

ARSET

Applied Remote Sensing Training

<http://arset.gsfc.nasa.gov>

 @NASAARSET

Aplicaciones de la percepción remota a la humedad del suelo y la evapotranspiración

Presentadoras:

Erika Podest

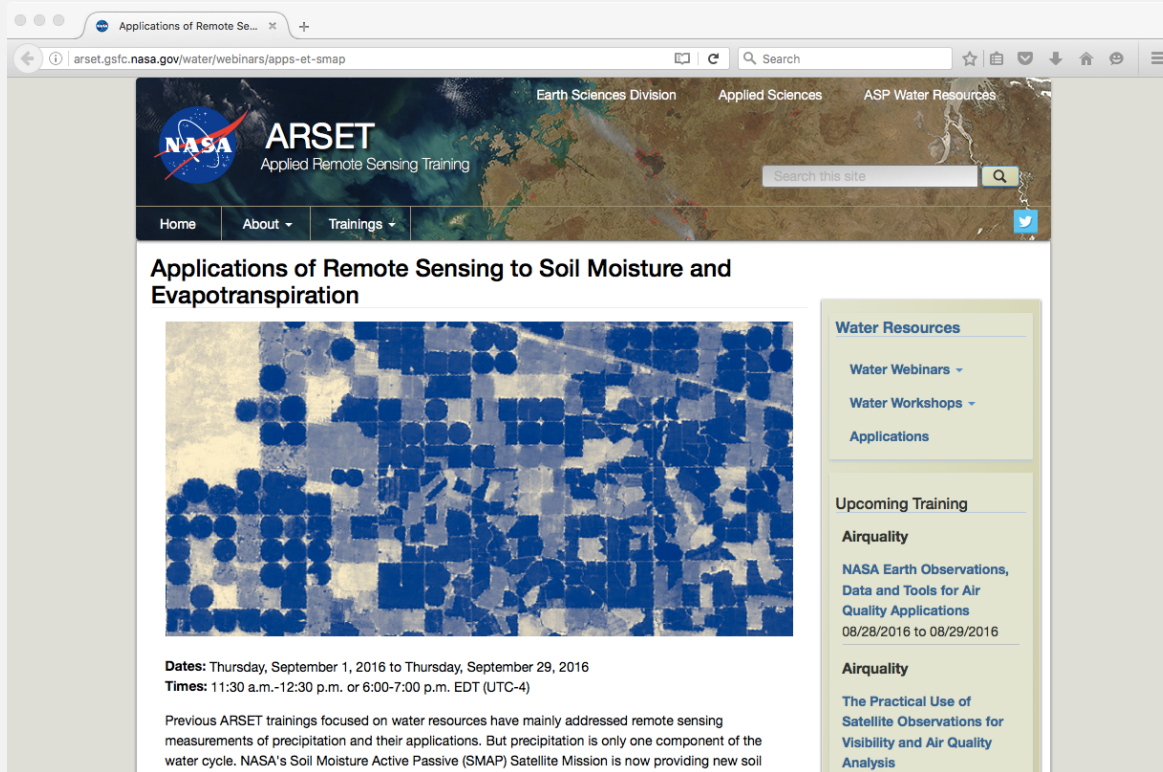
Amita Mehta

Tarea y certificados

- Tarea
 - Debe responder las preguntas de las tareas via Google Form
 - Se podrá encontrar en el <http://arset.gsfc.nasa.gov/water/webinars/apps-et-smap>
- Certificado de terminación
 - Asistir a las 5 sesiones del cursillo en línea
 - Completar las tareas asignadas antes de la fecha estipulada
 - Los certificados serán enviados por correo electrónico aproximadamente 2 meses después de la conclusión del cursillo por Marinés Martins (marines.martins@ssaihq.com)

Material del cursillo

<http://arset.gsfc.nasa.gov/water/webinars/apps-et-smap>



The screenshot shows the ARSET website homepage. At the top, there is a navigation bar with the NASA logo and the text "ARSET Applied Remote Sensing Training". Below this, there are links for "Home", "About", and "Trainings". The main heading is "Applications of Remote Sensing to Soil Moisture and Evapotranspiration". A large satellite image of a field is displayed. To the right, there is a sidebar with sections for "Water Resources" (including "Water Webinars", "Water Workshops", and "Applications"), "Upcoming Training" (with a link to "Airquality"), and "Airquality" (with a link to "The Practical Use of Satellite Observations for Visibility and Air Quality Analysis").

ARSET
Applied Remote Sensing Training

Earth Sciences Division | Applied Sciences | ASP Water Resources

Home | About | Trainings

Applications of Remote Sensing to Soil Moisture and Evapotranspiration

Water Resources

- Water Webinars
- Water Workshops
- Applications

Upcoming Training

Airquality

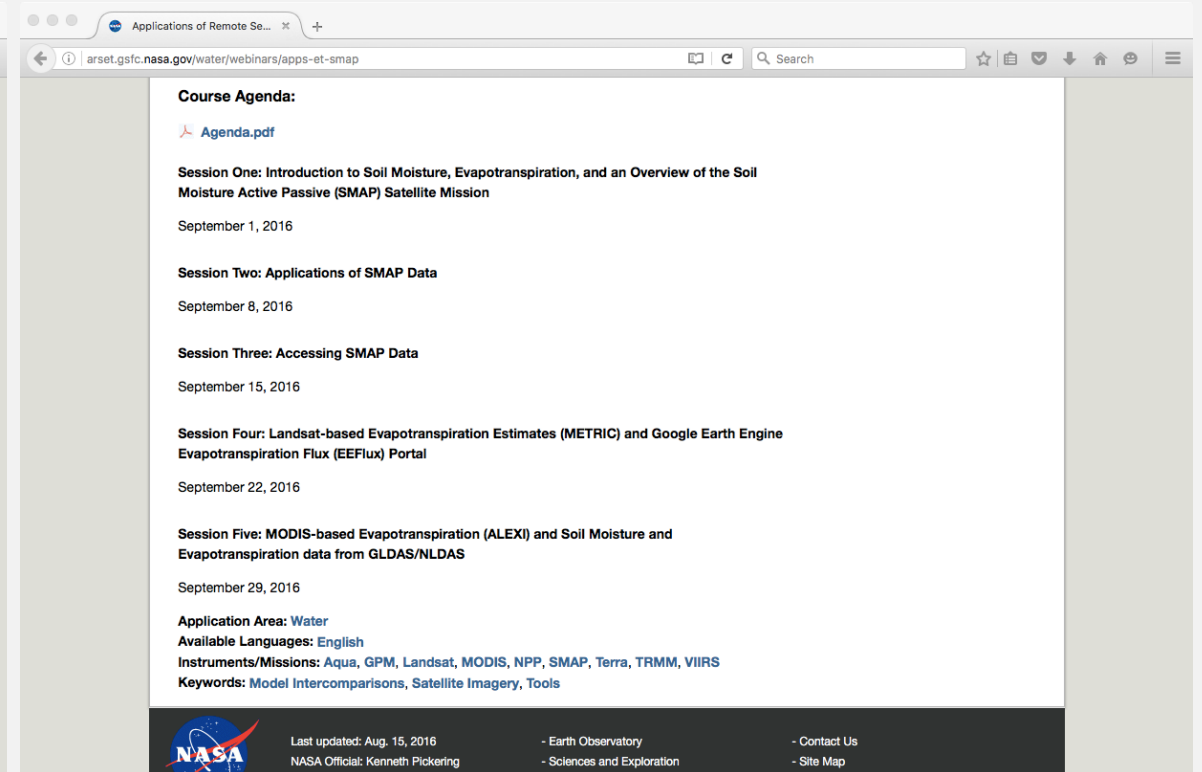
NASA Earth Observations, Data and Tools for Air Quality Applications
08/28/2016 to 08/29/2016

Airquality

The Practical Use of Satellite Observations for Visibility and Air Quality Analysis

Dates: Thursday, September 1, 2016 to Thursday, September 29, 2016
Times: 11:30 a.m.-12:30 p.m. or 6:00-7:00 p.m. EDT (UTC-4)

Previous ARSET trainings focused on water resources have mainly addressed remote sensing measurements of precipitation and their applications. But precipitation is only one component of the water cycle. NASA's Soil Moisture Active Passive (SMAP) Satellite Mission is now providing new soil



The screenshot shows the course agenda page. It features a "Course Agenda:" section with a link to "Agenda.pdf". The agenda lists five sessions with their respective dates: Session One (September 1, 2016), Session Two (September 8, 2016), Session Three (September 15, 2016), Session Four (September 22, 2016), and Session Five (September 29, 2016). Below the sessions, there is information about the application area (Water), available languages (English), and instruments/missions (Aqua, GPM, Landsat, MODIS, NPP, SMAP, Terra, TRMM, VIIRS). The page also includes a footer with the NASA logo, the last updated date (Aug. 15, 2016), the NASA official (Kenneth Pickering), and links to Earth Observatory, Sciences and Exploration, Contact Us, and Site Map.

Course Agenda:

[Agenda.pdf](#)

Session One: Introduction to Soil Moisture, Evapotranspiration, and an Overview of the Soil Moisture Active Passive (SMAP) Satellite Mission

September 1, 2016

Session Two: Applications of SMAP Data

September 8, 2016

Session Three: Accessing SMAP Data

September 15, 2016

Session Four: Landsat-based Evapotranspiration Estimates (METRIC) and Google Earth Engine Evapotranspiration Flux (EEFlux) Portal

September 22, 2016

Session Five: MODIS-based Evapotranspiration (ALEXI) and Soil Moisture and Evapotranspiration data from GLDAS/NLDAS

September 29, 2016

Application Area: [Water](#)

Available Languages: [English](#)

Instruments/Missions: [Aqua](#), [GPM](#), [Landsat](#), [MODIS](#), [NPP](#), [SMAP](#), [Terra](#), [TRMM](#), [VIIRS](#)

Keywords: [Model Intercomparisons](#), [Satellite Imagery](#), [Tools](#)

Footer:

Last updated: Aug. 15, 2016
NASA Official: Kenneth Pickering

- Earth Observatory
- Sciences and Exploration

- Contact Us
- Site Map

Agenda: Semana 5

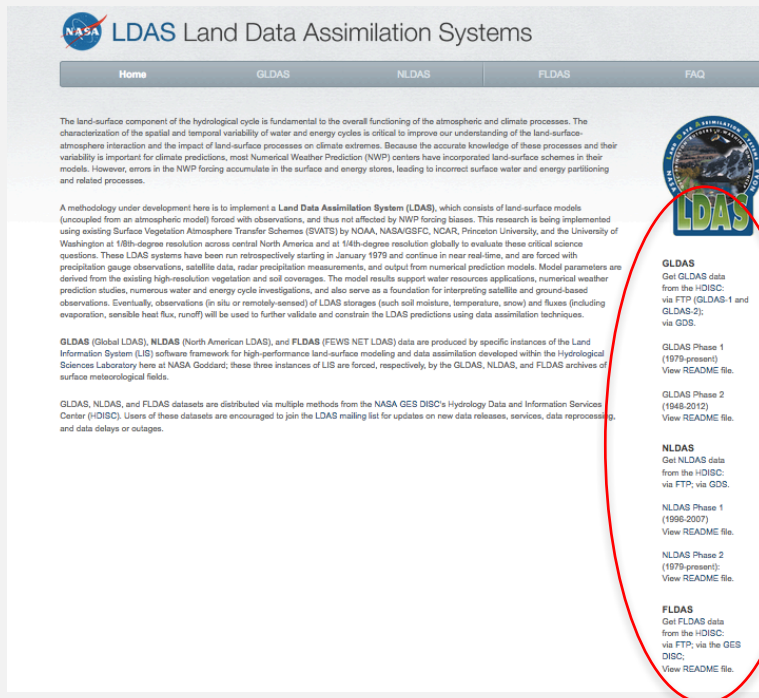
- ALEXI- ET y aplicaciones
- Datos de ET y humedad del suelo de los sistemas de asimilación de datos terrestres globales y de Norteamérica-- GLDAS (Global Land Data Assimilation System) y North American Land Data Assimilation System (NLDAS): Acceso a datos y análisis de QGIS

Datos de ET y humedad del suelo de
GLDAS (Global Land Data Assimilation
System) y North American Land Data
Assimilation System (NLDAS): Acceso a
datos y análisis de QGIS

ET y humedad del suelo de modelos de la superficie terrestre

Land Data Assimilation System* (LDAS): <http://ldas.gsfc.nasa.gov>

- Integra observaciones satelitales y a nivel del suelo dentro de modelos numéricos sofisticados con equilibrios hidrológico y energético



GLDAS

Get **GLDAS** data from the **HDISC**:
via **FTP (GLDAS-1 and GLDAS-2)**;
via **GDS**.

GLDAS Phase 1 (1979-present)
View **README file**.

GLDAS Phase 2 (1948-2012)
View **README file**.

NLDAS

Get **NLDAS** data from the **HDISC**:
via **FTP**; via **GDS**.

NLDAS Phase 1 (1996-2007)
View **README file**.

NLDAS Phase 2 (1979-present)
View **README file**.

FLDAS

Get **FLDAS** data from the **HDISC**:
via **FTP**; via the **GES DISC**;
View **README file**.

North American Land Data Assimilation System-2 (NLDAS-2)

<http://ldas.gsfc.nasa.gov/nldas>

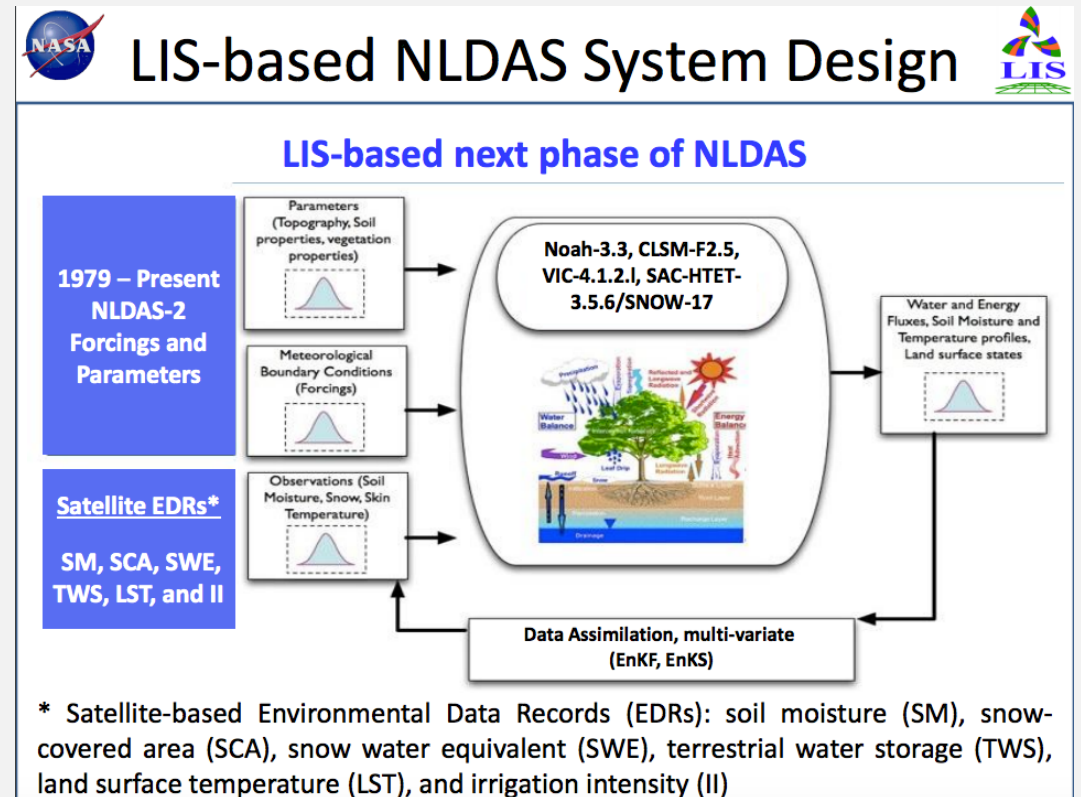
Cuatro versiones de modelos de superficie terrestre: NLDAS-2 Mosaic, Noah, SAC y VIC

Insumos:

- Precipitación: Pluviómetros NOAA-CPC
- Datos meteorológicos, datos de radiación superficial: Análisis regional de Norteamérica

Productos integrados incluyen:

- **Humedad del suelo**
- **Evapotranspiración**
- Escorrentía superficial/subterránea
- Equivalente en agua de la nieve



Courtesy of David Mocko, NASA GSFC

http://ldas.gsfc.nasa.gov/nldas/presentations/NLDAS-LIS-status-future_2015-03-11.pdf

Global Land Data Assimilation System (GLDAS)

<http://ldas.gsfc.nasa.gov/gldas/>

Cuatro versiones de modelos de superficie terrestre: Noah, CLM2, Mosaic, y VIC

Insumos:

- Lluvia: Datos a base de TRMM y multi-satelitales
- Datos meteorológicos: Reanálisis y datos globales basados en observaciones desde Princeton
- Manto de vegetación, manto tierra/agua, índice de área del follaje: MODIS (GLDAS-2)
- Nubes y nieve (para radiación superficial); satélites de NOAA y DMSP

Productos integrados incluyen

- **Humedad del suelo**
- **Evapotranspiración**
- Escorrentía superficial/subterránea
- Equivalente en agua de la nieve

Rodell, M., P. R. Houser, U. Jambor, J. Gottschalck, K. Mitchell, C.-J. Meng, K. Arsenault, B. Cosgrove, J. Radakovich, M. Bosilovich, J. K. Entin, J. P. Walker, D. Lohmann, and D. Toll, 2004. The Global Land Data Assimilation System. *Bulletin of the American Meteorological Society*, 85(3):381–394.

LDAS- Acceso a datos de la humedad del suelo y ET

Modelo	Resoluciones espacial/temporal	Fuente de datos
GLDAS (NOAH)	<ul style="list-style-type: none"> • $\frac{1}{4}^{\text{to}}$ – 1 grado (global) • 3 horas, mensual • 1948 – 2010 	<p>Giovanni: http://giovanni.gsfc.nasa.gov/giovanni</p> <p>Mirador: http://mirador.gsfc.nasa.gov/</p>
NOAH (v 2.1)	<ul style="list-style-type: none"> • 2000 – presente 	
VIC	<ul style="list-style-type: none"> • 1979 – presente 	
NLDAS (NOAH, VIC)	<ul style="list-style-type: none"> • $\frac{1}{8}^{\text{vo}}$ – 1 grado (global) • 1 hora, mensual • 1979 – presente 	

Original data files are in GRIB format

Acceso a datos de la humedad del suelo y evapotranspiración

- Demostración
- Ejemplos: Acceso y descarga:
 - 1) Datos de GLDAS VIC usando Mirador
 - 2) Datos de NLDAS VIC usando Giovanni e importación al QGIS

Búsqueda, selección y descarga de datos de Mirador

<http://mirador.gsfc.nasa.gov/>

The screenshot shows the Mirador data search interface. At the top, there are tabs for 'Keyword', 'Projects', and 'Science Areas'. Below these are search filters: 'Keyword: GLDAS', 'Time Span: 2016-07-01 To: 2016-07-31', and 'Location: (-28.65,-62.57),(3.12,-33.74)'. A 'Search GES-DISC' button is visible. A world map shows South America highlighted with a black box, and a red arrow points from a text box to this box. An 'Advanced Search' button is at the bottom right.

Búsqueda por palabra clave


Selección temporal

Selección espacial por latitud-longitud

Búsqueda

Selección espacial desde el mapa

Búsqueda, selección y descarga de datos de Mirador

GLDAS Noah Land Surface Model L4 monthly 0.25 x 0.25 degree V2.0 (GLDAS_NOAH025_M) 


[View Files](#) | [Info](#) | [Data Calendar](#)

Approx. **2** files found (Avg Size: **19.38 MB**)

Parameters: SURFACE PRESSURE, HEAT FLUX, LONGWAVE RADIATION, SHORTWAVE RADIATION, SURFACE TEMPERATURE, EVAPOTRANSPIRATION, RUNOFF...

Spatial Resolution: 0.25 degree x 0.25 degree

Temporal Resolution: 1 month

GLDAS VIC Land Surface Model L4 3 Hourly 1.0 x 1.0 degree V001 (GLDAS_VIC10_3H) 


[View Files](#) | [Info](#) | [Data Calendar](#)

Approx. **248** files found (Avg Size: **0.56 MB**)

Parameters: EVAPOTRANSPIRATION, HUMIDITY, SURFACE WINDS, SNOW WATER EQUIVALENT, RUNOFF, SOIL MOISTURE/WATER CONTENT, SNOW...

Spatial Resolution: 1 degree x 1 degree

Temporal Resolution: 3 hours

GLDAS VIC Land Surface Model L4 Monthly 1.0 x 1.0 degree V001 (GLDAS_VIC10_M) 

[View Files](#) | [Info](#) | [Data Calendar](#)

Approx. **2** files found (Avg Size: **0.51 MB**)

Parameters: EVAPOTRANSPIRATION, HUMIDITY, SURFACE WINDS, SNOW WATER EQUIVALENT, RUNOFF, SOIL MOISTURE/WATER CONTENT, RAIN...

Spatial Resolution: 1 degree x 1 degree

Temporal Resolution: 1 month

Elija

Búsqueda, selección y descarga de datos de Mirador

Results 1 - 1 for **GLDAS** (1 second)

GLDAS VIC Land Surface Model L4 Monthly 1.0 x 1.0 degree V001 [Info](#)

The following services are available for the data set(s). Whenever you add files to the shopping cart, you will be presented with options for selecting any of these services if they are cart-enabled.

[Subset Spatially and/or by Parameter](#) [Convert to NetCDF](#)

<input checked="" type="checkbox"/> Select All in Page <input type="checkbox"/> File Names/Descriptive File Names	Start Time
<input checked="" type="checkbox"/> GLDAS VIC10 M.A201607.001.grb (0.55 MB) One Click Download: NetCDF	2016-07-01 00:00:00 Metadata

[Add Selected Files To Cart](#) [Add All Files in All Pages To Cart](#)

NASA Search Results
Page: 1

Datos de GLDAS para julio 2016

Guardar datos en formato NetCDF

Pulse en el nombre del archivo para descargar o seleccióne 'Add to Cart' para descargar múltiples archivos

Búsqueda, selección y descarga de datos de Mirador

Keyword Projects Science Areas

Service Selection

Total Number of Files being added to the Cart is 15

Cancel

Continue to Cart

Instructions for Service Selection

- Data set files added to the cart have their corresponding services, and only one service can be selected per data set.
- To enable a service, select the radio button for any of the available services.
- Selecting a service that has subsetting will take you to a Service Options page and then back to this page.
- To change options for a service you have already selected, click on the "Edit" button.
- After choosing your services, click "Continue to Cart" to proceed, or click "Cancel" to return to your search results.

Data Set(s) Being Added to Shopping Cart

GLDAS VIC Land Surface Model L4 Monthly 1.0 x 1.0 degree V001 (GLDAS_VIC10_M.001)

Select Service Option: None Convert to NetCDF Subset Spatially and/or by Parameter...

Spatial Subsetting has been pre-selected because you chose the bounding box: (-28.65,-62.57),(3.12,-33.74)

Búsqueda, selección y descarga de datos de Mirador

[Basic Download](#) [More Download Options](#)

Your cart will automatically be emptied when you select any download option unless you choose to keep the items.
 Keep items in the cart after selecting a download option

Download Data (with wget, curl, etc.)
[URL List \(Data\)](#) [URL List \(Metadata\)](#) [URL List \(Data and Metadata\)](#)

Instructions:

wget:

1. Save the list of URLs in one of the above links to your local workstation as myfile.dat
2. [Create a ~/.netrc file pointing to urs.earthdata.nasa.gov and an empty ~/.urs_cookies file](#)
3. On your command line, using wget 1.14 (or higher):

```
wget --content-disposition --load-cookies ~/.urs_cookies --save-cookies ~/.urs_cookies --auth-no-challenge=on --keep-session-cookies -i myfile.dat
```

a UNIX curl example:

1. Save the list of URLs in one of the above links to your local workstation as myfile.dat
2. re-arrange the urls and provide output filenames as described in the curl config file format described below:

```
url = http://host.example.gov/dir/filename.hdf
output = filename.hdf
url = http://host.example.gov/dir/filename2.hdf
output = filename2.hdf
...
```
3. [Create a ~/.netrc file pointing to urs.earthdata.nasa.gov and an empty ~/.urs_cookies file](#)
4. On your command line:

```
curl -b ~/.urs_cookies -c ~/.urs_cookies -K ./myfile.dat
```

Note about pre-authentication downloads
Users who already tried to use wget to download data before authorizing NASA GESDISC Data Access will need to re-create their .urs_cookies file.

[More Options...](#)

Descargue archivo(s)
usando wget o curl

Búsqueda, selección y descarga de datos de Giovanni

<http://giovanni.gsfc.nasa.gov/giovanni/>

The screenshot shows the Giovanni web interface with several callout boxes highlighting key features:

- Opciones de análisis/representación gráfica:** A box pointing to the 'Select Plot' section, which includes options for 'Maps: Time Averaged Map', 'Comparisons', 'Time Series', 'Vertical', and 'Miscellaneous'.
- Búsqueda temporal y espacial:** A box pointing to the 'Select Date Range (UTC)' and 'Select Region (Bounding Box or Shapefile)' sections, which allow for temporal and spatial filtering.
- Búsqueda de datos por palabra clave:** A box pointing to the 'Select Variables' section, specifically the 'Keyword' search field.
- Representar datos en un gráfico:** A box pointing to the 'Plot Data' button at the bottom right of the interface.

The interface also displays a list of disciplines and measurements on the left side, and a status bar at the bottom with 'Help', 'Reset', 'Feedback', and 'Plot Data' buttons.

Búsqueda, selección y descarga de datos de Giovanni

Select Plot

Maps: Time Averaged Map
 Comparisons: Select...
 Time Series: Select...
 Vertical: Select...
 Miscellaneous: Select...

Select Date Range (UTC)

YYYY-MM HH:mm to 2016 -07 -01 00:00 to 2016 -07 -31 23:59

Select Region (Bounding Box or Shapefile)

Format: West, South, East, North

-125, 25, -67, 53

Show Map Show Shapes

Valid Range: 1979-01-02 to 2016-08-31

Number of matching Variables: 33 of 1315 Total Variable(s) included in Plot: 2

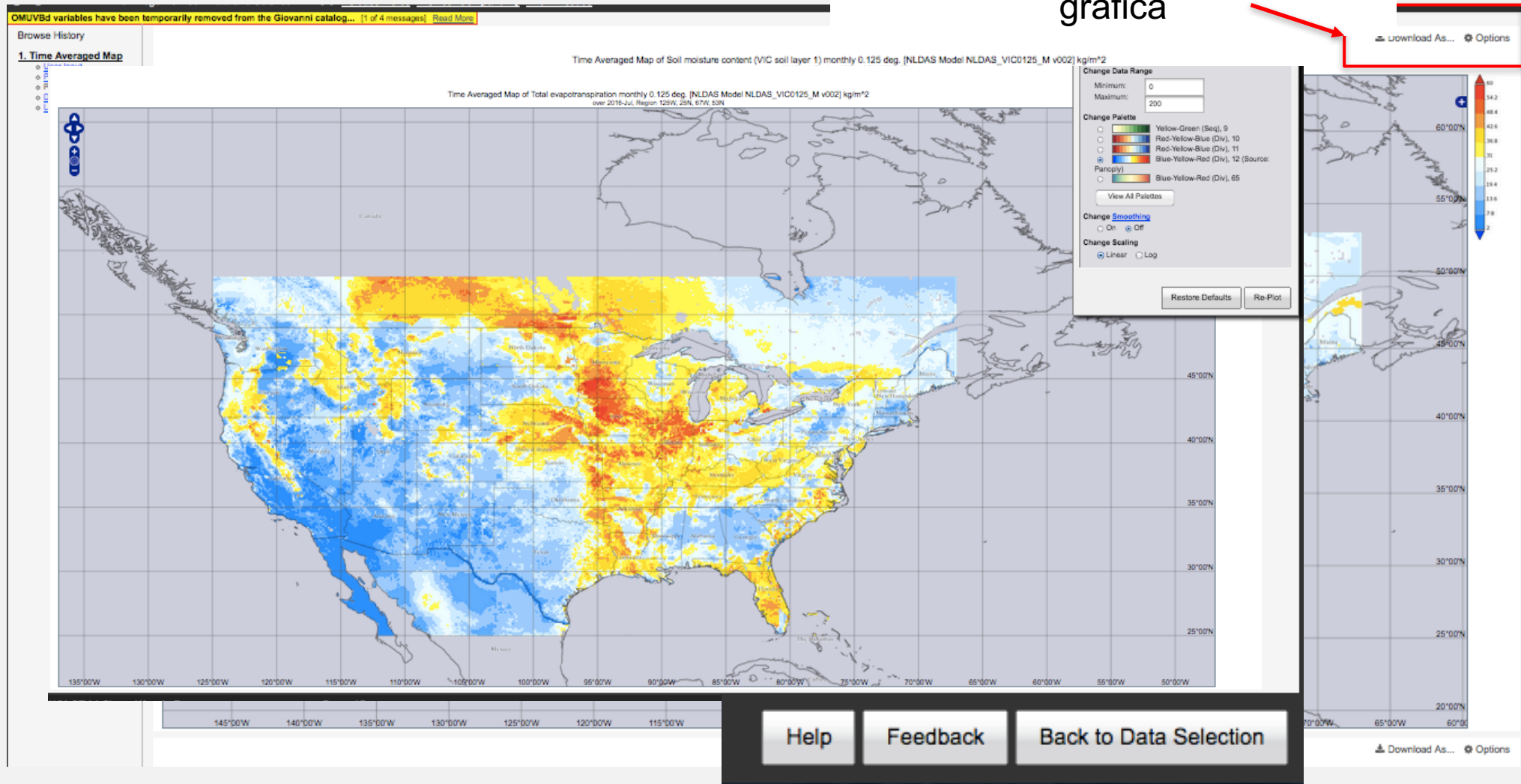
Keyword: NLDAS VIC Search Clear

Variable	Source	Temp.Res.	Spat.Res.	Begin Date	End Date	Units
<input type="checkbox"/> Latent heat flux (NLDAS_VIC0125_M.v002)	NLDAS Model	Monthly	0.125 °	1979-01-02	2016-08-31	W/m^2
<input type="checkbox"/> Canopy water evaporation (NLDAS_VIC0125_M.v002)	NLDAS Model	Monthly	0.125 °	1979-01-02	2016-08-31	W/m^2
<input type="checkbox"/> Ground heat flux (NLDAS_VIC0125_M.v002)	NLDAS Model	Monthly	0.125 °	1979-01-02	2016-08-31	W/m^2
<input type="checkbox"/> Moisture availability (total column) (NLDAS_VIC0125_M.v002)	NLDAS Model	Monthly	0.125 °	1979-01-02	2016-08-31	%
<input type="checkbox"/> Rainfall (unfrozen precipitation) (NLDAS_VIC0125_M.v002)	NLDAS Model	Monthly	0.125 °	1979-01-02	2016-08-31	kg/m^2
<input checked="" type="checkbox"/> Root zone soil moisture content (NLDAS_VIC0125_M.v002)	NLDAS Model	Monthly	0.125 °	1979-01-02	2016-08-31	kg/m^2
<input type="checkbox"/> Sensible heat flux (NLDAS_VIC0125_M.v002)	NLDAS Model	Monthly	0.125 °	1979-01-02	2016-08-31	W/m^2
<input type="checkbox"/> Snowfall (frozen precipitation) (NLDAS_VIC0125_M.v002)	NLDAS Model	Monthly	0.125 °	1979-01-02	2016-08-31	kg/m^2
<input type="checkbox"/> Snow water-equivalent (accumulated) (NLDAS_VIC0125_M.v002)	NLDAS Model	Monthly	0.125 °	1979-01-02	2016-08-31	kg/m^2
<input type="checkbox"/> Sublimation (evaporation from snow) (NLDAS_VIC0125_M.v002)	NLDAS Model	Monthly	0.125 °	1979-01-02	2016-08-31	W/m^2
<input type="checkbox"/> Subsurface runoff (baseflow) (NLDAS_VIC0125_M.v002)	NLDAS Model	Monthly	0.125 °	1979-01-02	2016-08-31	kg/m^2
<input type="checkbox"/> Surface radiative temperature (NLDAS_VIC0125_M.v002)	NLDAS Model	Monthly	0.125 °	1979-01-02	2016-08-31	K
<input type="checkbox"/> Surface runoff (non-infiltrating) (NLDAS_VIC0125_M.v002)	NLDAS Model	Monthly	0.125 °	1979-01-02	2016-08-31	kg/m^2
<input type="checkbox"/> Temperature (average surface skin) (NLDAS_VIC0125_M.v002)	NLDAS Model	Monthly	0.125 °	1979-01-02	2016-08-31	K
<input checked="" type="checkbox"/> Total evapotranspiration (NLDAS_VIC0125_M.v002)	NLDAS Model	Monthly	0.125 °	1979-01-02	2016-08-31	kg/m^2
<input type="checkbox"/> Transpiration (NLDAS_VIC0125_M.v002)	NLDAS Model	Monthly	0.125 °	1979-01-02	2016-08-31	W/m^2
<input type="checkbox"/> Latent heat flux (NLDAS_VIC0125_H.v002)	NLDAS Model	Hourly	0.125 °	1979-01-02	2016-09-17	W/m^2
<input checked="" type="checkbox"/> Soil moisture content (VIC soil layer 1) (NLDAS_VIC0125_M.v002)	NLDAS Model	Monthly	0.125 °	1979-01-02	2016-08-31	kg/m^2
<input type="checkbox"/> Soil moisture content (VIC soil layer 2) (NLDAS_VIC0125_M.v002)	NLDAS Model	Monthly	0.125 °	1979-01-02	2016-08-31	kg/m^2

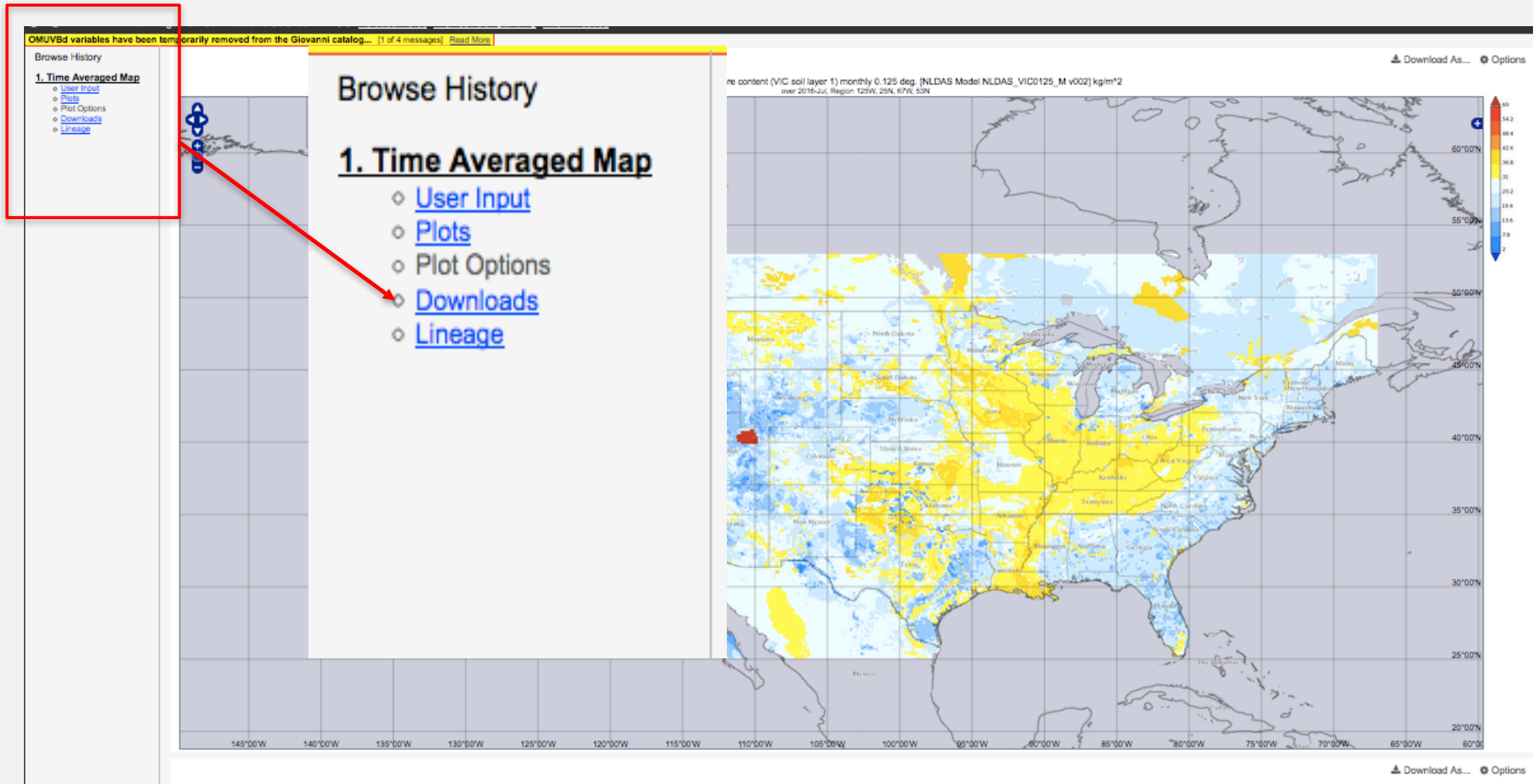
Seleccione humedad del suelo (Soil Moisture) y ET para julio 2016

Representación gráfica de datos en Giovanni

Modificación de representación gráfica



Representación gráfica de datos en Giovanni



Descarga de datos usando Giovanni

Browse History

1. Time Averaged Map

- [User Input](#)
- [Plots](#)
- [Plot Options](#)
- **[Downloads](#)**
- [Lineage](#)

Click on file links to download. Files contain data portrayed in the plot images.

NetCDF:

[g4.timeAvgMap.NLDAS VIC0125 M 002 soilmlyr1.20160701-20160731.125W 25N 67W 53N.nc](#)

[g4.timeAvgMap.NLDAS VIC0125 M 002 evpsfc.20160701-20160731.125W 25N 67W 53N.nc](#)

PNG:

[g4.timeAvgMap.NLDAS VIC0125 M 002 soilmlyr1.20160701-20160731.125W 25N 67W 53N.png](#)

[g4.timeAvgMap.NLDAS VIC0125 M 002 evpsfc.20160701-20160731.125W 25N 67W 53N.png](#)

GEOTIFF:

[g4.timeAvgMap.NLDAS VIC0125 M 002 soilmlyr1.20160701-20160731.125W 25N 67W 53N.geotif](#)

[g4.timeAvgMap.NLDAS VIC0125 M 002 evpsfc.20160701-20160731.125W 25N 67W 53N.geotif](#)

KMZ:

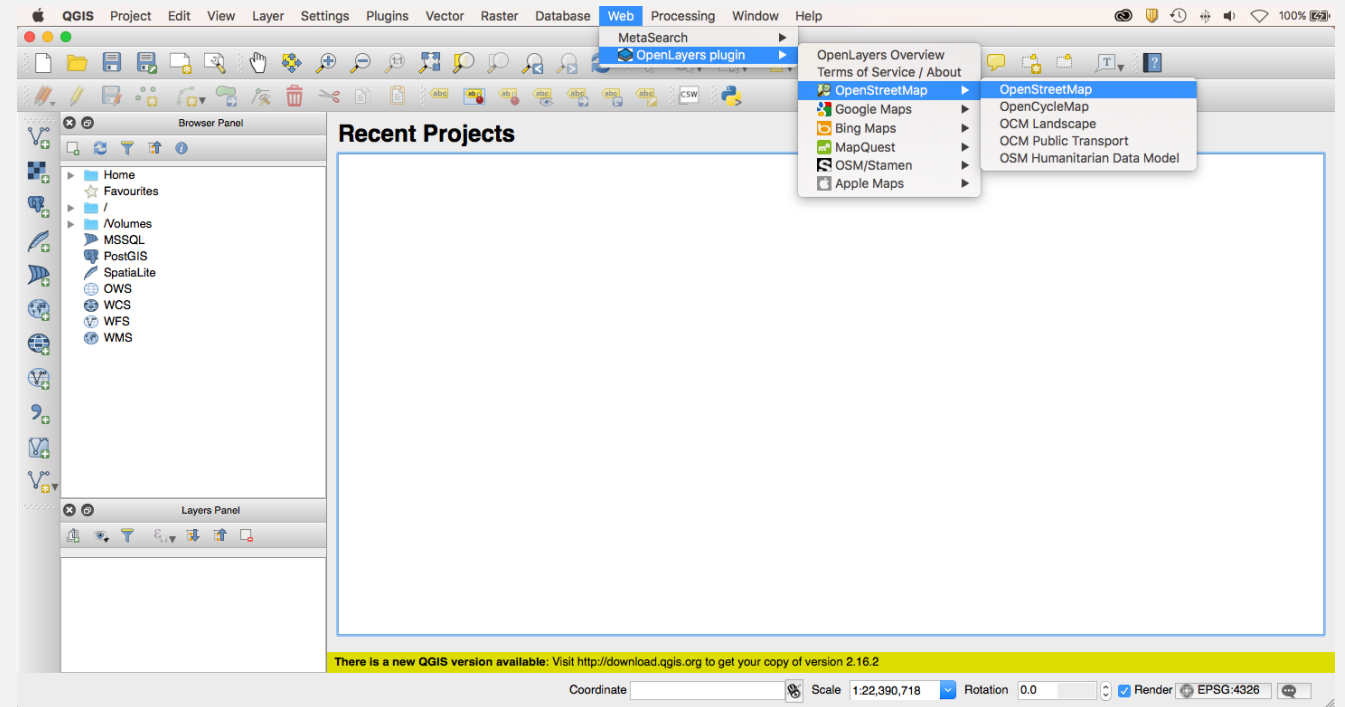
[g4.timeAvgMap.NLDAS VIC0125 M 002 soilmlyr1.20160701-20160731.125W 25N 67W 53N.kmz](#)

[g4.timeAvgMap.NLDAS VIC0125 M 002 evpsfc.20160701-20160731.125W 25N 67W 53N.kmz](#)

Archivos NetCDF, Geotiff, kmz y png

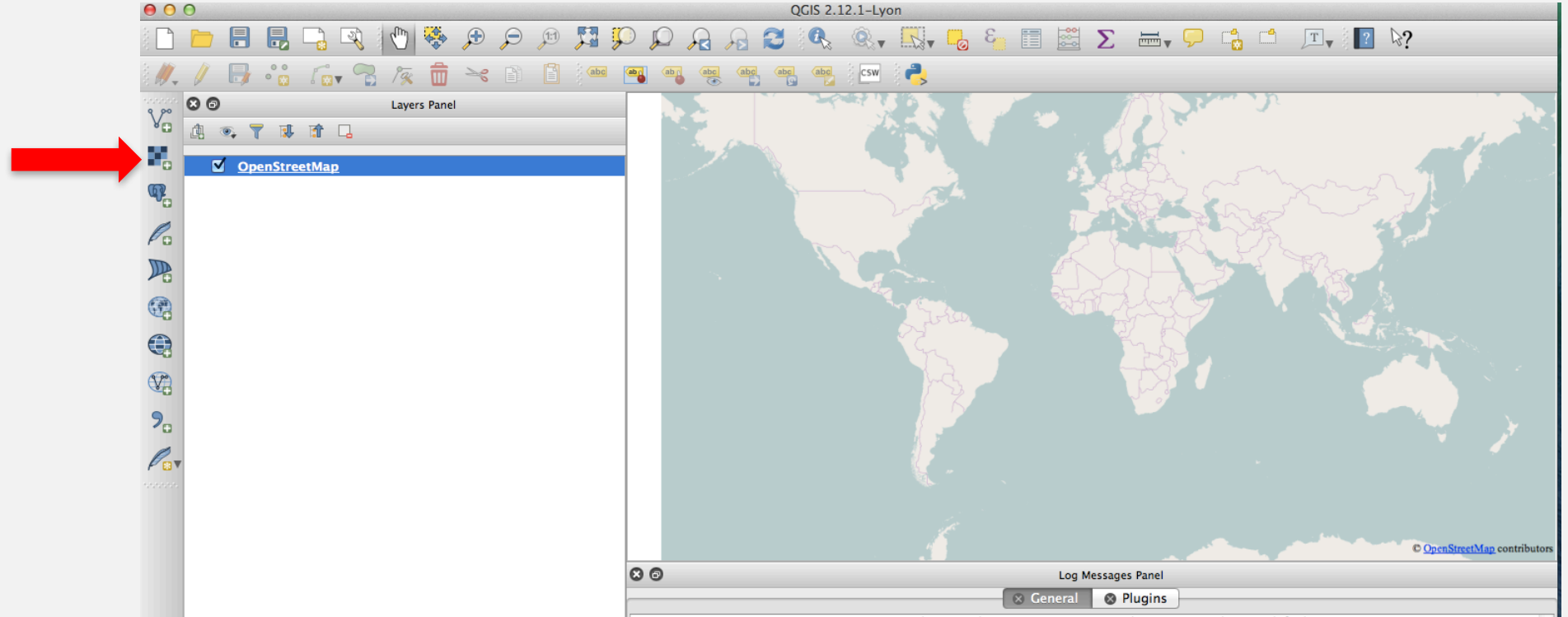
Para importar archivos NetCDF de ET y humedad del suelo del NLDAS al QGIS

- Instale QGIS:
 - http://bit.ly/ARSET_QGIS_Download_and_Install
- Abra QGIS y OpenStreetMap
 - En la barra superior, pulse en 'Web'
 - Seleccione 'OpenLayers Plugin'
 - Seleccione un mapa de fondo (nuestro ejercicio usa 'OpenStreetMap')



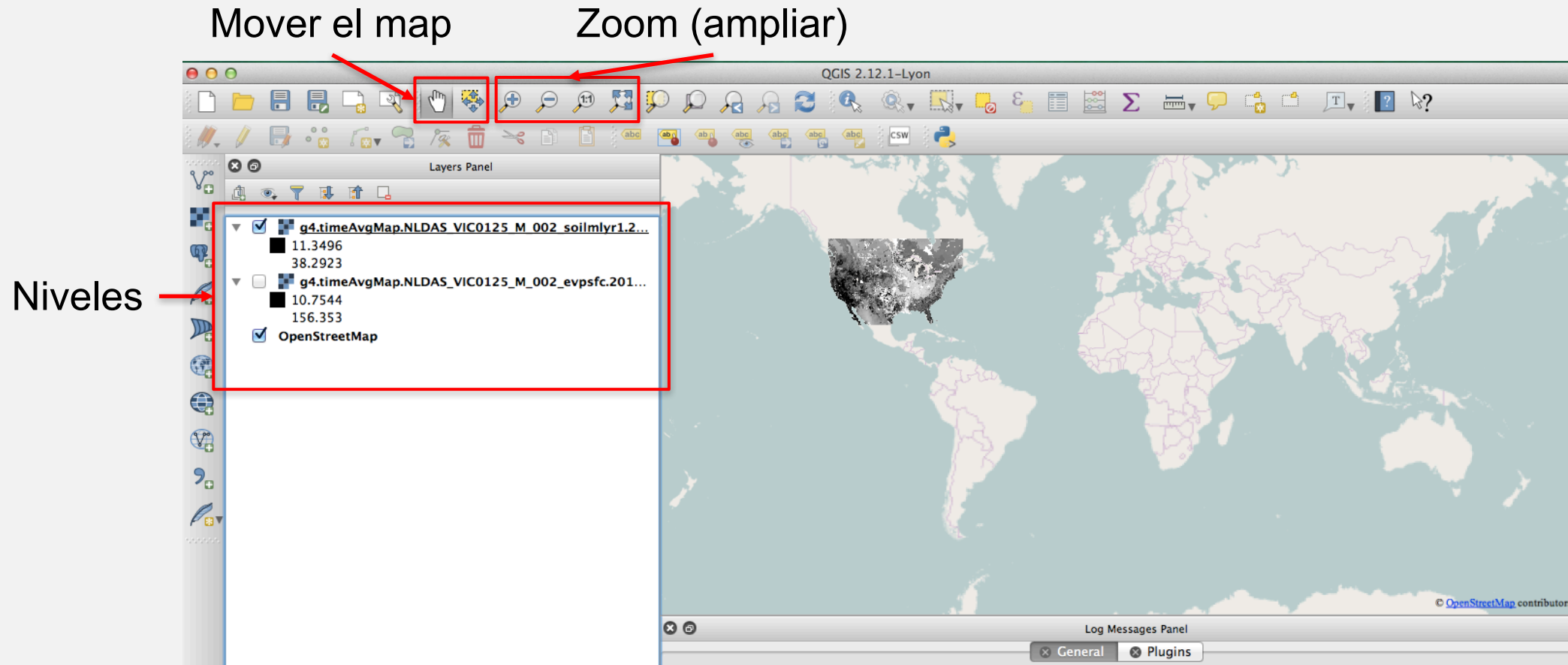
Para importar archivos NetCDF de ET y humedad del suelo del NLDAS al QGIS

- Seleccione 'Add Raster'
- Cargue los archivos NetCDF de ET y humedad del suelo del NLDAS uno por uno



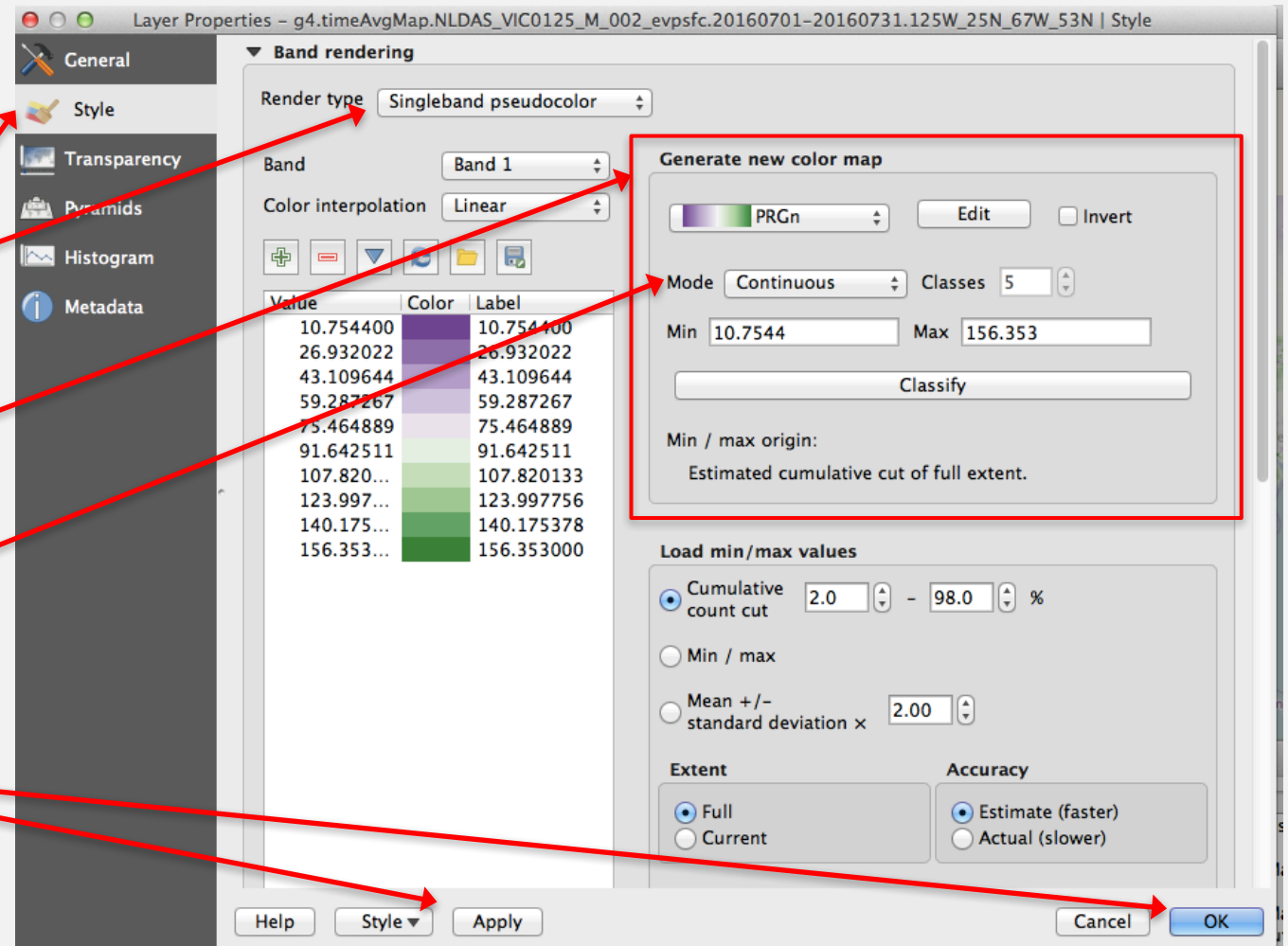
Para importar archivos NetCDF de ET y humedad del suelo del NLDAS al QGIS

- Aparecerá una imagen en blanco y negro de los datos




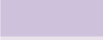








Para cambiar propiedades de niveles de datos

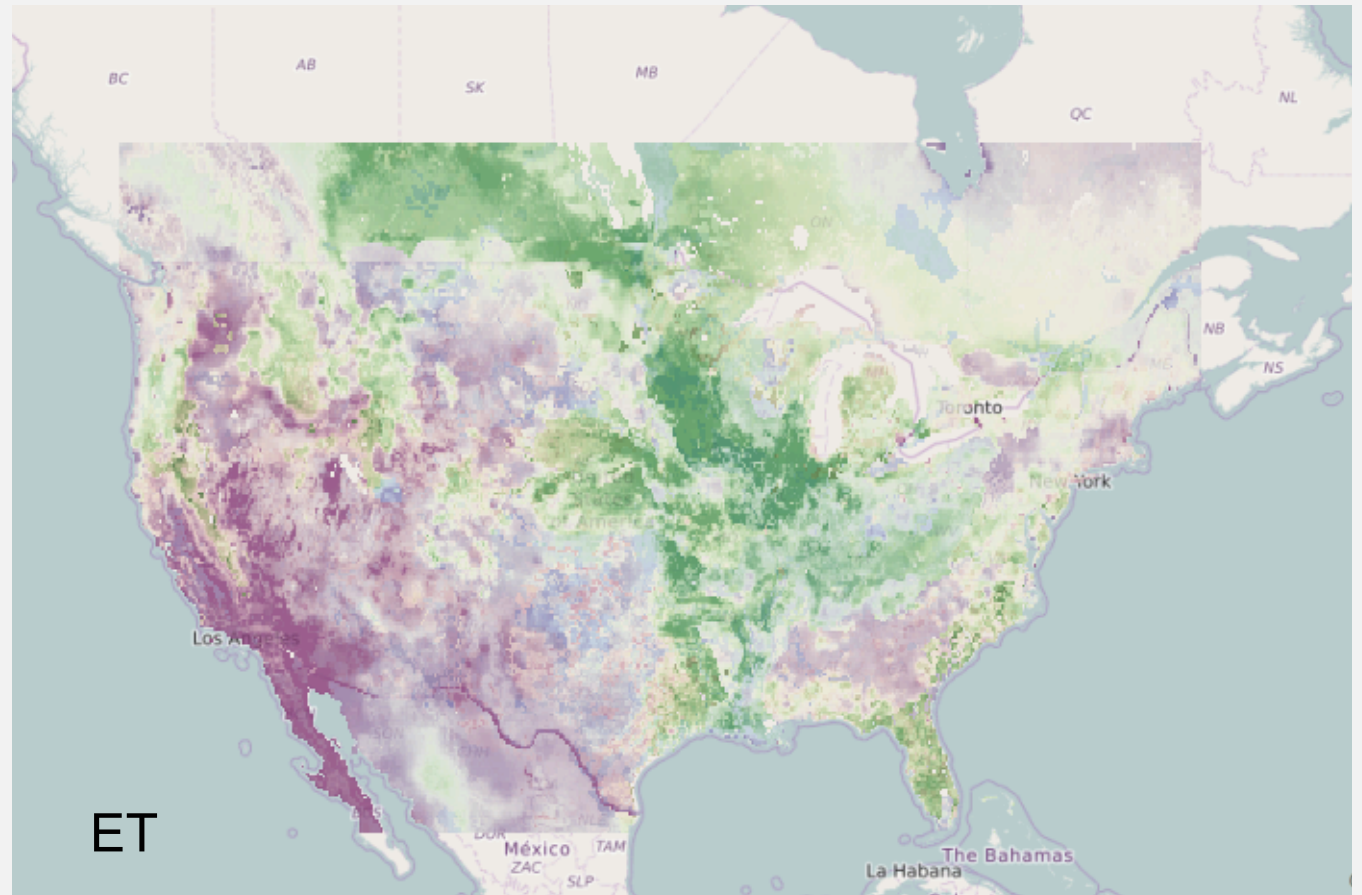
- Pulse en 'layer' en la barra superior y seleccione 'properties' para editar la visualización y el análisis del mapa
- Seleccione 'Style' in 'Render Type' y seleccione 'Singleband pseudocolor'
- Elija la tabla de colores de 'Generate new color map'
- Seleccione 'mode' como 'continuous' o 'Equal Interval'
- Pulse en 'Apply' y 'OK'



Para cambiar propiedades de niveles de datos

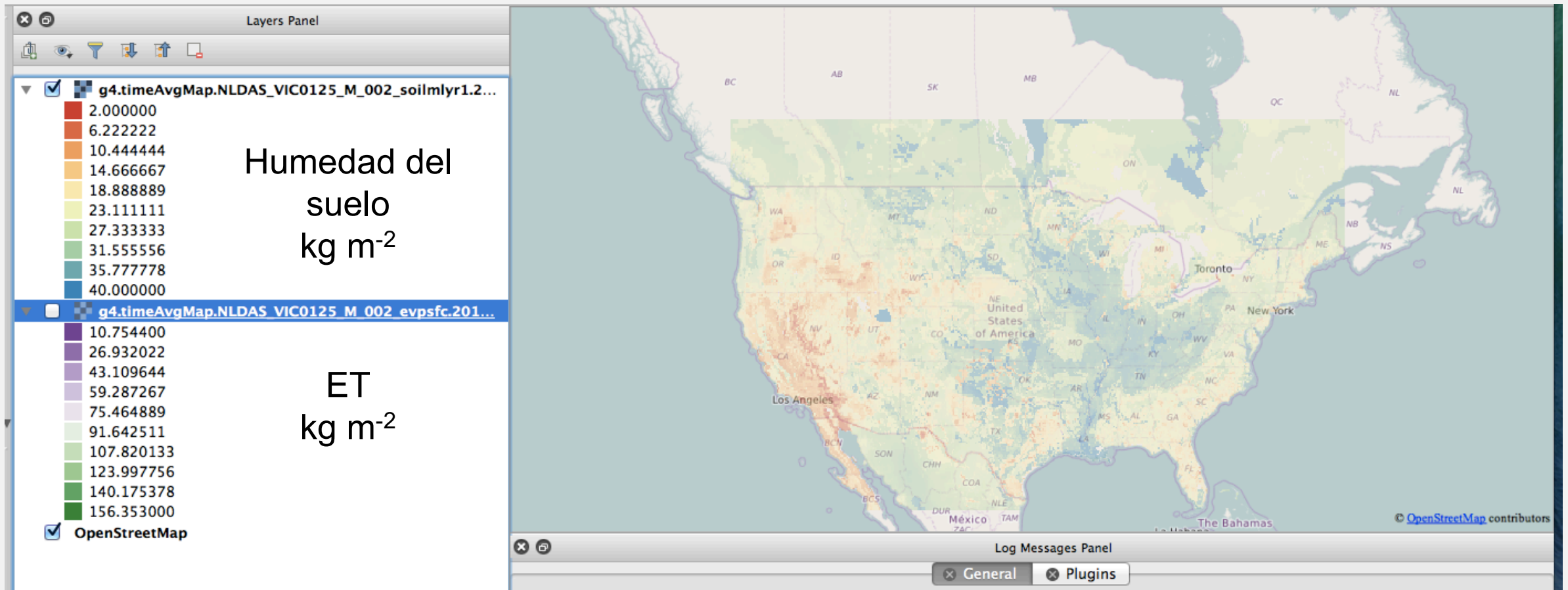
Value	Color	Label
10.754400		10.754400
26.932022		26.932022
43.109644		43.109644
59.287267		59.287267
75.464889		75.464889
91.642511		91.642511
107.820...		107.820133
123.997...		123.997756
140.175...		140.175378
156.353...		156.353000

- De 'Layer' en la barra superior, seleccione 'properties'
- Del menú a mano izquierda, seleccione 'Transparency'
- Elija el valor de porcentaje adecuado para poder ver el OpenStreetMap bajo el nivel de ET



Niveles de ET y humedad del suelo

- Repita los pasos de los 'properties' para el 'Layer' (nivel) de 'soil moisture' (humedad del suelo)



Resumen del cursillo

Este cursillo brindó información acerca de:

- La misión “Humedad del suelo activo/pasivo” (Soil Moisture Active Passive o SMAP) de la NASA, datos de la humedad del suelo de SMAP y sus aplicaciones en los campos de la agricultura, el monitoreo de inundaciones y sequías, pronósticos meteorológicos/climáticos y la salud humana
- El acceso a los datos de SMAP del centro nacional de datos de nieve y de hielo (National Snow & Ice Data Center o NSIDC) de la NASA: <http://nsidc.org>
- Estimaciones de la evapotranspiración basadas en Landsat (METRIC) y el acceso a ellas desde from EEFLUX: <http://eeflux-level1.appspot.com>
- Estimaciones de la evapotranspiración de MODIS/GOES (ALEXI) y el acceso a ellas desde la NOAA: <http://www.ospo.noaa.gov/Products/land/getd>
- Estimaciones de evapotranspiración basadas en modelos de asimilación de datos terrestres (Land Data Assimilation Models) y el acceso a ellas desde:
 - Mirador: <http://mirador.gsfc.nasa.gov>
 - Giovanni: <http://giovanni.gsfc.nasa.gov/giovanni>

Gracias

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