection('COPERNICUS/S5P/NRTI/L3_NO2')
9   .select('NO2_column_number_density')
10  .filterDate('2019-01-01', '2021-06-06');
11
12 var goodCollection = collection.map(
13   function(img) {
14     var rescaled_NO2 = img.select('NO2_column_number_density')
15                           .multiply(1000)
16                           .rename('NO2_rescaled');
17     return img.addBands(rescaled_NO2);
18   }
19 );
20
21 var NO2TimeSeries = ui.Chart.image.seriesByRegion({
22   imageCollection: goodCollection,
23   regions: regions,
24   reducer: ee.Reducer.mean(),
25   band: 'NO2_rescaled',
26   scale: 5000,
27   xProperty: 'system:time_start',
28   seriesProperty: 'label'
29 }).setChartType('ScatterChart')
30 .setOptions({
31   title: 'Temporal development of NO2 density',
32   vAxis: {title: 'NO2'},
33   lineWidth: 1,
34   pointSize: 1,
35 });
36
37 print(NO2TimeSeries)
```

<https://code.earthengine.google.com/f922fb4a2c6c6dd5acdb2b2e6f21f0a4>

Search places and datasets...

Copernicus_NO2_BKK_Rayong_Scaled *

Get Link Save Run Reset Apps

```
49  
50 print(N02TimeSeries)  
51  
52  
53 var nox = collection.median().clipToCollection(regions);  
54 var mask = nox.gt(0.000085);  
55 var nox = nox.updateMask(mask);  
56  
57  
58 // Image visualization  
59 // Source: https://developers.google.com/earth-engine/image_visualization  
60 Map.setCenter(101, 10.5, 8);  
61 Map.addLayer(nox, {min: 0.0, max: 0.0002, palette: ['black', 'blue', 'purple', 'cyan', 'green', 'yellow']}
```

Inspector Console Tasks

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

Temporal development of NO2 density

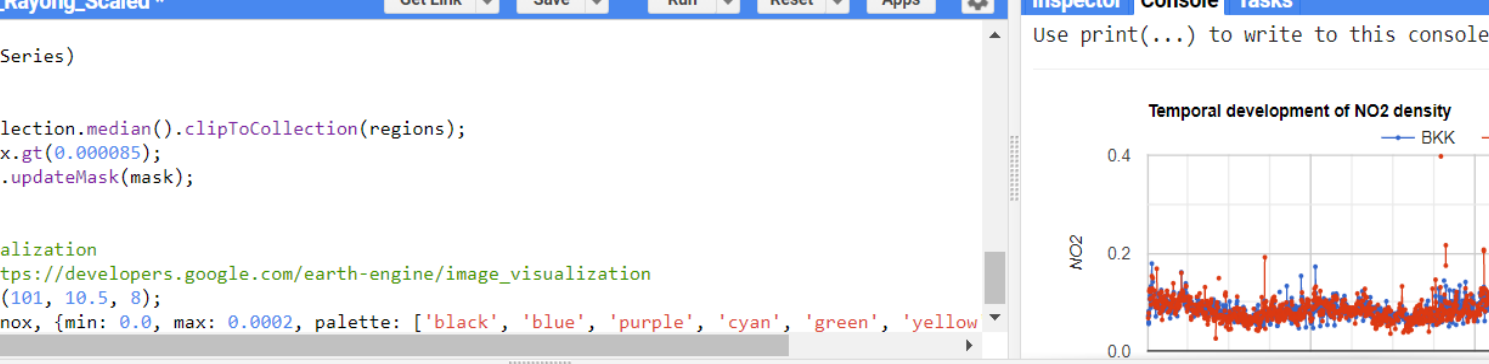
NO2

0.4

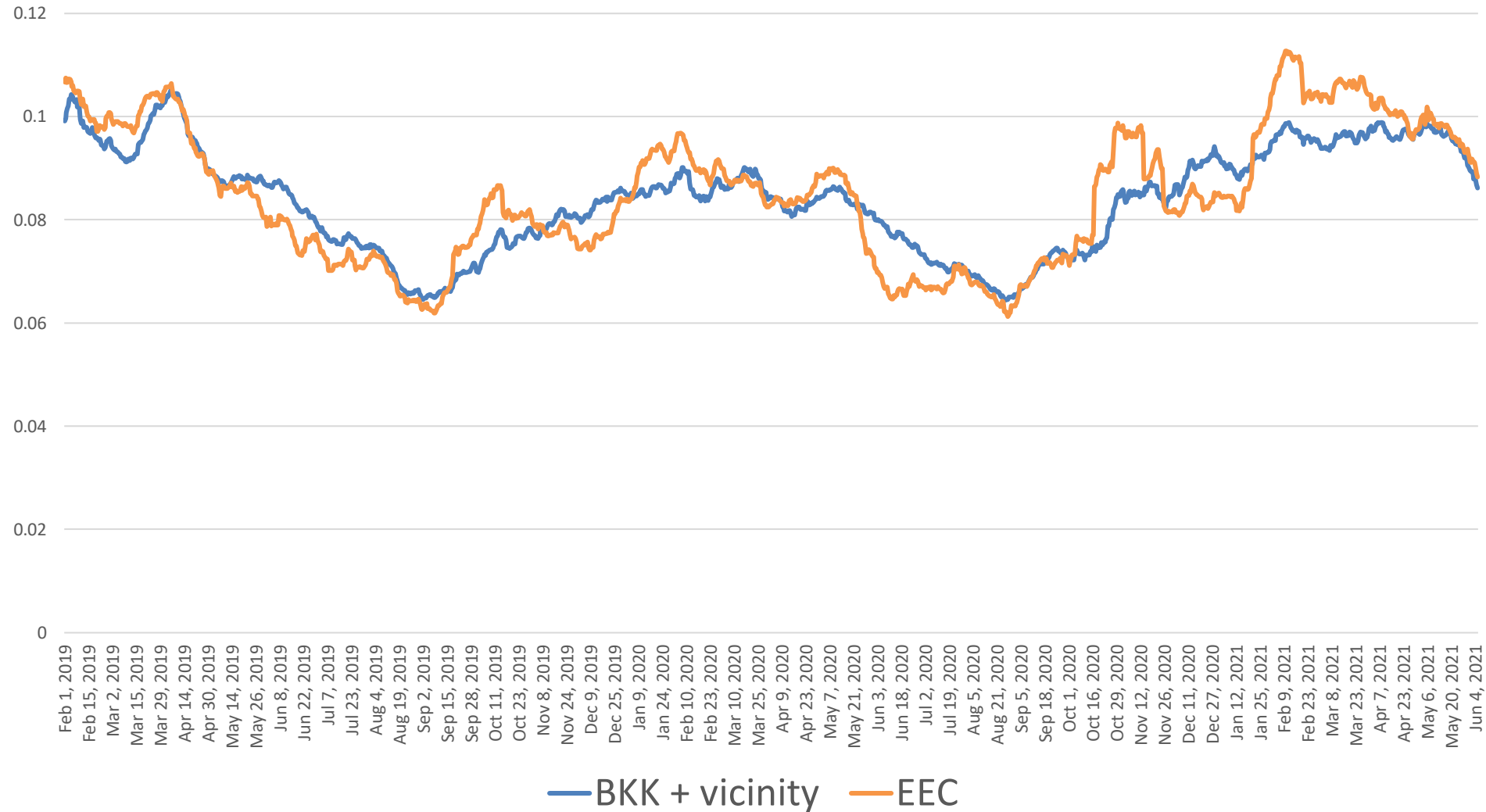
0.2

0.0

BKK EEC



Density of NO2 (30-day moving average)



Example #2: VIIRS

<https://code.earthengine.google.com/ee84302afa8c1a54d7128f8ae722be1a>

google.com



Search places and datasets...



TH_VIIRS_BKK_EEC

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Apps



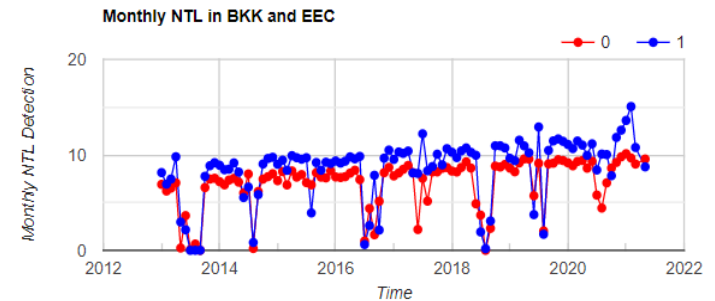
Imports (2 entries)

```
var BKK: Polygon, 16 vertices
var EEC: Polygon, 35 vertices
```

```
1 var regions = ee.FeatureCollection([
2   ee.Feature( // BKK
3     // BKK district
4     BKK, {label: 'BKK'}),
5   ee.Feature( // EEC
6     // EEC
7     EEC, {label: 'EEC'}),
8   ]);
9
10 var dataset = ee.ImageCollection('NOAA/VIIRS/DNB/MONTHLY_V1/VCMSCFG')
11   .filter(ee.Filter.date('2013-01-01', '2021-05-31'));
12 var nighttime = dataset.select('avg_rad');
13
14 var divisor = dataset.select('avg_rad').sum();
15
16 var result = dataset.map(function(image) {
17   return image.select('avg_rad').multiply(image.select('avg_rad').divide(divisor));
18 }).sum();
19
20 var NTL = ui.Chart.image.seriesByRegion(
21   nighttime, regions, ee.Reducer.mean())
22   .setChartType('ScatterChart')
23   .setOptions({
24     title: 'Monthly NTL in BKK and EEC',
25     vAxis: {title: 'Monthly NTL Detection'},
26     hAxis: {title: 'Time'},
27     lineWidth: 1,
28     pointSize: 4,
29     series: {
30       0 : {color: 'FF0000'}, // BKK
31       1 : {color: '0000FF'}, // EEC
32     }
33   });
34 print(NTL);
35
36 var nighttime = dataset.select('avg_rad');
37 var nighttimeVis = {min: 0.0, max: 60.0};
38 Map.setCenter(105, 15, 7);
39 Map.addLayer(nighttime, nighttimeVis, 'Nighttime');
```

Inspector Console Tasks

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



Search places and datasets...



TH_VIIRS_BKK_EEC

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Save

Run

Reset

Apps



Imports (2 entries)

var BKK: Polygon, 16 vertices
var EEC: Polygon, 35 vertices

```
1 var regions = ee.FeatureCollection([
2   ee.Feature( // BKK
3     // BKK district
4     BKK, {label: 'BKK'}),
5   ee.Feature( // EEC
6     // EEC
7     EEC, {label: 'EEC'}),
8   ]);
9
10 var dataset = ee.ImageCollection('NOAA/VIIRS/DNB/MONTHLY_V1/CMCFG')
11   .filter(ee.Filter.date('2013-01-01', '2021-05-31'));
12 var nighttime = dataset.select('avg_rad');
```

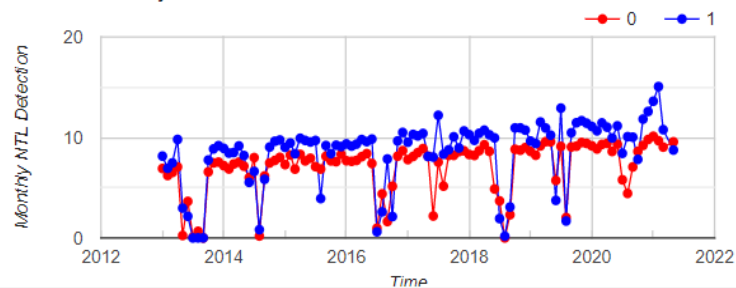
Inspector

Console

Tasks

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

Monthly NTL in BKK and EEC

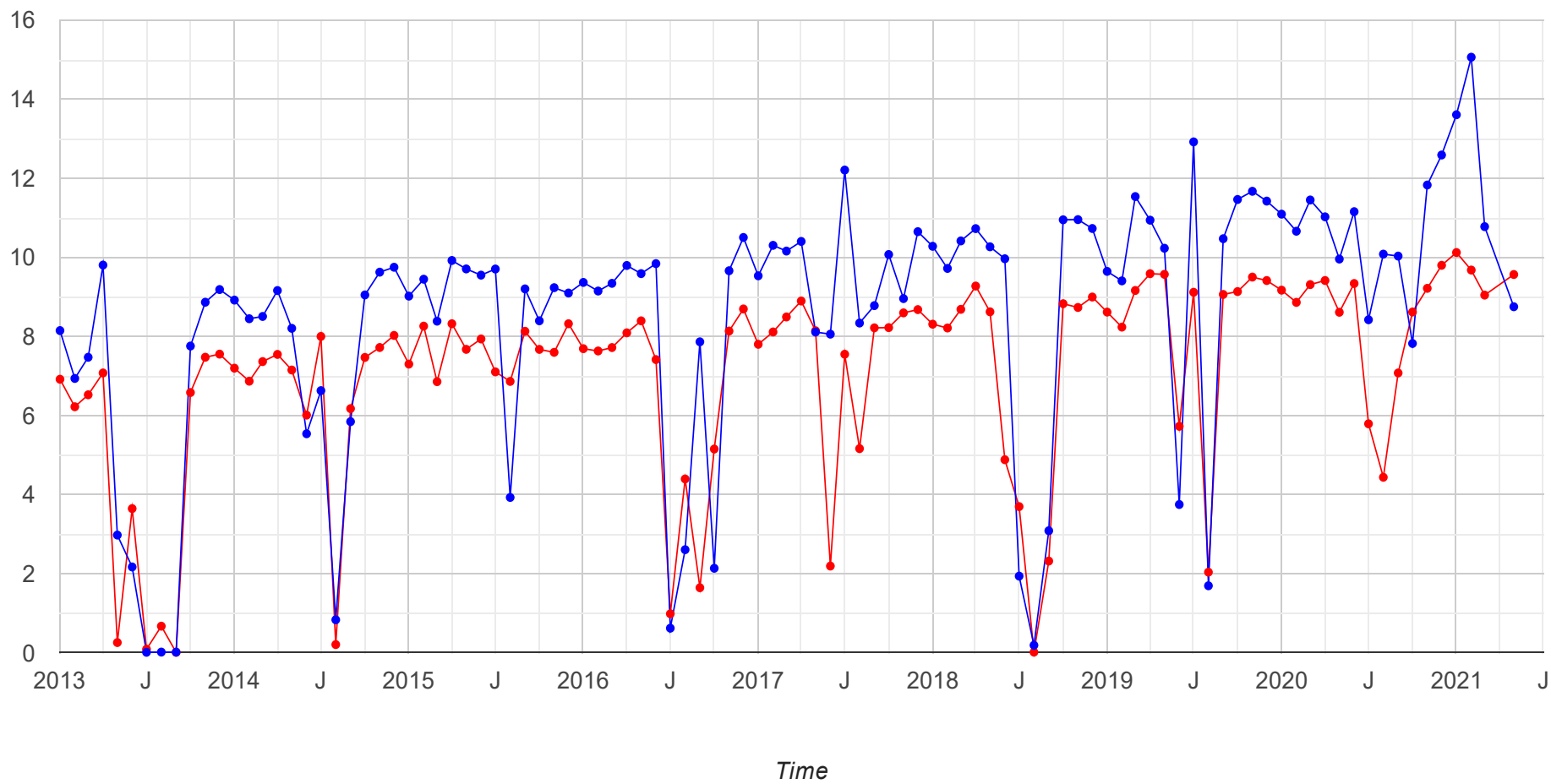


Layers

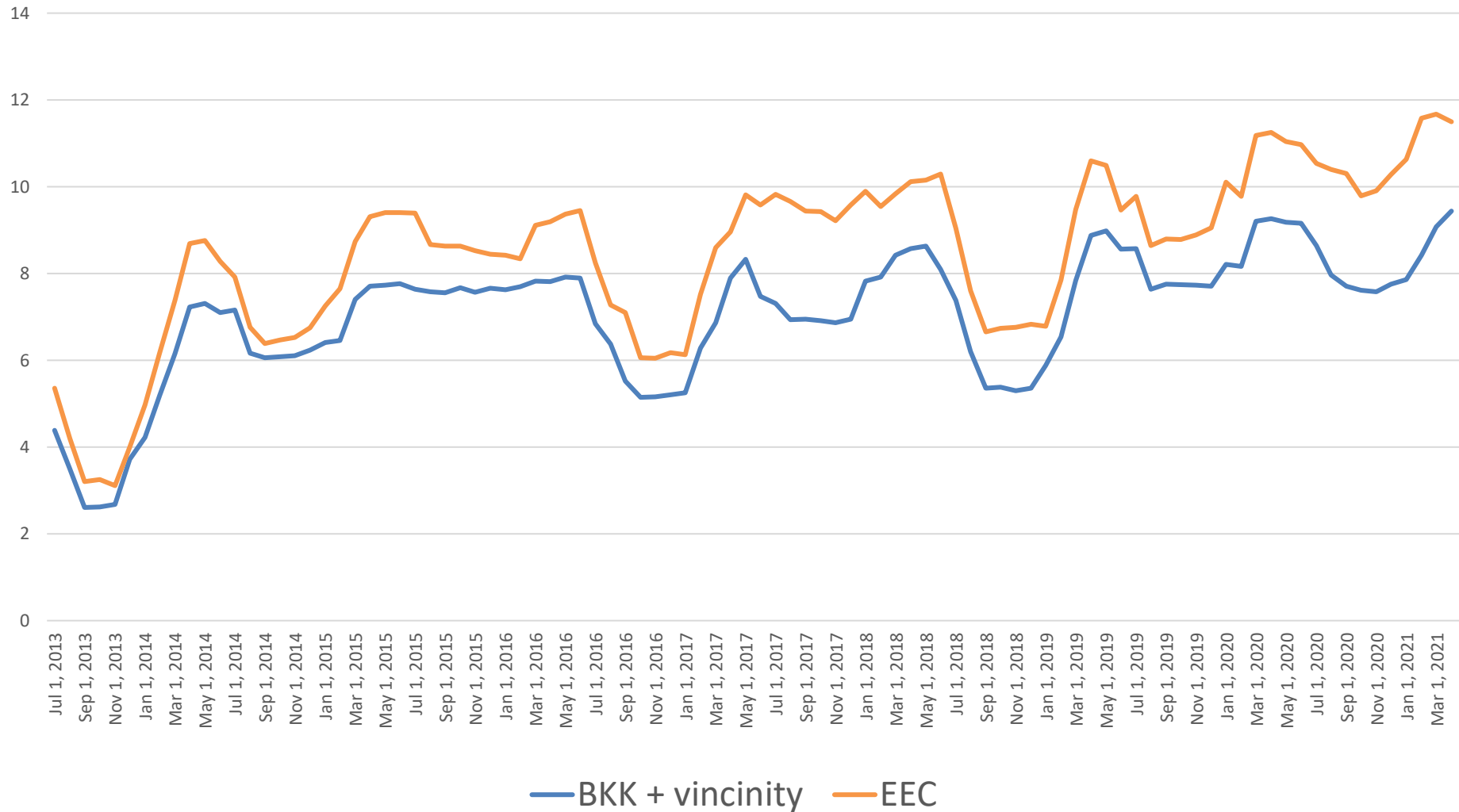
แผนที่

ดาว

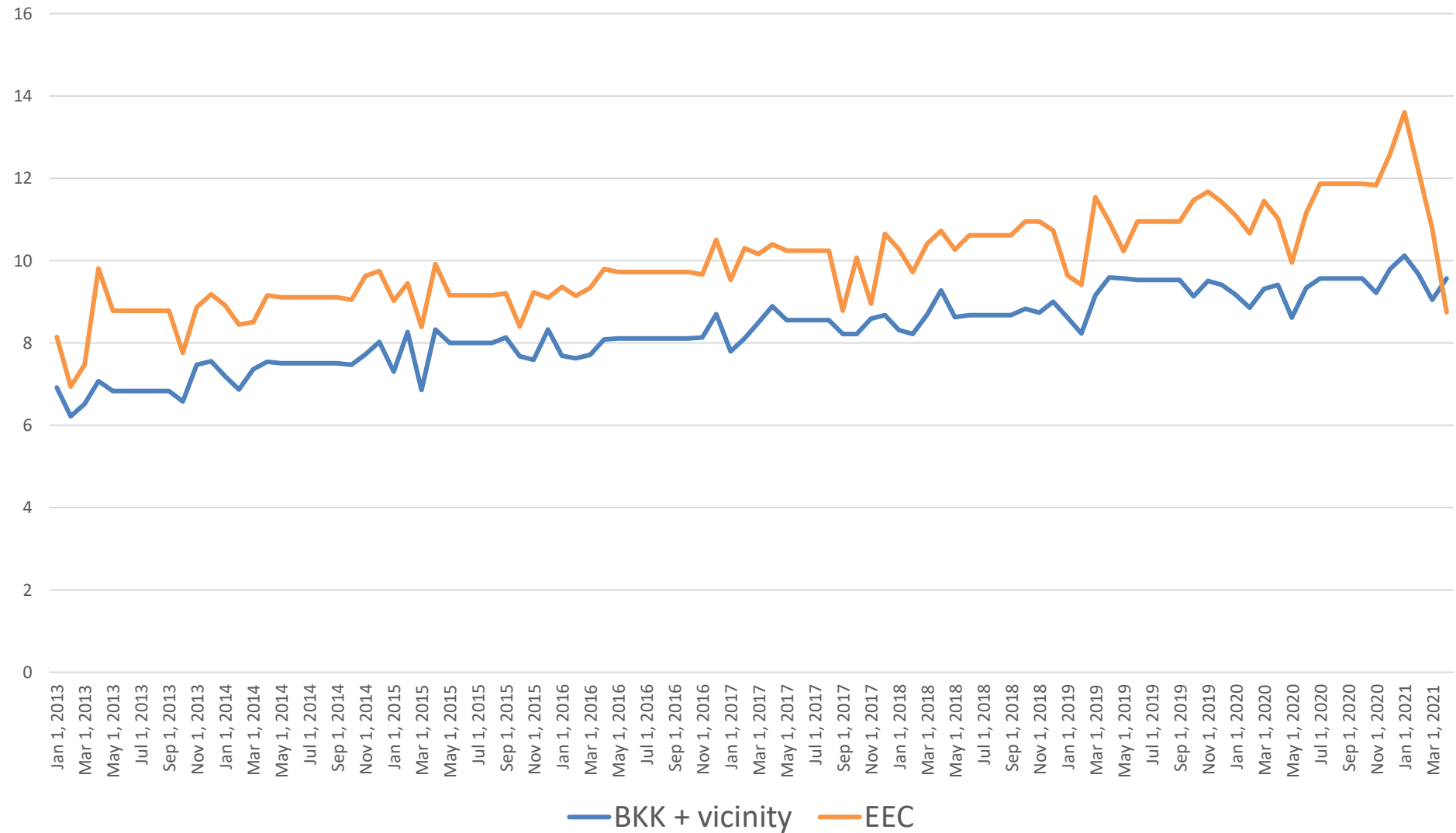
Monthly NTL in BKK and EEC



Nighttime-Light Average Density (6-month moving average)



Nighttime-Light Density (smoothed)



Example #3: Rainfall

Example -- Rainfall



TH_CHIRPS_Precipitation *

Imports (3 entries)

- var CHIRPS: ImageCollection "CHIRPS Pentad: Climate Hazards Group InfraRed Precipitation with Station Data (version 2.0 final)"
- var ROI: MultiPoint, 0 vertices
- var countries: Fusion Table "Countries.csv" (209 rows, 1 column)

```
1 // Load the CHIRPS data
2 var CHIRPS= ee.ImageCollection('UCSB-CHG/CHIRPS/PENTAD');
3 //Identify country
4 var Thailand = ee.FeatureCollection('ft:1tdSwUL7MVpOauSgRzqVTowdfy17KDbw-1d9omPw').filterMetadata('Country', 'equals', 'Thailand');
5 Map.addLayer(Thailand);
6 //Identify region of interest
7 var ROI
8 // Select dates: the CHIRPS data is from 1981-01-01 to 2016-02-27
9 var precip = CHIRPS.filterDate('1981-01-01', '1991-12-30');
10 var TS5 = Chart.image.series(precip, Thailand, ee.Reducer.mean(),1000, 'system:time_start').setOptions({
11     title: 'Precipitation Full Time Series',
12     vAxis: {title: 'mm/pentad'},
13 });
14 print(TS5);
15 // Charts One Year
16 var precip1year=CHIRPS.filterDate('2015-01-01', '2015-12-31');
17 var TS1 = Chart.image.series(precip1year, Thailand, ee.Reducer.mean(),1000, 'system:time_start').setOptions({
18     title: 'Precipitation 1-Year Time Series',
19     vAxis: {title: 'mm/pentad'},
20 });
21 print(TS1);
22
23 var ThailandPrecip1 = precip1year.mean().clip(Thailand);
24 var ThailandPrecip=precip.mean().clip(Thailand);
25 Map.addLayer(ThailandPrecip1, {'min': 0, 'max': 40, 'palette':"CCFFCC,00CC66,006600"});
26 Map.addLayer(ThailandPrecip, {'min': 0, 'max': 40, 'palette':"CCFFCC,00CC66,006600"});
27 // Export a cloud-optimized GeoTIFF.
28 Export.image.toDrive({
29     image: ThailandPrecip1,
30     description: 'imageToCOGeoTiffExample',
31     fileFormat: 'GeoTIFF',
32     maxPixels: 1e9,
33     fileNamePrefix: 'exampleExport',
34     formatOptions: {cloudOptimized: true}
35 });
36
```

Example #4: Land Surface Temp.

Example – Land Surface Temp.

TH_LST*

Imports (1 entry)

var small_region: Polygon, 4 vertices

```
1 //Choose country using GEE Feature Collection
2 var region = ee.FeatureCollection('ft:1tdSwUL7MVpOauSgRzqVTOWdfy17KDbw-1d9omPw').filterMetadata('Country', 'equals', 'Thailand');
3 // Import region
4 //var region = geometry;
5 //Add region outline to layer - for selected countries
6 Map.addLayer(region, {}, 'Thailand');
7 // Collect bands and scale
8 var modisLSTday = ee.ImageCollection('MODIS/MOD11A2').select('LST_Day_1km');
9 var modisLSTnight = ee.ImageCollection('MODIS/MOD11A2').select('LST_Night_1km');
10 var modLSTday = modisLSTday.map(function(img) {
11   return img.multiply(0.02).subtract(273.15).copyProperties(img, ['system:time_start', 'system:time_end']);
12 });
13 var modLSTnight = modisLSTnight.map(function(img) {
14   return img.multiply(0.02).subtract(273.15).copyProperties(img, ['system:time_start', 'system:time_end']);
15 });
16 // Select dates
17 var collection05night = ee.ImageCollection(modLSTnight.filterDate('2000-01-01', '2016-03-31'));
18 var collection05day = ee.ImageCollection(modLSTday.filterDate('2000-01-01', '2016-03-31'));
19 var collection01night = ee.ImageCollection(modLSTnight.filterDate('2015-01-01', '2015-12-31'));
20 var collection01day = ee.ImageCollection(modLSTday.filterDate('2015-01-01', '2015-12-31'));
21 //Clip to Specified Region
22 var clipped05night = collection05night.mean().clip(region)
23 var clipped05day = collection05day.mean().clip(region)
24 var clipped01night = collection01night.mean().clip(region)
25 var clipped01day = collection01day.mean().clip(region)
26 // Charts Long Term Time Series
27 var TS5 = Chart.image.series(collection05day, small_region, ee.Reducer.mean(), 1000, 'system:time_start').setOptions({
28   title: 'LST Long-Term Time Series',
29   vAxis: {title: 'LST Celsius'},
30 });
31 print(TS5);
32 //Set Center of Map & Add Clipped Image Layer
33 Map.setCenter(102, 15, 4); //long, lat, zoom
34 Map.addLayer(clipped01day, {'min': 0, 'max': 40, 'palette': "0000ff,32cd32,ffff00,ff8c00,ff0000"}, 'LSTregion');
35 Map.addLayer(collection01day, {'min': 0, 'max': 40, 'palette': "0000ff,32cd32,ffff00,ff8c00,ff0000"}, 'LSTglobal', false);
36
```


Example #5: NDVI

Example – Normalized Difference Vegetation Index (NDVI)

Google Earth Engine

Search places and datasets...



VI *

Get Link

Save

Imports (1 entry)

var small_region: Polygon, 4 vertices

//Choose country using GEE Feature Collection

```
var region = ee.FeatureCollection('ft:1tdSwUL7MVpOauSgRzqVTOwdfy17KDbw-1d9omPw').filterMetadata('Country', 'equals', 'Thailand');
```

// Import region

//var region = geometry;

//Add region outline to layer - for selected countries

Map.addLayer(region, {}, 'Thailand')

// Collect data and filter by total dates

```
var modisNDVI = ee.ImageCollection('MODIS/MCD43A4_NDVI');
```

// Image collections for NDVI for all years, one value per month.

```
var collection05 = ee.ImageCollection(modisNDVI.filterDate('2000-01-01', '2017-12-31'));
```

```
var collection01 = ee.ImageCollection(modisNDVI.filterDate('2008-01-01', '2008-12-31'));
```

//Clip to Specified Region

```
var clipped05 = collection05.mean().clip(region)
```

```
var clipped01 = collection01.mean().clip(region)
```

// Charts //

//Long-Term Time Series

```
var TS5 = Chart.image.seriesByRegion(collection05, small_region, ee.Reducer.mean(), 'NDVI', 500, 'system:time_start').setOptions({
  title: 'NDVI Long-Term Time Series',
  vAxis: {title: 'NDVI'},
});
```

```
print(TS5);
```

//Short-Term Time Series

```
var TS1 = Chart.image.seriesByRegion(collection01, small_region, ee.Reducer.mean(), 'NDVI', 500, 'system:time_start').setOptions({
  title: 'NDVI Short-Term Time Series',
  vAxis: {title: 'NDVI'},
});
```

```
print(TS1);
```

//Set Center of Map & Add Clipped Image Layer + Global NDVI

Map.setCenter(102, 15, 5); //long, lat, zoom

```
Map.addLayer (clipped01, {min: 0.0, max: 1, palette: ['FFFFFF', 'CC9966', 'CC9900', '996600', '33CC00', '009900', '006600', '000000']}, 'NDVI');
```

```
Map.addLayer(collection01, {min: 0.0, max: 1, palette: ['FFFFFF', 'CC9966', 'CC9900', '996600', '33CC00', '009900', '006600', '000000']}, 'NDVIglobal', false);
```