



WHAT MAUNA LOA CAN TELL US ABOUT CLIMATE CHANGE

Lesson 5—Student Assignment Comparing CO₂ Data by Location

Graph 1 Annual data trends

1. Graph the 1985, 1990, 1995, and 2000 annual fitted data for each location A-F. Where missing data, marked on the charts as “-99.99”, omit this point.
2. Draw a best-fit straight line on the trend of each location.
3. Look at the line for each location:
Do you see any trends at each location? If so, what?

Do you see any worldwide trends over time? If so, what?

Graph 2 Monthly data trends

4. Graph the monthly data for 1985, 1990, 1995, and 2000 at each location. Clearly mark the year and location of each line. Where missing data, marked on the charts as “-99.99”, omit this point. Lines cannot be connected where one or more month’s data is missing. It is helpful to color key each location. Each location might also be graphed separately.
5. Assess the shapes of each location’s lines.:
Are there locations that seem to have similar shapes?
6. Discuss the causes of rising or falling CO₂ and what you think might be the cause of changes at each of the graphed locations.



7. Using the world map worksheet and your knowledge of the causes of the rise and fall of CO₂, decide which of the 6 boxes on the map might be the locations of each of the data sets (A-F)

Location Data:

For each table: Monthly values are expressed in parts per million (ppm) and reported in the 2003A SIO manometric mole fraction scale. The monthly values have been adjusted to the 15th of each month. Missing values are denoted by -99.99. The "annual" average is the arithmetic mean of the twelve monthly values. In years with one or two missing monthly values, annual values were calculated by substituting a fit value (4-harmonics with gain factor and spline) for that month and then averaging the twelve monthly values.

Location A

Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual	Annual-Fitted
1985	-99.99	342.59	342.54	342.94	343.20	-99.99	344.10	-99.99	-99.99	343.76	-99.99	343.99	-99.99	343.48
1990	350.59	-99.99	350.93	349.76	-99.99	351.49	352.27	351.97	352.93	351.35	352.34	352.10	(351.48)	351.58
1995	356.50	356.19	-99.99	357.09	357.07	-99.99	358.66	358.97	358.86	358.17	358.88	358.46	(357.83)	357.95
2000	365.66	-99.99	366.18	-99.99	366.13	-99.99	367.59	366.24	-99.99	366.98	367.34	-99.99	-99.99	366.61

Location B

Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual	Annual-Fitted
1985	348.03	348.74	349.17	348.39	350.15	349.21	344.74	340.03	340.37	343.33	346.28	-99.99	(346.37)	346.51
1990	356.33	357.17	357.17	357.78	359.07	355.89	352.01	348.19	349.53	353.18	354.80	355.97	354.81	354.86
1995	362.24	362.71	363.51	364.68	364.32	363.65	358.89	354.07	356.59	359.19	360.83	-99.99	(361.16)	361.26
2000	370.10	372.41	373.42	373.90	374.31	371.41	366.04	362.86	363.07	368.11	370.66	371.43	369.81	369.85

Location C

Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual	Annual-Fitted
1985	-99.99	-99.99	-99.99	-99.99	352.62	348.19	343.36	-99.99	338.63	342.77	347.10	349.44	-99.99	-99.99
1990	359.35	360.18	360.84	360.66	360.27	357.76	351.33	346.28	347.13	350.85	355.82	358.49	355.75	355.86
1995	363.49	364.94	366.72	366.33	365.75	364.32	358.59	352.06	353.45	357.27	362.34	365.65	361.74	361.83
2000	373.23	375.13	374.83	375.42	376.18	374.01	366.54	360.78	361.77	367.51	370.58	373.37	370.78	370.78



Location D

Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual	Annual-Fitted
1985	-99.99	-99.99	-99.99	343.99	342.87	343.22	344.38	344.37	344.72	344.34	344.42	-99.99	-99.99	344.10
1990	-99.99	-99.99	-99.99	351.25	351.80	352.59	-99.99	352.19	352.97	352.53	352.73	353.24	-99.99	352.26
1995	358.28	-99.99	-99.99	-99.99	358.62	-99.99	-99.99	359.09	-99.99	-99.99	-99.99	-99.99	-99.99	358.89
2000	367.40	-99.99	366.75	-99.99	366.28	365.80	366.83	367.73	-99.99	367.90	368.44	-99.99	-99.99	367.19

Location E

Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual	Annual-Fitted
1985	346.27	346.37	347.83	348.45	350.10	348.88	345.90	342.85	341.09	343.09	344.40	346.41	345.97	345.91
1990	354.49	356.59	356.81	357.37	357.73	356.95	354.69	352.74	350.88	351.86	353.76	355.07	354.91	354.87
1995	360.82	362.81	362.77	364.46	364.26	362.88	360.45	357.73	357.53	359.24	359.77	361.23	361.16	361.18
2000	369.97	371.12	372.55	373.18	373.42	373.20	368.74	366.62	366.45	366.90	369.06	370.39	370.13	370.12

Location F

Year	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual	Annual-Fit
1985	344.97	346.00	347.43	348.35	348.93	348.25	346.56	344.69	343.09	342.80	344.24	345.56	345.90	345.86
1990	353.66	354.70	355.39	356.20	357.16	356.22	354.82	352.91	350.96	351.18	352.83	354.21	354.19	354.19
1995	359.96	361.00	361.64	363.45	363.79	363.26	361.90	359.46	358.06	357.75	359.56	360.70	360.88	360.90
2000	369.14	369.46	370.52	371.66	371.82	371.70	370.12	368.12	366.62	366.73	368.29	369.53	369.48	369.47