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D4: GLOBE Website Data Access and Visualization

Cornell Lewis, Raytheon Corp.
GLOBE Website Project Manager

Dr. Dixon Butler, NASA/ADNET Systems, Inc.
Consultant

8/15/13

THE GLOBE PROGRAM

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Overview

- **Introductions**
  - **Who We Are:**

    Cornell Lewis
    - Project lead for website development and operations

    Dixon Butler
    - Science Advisor to NASA on the GLOBE Program
    - Former Director of the GLOBE Program
  - **Who you are: Job Title, Web Use**

- **Goals of the Session**
  - **Demonstrate how to find, visualize and output data**
  - **Provide hands-on training**
  - **To understand what your role and job functions are to better meet your needs**
  - **Listen to your concerns and feedback on how to improve the viz system**

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Agenda

- Introduction of the Visualization System
- Where is the Visualization System?
- Interface Overview
- Overview of Key Functionality
  - Map Types
  - Layers
  - Filtering
  - Data Tables
  - Plotting/Graphs
  - Exporting
- Your Assignment
- Questions and Answers

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Introduction to the Visualization System

- **Ways to look at data:**
  - **Measurement maps: *How do values vary from place to place?***
  - **Graphs: *How do values vary over time?***
  - **Site tables: *What are specific values for further analysis?***
  - **Layer tables: Sort by latitude, longitude, elevation, or value**
- **Ways to look for data:**
  - **Data count maps:**
    - > ***Where are there data?***
    - > ***Which sites have many measurements?***
    - > **Filter by time period or ele*vation***
  - **Layer tables: Sort by latitude, longitude, elevation, or amount**
  - **School information: *What sites? How many data of each type?***
- ***Where is a site, school, or teacher?***

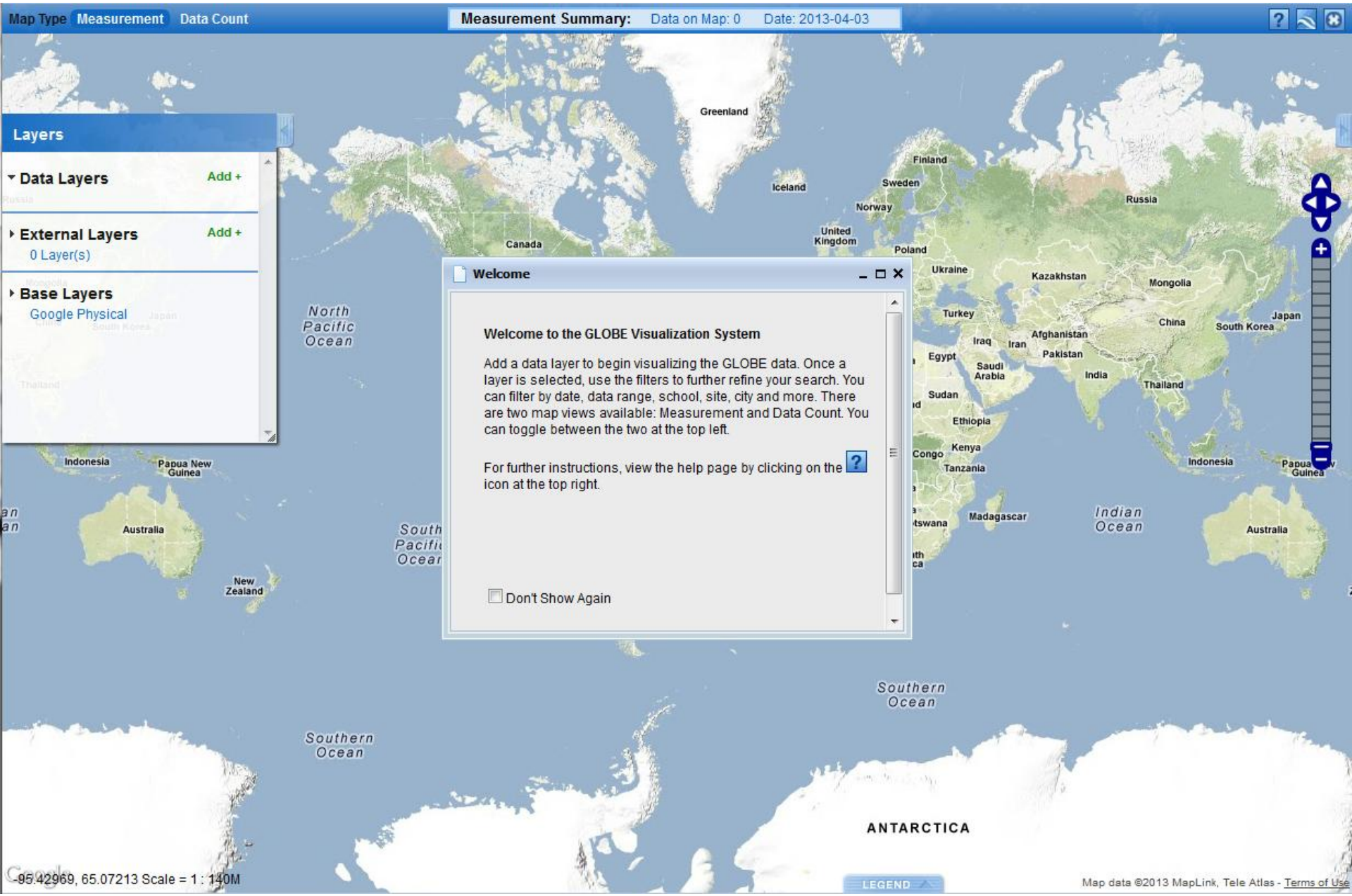
THE GLOBE PROGRAM

Using the GLOBE Visualization System

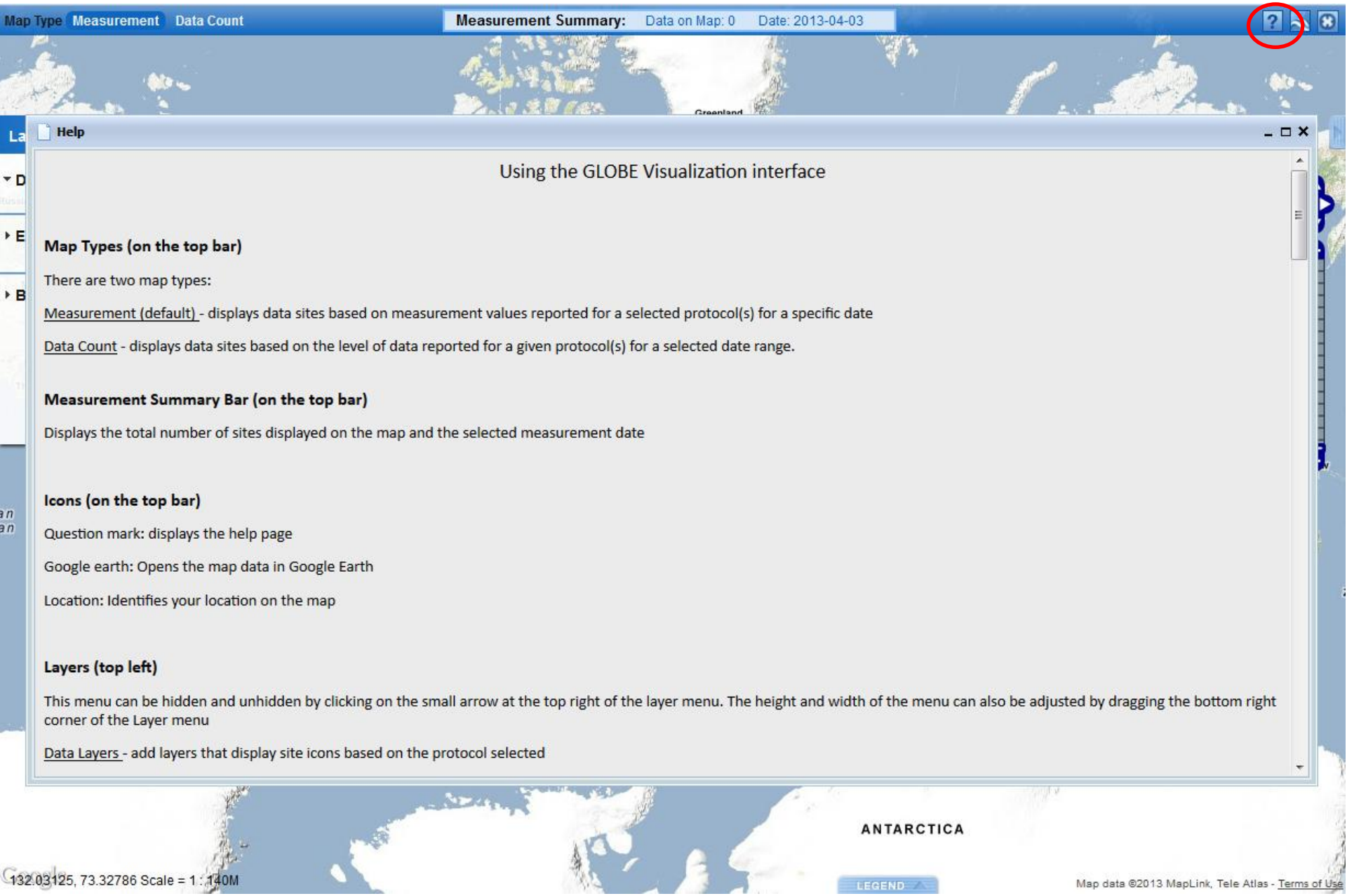
Hold the mouse over the Explore Science menu, then click on Finding GLOBE Data.

Click on Visualize GLOBE Data or click on the map under GLOBE Data

This is the GLOBE Visualization Landing Page. Read the Welcome box and then close it.



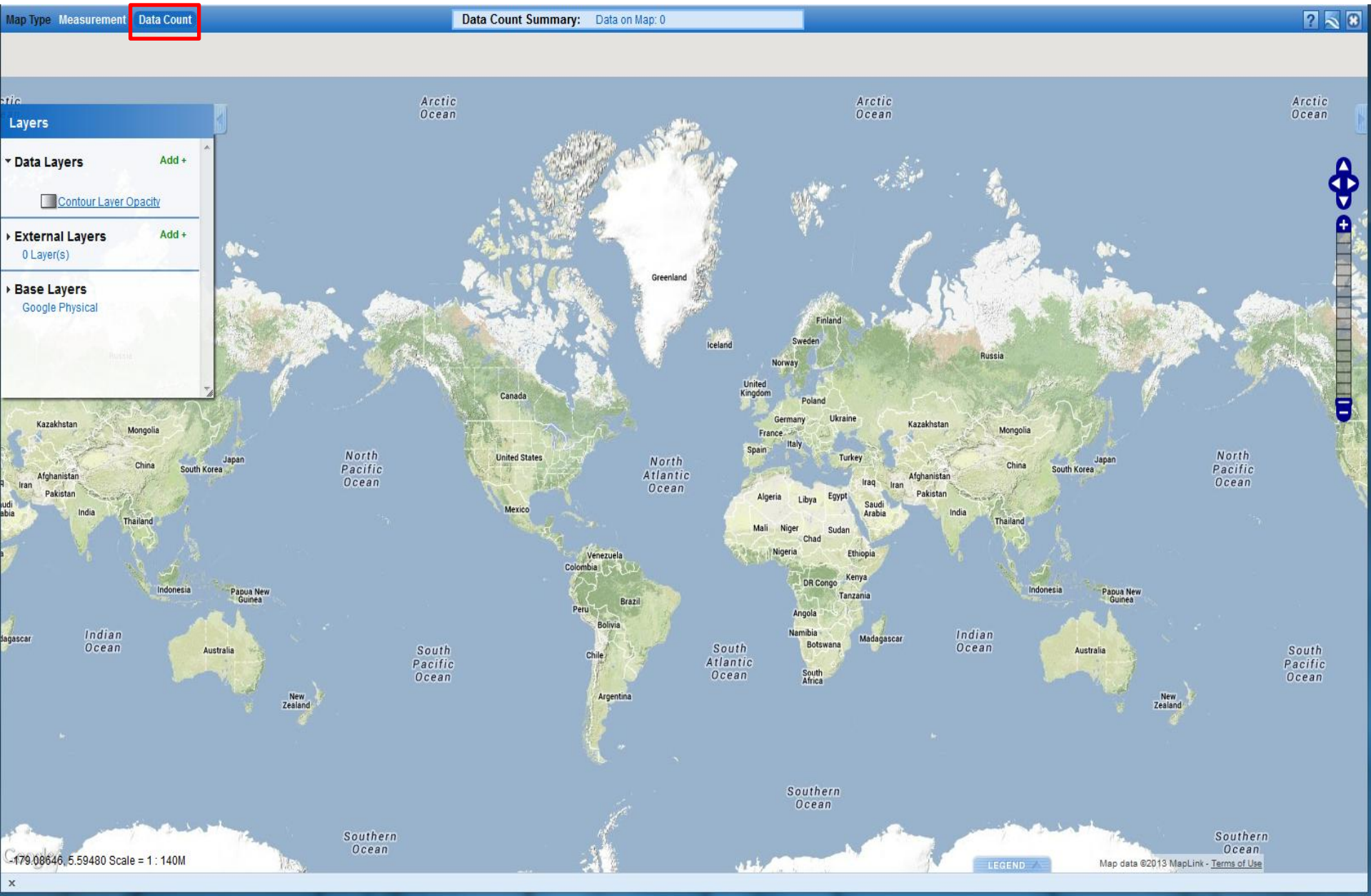
Click on the ? button in the upper right corner to open the Help page.



Overview of the Visualization Window Features

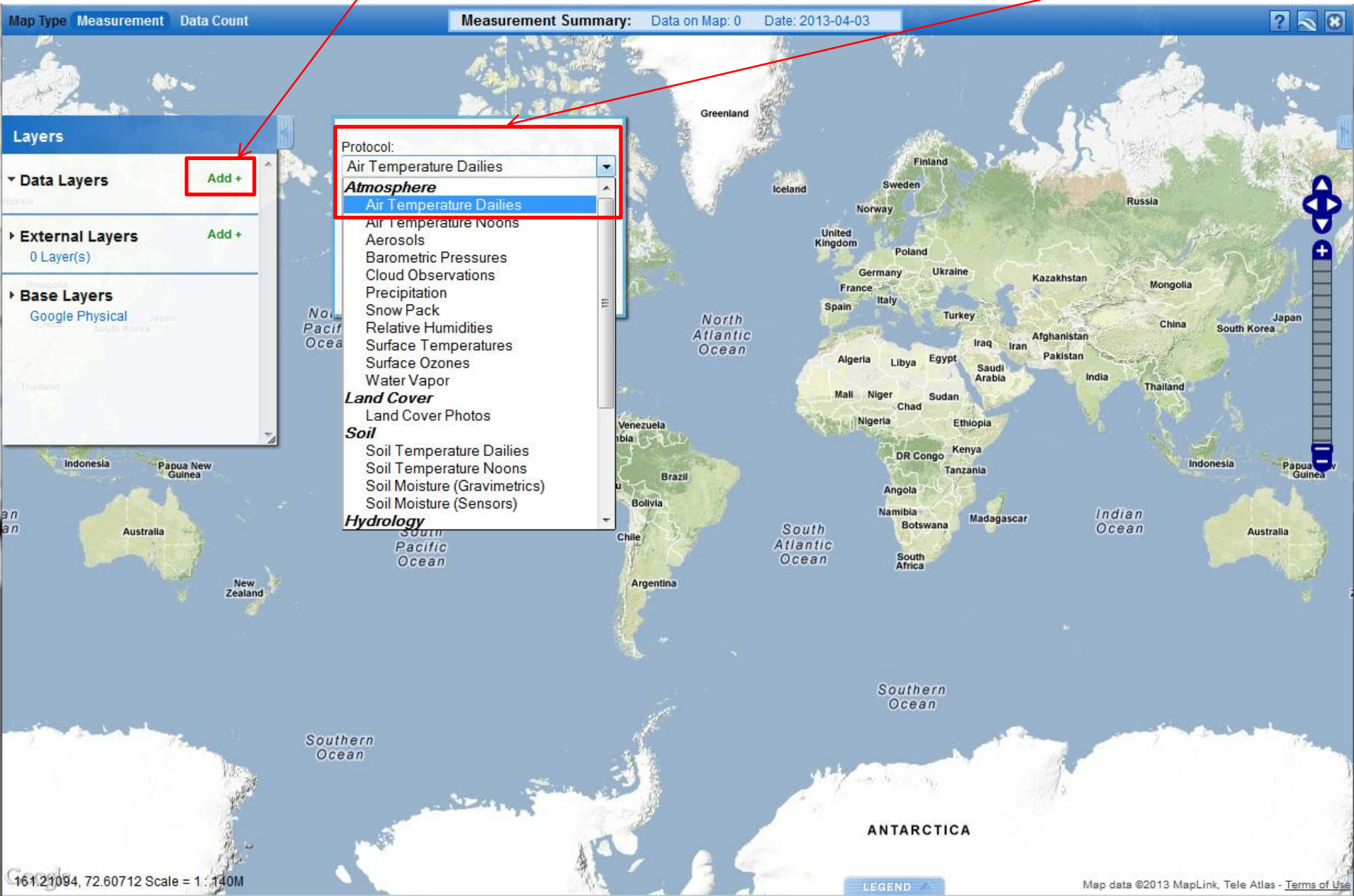
Close the Help box. Click on Data Count.

The Data Count view helps identify sites with larger datasets for a given data type.

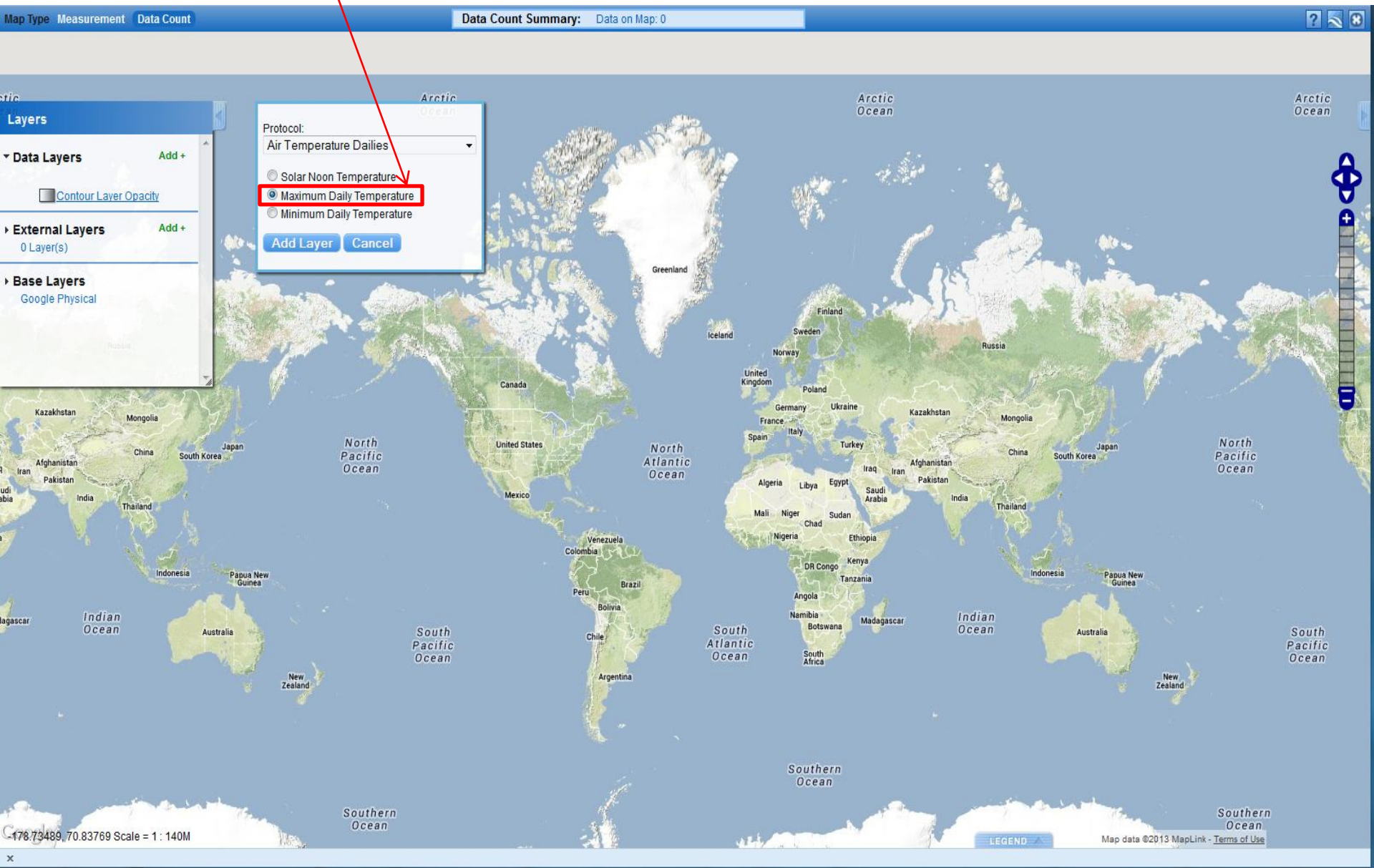


To see some data, click on Add+ next to Data Layers.

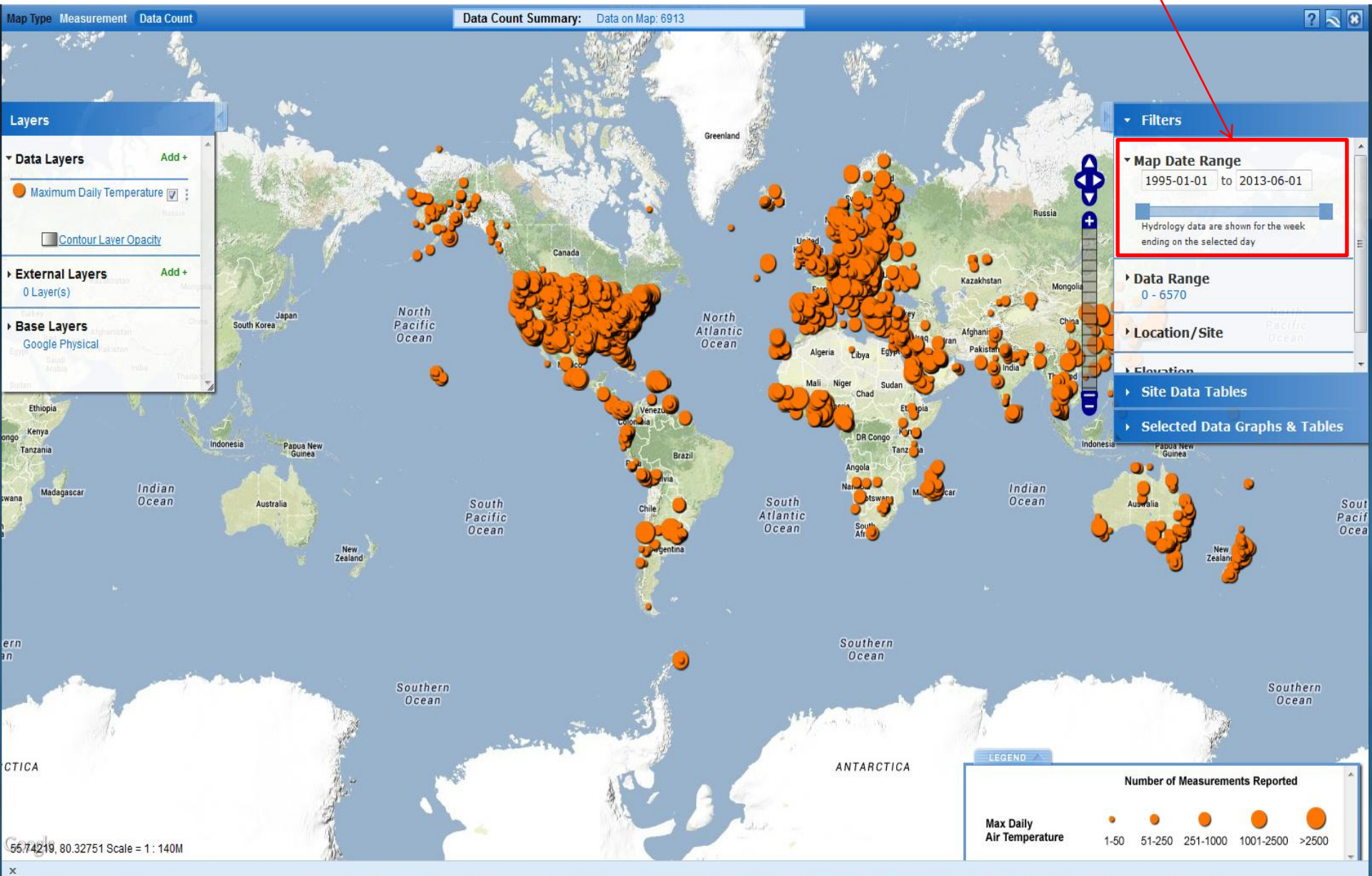
Select the data type you wish to see from the drop down menu.



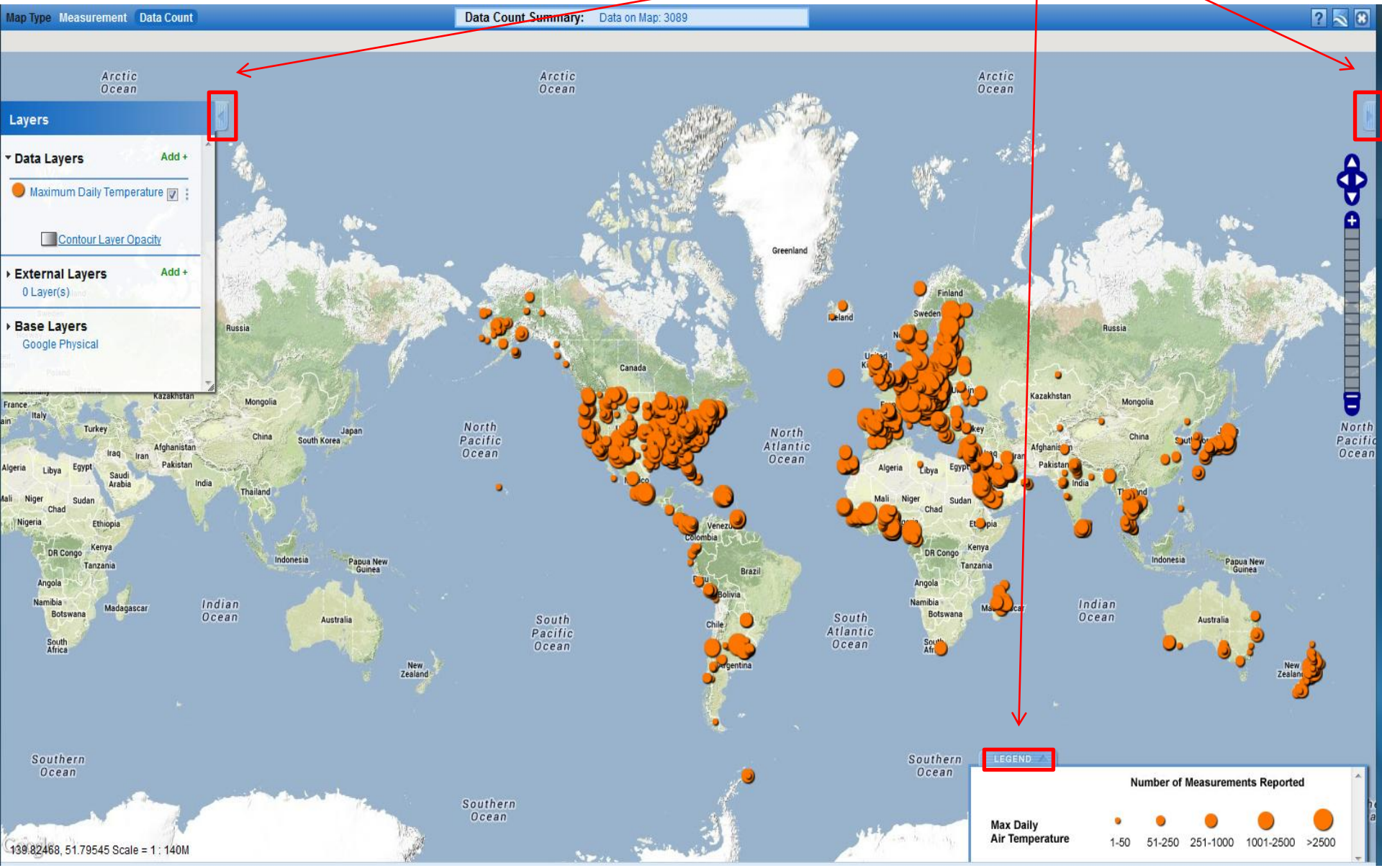
For this tutorial select Air Temperature Dailies from the drop down, click on the radio button next to Maximum Daily Temperature, and then click on the Add Layer button.



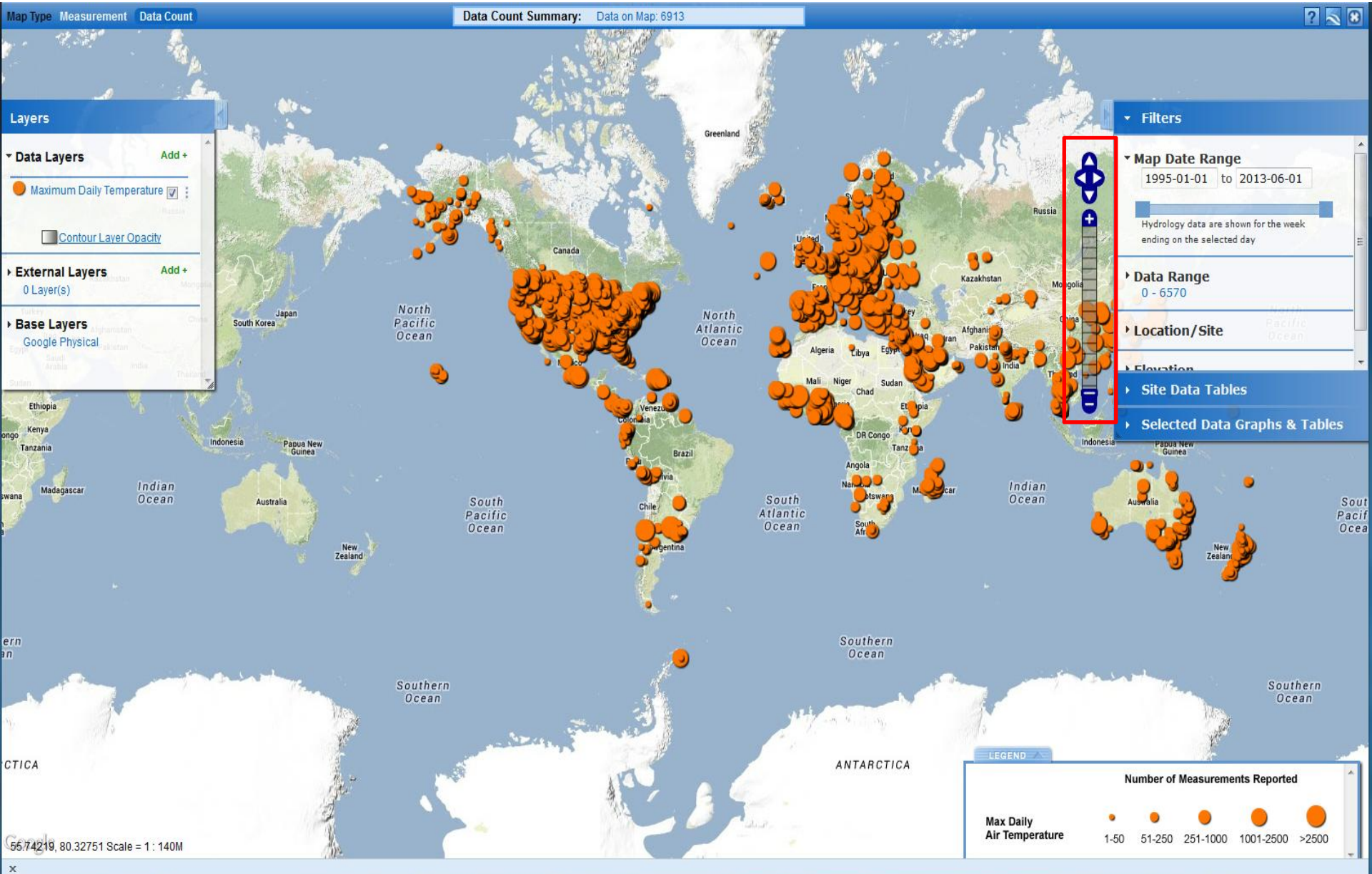
The new layer will be added to the map. A legend will pop-out of the bottom right corner and the Advanced Features Control will pop-out of the right side of the screen. The Filters Controls will be open by default with the **Map Date Range** set to the entire history of GLOBE.



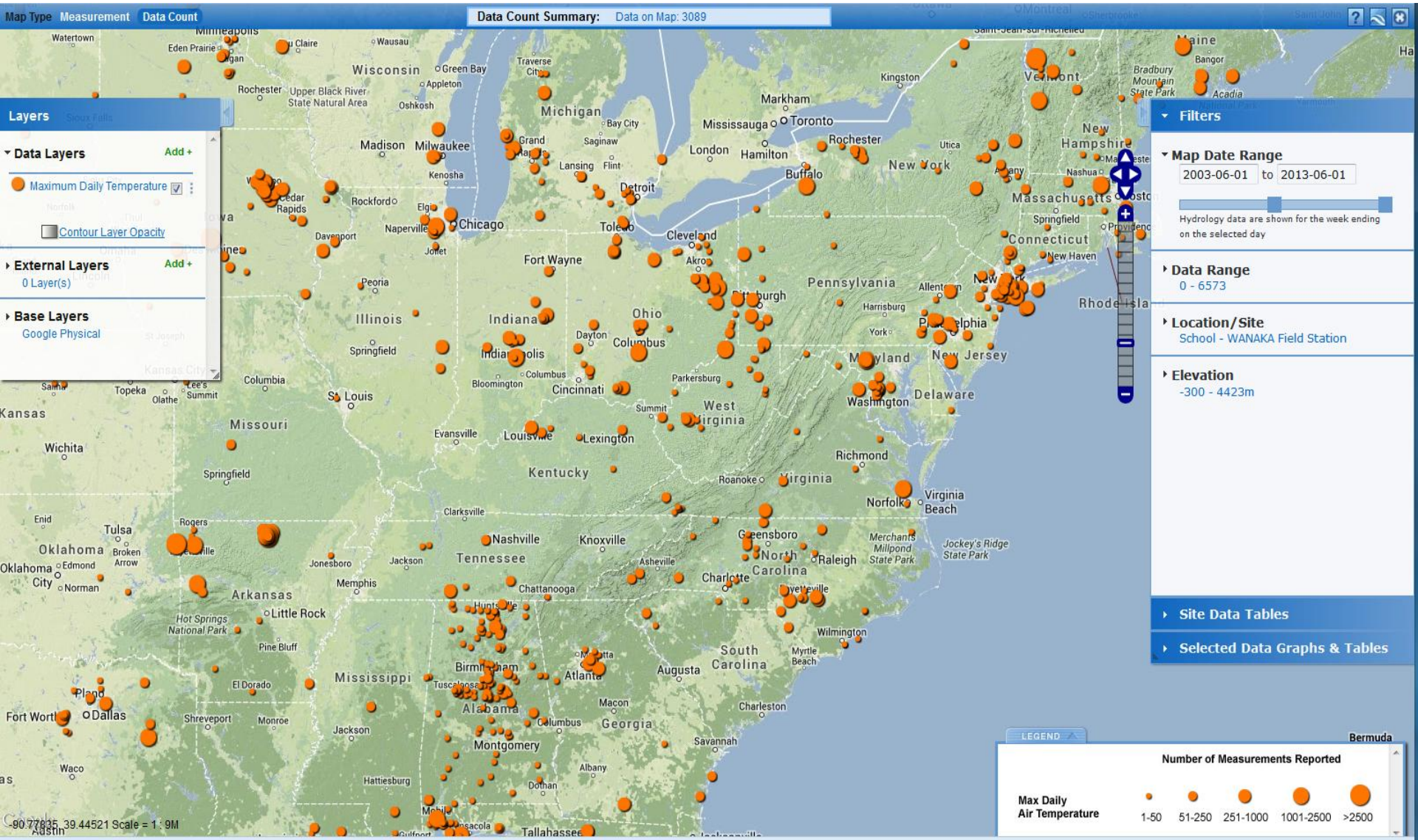
When the pop-out boxes cover some of the data,
they can be minimized and maximized by clicking on their tabs.



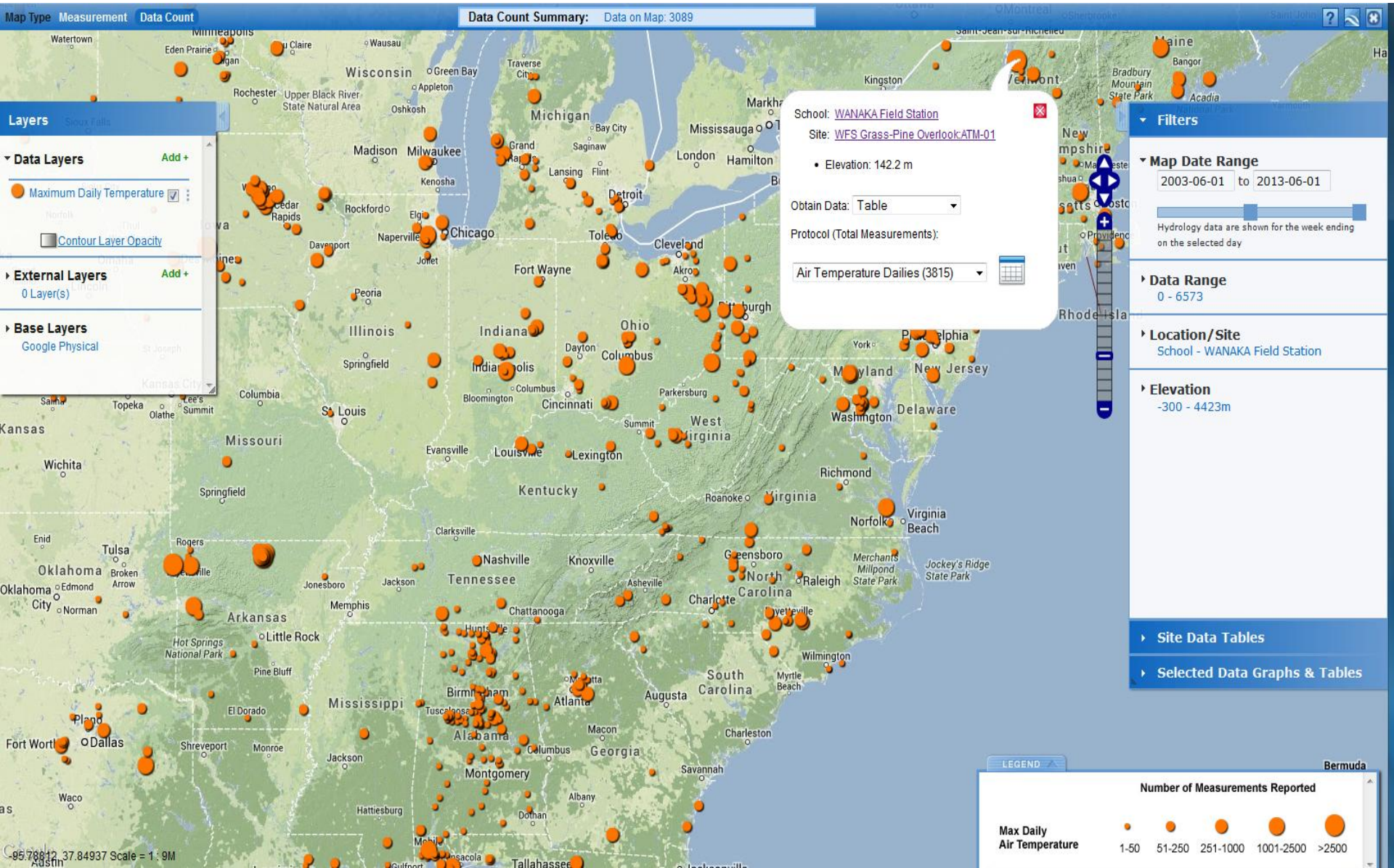
You can control how much of the world map is visible using the movement controls or your mouse. With the mouse, click and drag in any direction to move the map, double click to zoom in one unit on the cursor location, or use the mouse scroll wheel to zoom in and out.



Narrowing the Map Date Range to the past 10 years and zooming in shows the spread of GLOBE measurements and where there are sites with larger datasets.
These sites offer better possibilities for study in research projects.
To make the Filters box easier to use, drag the bottom down to make it larger.



Clicking on an icon on the Map opens a site pop-up box.
The pop-up box contains links to details about the school and the site, a list of all data types collected at the site and other controls.

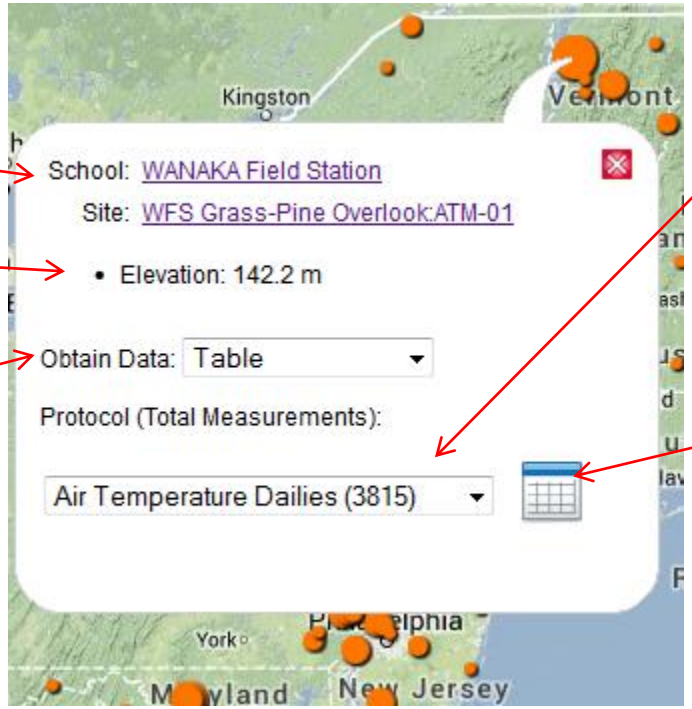


This box gives information about the site and is the gateway to creating tables and plots of site data.

The school and site name

Site data values

A drop down menu for choosing **Table** or **Time Series Plot**

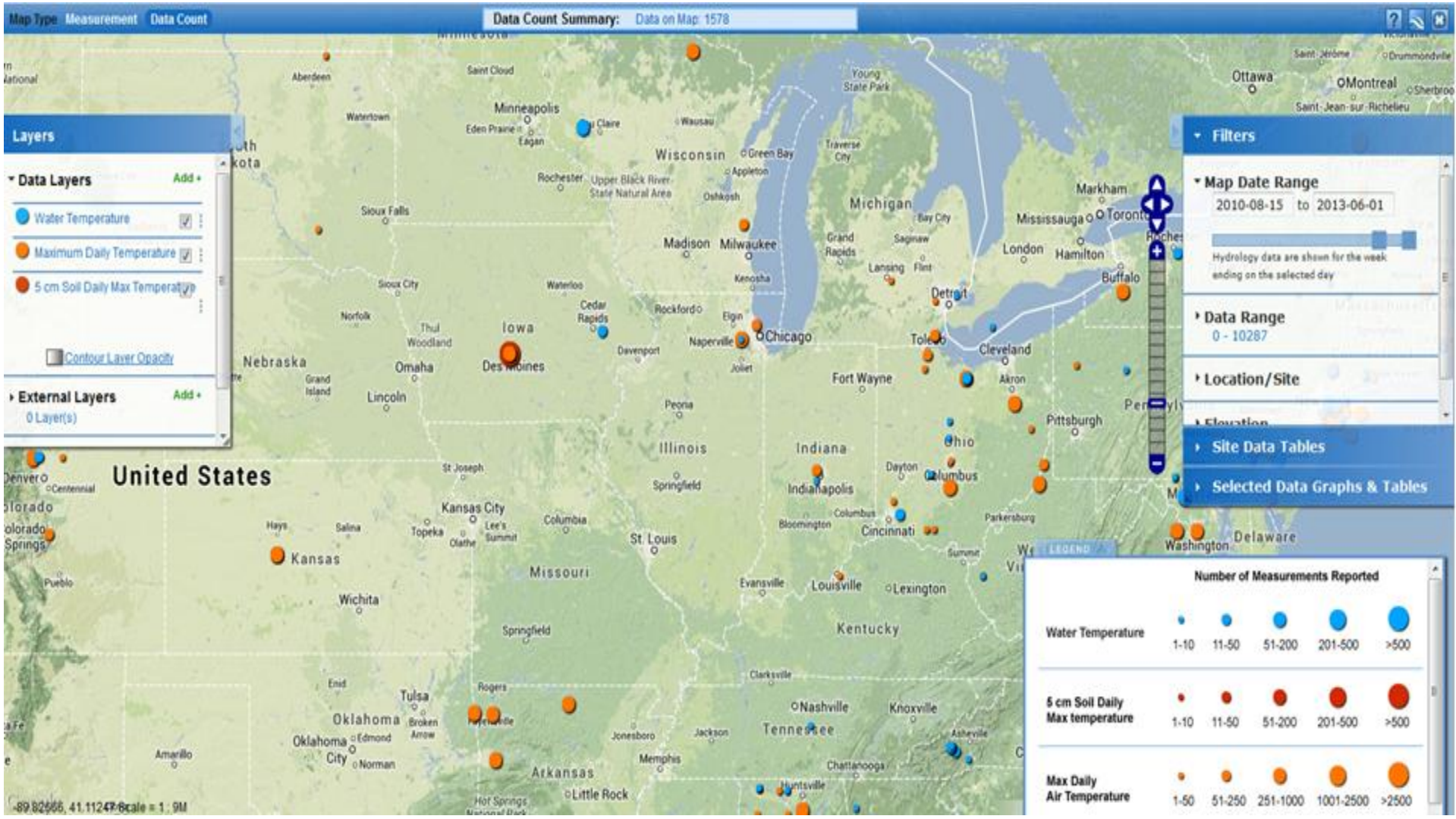


A drop down menu for choosing which type of data to plot or tabulate

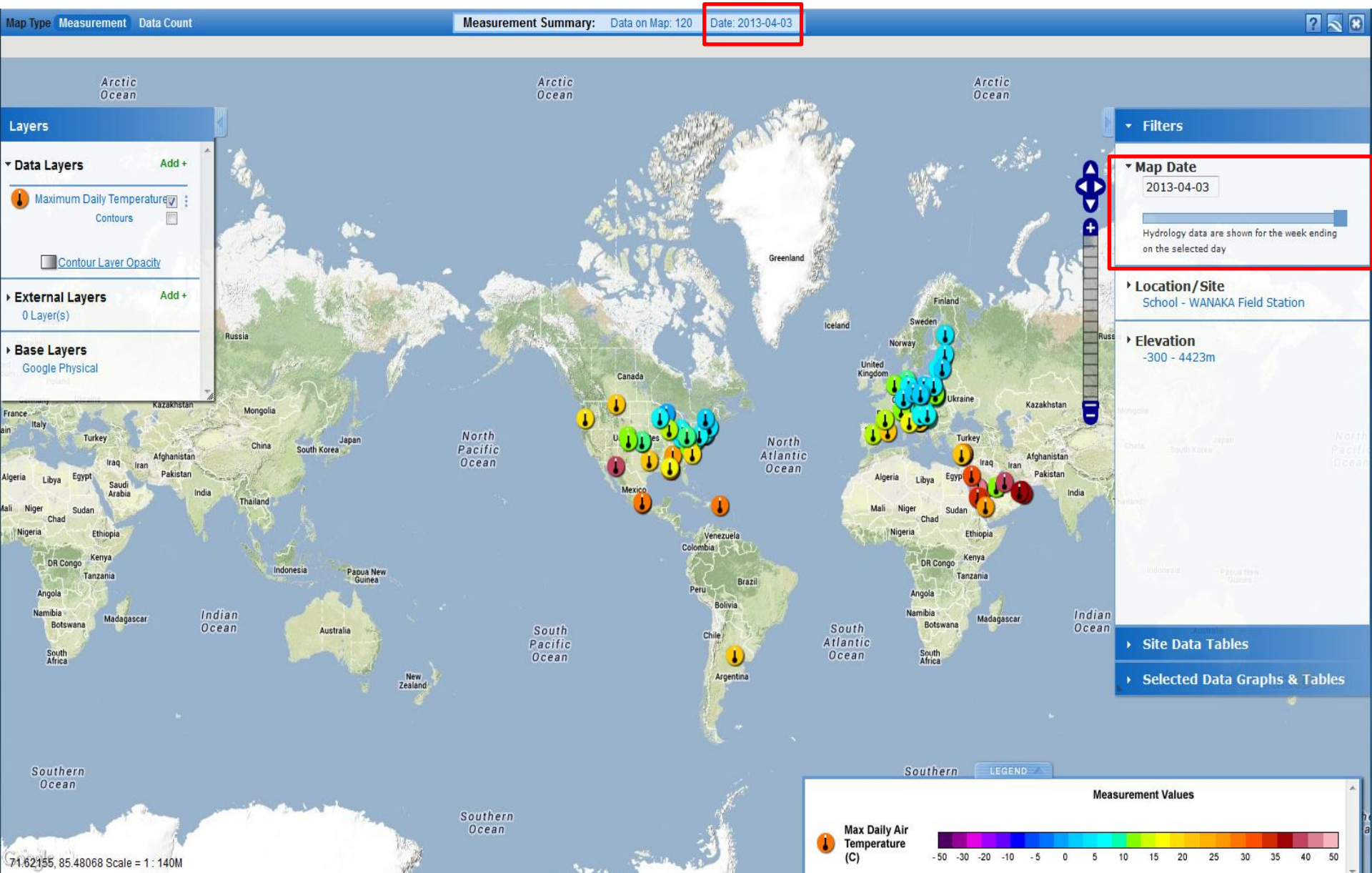
A table or plot button. Click to add this site and data type to the options for tables and plots.

The choice of **data type** is not limited to visible map **Data Layer**.
The total number of measurements is given in parentheses after the name of each data type.

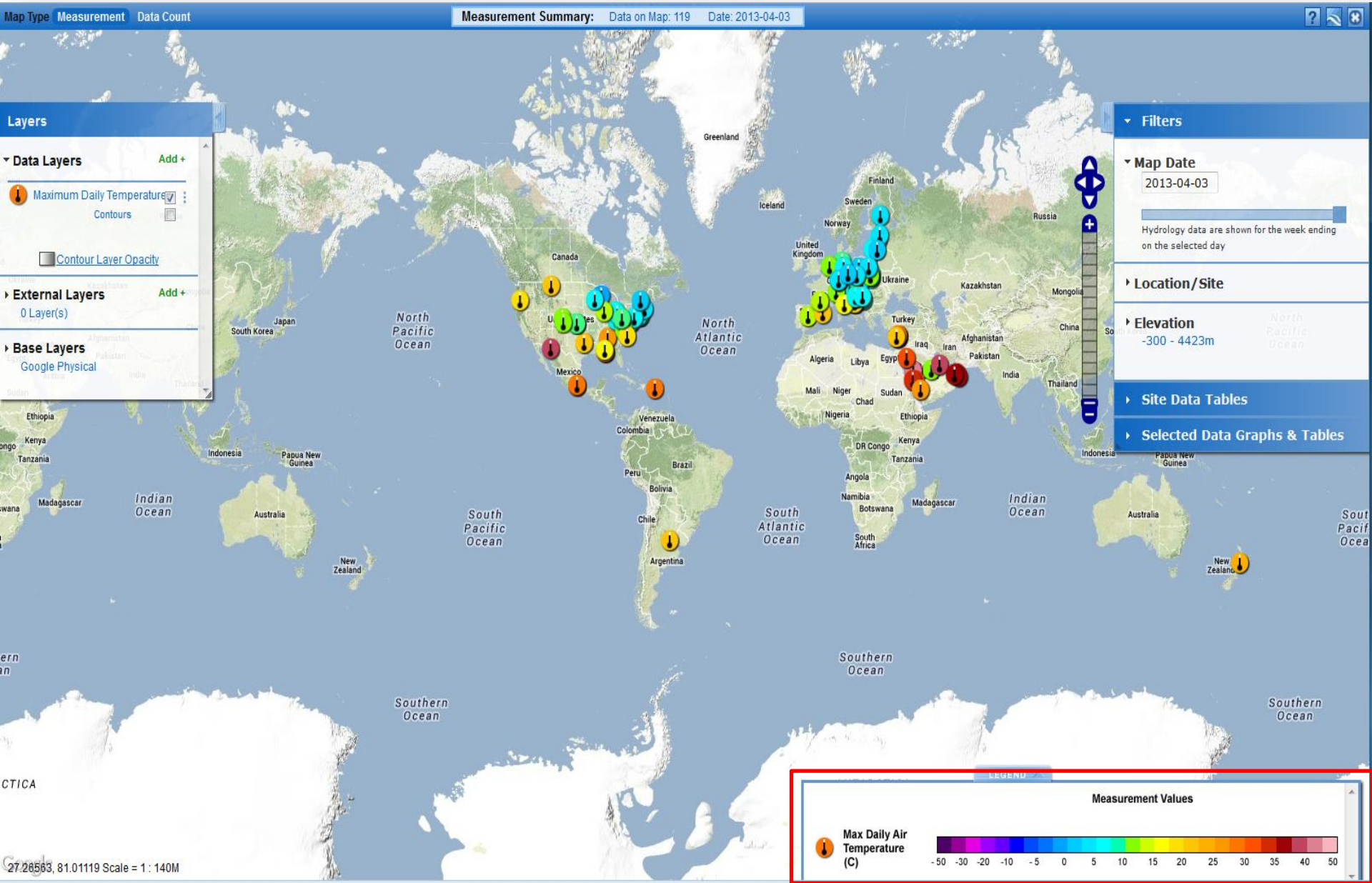
Additional data layers can be added to find locations with multiple types of data. Using layers and the filter tool you can find a data set to meet just about any investigation need.



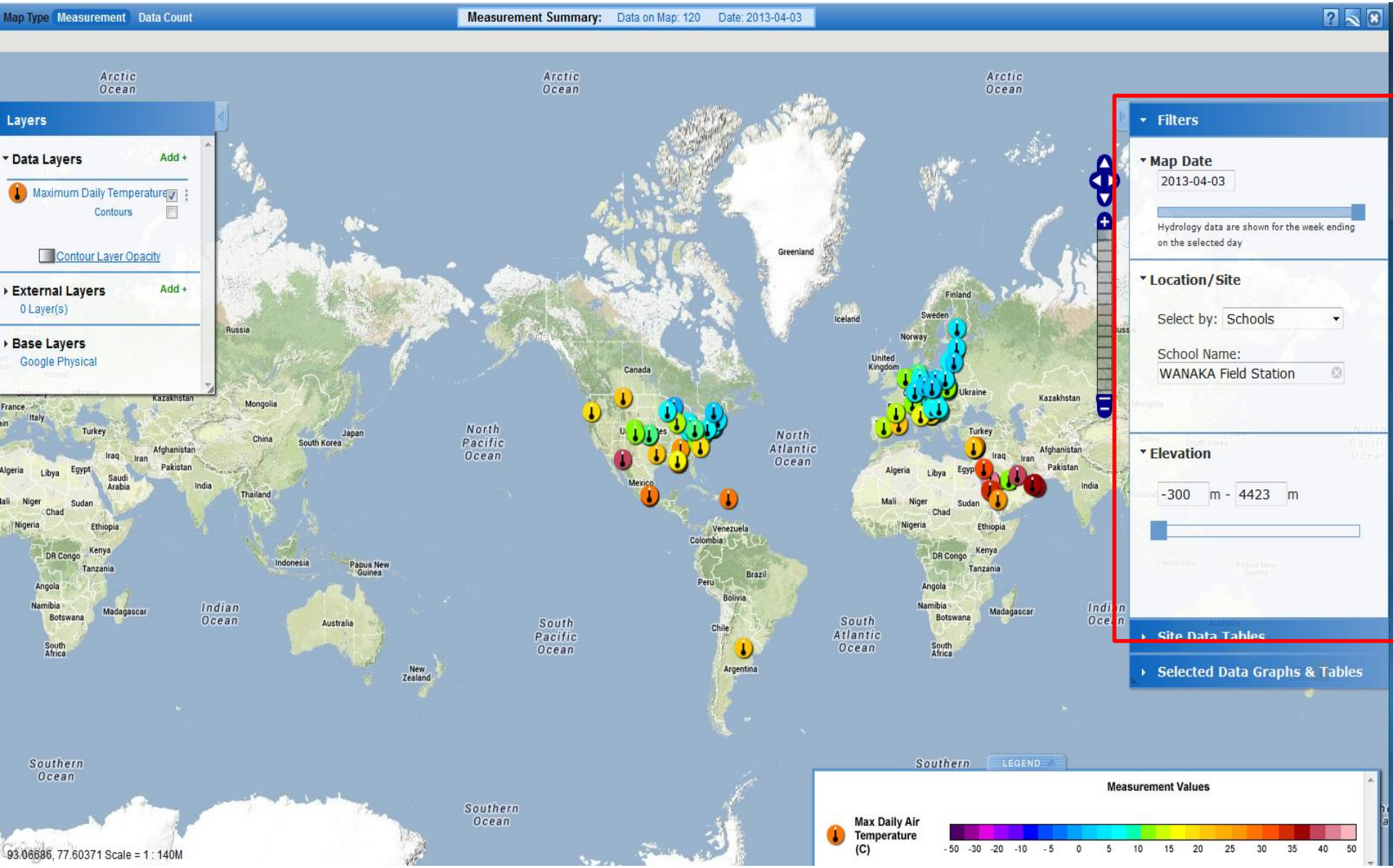
Now, let's focus on maps of measurements. Zoom out and click on Map Type Measurement. Now the map shows actual values of maximum air temperature for one day, today's date – change date to April 3, 2013.



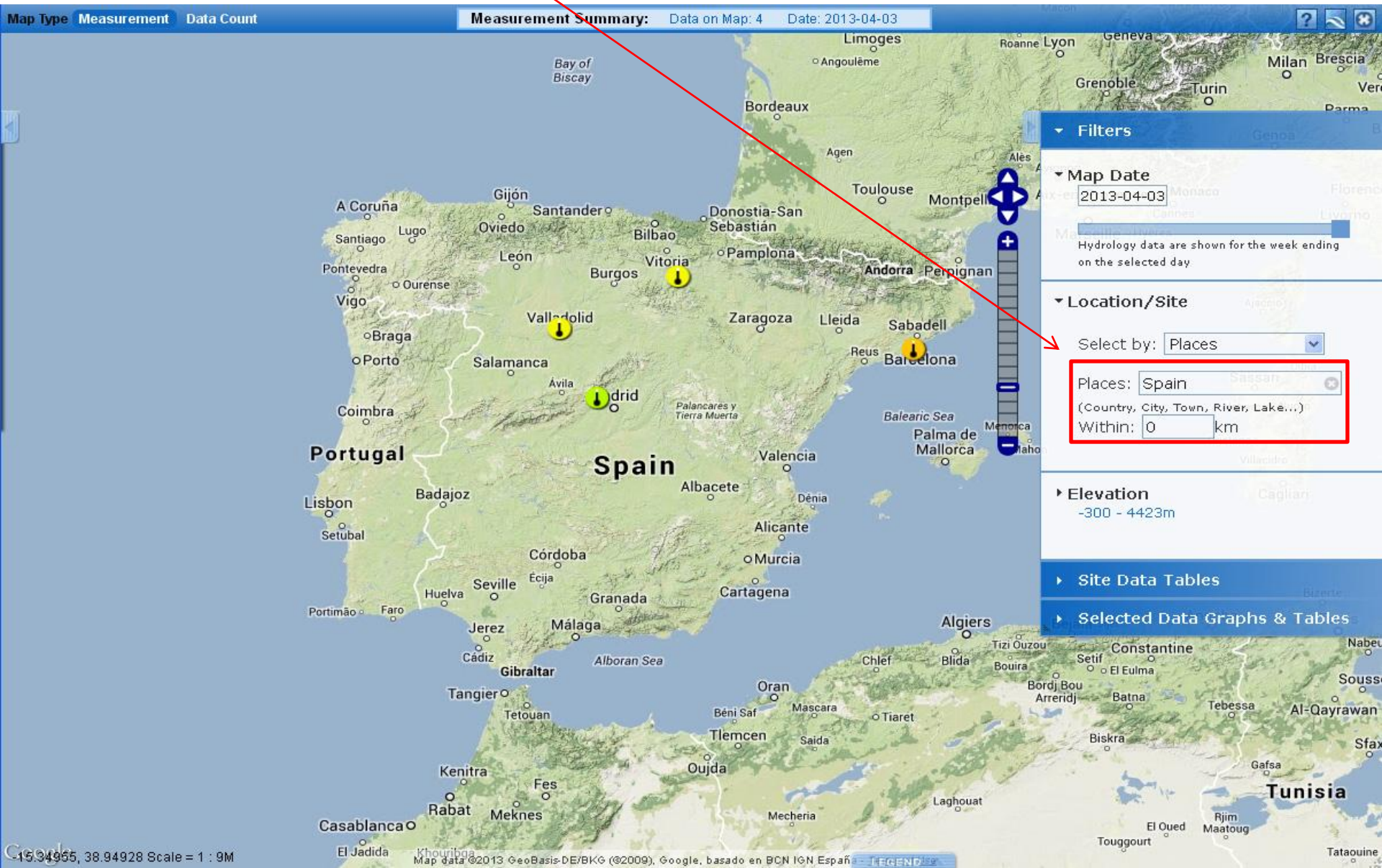
The box at the bottom right shows the legend for the data layer –
the colors in the scale correspond to the possible data values for that data type.
Each data layer has its own unique icon.



The Filters box is where you refine which data are shown on the map.
You can control the date and limit the map to display only data at a specific location (such as a country) or at a specific elevation range.

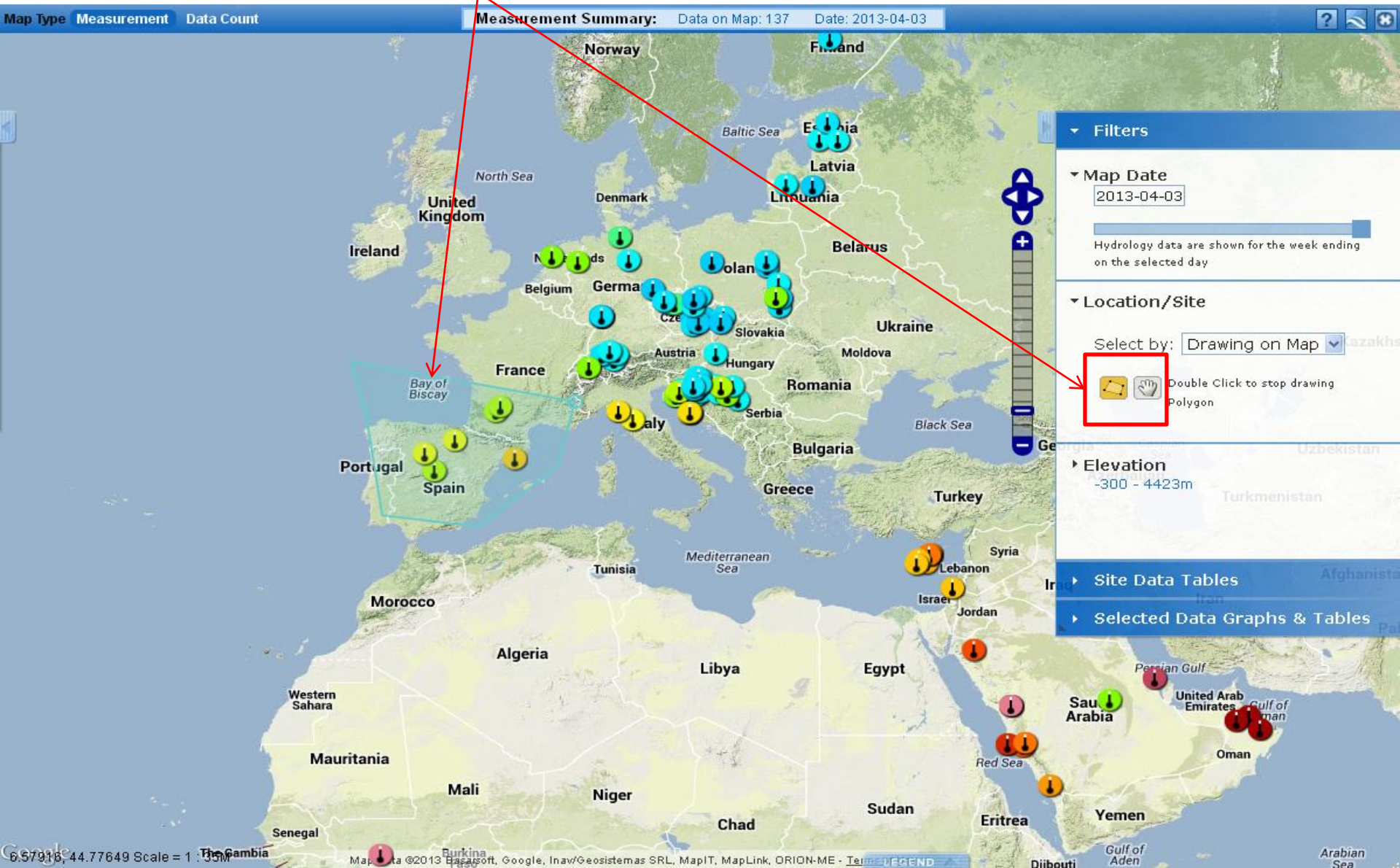


Using the filter tool, let's open the Location/Site filter and select by 'Places' and then enter in Spain. The map will zoom into the selected place and only display sites in the location

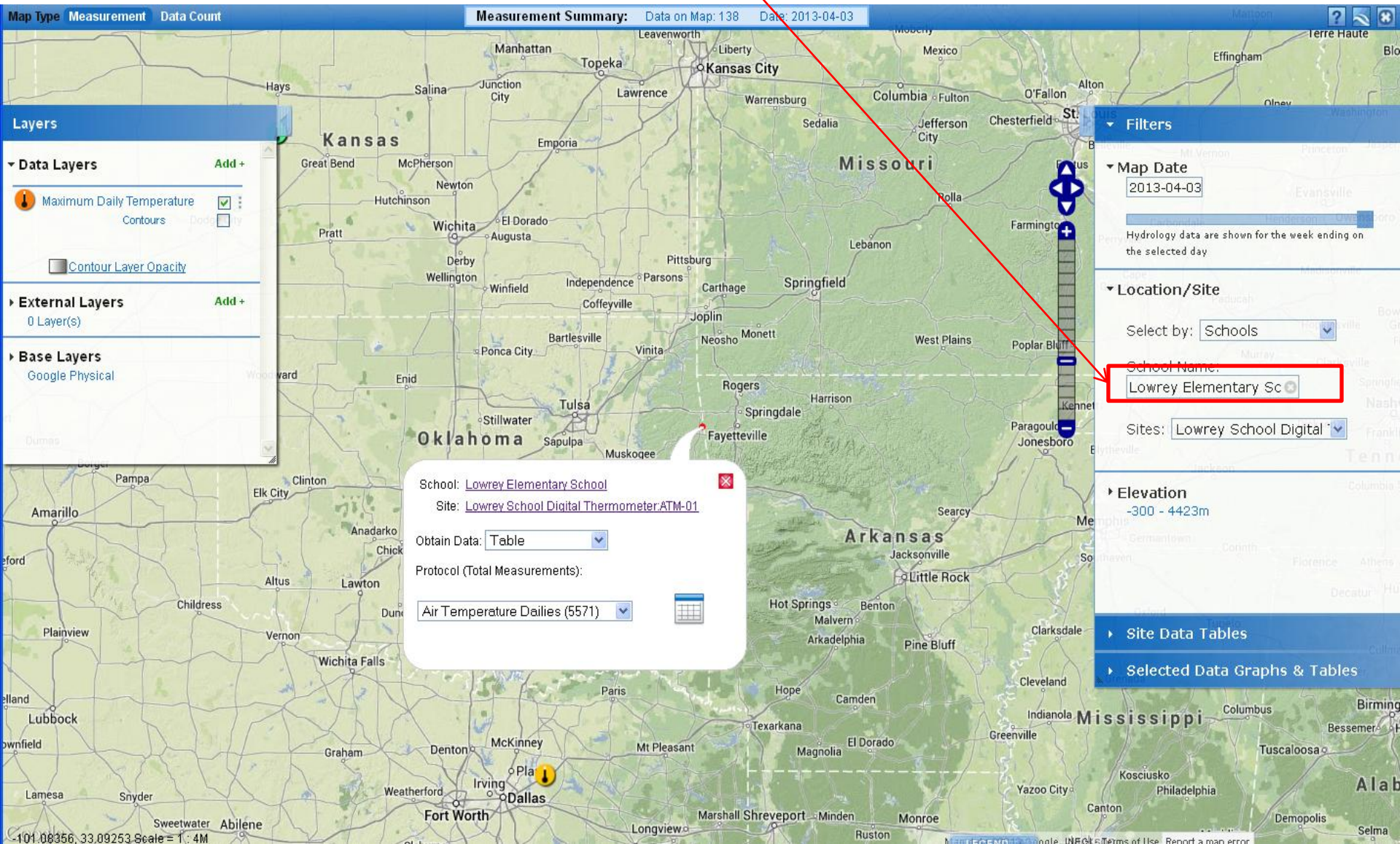

Map Type
Measurement
Data Count
Measurement Summary:
Data on Map: 4
Date: 2013-04-03
Filters
Map Date
2013-04-03
Hydrology data are shown for the week ending on the selected day
Location/Site
Select by:
Places
Places:
Spain
(Country, City, Town, River, Lake...)
Within:
0
km
Elevation
-300 - 4423m
Site Data Tables
Selected Data Graphs & Tables
Portugal
Spain
Tunisia
Algiers
Lisbon
Madrid
Barcelona
Valencia
Seville
Granada
Málaga
Gibraltar
Tangier
Casablanca
Rabat
Fes
Meknes
Oran
Tlemcen
Constantine
Bay of Biscay
Alboran Sea
Balearic Sea
Palma de Mallorca
Andorra
Bordeaux
Toulouse
Lyon
Milan
Turin
Grenoble
Zaragoza
Bilbao
Pamplona
Donostia-San Sebastián
Santander
Gijón
A Coruña
Oviedo
Lugo
Santiago
Pontevedra
Ourense
Vigo
Braga
Porto
Coimbra
Salamanca
Ávila
Valladolid
Burgos
Vitoria
León
Lleida
Sabadell
Reus
Perpignan
Montpellier
Limoges
Angoulême
Agen
Alès
Geneva
Brescia
Menorca
Ibiza
Sassari
Cagliari
Bizerte
Nabeul
Sousse
Sfax
Gafsa
Tebessa
Al-Qayrawan
Biskra
Batna
Setif
Bejaia
Tizi Ouzou
Blida
Chlef
Mascara
Tiaret
Saida
Béni Saf
Oujda
Mecheria
Laghouat
Ghardaia
El Oued
Touggourt
Rjim
Maatoug
Tataouine
Djerba
Zarzis
Gabès
Sfax
Kairouan
Sousse
Monastir
Mahdia
Tunis
Bizerte
Nabeul
Hammamet

You can also filter data sites using the ‘Drawing on Map’ option. This allows you to select sites by drawing a polygon around the sites you want to isolate. This can be useful for viewing only those sites that are on the map in a table view.

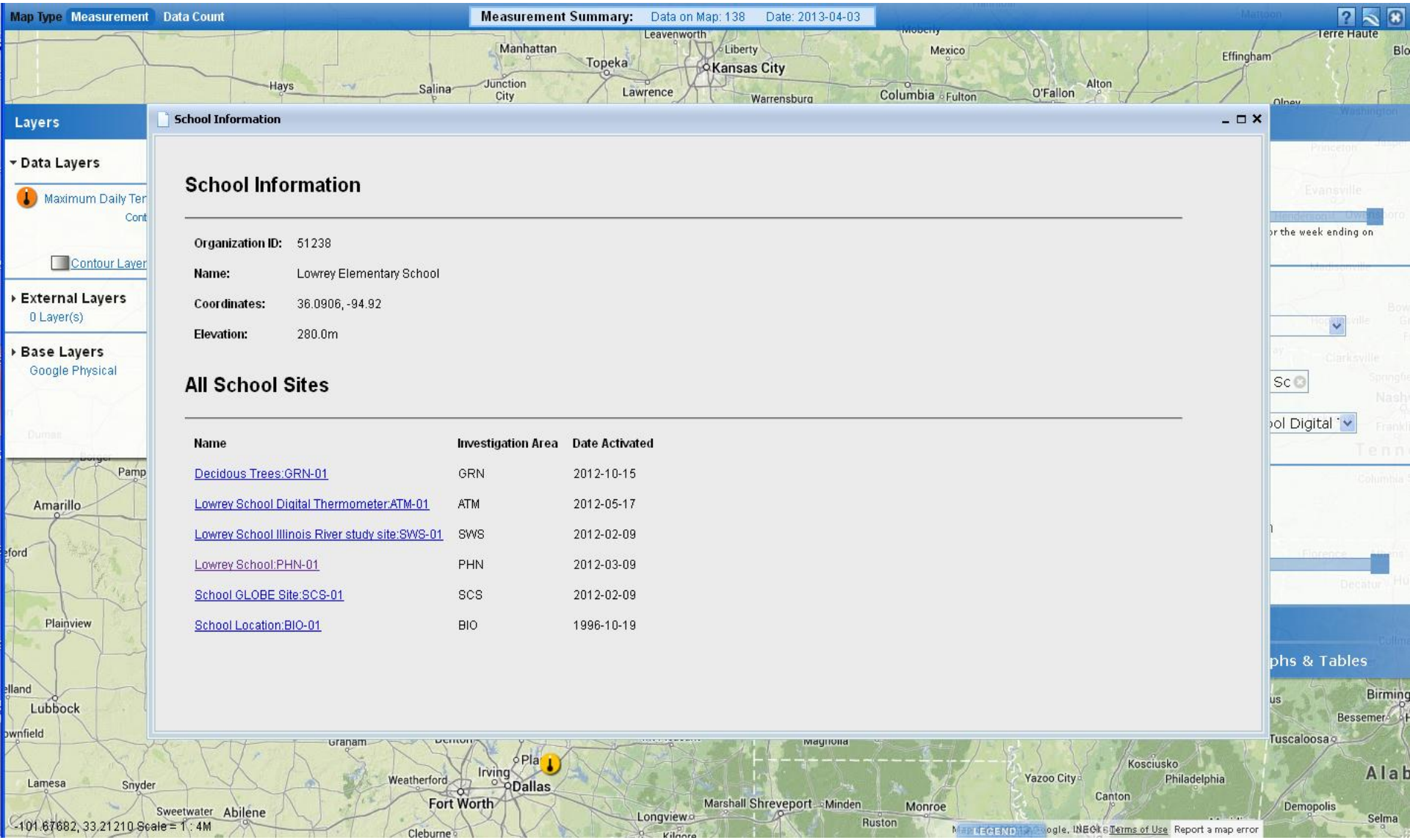
Click the hand icon to exit the draw tool.



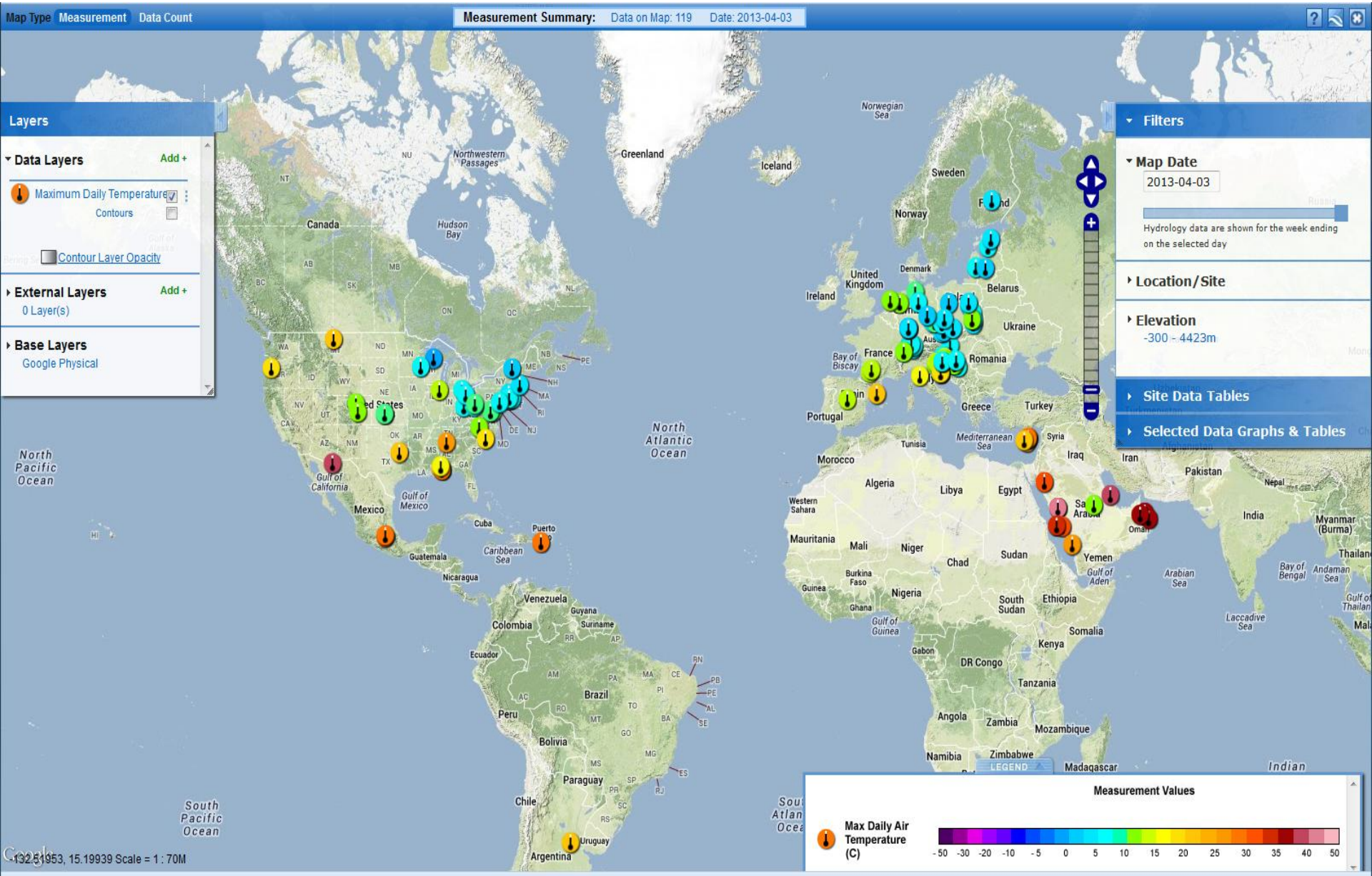
Let's now search for a particular school and site. Type in 'Lowrey ' in the school field. The system should auto-complete to show a list of schools that start with that name. Select Lowrey Elementary School. The icon is a small red dot which indicates no data from the added data layers was entered on the current map date.



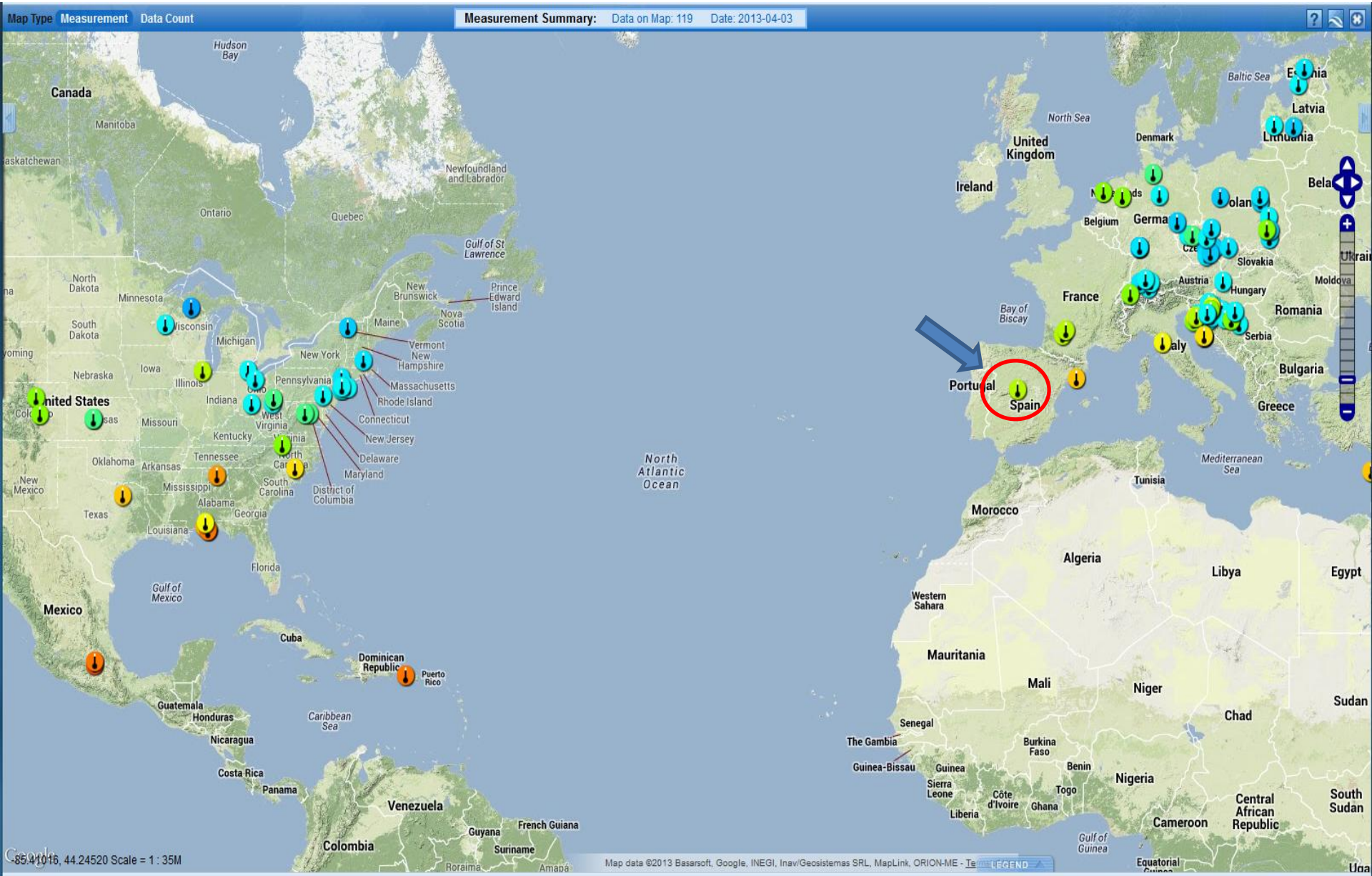
Click on the Lowrey Elementary School link to get school information and a list of school sites. Close the window and remove Lowrey school from the place filter.



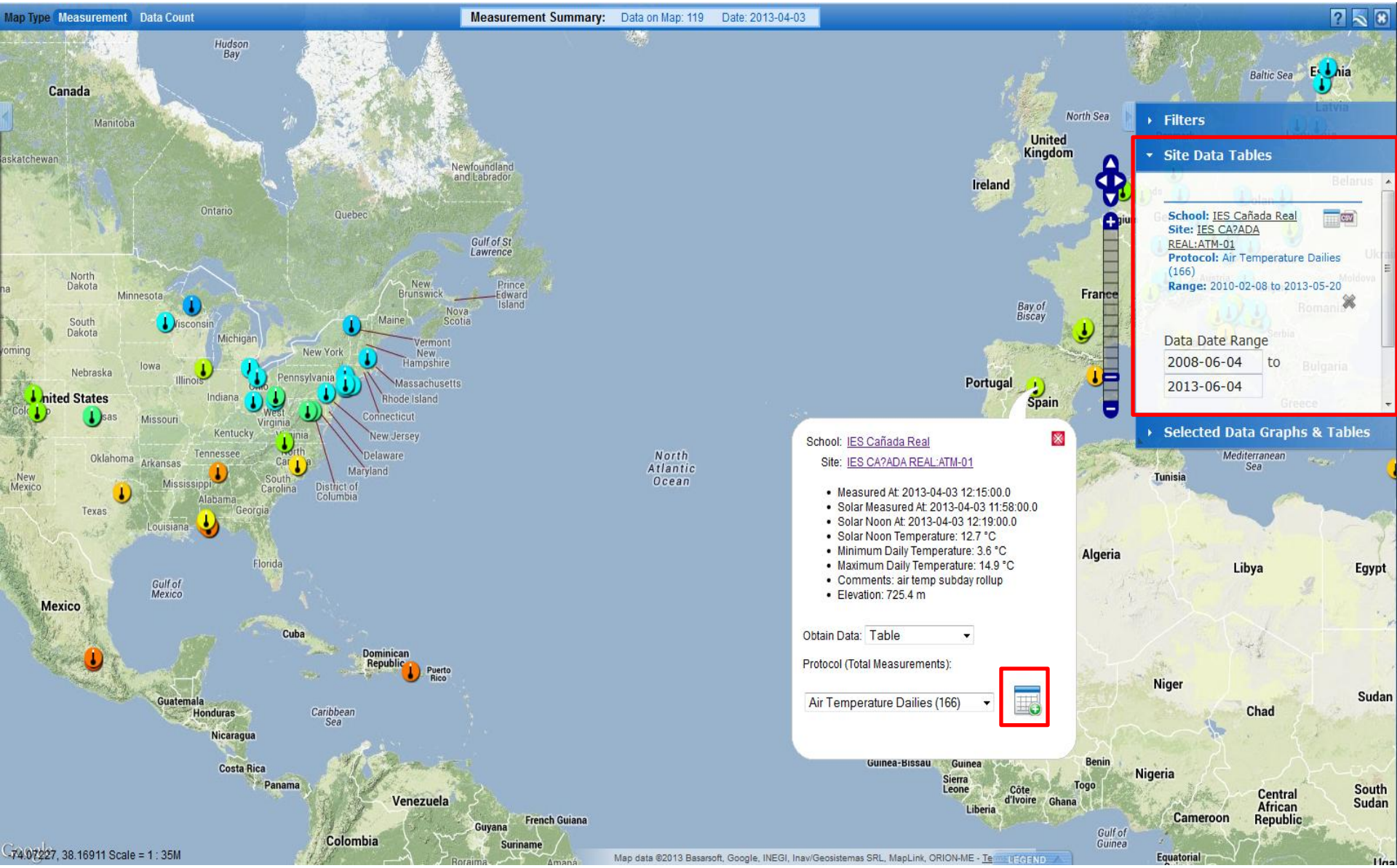
Zooming spreads out overlapping data points.
Closing the pop-out boxes let's one see any data points they may be hiding.



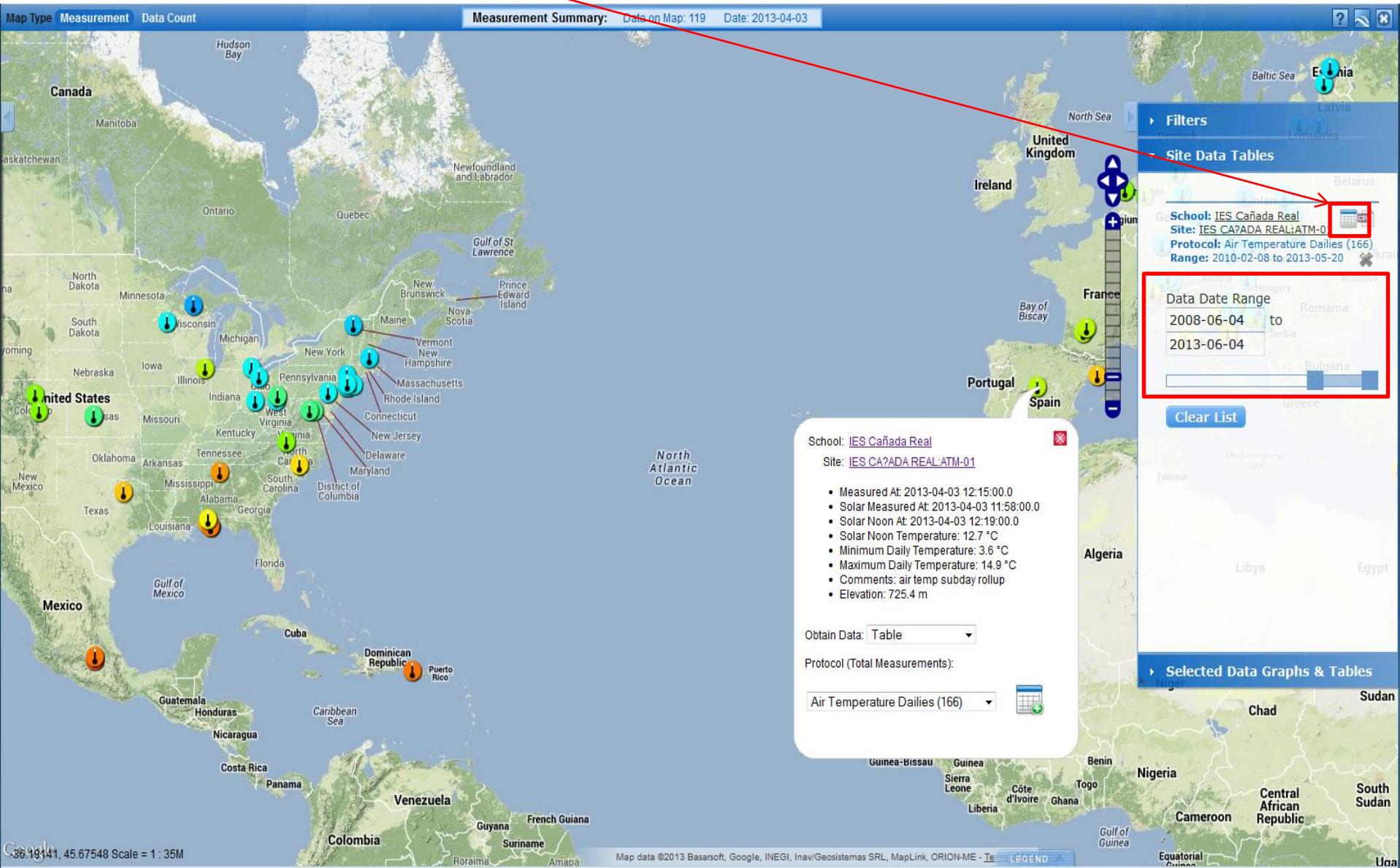
Click on a point on the Map to open the site pop-up box.



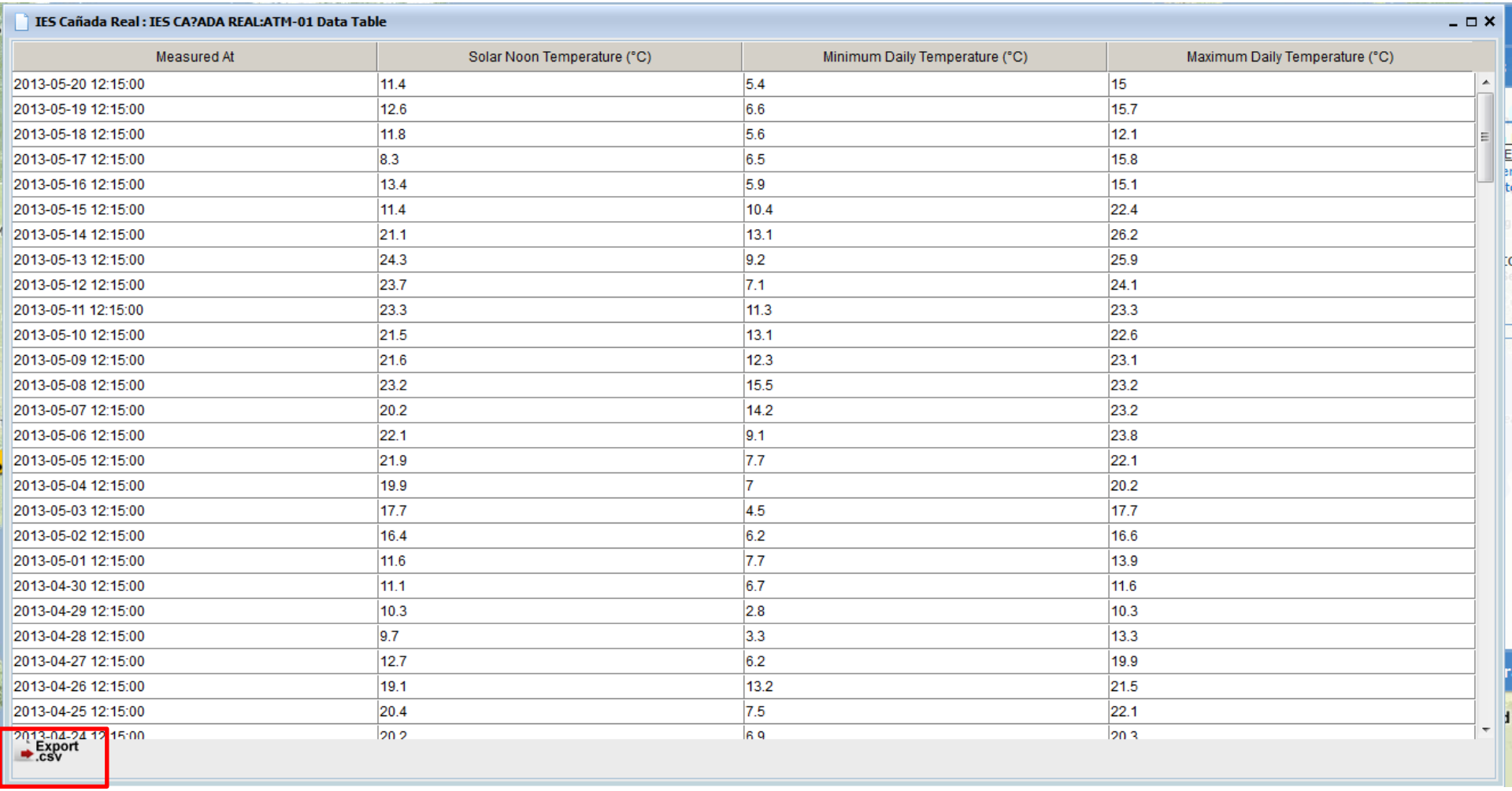
To view data in a table, click on the Table button in the site info window to add the site to the Site Data Tables section of the right hand pop-open box



Select the range of dates you wish to be included in the data table.
Move the sliders or enter the specific start and end dates.
Click on the Table button next to the school name to produce the table.



Note that this table gives values for local solar noon and minimum and maximum daily temperature. Clicking the button at the bottom will export the data in comma delimited format.



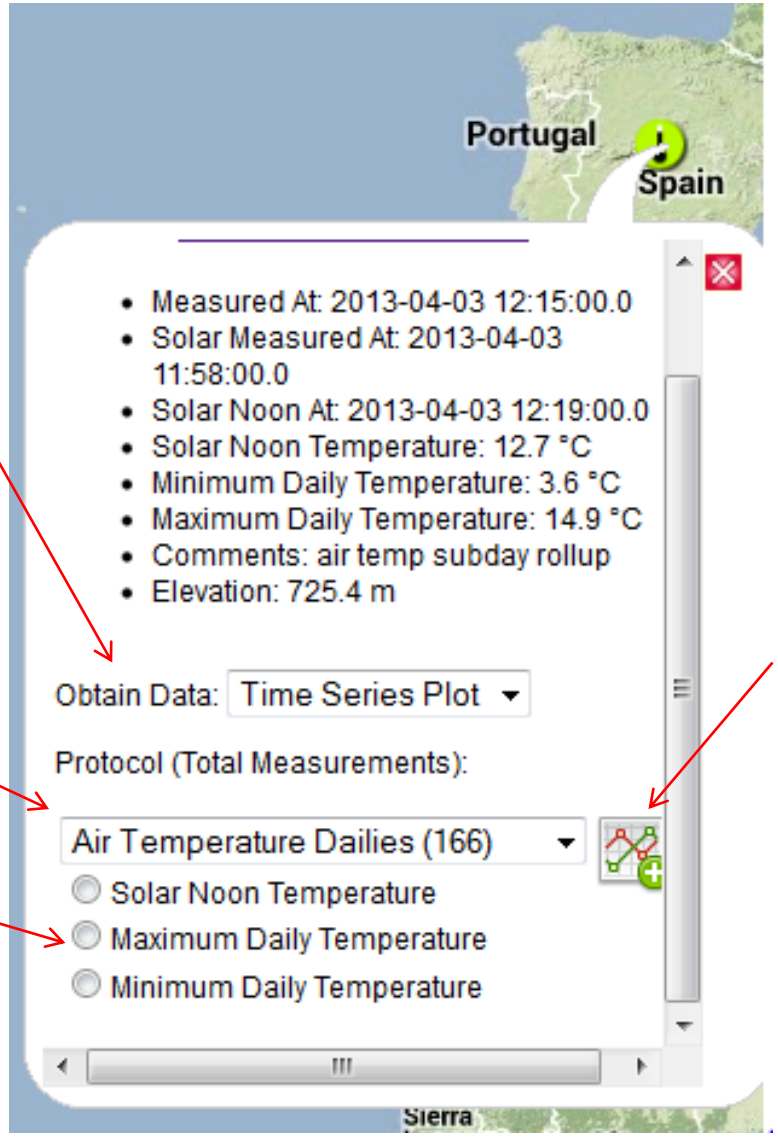
Measured At	Solar Noon Temperature (°C)	Minimum Daily Temperature (°C)	Maximum Daily Temperature (°C)
2013-05-20 12:15:00	11.4	5.4	15
2013-05-19 12:15:00	12.6	6.6	15.7
2013-05-18 12:15:00	11.8	5.6	12.1
2013-05-17 12:15:00	8.3	6.5	15.8
2013-05-16 12:15:00	13.4	5.9	15.1
2013-05-15 12:15:00	11.4	10.4	22.4
2013-05-14 12:15:00	21.1	13.1	26.2
2013-05-13 12:15:00	24.3	9.2	25.9
2013-05-12 12:15:00	23.7	7.1	24.1
2013-05-11 12:15:00	23.3	11.3	23.3
2013-05-10 12:15:00	21.5	13.1	22.6
2013-05-09 12:15:00	21.6	12.3	23.1
2013-05-08 12:15:00	23.2	15.5	23.2
2013-05-07 12:15:00	20.2	14.2	23.2
2013-05-06 12:15:00	22.1	9.1	23.8
2013-05-05 12:15:00	21.9	7.7	22.1
2013-05-04 12:15:00	19.9	7	20.2
2013-05-03 12:15:00	17.7	4.5	17.7
2013-05-02 12:15:00	16.4	6.2	16.6
2013-05-01 12:15:00	11.6	7.7	13.9
2013-04-30 12:15:00	11.1	6.7	11.6
2013-04-29 12:15:00	10.3	2.8	10.3
2013-04-28 12:15:00	9.7	3.3	13.3
2013-04-27 12:15:00	12.7	6.2	19.9
2013-04-26 12:15:00	19.1	13.2	21.5
2013-04-25 12:15:00	20.4	7.5	22.1
2013-04-24 12:15:00	20.2	6.9	20.3

Now let's make a plot of the data from this same site.
Note that it was necessary to scroll down to see the choices.

Time Series Plot has been selected.

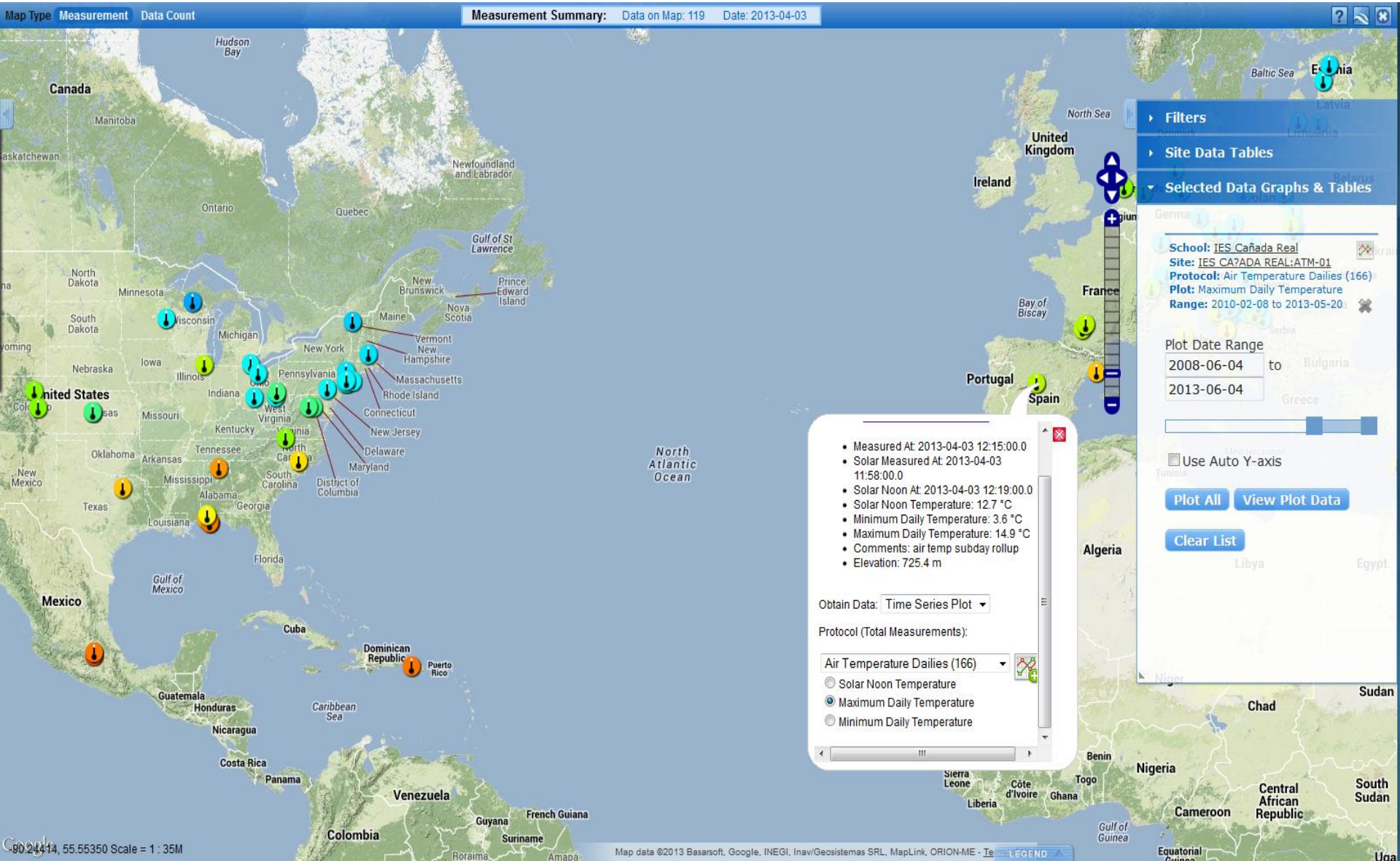
You must choose which dataset to plot from a drop down menu. Note that you can choose other sets of atmosphere data and not just Air Temperature Dailies.

Select one of the options from the list.

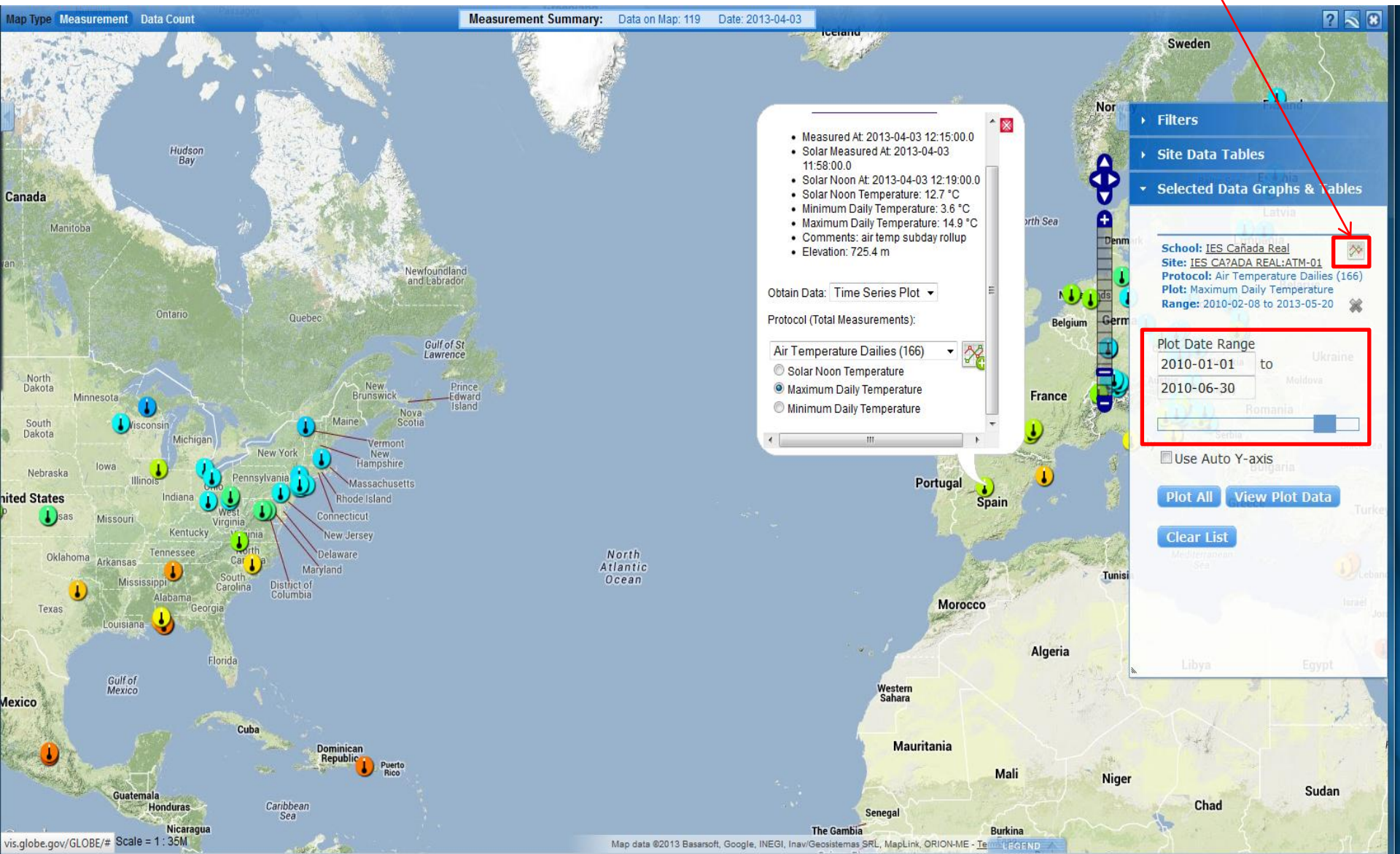


When you have made your selection, click on the plot button.

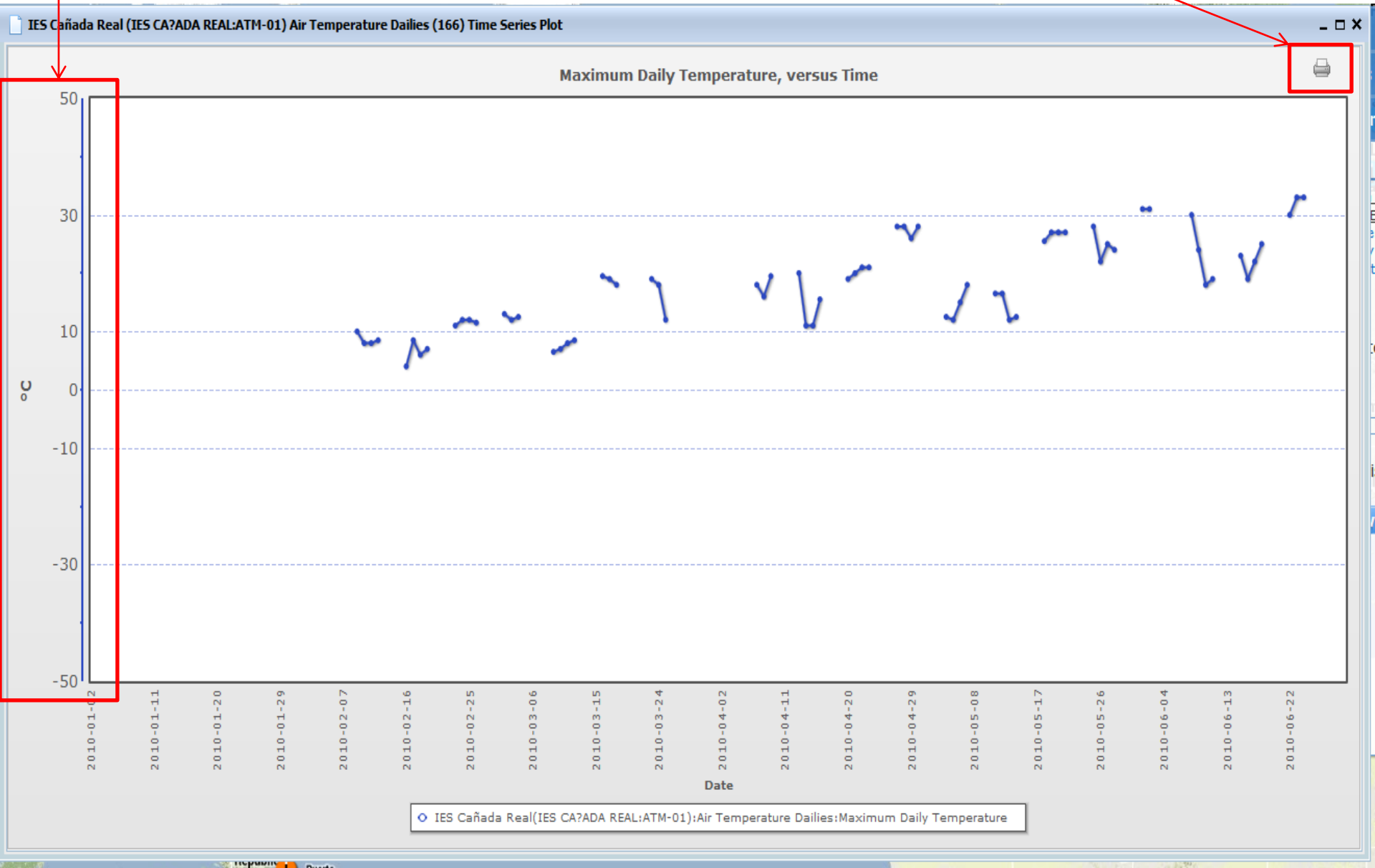
Clicking on the Plot button adds the site to the plot list and opens the Selected Data Graphs & Tables section of the right pop-open box.



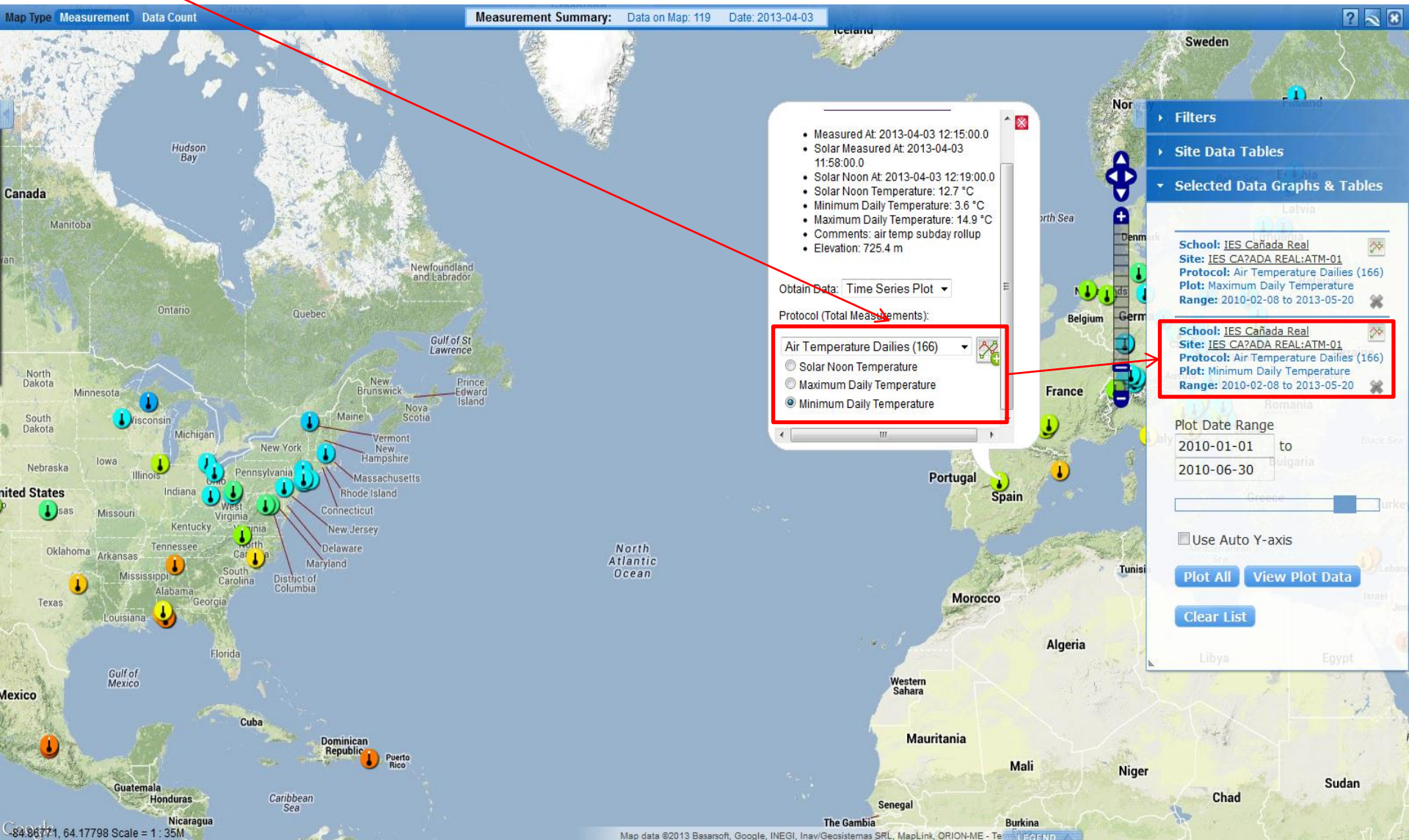
Now select the range of dates to plot; January – June 2010 has been selected.
Use the sliders or enter the specific start and end dates.
Click on the **plot** button next to the school name to produce the graph.



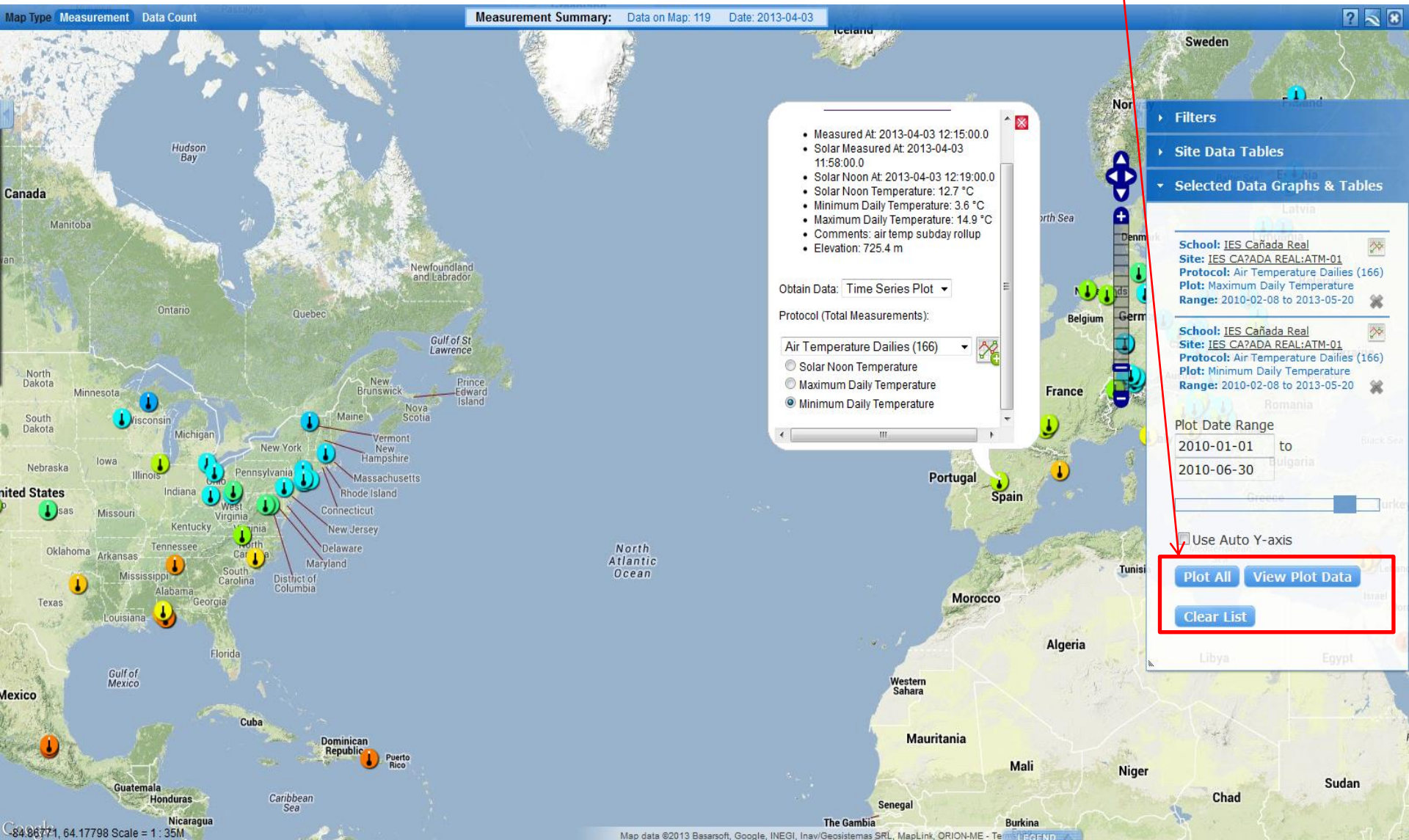
Note that the y-axis on this graph covers the full range of possible air temperature values.
When data points are for consecutive days, they are connected with a line.
Clicking the print button will print out a copy of this graph.



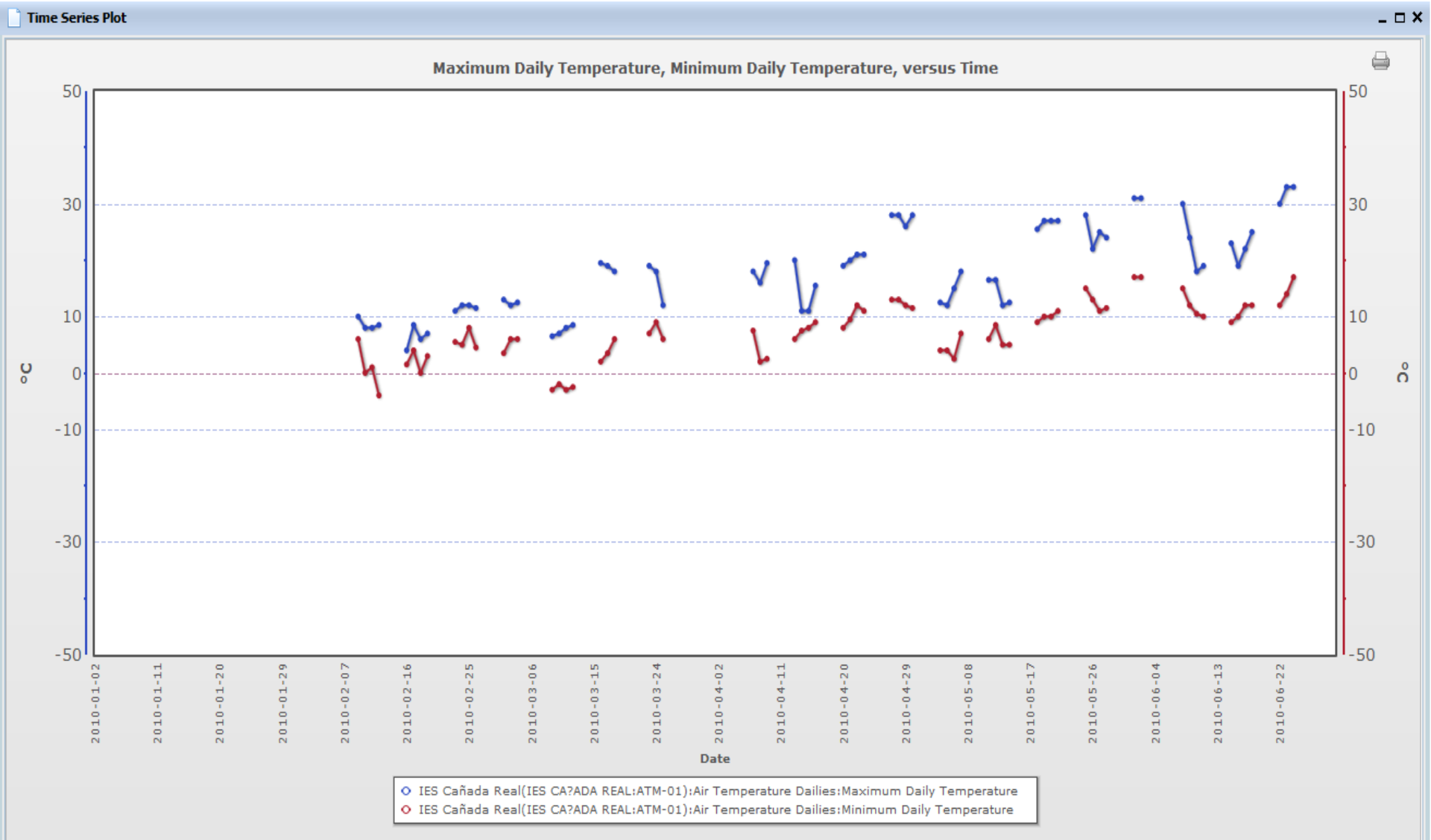
You can select additional datasets to plot.
In the pop-up box of site information, select a different dataset.
Click on the plot button to add this data set to the list of Selected Data Graphs & Tables.



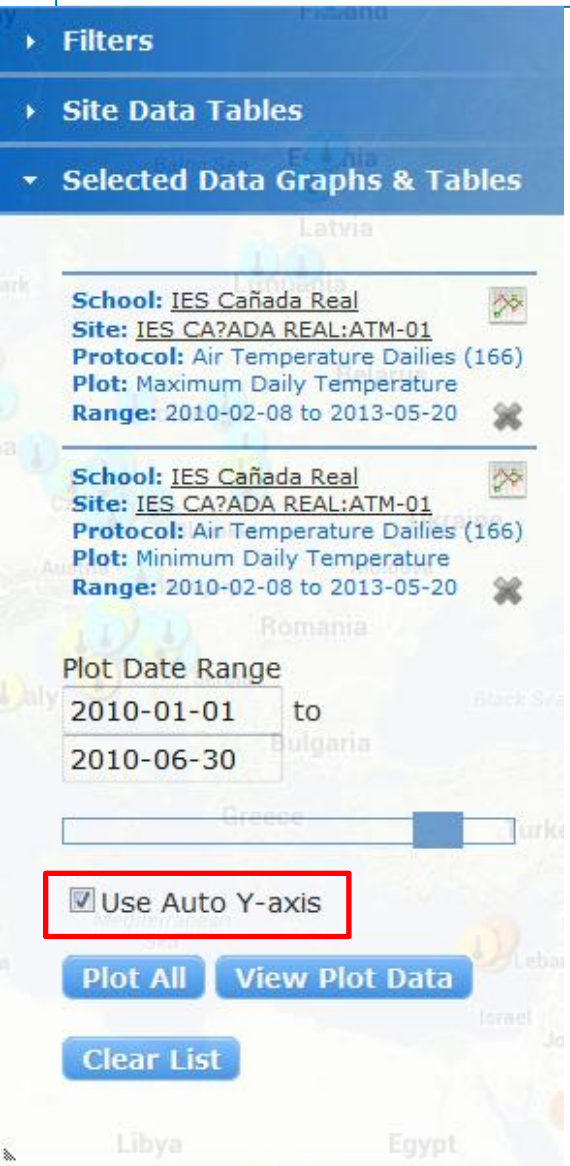
With two datasets selected, you can plot them both by clicking Plot All.

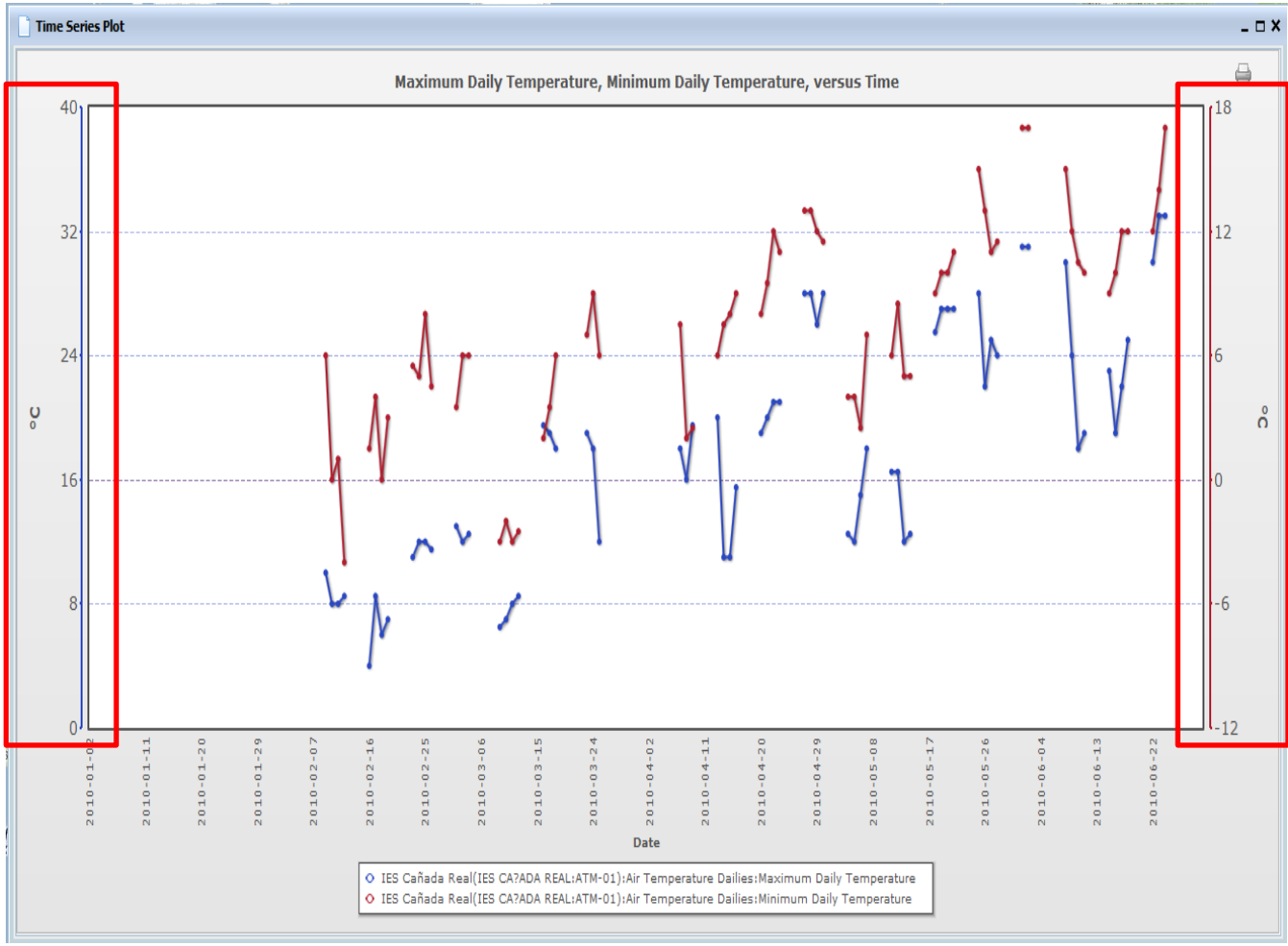


Here is the result. A maximum of 6 datasets can be added to the plot list.



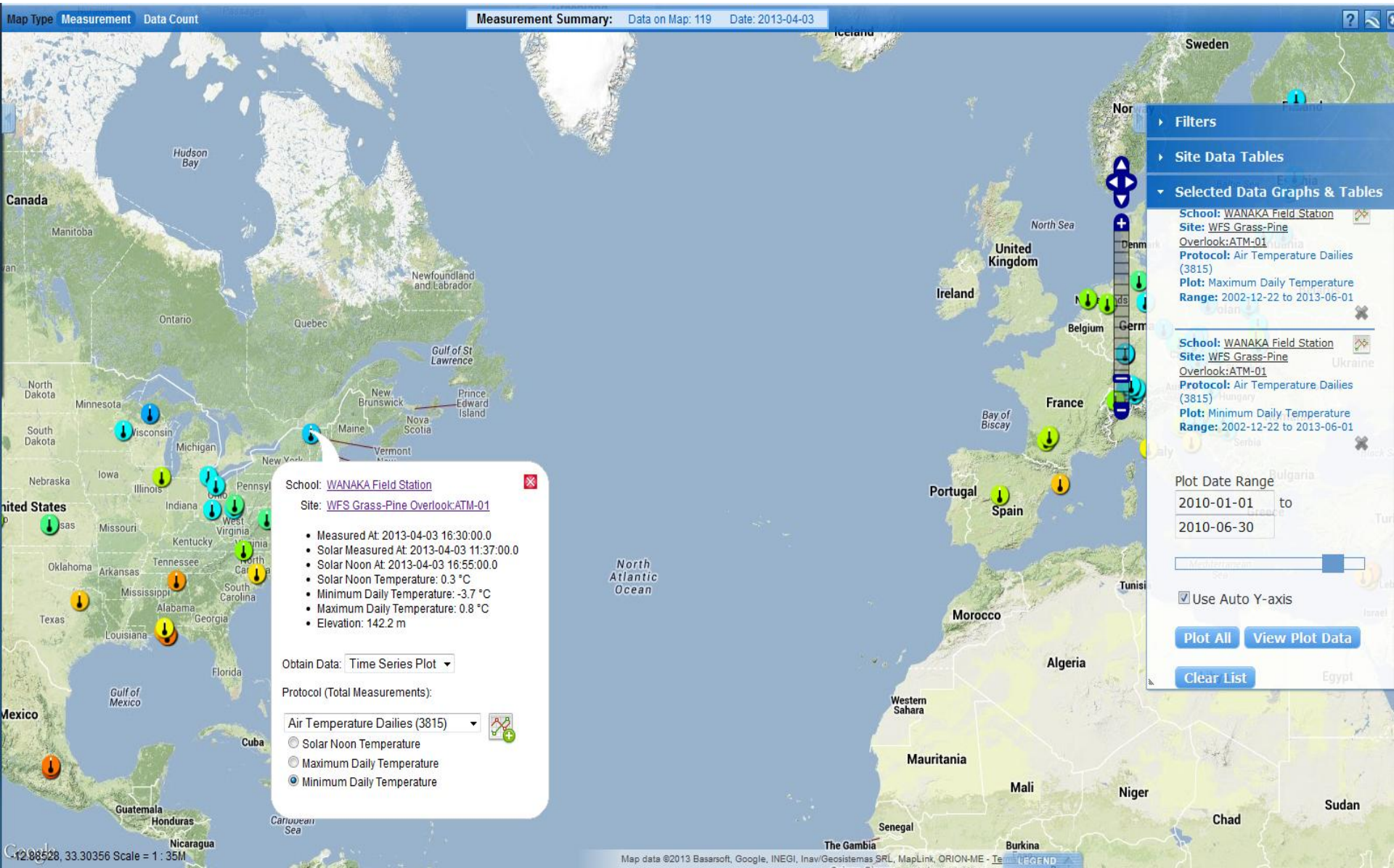
If we check the Use Auto Y-axis box the software adjusts the y-axes individually to spread the data vertically on the graph.
With two datasets with the same units, the result can be misleading.
Note that the minimum temperature in red is above the maximum on most days.



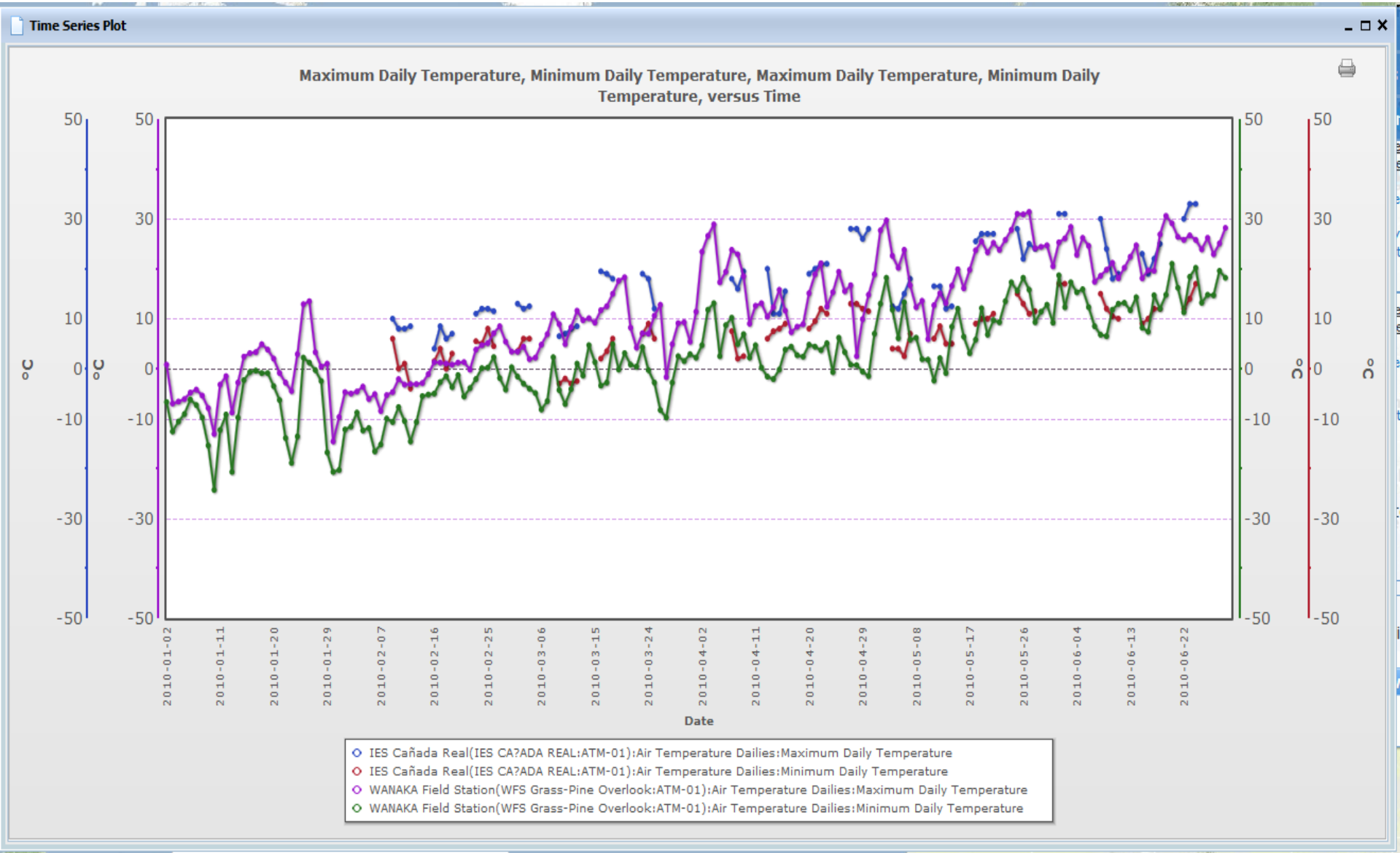


Now add two more data sets: Maximum and Minimum Daily Temperature for a different site - the data rich site in Vermont.

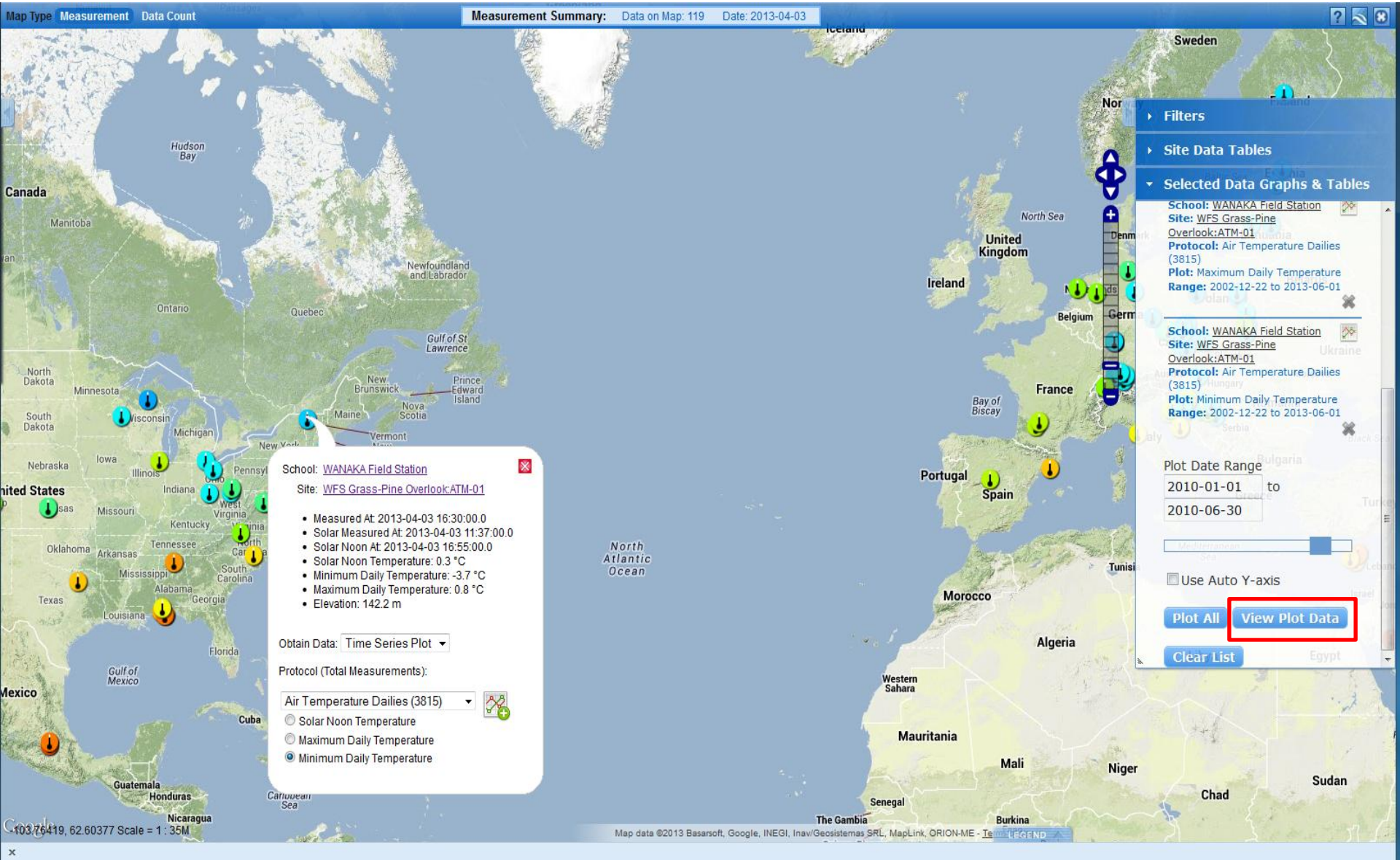
Uncheck Use Auto Y-axis, and click Plot All.



Here is the result. Note that all the y-axis scales are the same. Despite their location on different continents, the temperature patterns for these 6 months are similar.



To get a table of the four datasets from the two sites click View Plot Data.



Here is a section of the resulting table.

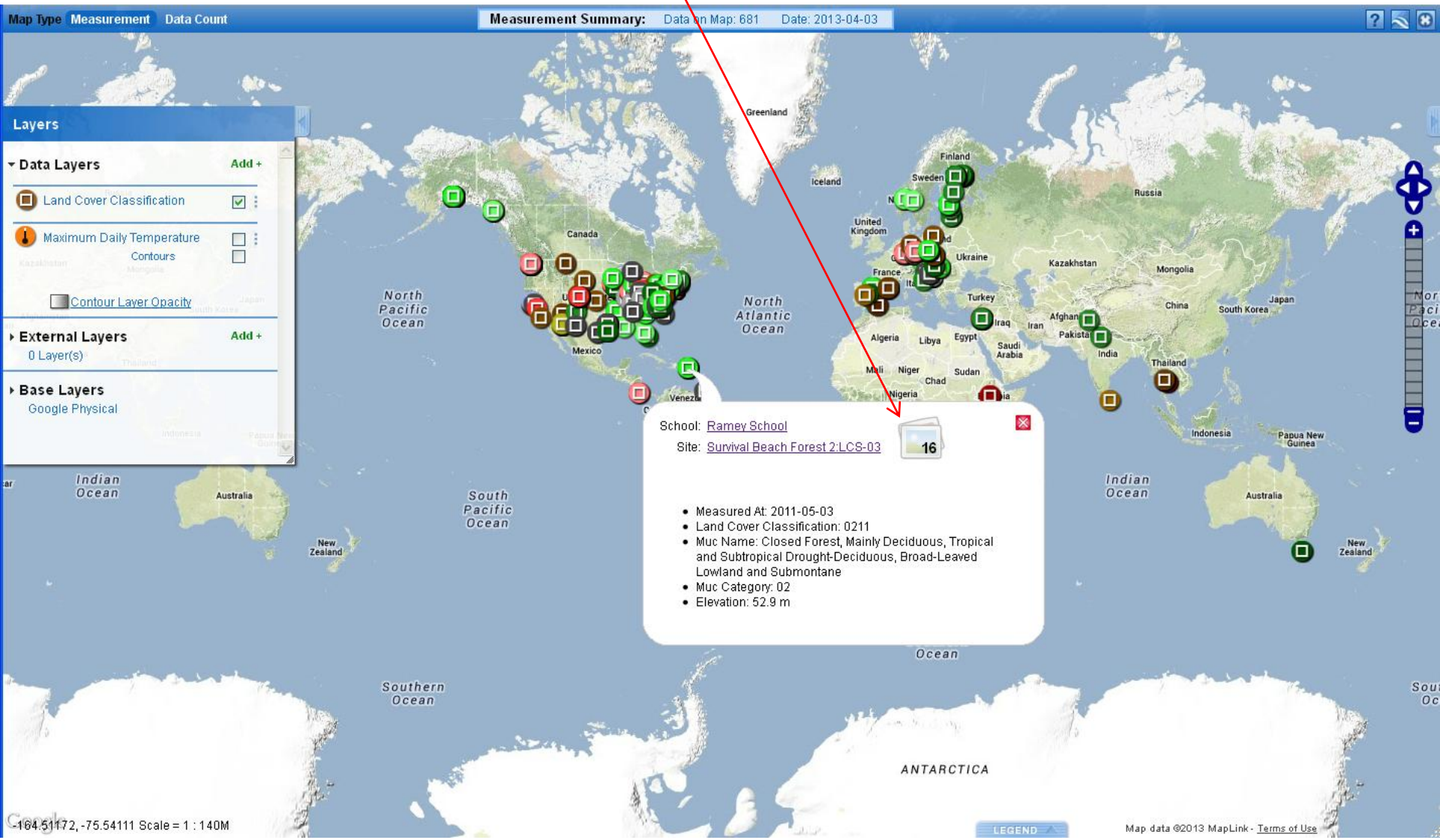
Time Series Plot Data

Measured At	IES Cañada Real IES CA?ADA REAL:ATM-01 Air Temperature Dailies Maximum Daily Temperature (°C)	IES Cañada Real IES CA?ADA REAL:ATM-01 Air Temperature Dailies Minimum Daily Temperature (°C)	WANAKA Field Station WFS Grass-Pine Overlook:ATM-01 Air Temperature Dailies Maximum Daily Temperature (°C)	WANAKA Field Station WFS Grass-Pine Overlook:ATM-01 Air Temperature Dailies Minimum Daily Temperature (°C)
2010-02-09	10	6	-4.7	-10.7
2010-02-10	8	0	-2.1	-7.7
2010-02-11	8	1	-3.2	-10.5
2010-02-12	8.5	-4	-3.1	-14.6
2010-02-13			-3.1	-10.7
2010-02-14			-2.9	-5.5
2010-02-15			-1.1	-5.2
2010-02-16	4	1.5	1.3	-5
2010-02-17	8.5	4	1.2	-2.7
2010-02-18	6	0	1	-1.5
2010-02-19	7	3	0.8	-3.7
2010-02-20			1.2	-1.3
2010-02-21			1.3	-5.6
2010-02-22			-0.2	-3.9
2010-02-23	11	5.5	3.8	-2.1
2010-02-24	12	5	4.7	0.1
2010-02-25	12	8	5.1	0.2
2010-02-26	11.5	4.5	7.1	2.3
2010-02-27			8.5	-1.9
2010-02-28			5.4	-4.2
2010-03-01			3.4	0.3
2010-03-02	13	3.5	3.4	-1.6
2010-03-03	12	6	4.4	-3
2010-03-04	12.5	6	1.9	-4
2010-03-05			2.2	-4.9

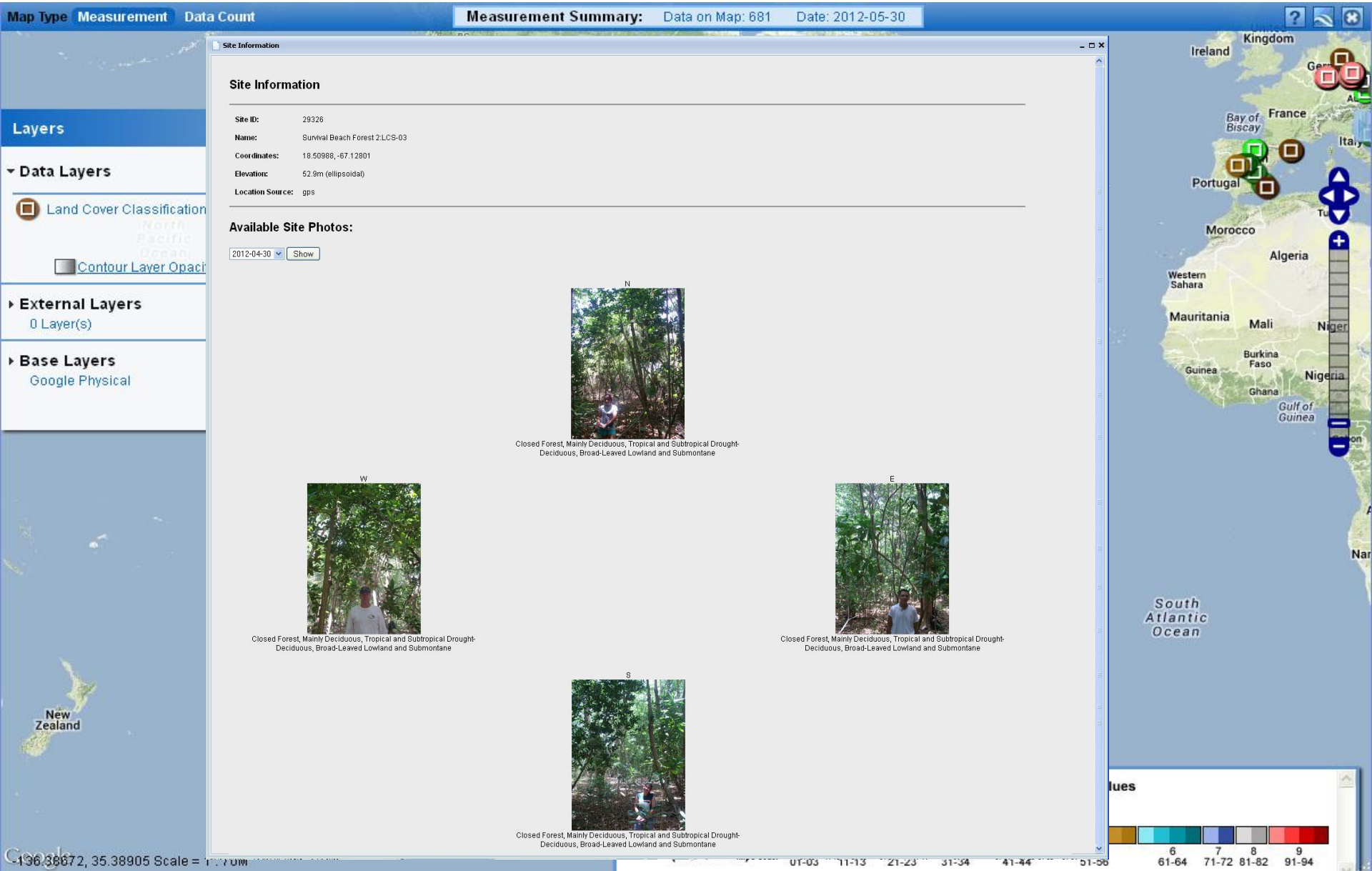
Export .csv

Let's take a look at Land Cover Classification. Add the Land Cover Classification Layer. This map represents the entire history of GLOBE as land cover classification generally changes slowly. In this case, we are not describing the situation for a day or a week but building up of a global map. Turn off the Daily Temperature layer

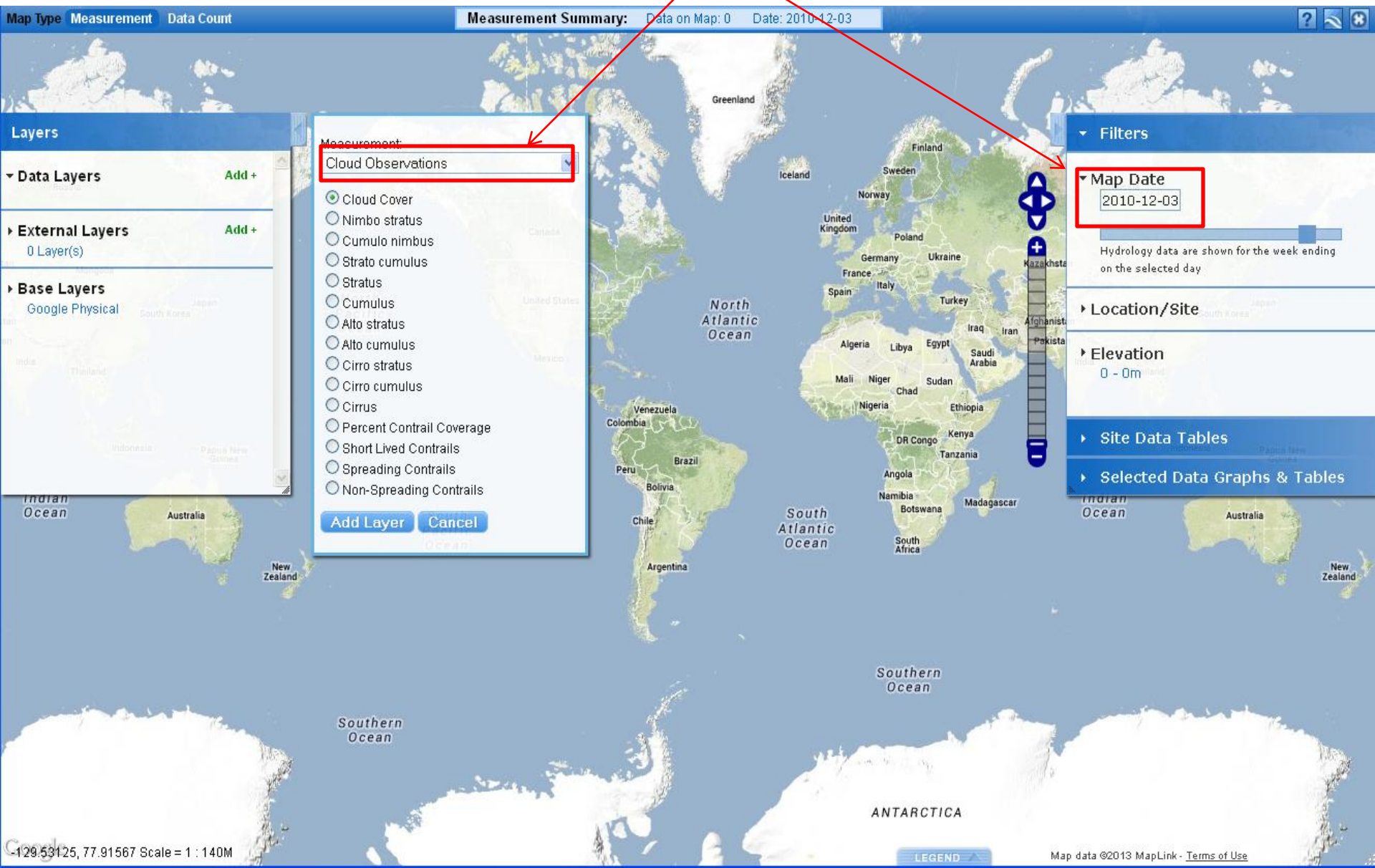
Now, click on an icon. If the site has photos, there will be a photo icon with the number of photos taken at the site



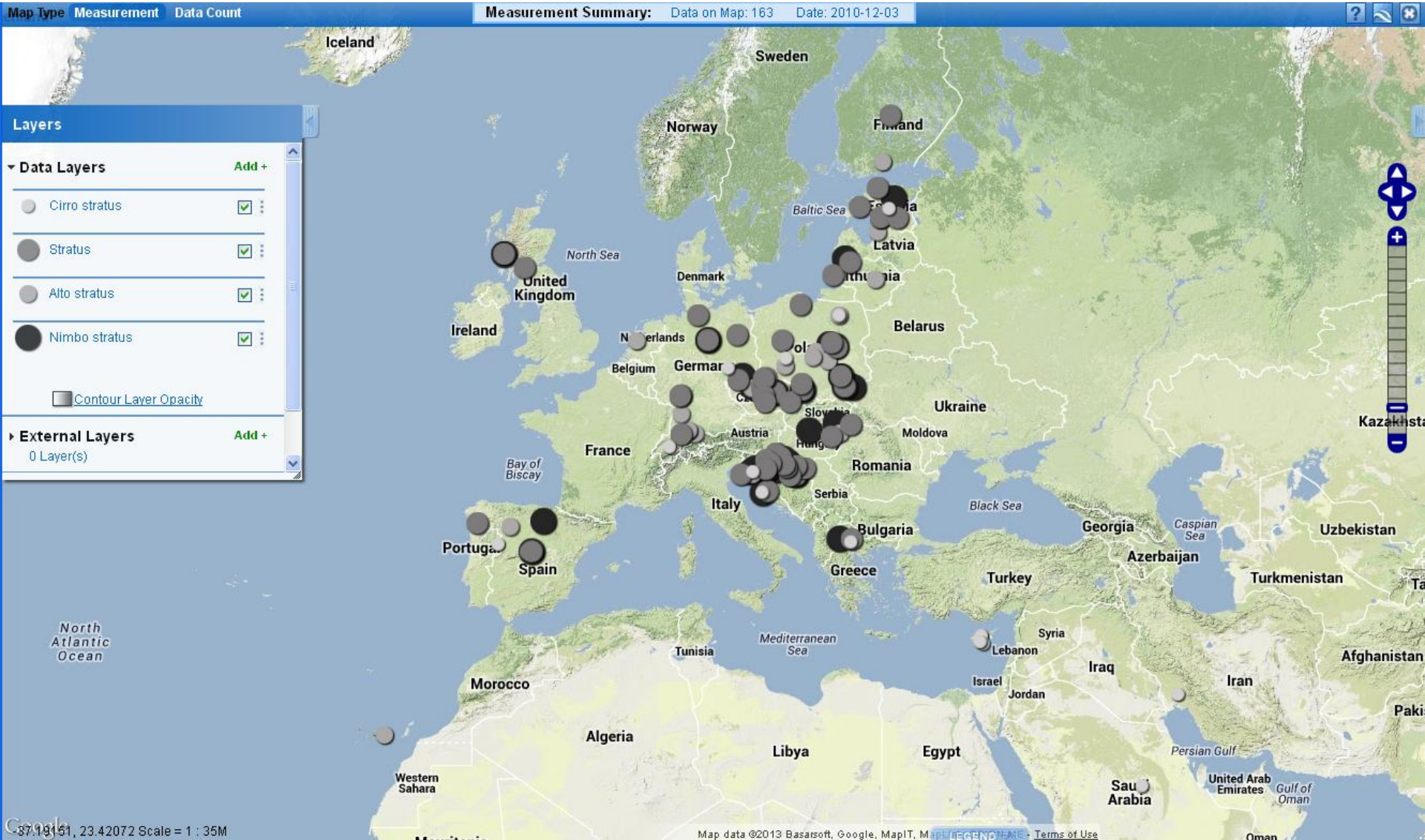
A site information detail page opens showing the photos



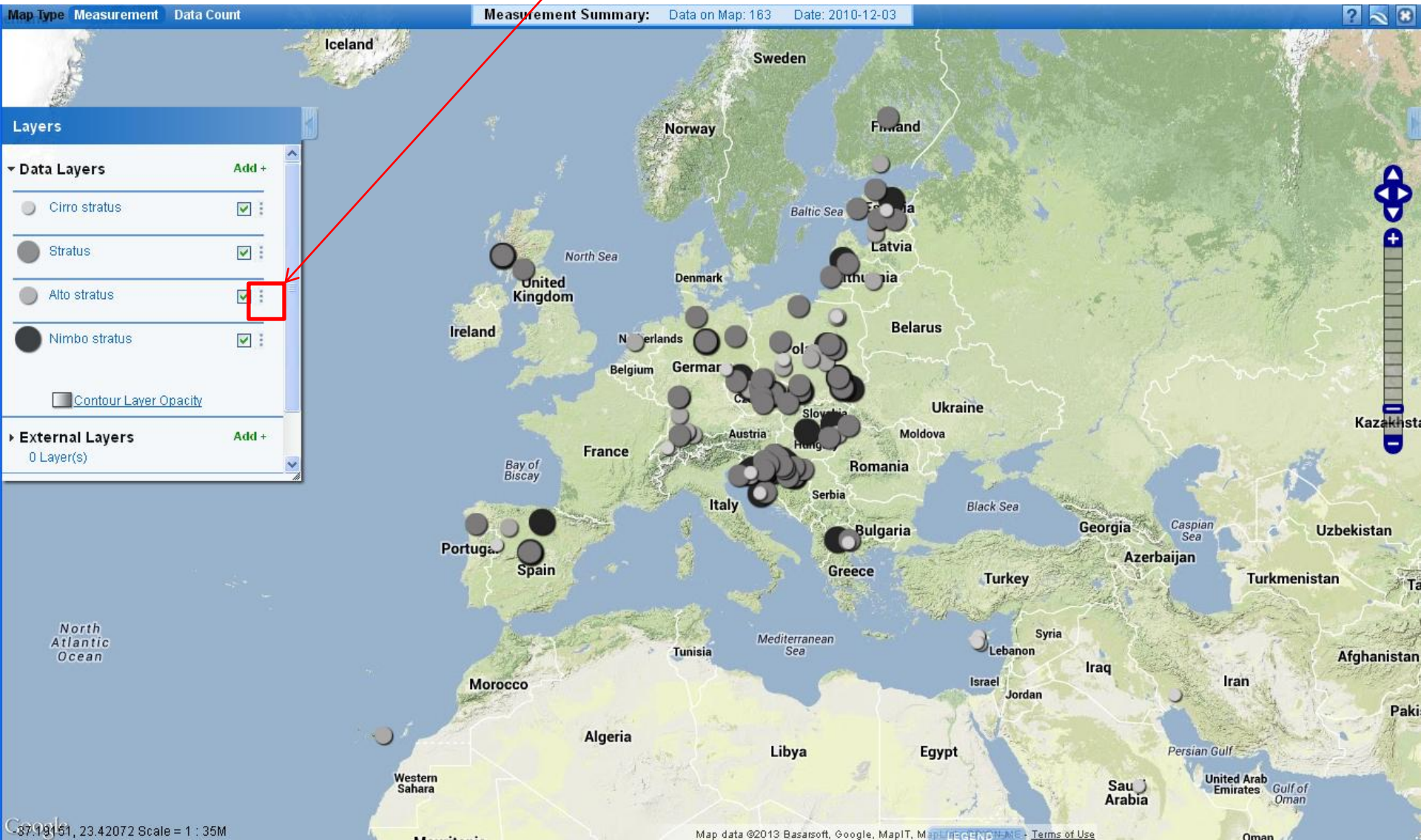
Layer Stacking/ Ordering – Add four Cloud Observation Layers – Cirrus Stratus, Alto Stratus, Stratus and Nimbo Stratus. Change the map date to Dec. 3rd 2010.



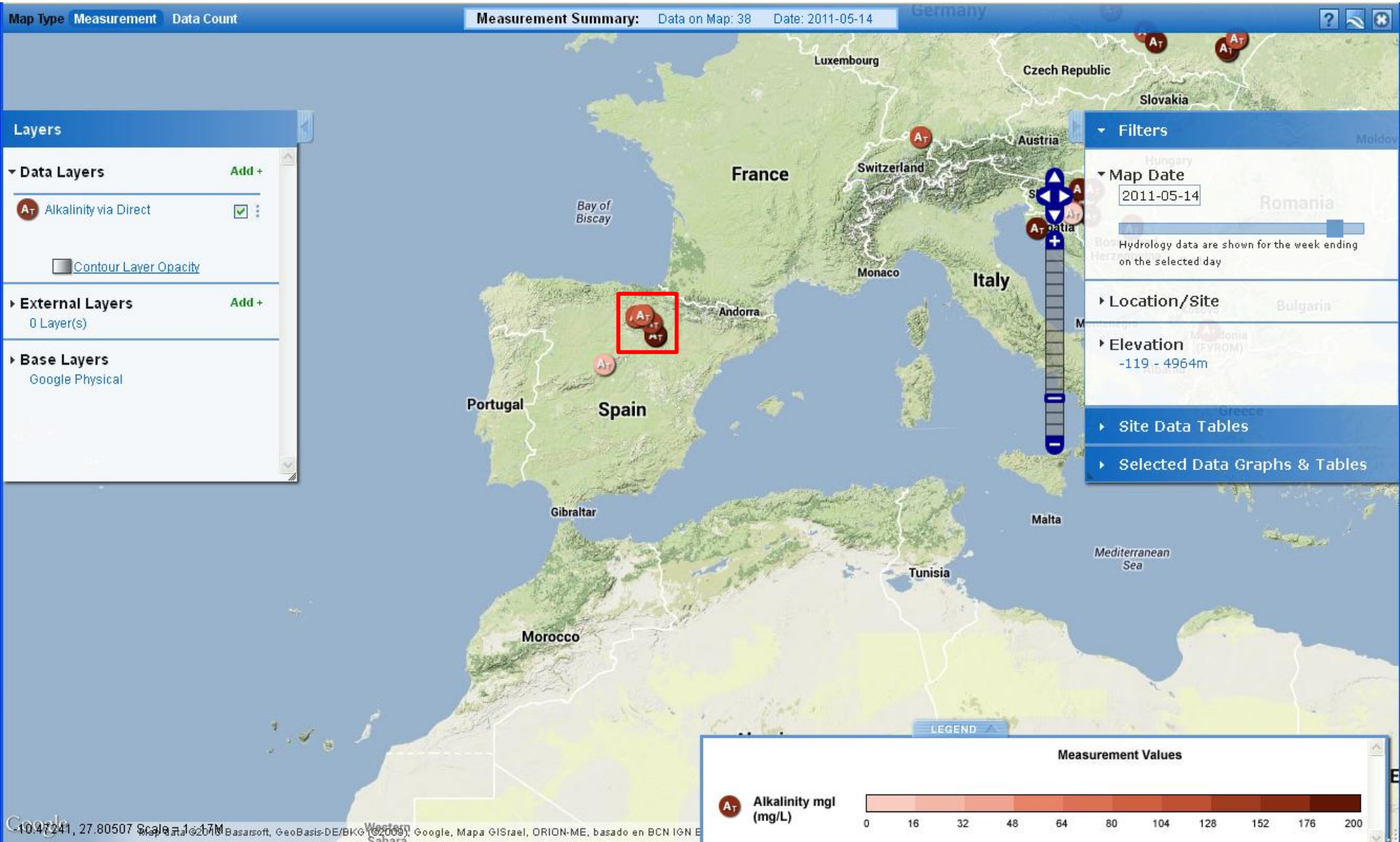
Cloud Observations and other measurement types (Soil Properties, etc.) utilizes different layer sizes and colors so one can see up to 5 layers at a single site. Since different Cloud Observations can be made at the same site on the same day, layer icons can be hidden under another icon.

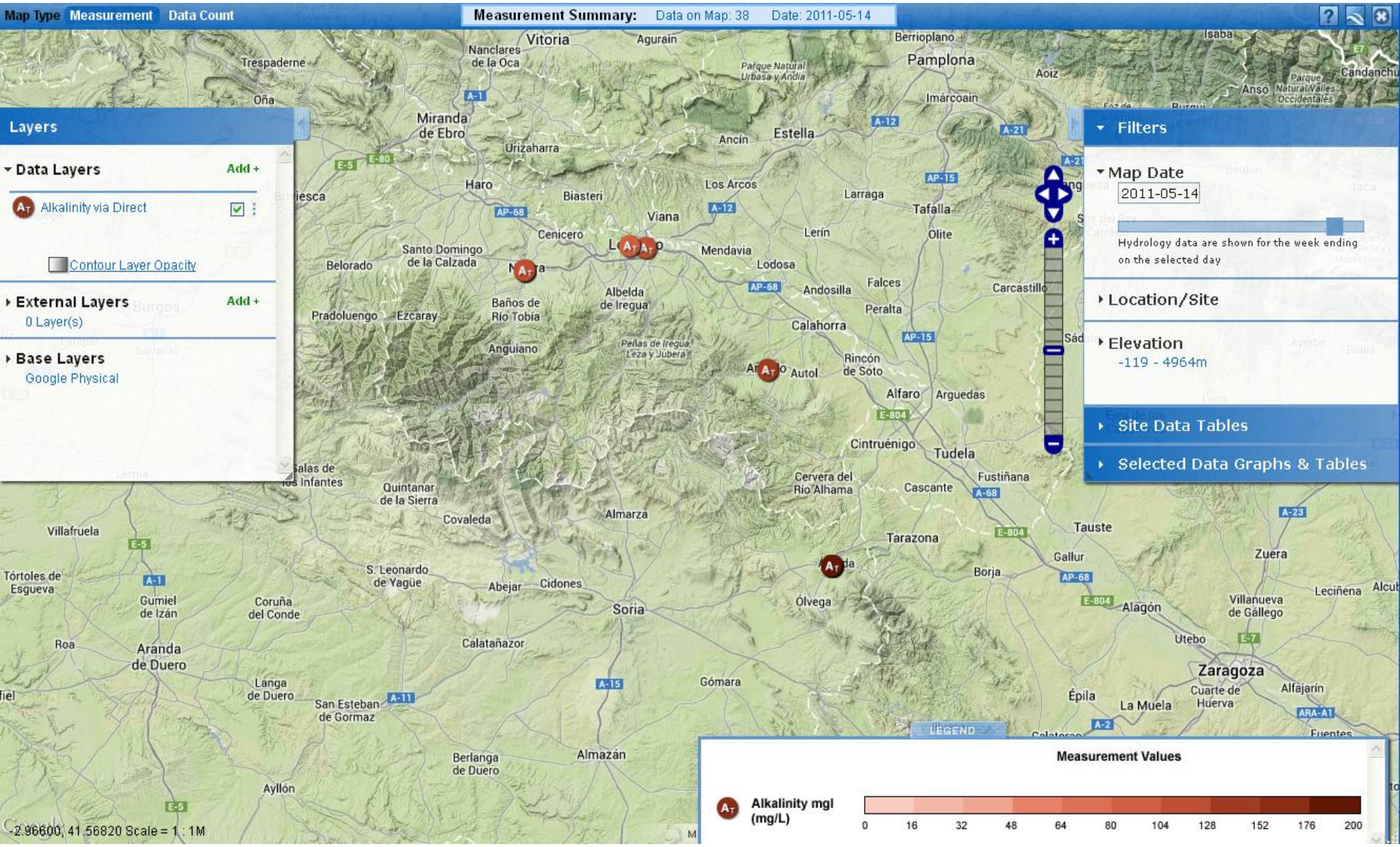


To re-order a layer, click and hold the small dots next to the add button. Now drag the layer to the new position

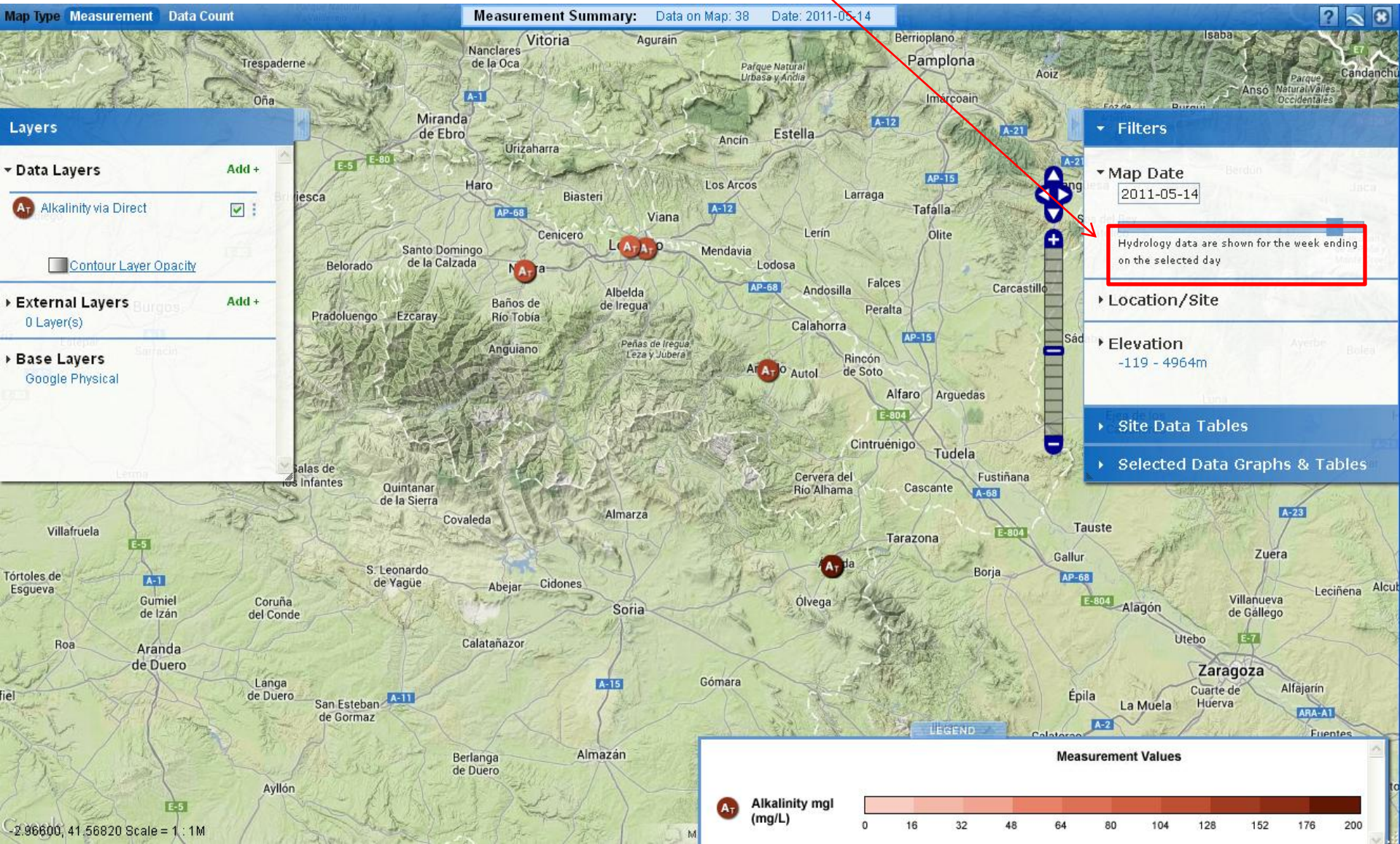


It’s also important to realize that if there are lots of data sites displayed on the map, site icons may be hidden under other icons. If you are not seeing the correct site info window when you click on a site, try zooming in to make sure your site is not hidden under another site. How many sites are in the square below?

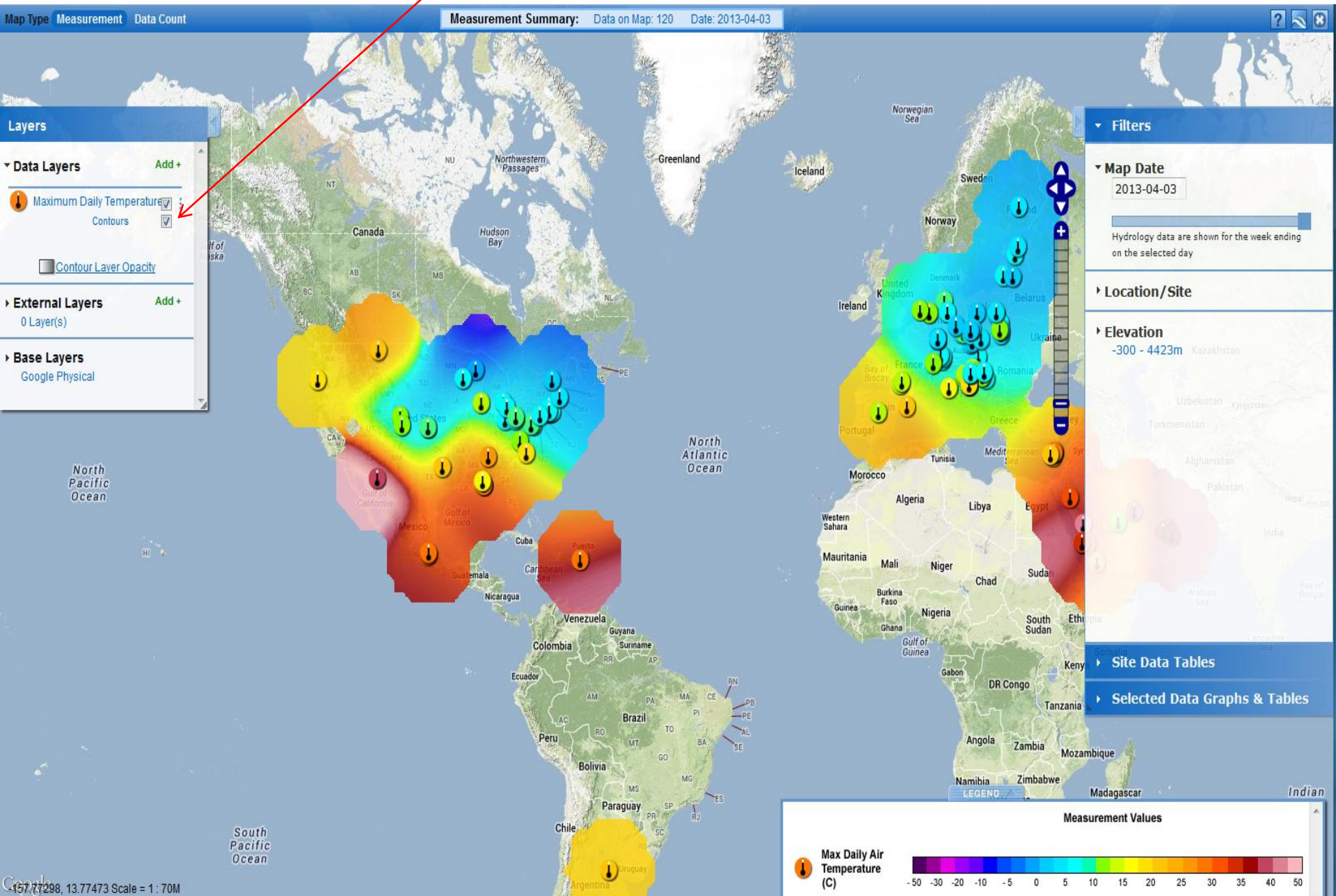



Map Type Measurement Data Count
Measurement Summary: Data on Map: 38 Date: 2011-05-14
Layers
Data Layers Add +
Alkalinity via Direct
Contour Layer Opacity
External Layers Add +
0 Layer(s)
Base Layers
Google Physical
Filters
Map Date
2011-05-14
Hydrology data are shown for the week ending on the selected day
Location/Site
Elevation
-119 - 4964m
Site Data Tables
Selected Data Graphs & Tables
LEGEND
Measurement Values
Alkalinity mgl (mg/L)
0 16 32 48 64 80 104 128 152 176 200
-2.96600, 41.56820 Scale = 1 : 1M

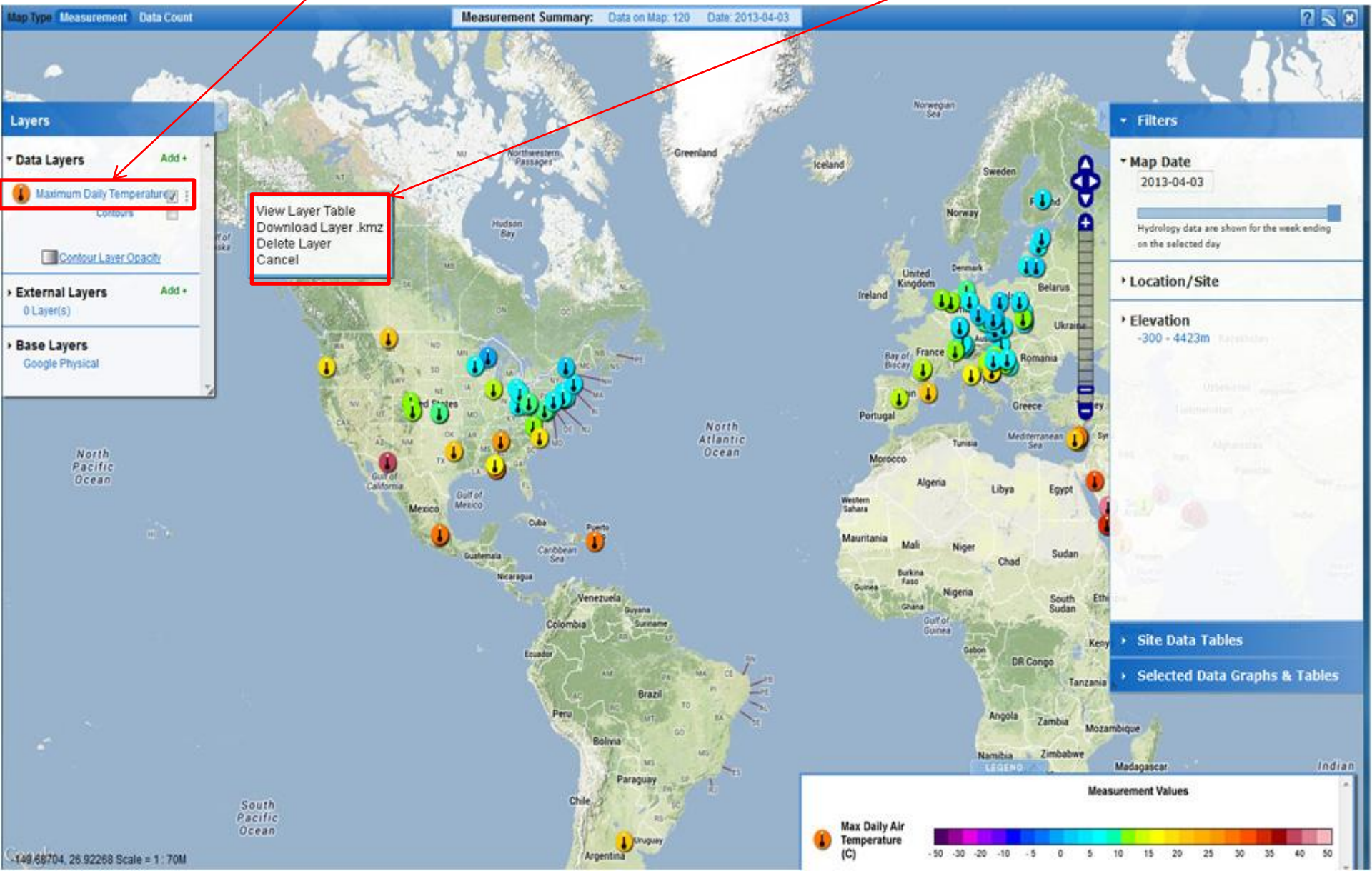
Hydrology data are shown for the 7 days ending with the date selected for a map.



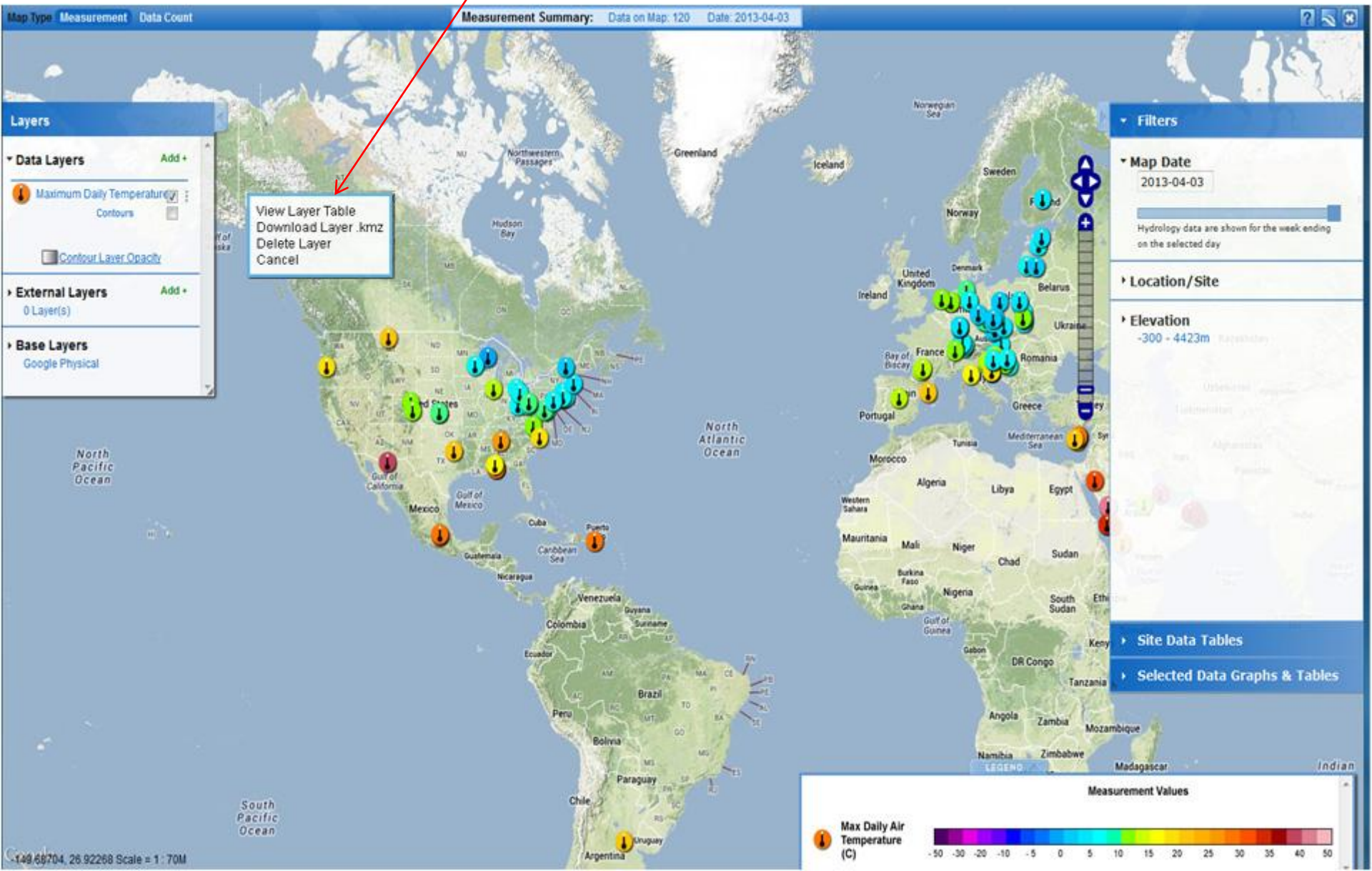
From the Layers Pop-Up box contours of some data sets may be shown by clicking the Contours box.



Click on the layer name (Maximum Daily Temperature) – A selection pop-up box appears.



Click on **View Layer Table** – a layer values table appears.



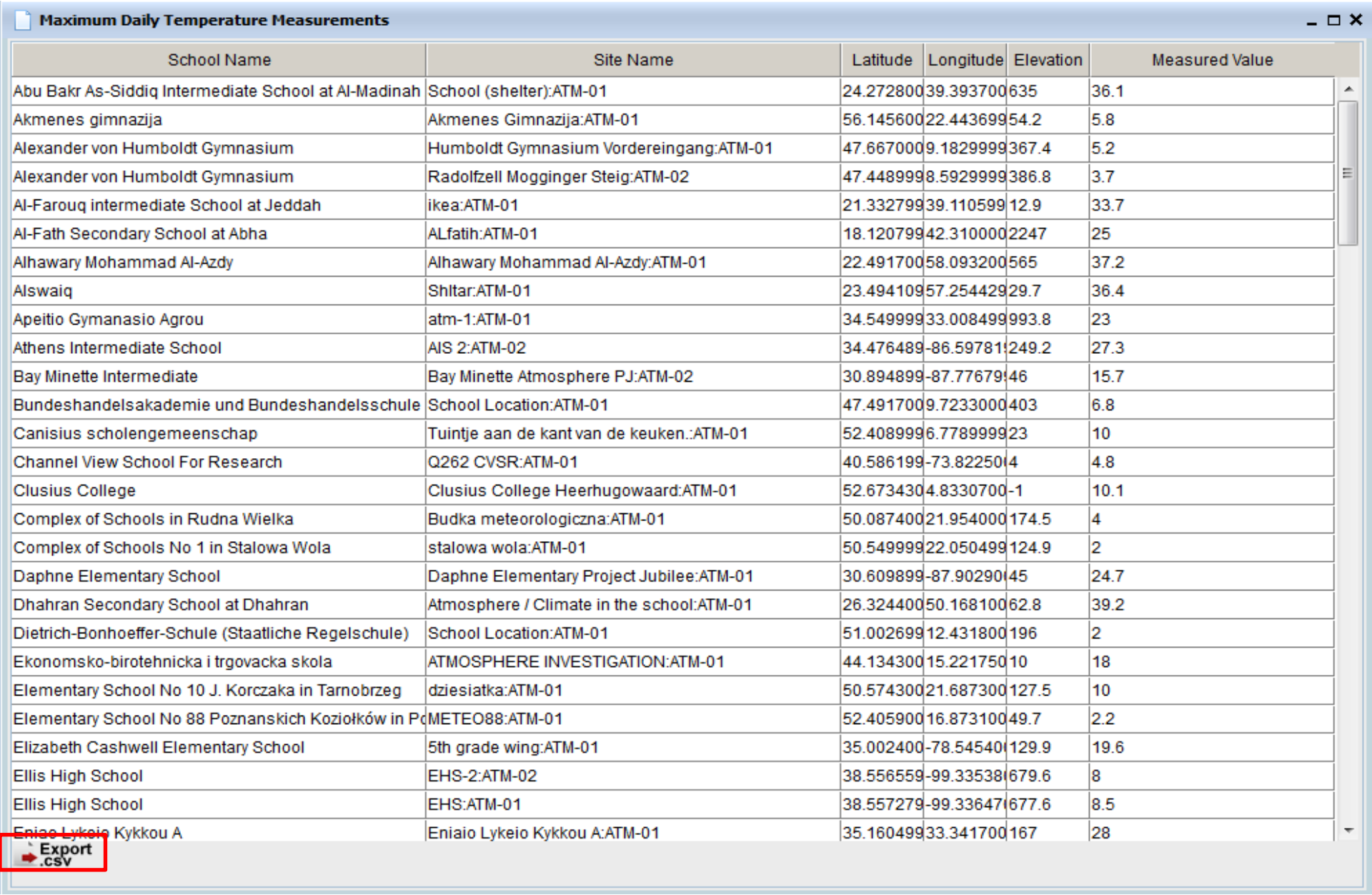
The table can be sorted by any Field Name (School Name, Site Name, etc.)
Double -click on the field name to sort by that field.

Maximum Daily Temperature Measurements

School Name	Site Name	Latitude	Longitude	Elevation	Measured Value
Abu Bakr As-Siddiq Intermediate School at Al-Madinah	School (shelter):ATM-01	24.272800	39.393700	635	36.1
Akmenes gimnazija	Akmenes Gimnazija:ATM-01	56.145600	22.443699	54.2	5.8
Alexander von Humboldt Gymnasium	Humboldt Gymnasium Vordereingang:ATM-01	47.667000	9.1829999	367.4	5.2
Alexander von Humboldt Gymnasium	Radolfzell Mogginger Steig:ATM-02	47.448999	8.5929999	386.8	3.7
Al-Farouq intermediate School at Jeddah	ikea:ATM-01	21.332799	39.110599	12.9	33.7
Al-Fath Secondary School at Abha	ALfatih:ATM-01	18.120799	42.310000	2247	25
Alhawary Mohammad Al-Azdy	Alhawary Mohammad Al-Azdy:ATM-01	22.491700	58.093200	565	37.2
Alswaiq	Shltar:ATM-01	23.494109	57.254429	29.7	36.4
Apeitio Gymanasio Agrou	atm-1:ATM-01	34.549999	33.008499	993.8	23
Athens Intermediate School	AIS 2:ATM-02	34.476489	-86.59781	249.2	27.3
Bay Minette Intermediate	Bay Minette Atmosphere PJ:ATM-02	30.894899	-87.77679	46	15.7
Bundeshandelsakademie und Bundeshandelsschule	School Location:ATM-01	47.491700	9.7233000	403	6.8
Canisius scholengemeenschap	Tuintje aan de kant van de keuken.:ATM-01	52.408999	6.778999	23	10
Channel View School For Research	Q262 CVSR:ATM-01	40.586199	-73.82250	4	4.8
Clusius College	Clusius College Heerhugowaard:ATM-01	52.673430	4.8330700	-1	10.1
Complex of Schools in Rudna Wielka	Budka meteorologiczna:ATM-01	50.087400	21.954000	174.5	4
Complex of Schools No 1 in Stalowa Wola	stalowa wola:ATM-01	50.549999	22.050499	124.9	2
Daphne Elementary School	Daphne Elementary Project Jubilee:ATM-01	30.609899	-87.90290	45	24.7
Dhahran Secondary School at Dhahran	Atmosphere / Climate in the school:ATM-01	26.324400	50.168100	62.8	39.2
Dietrich-Bonhoeffer-Schule (Staatliche Regelschule)	School Location:ATM-01	51.002699	12.431800	196	2
Ekonomsko-birotehnicka i trgovacka skola	ATMOSPHERE INVESTIGATION:ATM-01	44.134300	15.221750	10	18
Elementary School No 10 J. Korczaka in Tarnobrzeg	dziesiatka:ATM-01	50.574300	21.687300	127.5	10
Elementary School No 88 Poznanskich Koziołków in Po	METEO88:ATM-01	52.405900	16.873100	49.7	2.2
Elizabeth Cashwell Elementary School	5th grade wing:ATM-01	35.002400	-78.54540	129.9	19.6
Ellis High School	EHS-2:ATM-02	38.556559	-99.33538	679.6	8
Ellis High School	EHS:ATM-01	38.557279	-99.33647	677.6	8.5
Eniao Lykeio Kykkou A	Eniaio Lykeio Kykkou A:ATM-01	35.160499	33.341700	167	28

Export .csv

The table can be exported to a *.csv (Comma Separated Value) format for use in spreadsheet program or GIS by clicking the **Export** button.



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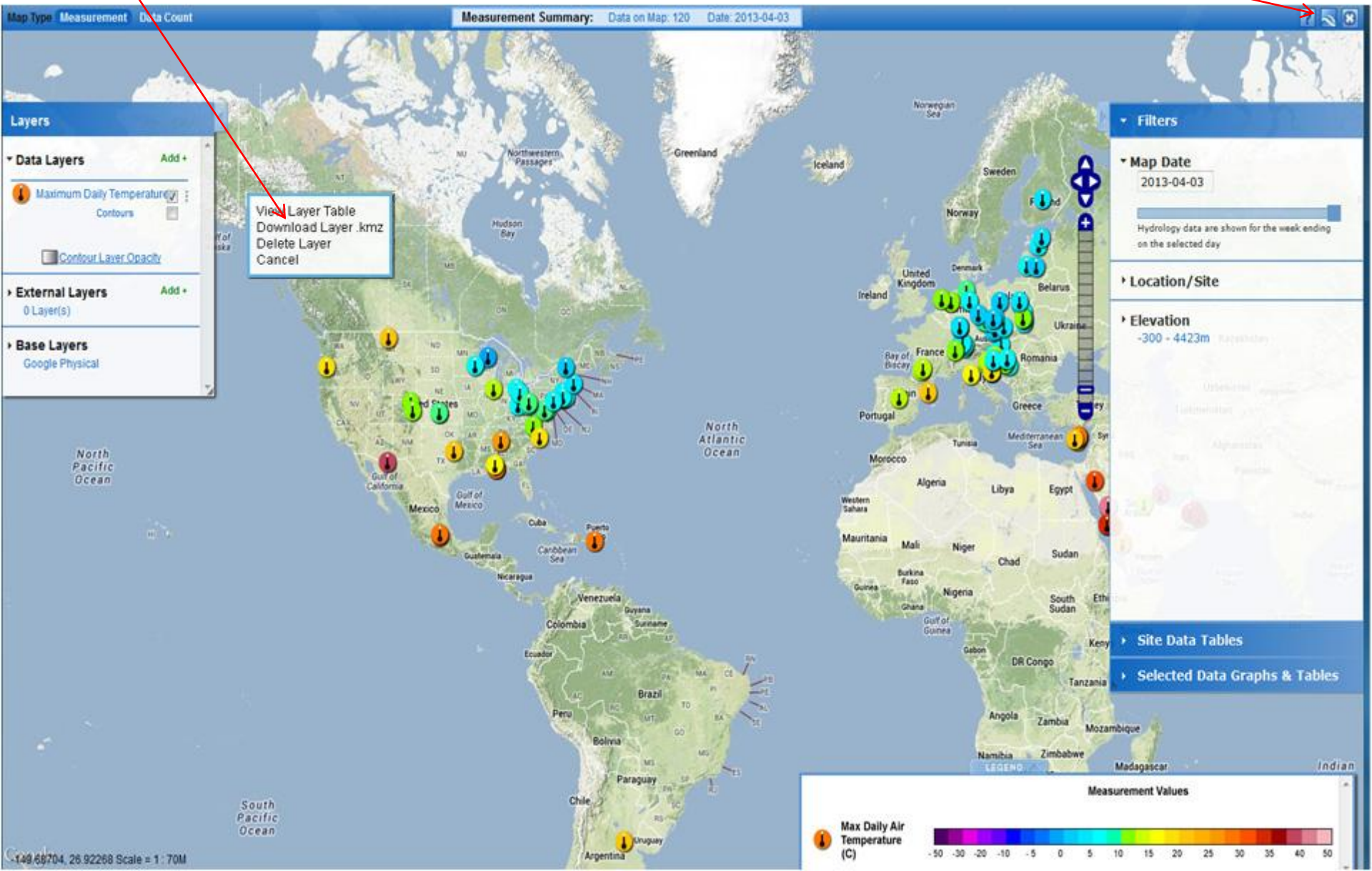
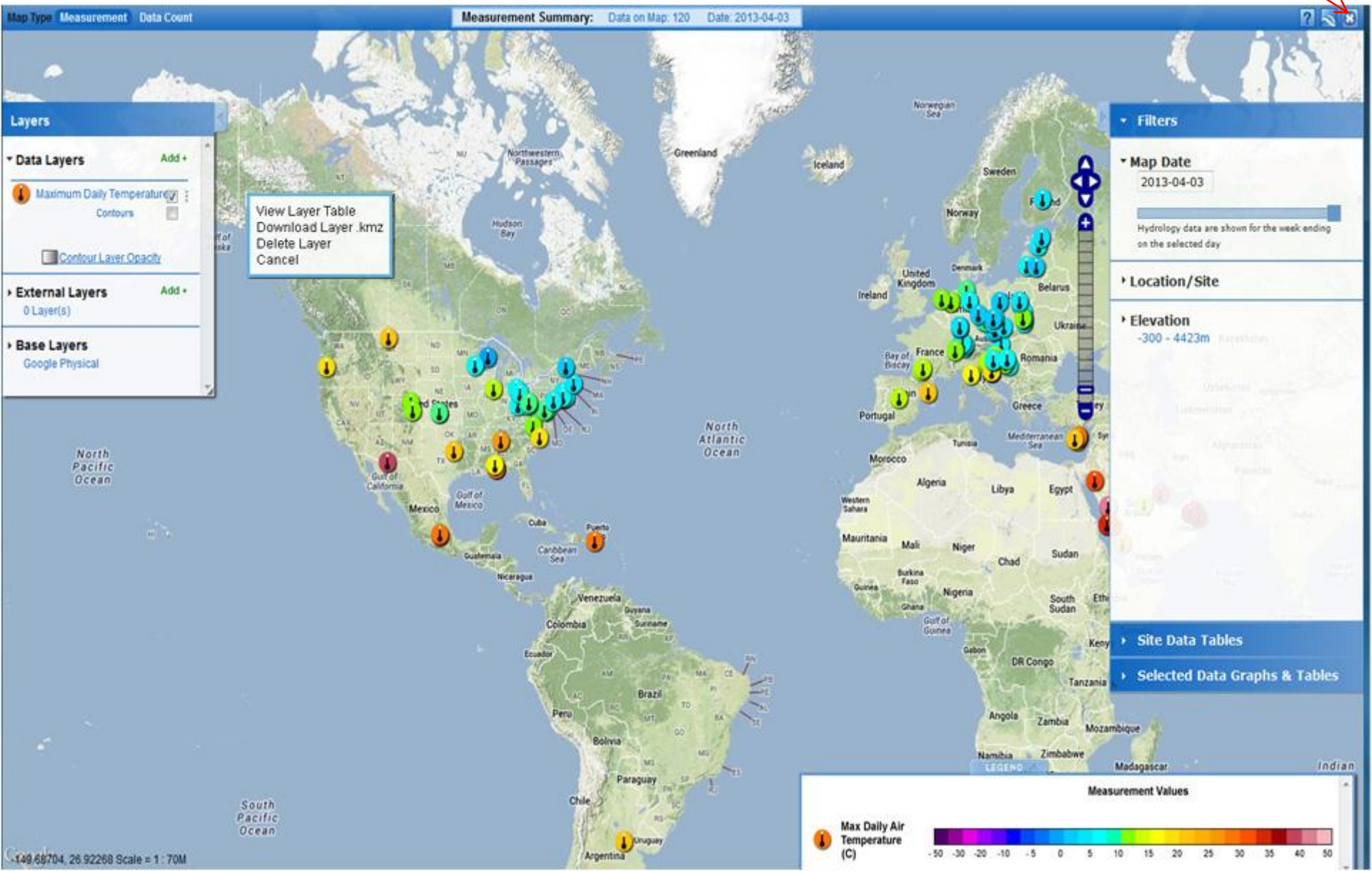
Eniaio Lykeio Kykkou A	Eniaio Lykeio Kykkou A:ATM-01	35.160499	33.341700	167	28

Export .csv

A KMZ file may be exported to Google Earth (desktop version) by clicking Download KMZ.
You may also view the visible layers in Google's 3D Browser version (less powerful)



If your browser supports Geolocation services (such as Firefox),
you can zoom directly to your location by selecting the ‘current location’ icon



Your Assignment

1. On April 7, 2004, how many schools in the Czech Republic reported a water pH reading less then 5?

2. Which measurement technique did the school(s) use?

3. What was the range of pH values reported for this site in 2003 and 2004?

4. Pick one Czech school with a pH value less than 5 and another nearby school reporting water pH on April 7, 2004 and plot the data from the two schools for January to May 2004. What does the graph illustrate?

5. Which school in Poland has reported the most water pH data?

6. Plot water pH, conductivity, and alkalinity for this site from January to May 2004.
   What does this graph illustrate?

Answers

1. One (Filtered by Czech Republic using the place filter and date and then used the 'View Table Layer' tool).

2. Paper (Clicked on the site on the map, it's the lightest color icon. Value found in site info window).

3. 3 – 6 pH units in 2003, 3-6.5 in 2004 (Selected pH and added site to Site Data Table and selected Data Date Range from Jan-Dec 2003 and then for 2004).

4. The pH level for the school with the higher pH lever on April 7th on was consistently higher from Jan to May

5. XI Liceum St. Konarskiego in Wrocław (Filtered by Poland, switched to Data Counts map. It has the largest circle)

6. The pH remains fairly constant despite significant changes in alkalinity and conductivity (Added each dataset to the plot list by selecting each one in the site info window)

Questions and Answers

THE GLOBE PROGRAM