Data Analysis: *Identifying a Sea Breeze Front*

A. Complete this portion on the provided Figures 1-4.

B. Using Figures 5 and 6:

1. What differences do you notice between the two profiles?

2. When did the sea breeze front begin?

3. How long did the front have an effect?

4. How much did air temperature change during this time?
   a. At DBBB: _____
   b. At DLAU: _____
5. How much did the relative humidity change?
   a. At DBBB: _____
   b. At DLAU: _____

C. Using Figures 7 and 8:

6. i. By approximately how much did the wind speed increase at DBBB? _____
   ii. From what direction did the wind shift? _____
   iii. To what direction did the wind shift? _____
   iv. How long did the increased wind speed and direction shift last? _____

7. Were there any other drastic shifts in wind direction during the 24 hour period?

8. Based on the data from Figures 1-4, did the DLAU station experience the sea breeze? Provide evidence for your answer.

D. Using the radar loop:

9. Does the front cross the entire state of Delaware? _____
10. Using the time stamps in the upper right corner, determine how long it takes for the front to move from the coast to the furthest point inland. _____

E. Using real-time data from DEOS (www.deos.udel.edu):

11. The date and time of the current observations: _____
12. Current air temperature: _____
13. Current relative humidity: _____
14. Current wind speed: _____
15. Current wind direction: _____
16. By looking at the plots of air temperature and relative humidity, is there evidence of a sea breeze front taking place in the last 24 hours?
17. Is there evidence of a sea breeze front in other areas? Describe the evidence for or against the presence of a sea breeze front.

Discussion Questions

1. How might the following affect the formation and characteristics of a sea breeze front?
    a. A cloudy day

    b. A brief, but strong thunderstorm moving west to east over the area

    c. A nor'easter

    d. An intense heat wave, with temperatures exceeding 100˚F, for a week straight

    e. Increased development of the coastal area, including wider road, more impervious surface, and large skyscraper hotels.

2. The radar loop definitively shows the movement of the sea breeze front. If you were a meteorologist on the news, what would be the advantages and disadvantages of showing a modeled or predicted loop as opposed to an actual radar loop?

3. In the radar loop, we can see what appears to be a slow moving sea breeze moving northeast from Delaware Bay into New Jersey. Why do you think there is not a sea breeze front moving west to east from Chesapeake Bay onto Maryland's Eastern Shore?

    a. If there was a Chesapeake Bay sea breeze front, what would be the result of the two fronts converging?

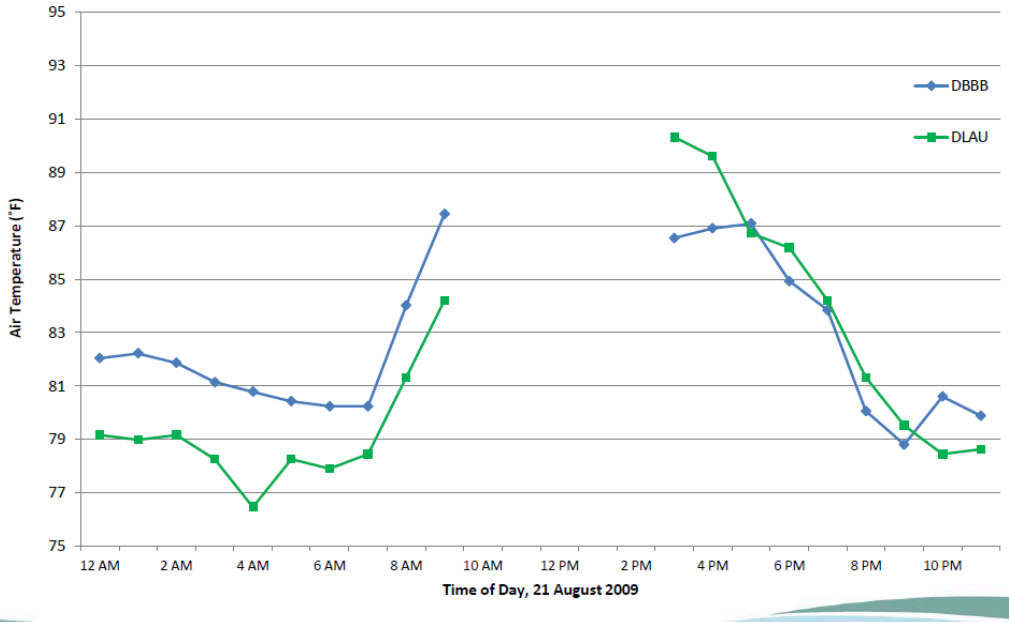
4. Discuss the advantages and disadvantages of environmental observing system data.

5. If you were city manager, how could you use the data and models presented in this activity to guide future development in your city?

6. Describe other methods of determining the impact of urbanization on sea breeze fronts.

Sea Breeze

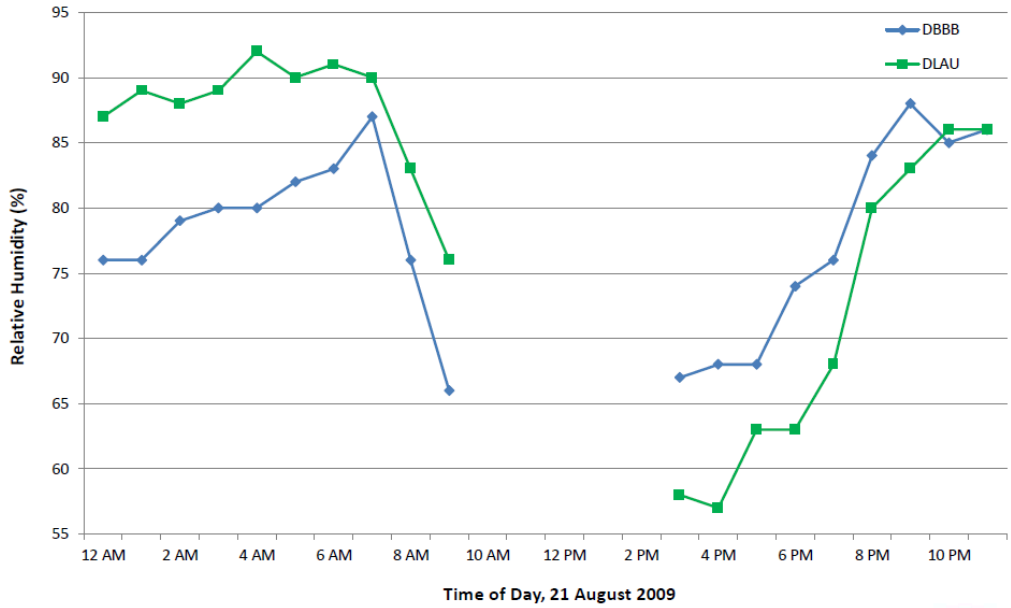
Figure 1. Air temperature data from DEOS stations DBBB and DLAU on 21 August 2009.



Delaware Sea Grant Data Activity

Sea Breeze

Figure 2. Relative humidity data from DEOS stations DBBB and DLAU on 21 August 2009.



www.deseagrant.org/outreach/education

Figure 3. Wind speed data from DEOS stations DBBB and DLAU on 21 August 2009.

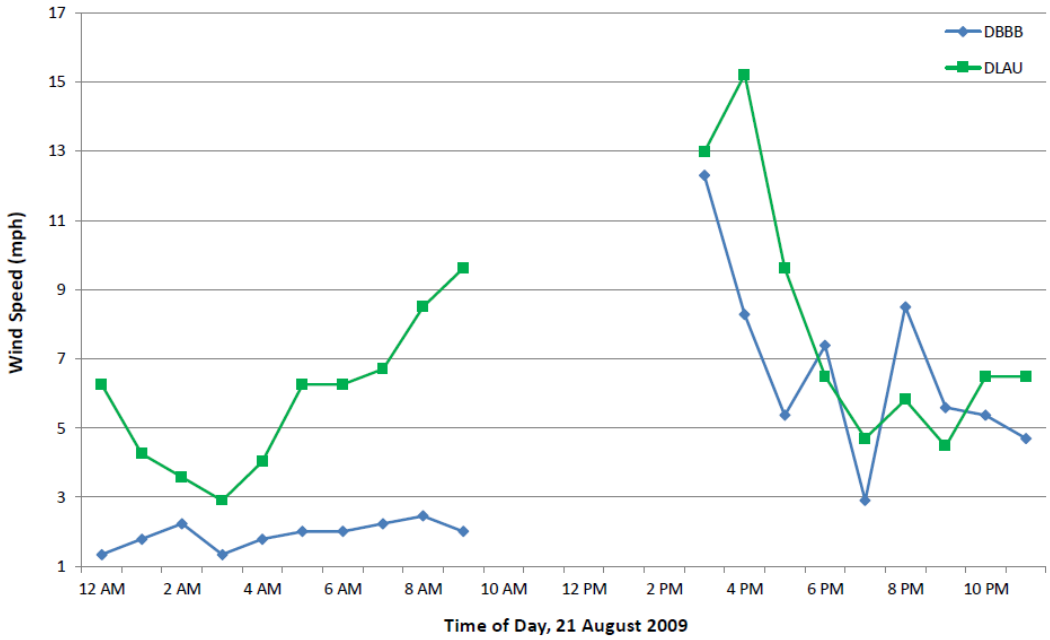


Figure 4. Wind direction data from DEOS stations DBBB and DLAU on 21 August 2009.

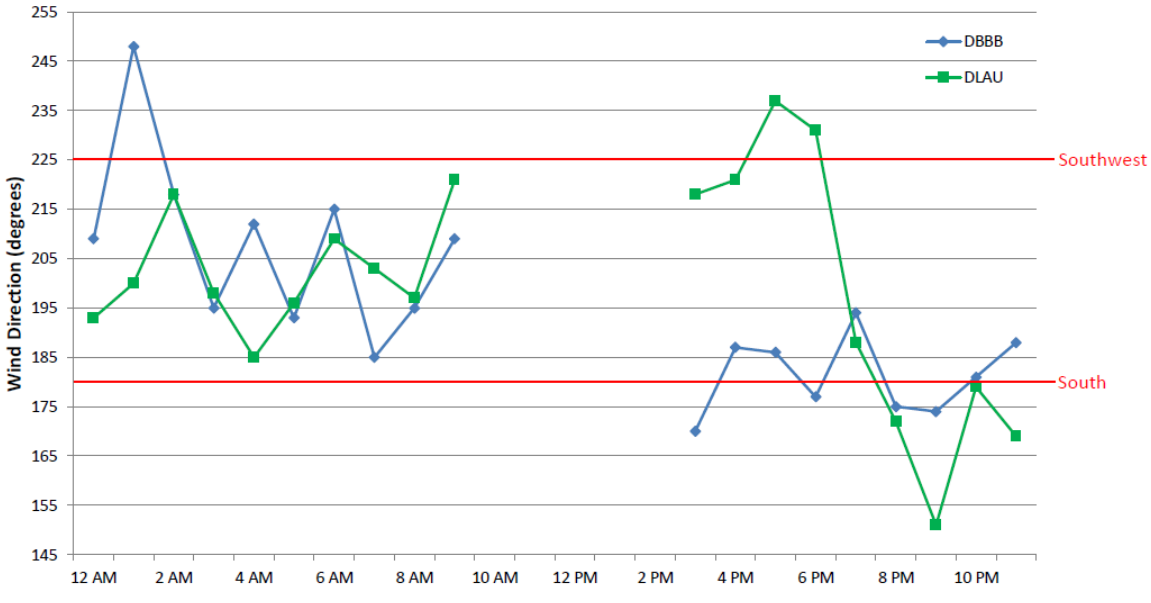


Table 1. Meteorological data from two Delaware Environmental Observing System (DEOS) stations from 8 August, 2009.

				Station: DBBB				Station: DLAU			
Year	Month	Day	Hour	Air Temperature	Relative Humidity	Wind Speed	Wind Direction	Air Temperature	Relative Humidity	Wind Speed	Wind Direction
			(EDT)	(˚F)	(%)	(mph)	(degrees)	(˚F)	(%)	(mph)	(degrees)
2009	8	21	12:00 AM	82.04	76	1.3	209	79.16	87	6.3	193
2009	8	21	1:00 AM	82.22	76	1.8	248	78.98	89	4.3	200
2009	8	21	2:00 AM	81.86	79	2.2	218	79.16	88	3.6	218
2009	8	21	3:00 AM	81.14	80	1.3	195	78.26	89	2.9	198
2009	8	21	4:00 AM	80.78	80	1.8	212	76.46	92	4.0	185
2009	8	21	5:00 AM	80.42	82	2.0	193	78.26	90	6.3	196
2009	8	21	6:00 AM	80.24	83	2.0	215	77.9	91	6.3	209
2009	8	21	7:00 AM	80.24	87	2.2	185	78.44	90	6.7	203
2009	8	21	8:00 AM	84.02	76	2.5	195	81.32	83	8.5	197
2009	8	21	9:00 AM	87.44	66	2.0	209	84.2	76	9.6	221
2009	8	21	10:00 AM	81.32	79	9.8	166	86.72	68	12.1	221
2009	8	21	11:00 AM	81.14	78	11.2	170	86.36	67	12.3	241
2009	8	21	12:00 PM	81.5	78	12.3	167	89.24	62	11.9	213
2009	8	21	1:00 PM	81.32	78	12.3	169	90.86	56	13.6	231
2009	8	21	2:00 PM	81.86	77	13.4	165	91.4	56	14.5	209
2009	8	21	3:00 PM	86.54	67	12.3	170	90.32	58	13.0	218
2009	8	21	4:00 PM	86.9	68	8.3	187	89.6	57	15.2	221
2009	8	21	5:00 PM	87.08	68	5.4	186	86.72	63	9.6	237
2009	8	21	6:00 PM	84.92	74	7.4	177	86.18	63	6.5	231
2009	8	21	7:00 PM	83.84	76	2.9	194	84.2	68	4.7	188
2009	8	21	8:00 PM	80.06	84	8.5	175	81.32	80	5.8	172
2009	8	21	9:00 PM	78.8	88	5.6	174	79.52	83	4.5	151
2009	8	21	10:00 PM	80.6	85	5.4	181	78.44	86	6.5	179
2009	8	21	11:00 PM	79.88	86	4.7	188	78.62	86	6.5	169