Latin-American Network of Forest Fires (RedLatIF) Regional Network.

Jesús Anaya

3rd GWIS and GOFC-GOLD Fire IT meeting

1st-2nd October 2018, University of Maryland.

RedLaTIf has 15 Members and 15 Participants from Argentina, Brazil, Bolivia, Chile, Colombia, Costa Rica, Cuba, Mexico and Peru.

EEUU and Spain.

The Global Wildland Fire Network (Isabel Manta from Peru, Luis Diego de Costa Rica and *amigos de la naturaleza* from Bolivia.)

MEETINGS

October	*2018 – NOAA-NCWCP (next week)*
August	*2017 – CONABIO, Ciudad de Mexico*
November	2015 – San José dos Campos, Brazil
October	2012 – Santiago, Chile
November	2010 – Guanajuato, Mexico
April	2009 – São José dos Campos, Brazil
September	2007 – Mar del Plata, Argentina
September	2006 – Cartagena de Indias, Colombia
December	2005 – Ciudad de Mexico, Mexico
November	2004 – Santiago de Chile, Chile

Planned activities during the last meeting:

-Create a new version of the protocol describing the use of EE by 16 of August 2017.
-Finish a paper using the optimal thresholds stratified by ecoregions explaining the potential and limitation of this method.
-Verify the new version of the script in areas subject to fires in different countries.
-Define match-funding from each institution represented by a RedLaTIF member in order to participate in the IPP call
-Draft a letter-of-intent from each institution by the end of August.
-It was defined that the next meeting of RedLaTIF will be held in the context of the WildFire conference, 2019, 06-10 of May.
-Two members (Nicolas and Gerardo) will represent RedLaTIF in the Regional Network Summit in Tbilisi, Georgia.

Projects at national level

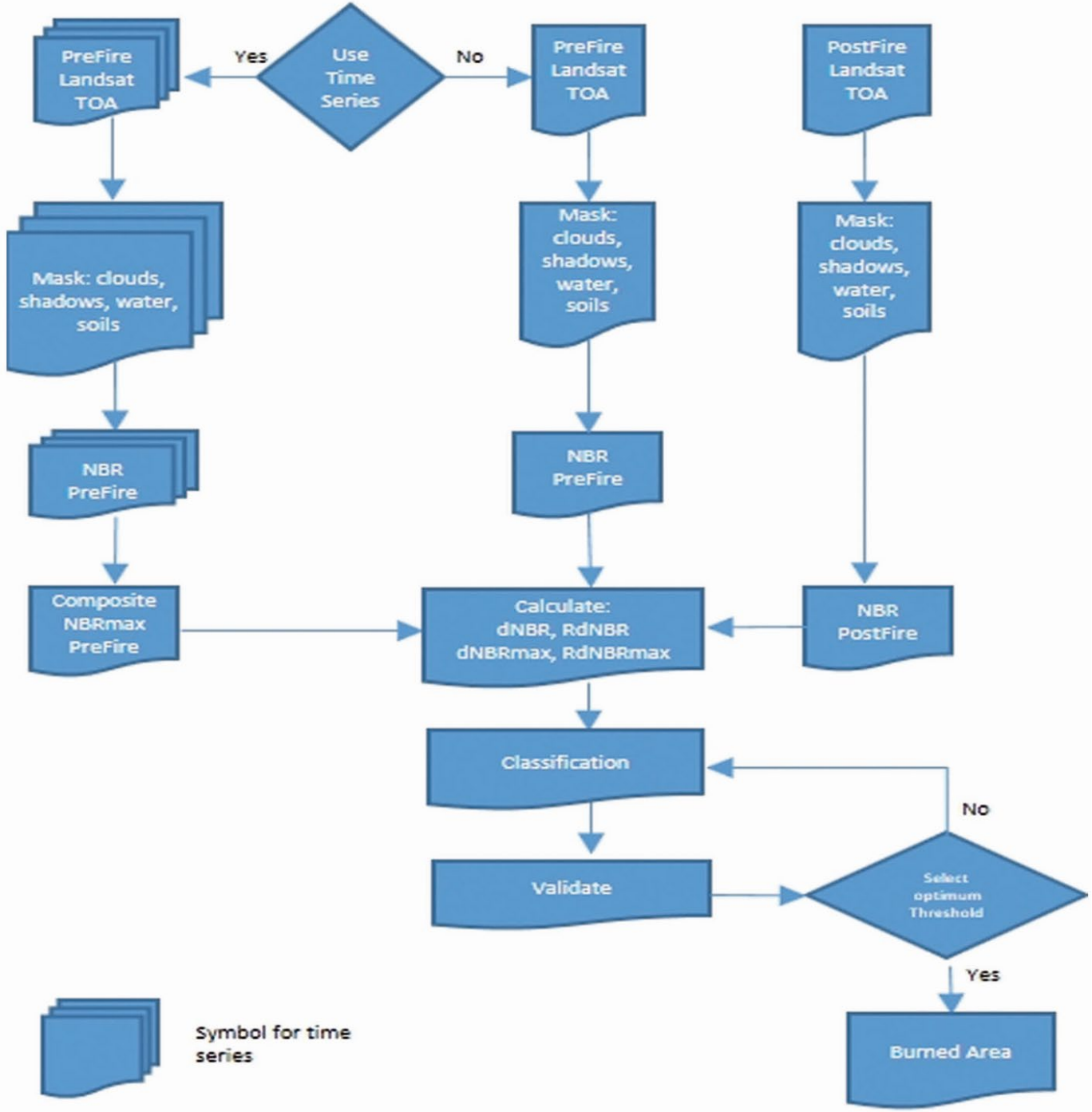
*Chile: analyses of fire severity 2016-2017
*Bolivia: Fire Risk
*Argentina: Burned area mapping in Sierra de Cordoba
*Brazil: Continuous and automatic mapping, Queimadas Web Server
*Colombia: Fire ecology in the Orinoco basin
*Mexico: Monthly BA products with MODIS, plugging to detect BA using QGIS+Landsat and Migration from MODIS to VIIRS

Current Activities

- Important ecosystems subject to fire are not well represented in global BA map, especially because of the small size of BA

-Generate and validate a temporal BA model based on time series (as prefire) using GEE as a collaborative environment
“Tuning the model” with regional experts.

Anaya, J.A., W.F. Sione, and A. Rodriguez-Montellano. Burned area detection based on time-series analysis in a cloud computing environment. Revista de teledetección.(51), 61-73
https://doi.org/10.4995/raet.2018.8618


PreFire Landsat TOA
Yes
Use Time Series
No
PreFire Landsat TOA
PostFire Landsat TOA
Mask: clouds, shadows, water, soils
Mask: clouds, shadows, water, soils
Mask: clouds, shadows, water, soils
NBR PreFire
NBR PreFire
Composite NBRmax PreFire
Calculate: dNBR, RdNBR dNBRmax, RdNBRmax
NBR PostFire
Classification
No
Validate
Select optimum Threshold
Yes
Burned Area
Symbol for time series

Página principal de Mic | Correo - jaanayaa@eaf | Cerrar sesión | Cerrar sesión | ftp://geogra.uah.es - G | *20171206_AR - Earth | palette:'aec3d4' red - C

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Scripts | Docs | Assets

20171205_IMERG_PRECIPITATON_JAXA
20171206_AR
20171206_AR (copy)
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20171206_CO tmp2delete
20171206_Charts
20171206_FIRMS_ANNUAL_mod14_myd144
20171206_LandsatTopographycCorrection

20171206_AR * | Get Link | Save | Run | Reset

```
var filterS = patchsize.gt(10);
var NBRF = filterS.mask(filterS);
Map.addLayer(NBRF, {palette:'ED2939'}, 'Burned Area');

//Export burned area

//var Nombre = "NBRc"+'_'+String(path) +'_'+ String(row)+'_'+ String
var Nombre = "dNBR_20170908_AR_si"+'_'+String(path) +'_'+ String(row
var regions = ee.FeatureCollection('ft:1_RZgjlcqixp-L9hyS6NYGqLaKOlr
                .filterMetadata('PATH', 'equals', path)
                .filterMetadata('ROW', 'equals', row);

Export.image(NBRF, Nombre, {
        'scale':30, // output pixel size
```

Inspector | Console | Tasks

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

Fecha - Inicio de la serie JSON
2015-8-23 JSON

Fecha - Fin de la serie JSON
2015-8-31 JSON

Serie NBR - Landsat 2015

nd

0.4
0.3

Geometry Imports

Layers | Mapa | Satélite

Google

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20171205_IMERG_PRECIPITATON_JAXA
20171206_AR
20171206_AR (copy)
20171206_BO
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20171206_AR * | Get Link | Save | Run | Reset

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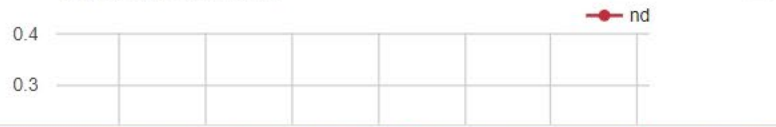
Serie NBR - Landsat 2015



Geometry Imports | Layers | Mapa | Satélite

Google | Datos de mapas ©2018 Google | 5 km | Términos de uso | Notificar un problema de Maps

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Scripts | Docs | Assets

- 20171206_BO (copy)
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- 20171206_FIRMS_ANNUAL_mod14_myd144
- 20171206_LandsatTopographycCorrection
- 20171206_MCD45A1
- 20171206_MCD45A1 (copy)
- 20171206_MYD11A1_LST
- 20171206_SENTINEL2_NOCLOUDS

20171206_CO | Get Link | Save | Run | Reset

```
7  //FIXED: T0 is just before prefire date, T1 is just after prefire dat
8  //------------------FIXED OR TIME SERIES--------
9  //Note in console if you have a singel date (fixed) or a time series.
10 //- - - - - - - - - START PREFIRE -
11 var yearT0        = 2013; // AÑO Pre Fuego [ejm: 1999 - 2015] L8 firs
12 var monthT0       = 12;    // MES Pre Fuego [1 = Enero, 12 =Diciembre
13 var dayT0         = 18;    // DIA Pre Fuego [1....31, Dias calendaric
14 //- - - - - - - - - END PREFIRE -
15 var yearT1        = 2014; // AÑO Post Fuego [ejm: 1999 - 2015]
16 var monthT1       = 12;   // MES Post Fuego [1 = Enero, 12 =Diciembre
17 var dayT1         = 31;   // DIA Post Fuego [1....31, Dias calendaric
18 ////////////////////////////////////////////////////////////////////
19 //- - - - - - - - - SELECCION DE ESCENA LANDSAT -
20 var path          = 8;  // Cambiar PATH de la imagen Landsat
```

Inspector | Console | Tasks

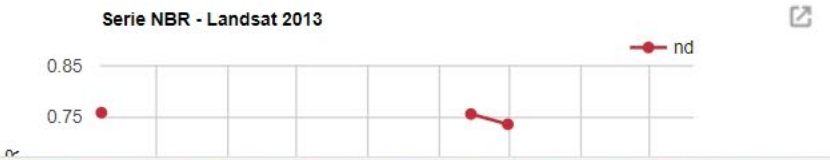
Use print(...) to write to this console.

Fecha - Inicio de la serie JSON

2013-12-18 JSON

Fecha - Fin de la serie JSON

2014-12-31 JSON



Geometry Imports

Layers | Mapa | Satélite

Google

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Scripts | Docs | Assets

- 20171206_BO (copy)
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- 20171206_MCD45A1 (copy)
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20171206_CO | Get Link | Save | Run | Reset

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Fecha - Fin de la serie JSON

2014-12-31 JSON

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Scripts | Docs | Assets

- 20180921_AR_wrs229082
- 20180921_CO_WRS007058
- 20180921_ImageCollectinListImages
- 20180921_ImageCollectinListImages (copy)
- 20180921_MX
- 20180921_MX (copy)
- 20180921_MX_v1
- 20180921_MX_v2
- 20180924_ImageCollectinListImages (copy)
- 20180924_MX_025048_2014
- 20180924_MX_032040
- 20180924_MX_032040 (copy)

20180921_CO_WRS007058 * | Get Link | Save | Run | Reset

```
168 var filterS = patchsize.gt(10);
169 var NBRF = filterS.mask(filterS);
170 Map.addLayer(NBRF, {palette:'ED2939'}, 'Burned Area');
171
172 //Export burned area
173
174 //var Nombre = "NBRc"+'_'+String(path) +'_'+ String(row)+'_'+ String
175 var Nombre = "dNBR_20180921_CO_06_si"+'_'+String(path) +'_'+ String(
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177                 .filterMetadata('PATH', 'equals', path)
178                 .filterMetadata('ROW', 'equals', row);
179
180 Export.image(NBRF, Nombre, {
181
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Inspector | Console | Tasks

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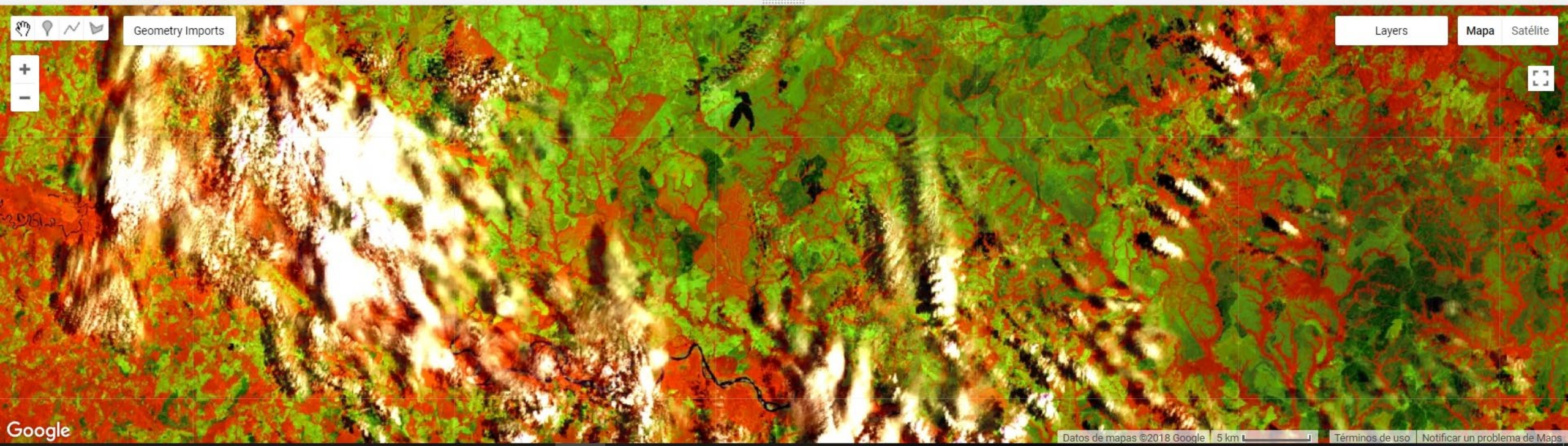
Fecha - Inicio de la serie JSON
2015-3-10 JSON

Fecha - Fin de la serie JSON
2018-3-5 JSON

▸ ImageCollection MODIS/051/MCD45A1 (3 elements) JSON



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- 20180921_AR_wrs229082
- 20180921_CO_WRS007058
- 20180921_ImageCollectinListImages
- 20180921_ImageCollectinListImages (copy)
- 20180921_MX
- 20180921_MX (copy)
- 20180921_MX_v1
- 20180921_MX_v2
- 20180924_ImageCollectinListImages (copy)
- 20180924_MX_025048_2014
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20180921_CO_WRS007058 * | Get Link | Save | Run | Reset

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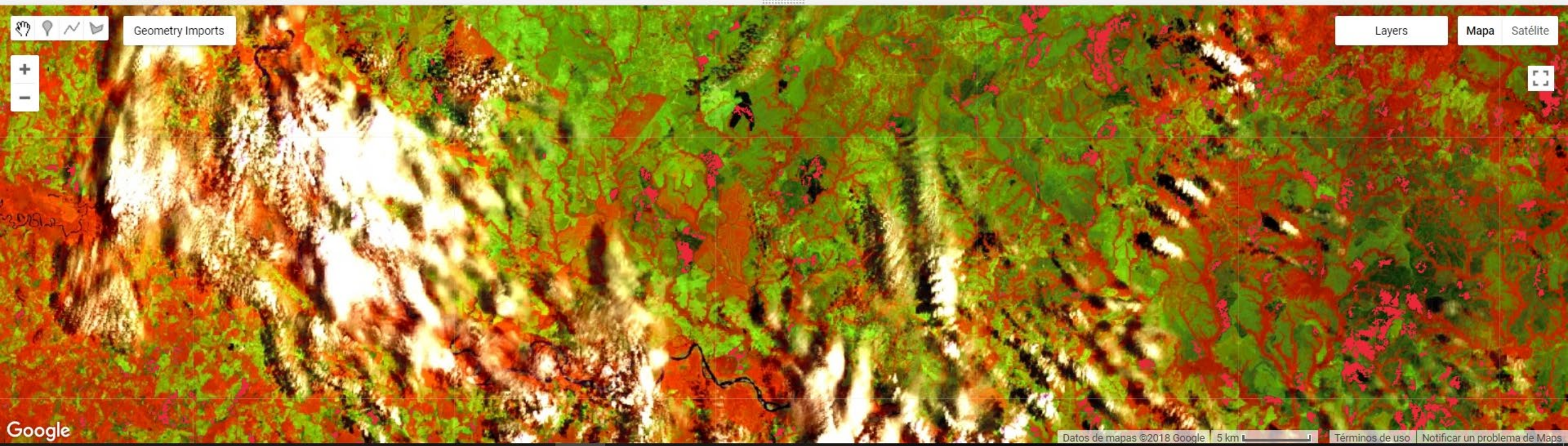

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Scripts | Docs | Assets

- 20180921_MX
- 20180921_MX (copy)
- 20180921_MX_v1
- 20180921_MX_v2
- 20180924_ImageCollectinListImages (copy)
- 20180924_MX_025048_2014
- 20180924_MX_032040
- 20180924_MX_032040 (copy)
- 20180924_MX_032040 (copy)2delete
- 20180927_CL_233083
- 20181001_MX_v3
- CalculoNBR
- CalculoNBR (copy)tmp

20180924_MX_032040 | Get Link | Save | Run | Reset

```
164
165 //Eliminate patchsize smaller than aprox. 1 ha
166 var patchsize = DnbrClass.connectedPixelCount(100, false);
167 var filterS = patchsize.gt(10);
168 var NBRF = filterS.mask(filterS);
169 Map.addLayer(NBRF, {palette:'ED2939'}, 'Burned Area');
170
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178
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Inspector | Console | Tasks

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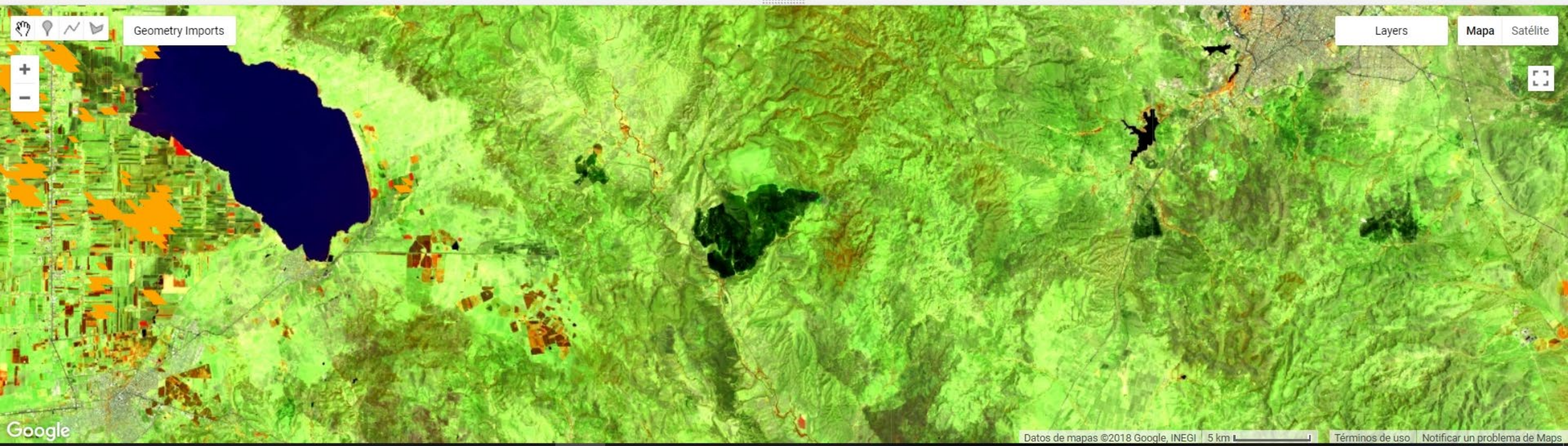
Fecha - Inicio de la serie JSON

2015-4-28 JSON

Fecha - Fin de la serie JSON

2018-4-20 JSON

▸ ImageCollection MODIS/051/MCD45A1 (3 elements) JSON



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Scripts | Docs | Assets

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- 20180921_MX (copy)
- 20180921_MX_v1
- 20180921_MX_v2
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20180924_MX_032040 | Get Link | Save | Run | Reset

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Fecha - Fin de la serie JSON

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Geometry Imports

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Scripts | Docs | Assets

- 20180921_MX
- 20180921_MX (copy)
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- 20180921_MX_v2
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- 20180924_MX_025048_2014
- 20180924_MX_032040
- 20180924_MX_032040 (copy)
- 20180924_MX_032040 (copy)2delete
- 20180927_CL_233083
- 20181001_MX_v3
- CalculoNBR
- CalculoNBR (copy)tmp

20180927_CL_233083 * | Get Link | Save | Run | Reset

```
162 //var Dnbr = ((NBR_PREmax.subtract(NBRpostfire)).divide(NBR_PREmax).
163 var DnbrClass = Dnbr.mask(Dnbr);
164
165 //Eliminate patchsize smaller than aprox. 1 ha
166 var patchsize = DnbrClass.connectedPixelCount(100, false);
167 var filterS = patchsize.gt(10);
168 var NBRF = filterS.mask(filterS);
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176
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Inspector | Console | Tasks

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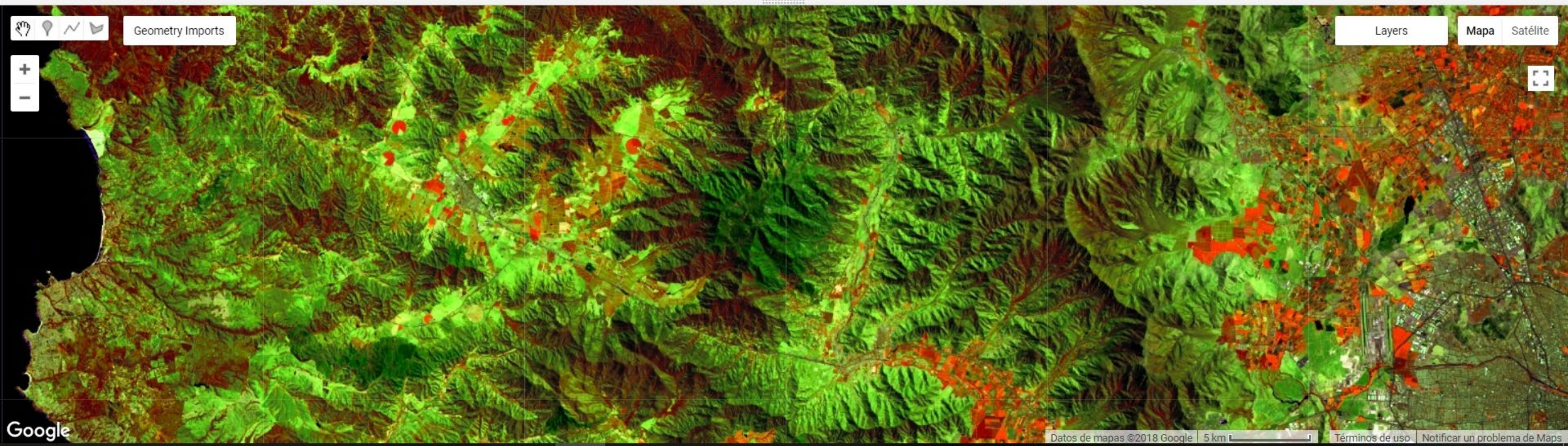
2015-4-28 JSON

Fecha - Fin de la serie JSON

2018-4-20 JSON

▸ ImageCollection MODIS/051/MCD45A1 (3 elements) JSON



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173 //var Nombre = "NBRc"+'_'+String(path) +'_'+ String(row)+'_'+ String
174 var Nombre = "dNBR_20180927_CL_si"+'_'+String(path) +'_'+ String(row
175 var regions = ee.FeatureCollection('ft:1_RZgjlcqixp-L9hyS6NYGqLaKOlr
176
```

Inspector | Console | Tasks

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

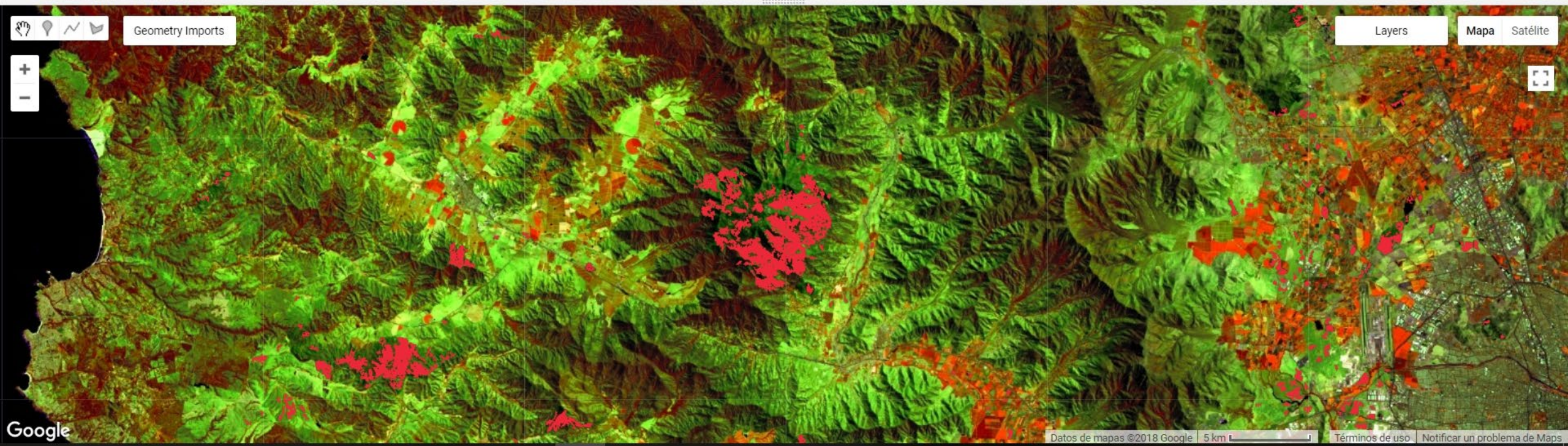
Fecha - Inicio de la serie JSON

2015-4-28 JSON

Fecha - Fin de la serie JSON

2018-4-20 JSON

▸ ImageCollection MODIS/051/MCD45A1 (3 elements) JSON



ESP 2:40 p. m. 01/10/2018

	Chiquitano Forest (141.434 ha)		Amazon Forest (3619 ha)		Dry El Chaco (36.360 ha)	
	Threshold	BA (ha)	Threshold	BA (ha)	Threshold	BA (ha)
Agreement	dNBR	51,826	dNBR	1841	dNBR	18,314
Commission	0.1	13,705	0.1	918	0.1	24,391
Agreement	dNBRmax	105,453	dNBRmax	2262	dNBRmax	25,155
Commission	0.2	16,466	0.2	849	0.6	8605
Agreement	RdNBR	57,440	RdNBR	1847	RdNBR	19,097
Commission	0.1	19,270	0.4	921	0.6	4559
Agreement	RdNBRmax	120.814	RdNBRmax	2235	RdNBRmax	23,948
Commission	0.2	34,228	0.2	838	1.0	5980
Agreement	MCD45A1	2564	MCD45A1	0	MCD45A1	4295
Commission		0		0		1799

Agreement and commission for each model (green), MCD45A1 included. Total BA as reference in gray color.

The challenge when using thresholds is to maximize burned area detection and at the same time minimize comission errors. Finding the optimal BA detection per ecosystem (or here, single Landsat images) may require different approaches. We found that using composites (dNBRmax, RdNBR max) increase BA detection due to the removal of clouds in prefire.

In terms of commission there is an increment in Chiquitano forests when time series are added, but decrease or remain similar in the Amazon forest and the Dry Chaco. We included MCD45A1 for comparison with a global product. Large omission values are common in global products, in the case of the colombian Amazon small burned forest fragments are commonly not detected, . We are aware that newer versions of global products provide better accuracy, but MCD45A1 dataset was available in the GEE environment.

Our preliminary results show that when using composites the accuracy is similar or better than using a single PreFire scene. This is important considering the low temporal resolution of the Landsat program. A standard radiometric calibration to surface reflectance is required to minimize factors that are external to fire ocurrence. Our methods are based on TOA image calibration due to the large number of images available in GEE datasets, so better BA accuracies are expected when using SR data.

We have found GEE as an excelent Collaborative Virtual Environment. RedLaTIF has a large geographic representation and GEE allows code and expertise sharing within a common framework. Future RedlaTIF initiatives should include active fires from VIIRS in order to detect small fires, improve the spatial temporal resolution by using Sentinel 1 and 2 data, and relate fire with land cover land use change.

Thanks