

Figure AT-STP-5: Europe Temperatures - September 21, 2006.

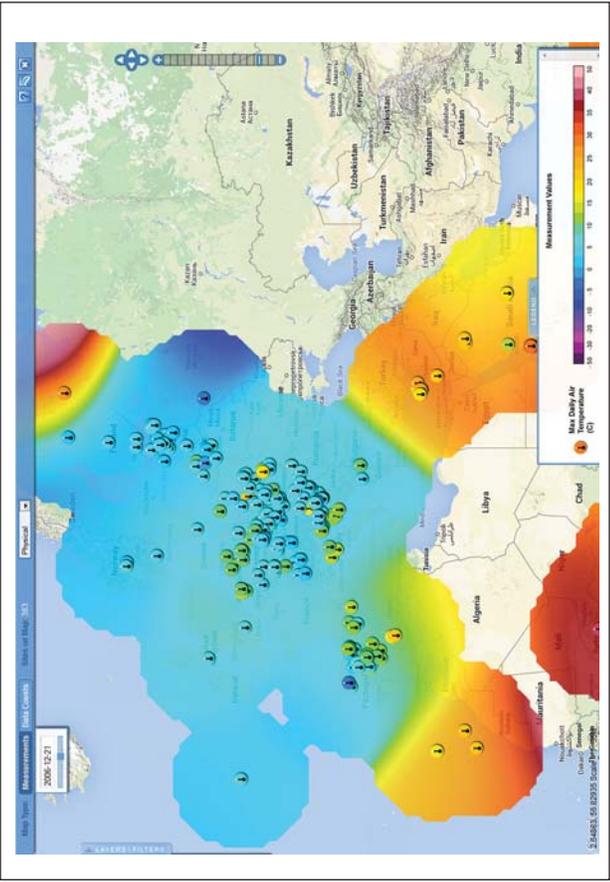


Figure AT-STP-6: Europe Temperatures - December 21, 2006.

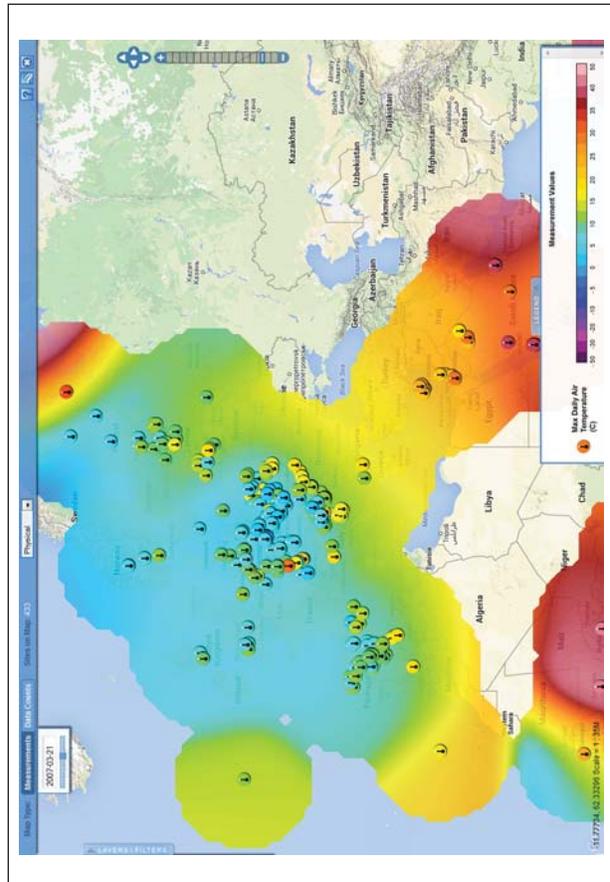


Figure AT-STP-7: Europe Temperatures - March 21, 2007.

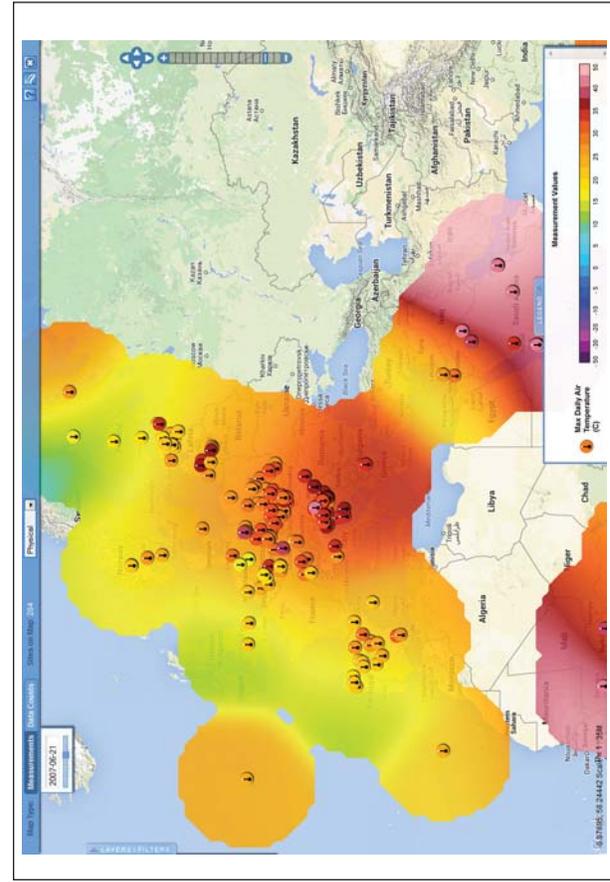


Figure AT-STP-8: Europe Temperatures - June 21, 2007.

Figure AT-STP-9: Maps

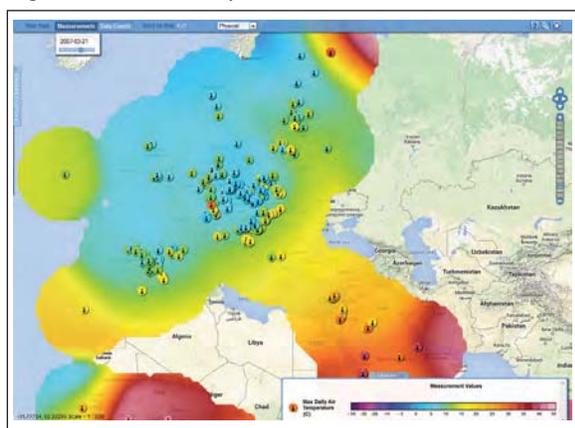


Figure AT-STP-10: Graphs

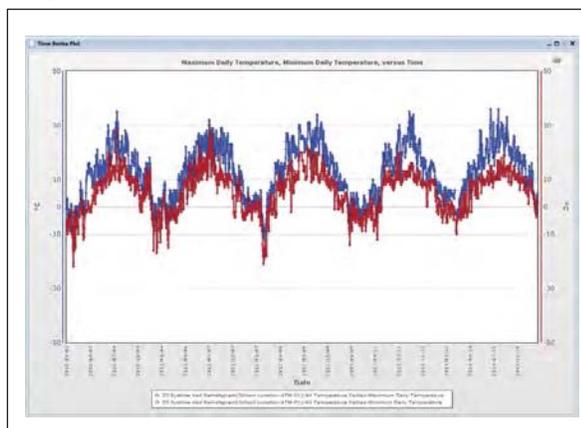


Figure AT-STP-11: Data Table

School Name	Latitude [▲]	Longitude	Elevation	Measured Value
Wilhelm-August-Lay-Schule	48.083	7.683	160.8	22.5
Foerderzentrum Erding	48.2977	11.8943	468	26
Stredni Odborne Uciliste Lesnicke a Rybarsk / SOUL a R/	48.9345	17.2934	147.9	23
Zakladni skola Josefa Bublka, Banov	48.9908	17.7203	250	22
ZS a MS Domamil	49	15	495	20
Zakladni skola T.G.Masaryka	49	15	465	23
ZS Brumov Bylnice	49.0818	18.0198	286.9	21.3
Gymnazium Slavcivn	49.0905	17.88	363	21
ZS Otrokovice	49.2179	17.5115	135.8	23
Volksschule Petersaurach	49.3117	10.7448	445	21.2
Staatliche Realschule	49.32613	11.01033	301	23
ZS Bystrice nad Pernstejnem	49.519	16.26	570	21
Gymnazium Dr. A. Hrdlicky	49.542	15.3537	518	22.4
Wilhelm-Erb-Gymnasium	49.5673	7.8502	268	22.8
Gimnazjum No 2 in Żywiec	49.6833	19.2002	353	18.3
ZS Pomezí	49.7148	16.3003	565	29.5
Gymnasium an der Heinzenwies	49.7213	7.3092	341	22
Zakladni Skola Opavska	49.7597	17.7845	401	20.7
ZS Golcuv Jenikov	49.8224	15.4836	395	25.1
Darmstadt Elementary School	49.8457	8.6412	217.1	17
VOS a SOST Litomysl	49.8724	16.3041	299.6	19
Offene Schule Babenhausen	49.9	8.84	37	21.6
Gymnazium (CZCZMA4W)	49.9042	16.4432	350	24
ZS Borovskeho Karvina	49.9088	18.4522	279	27
ZS Vrane nad Vltavou	49.9368	14.3792	240	26
Offene Schule Babenhausen	49.96	8.95	37	21
Complex of Schools in Jaroslaw	50.0033	22.6786	212.2	22.6
Gymnazium Voderadska	50.0673	14.4977	185	24
Complex of Schools in Rudna Wielka	50.0874	21.954	174.5	22.5
Gimnazjum No 7 Jana III Sobieskiego in Rzeszów	50.1466	22.1738	179.1	23
Zakladni Skola (CZCZAHJA)	50.2057	16.2367	438	25
DDM	50.2066	15.8347	233.2	26
4. Zakladni Skola - Ekolog. Praktikum	50.4387	15.3523	868	22.2
Mittelschule Elsterberg	50.4433	12.5057	643.5	19.1
Gimnazium in Toszek	50.4514	18.5163	209.1	19
Complex of Schools J. Kilnskiego in Krapkowice	50.4842	17.9581	200	21
Goethe Schule	50.5412	8.522	260	26.3



and disadvantages of each type of display.

For example, your students might notice that:

Maps show how data varies from one location to another. You can see world-wide or regional patterns such as the warmer temperatures in the equatorial regions of the world.

Graphs show how data changes over time. You can see annual patterns such as the warmer temperatures in summer and the colder temperatures in winter.

Data tables show lots of data values in a grid. You can quickly find any type of data for any location, such as the temperature and precipitation amount for a given city.

Post a copy of the map, graph and data table on a bulletin board, and have your students write under each type of display some interesting observations that they see in that display. For example, under the graph they might write the coldest day of the year. Under the map, they might write the coldest location in the world. Then have them write some questions that could be answered with that type of display.

You may need to revisit this comparison of different types of data displays, as students plan their own investigations, such as in step 5 below. Students need to be sure that they're using the most appropriate display for their data analysis.

Step 5. Students use an inquiry-based approach to extend the investigations.

There are several ways that you and your students can extend the investigations. For example:

- Print out maps from two consecutive days (such as June 21 and June 22). Using these two maps, students can explore short term variations versus long-term seasonal changes. For example, they might see minor changes in the shapes of the temperature bands from one day to the next, and larger changes in the overall temperatures from one season to the next.

- Pick two locations for more detailed comparison. For example, your students might find that a town on the Mediterranean coast has less variation between winter and summer than a place in central Canada. This might be because the water of the Mediterranean has a moderating effect on temperature variations. If so, do other coastal locations have similarly moderated temperature variations?
- Display other data on the maps, such as precipitation amount. Students might compare patterns of snowfall in the winter versus the summer and compare Northern Hemisphere vs. Southern Hemisphere.

In each of these extensions, be sure your students use an inquiry-based approach, in which students:

1. Begin by exploring the displays to see what patterns and questions emerge.
2. Select a question that seems especially interesting.
3. Decide what resources can help students investigate the question. Especially focus on use of GLOBE data (each of the examples above uses GLOBE data).
4. Conduct the investigation, either individually or in teams.
5. Share the findings with other students.
6. Think about what new questions emerged that could lead to further investigations.

For these investigations to succeed, they need to be genuinely engaging for the students, the student(s) should really care about the answer. One goal of the activities in this seasons module is to stimulate such interests. In that sense, these activities not only have their own intrinsic value, but also serve as launching pads for further investigations.



Assessment

In this activity, your students have learned about seasonal patterns in global temperature data. They also have learned about GLOBE's map visualization tools. To assess student learning, use the following two steps:

1. Ask your students to use the GLOBE data server to create a contour map of student temperature data from July 15 and January 15 (these dates are near the peaks of summer and winter, and are different from the maps they've already used). Check to make sure each student is able to do this activity correctly. You might have a student who knows how to do this help you by observing the other students as they go through the steps, to see who knows how to do this, and who has what kinds of problems.
2. If possible print out the July 15 and January 15 maps from the previous step, and make copies for your students. If you can't do this, then use the sample Dec 21 and June 21 temperature maps that appear in the background section. Then have your students indicate which is summer and which is winter. If you wanted to extend the assessment further, you might print out a 6 month sequence from July 15 to January 15 (one map from each month), cut out or cover over the date on each display, and then ask your students to sort them into the proper sequence. Then ask them to write down what evidence they used to put them in this sequence.