

Oceans are the main regulators of carbon dioxide

Energy conservation is rational and does not have to be justified by fear of climate change, argues **Lance Endersbee**. He predicts that carbon dioxide levels in the atmosphere may actually decline in the next few years due to falling ocean temperatures, and warns that carbon sequestration and carbon trading may turn out to be futile activities in addressing climate change.

I WISH TO DRAW attention to new recently available data that supports the view that climate change has natural causes, and that the influence of human generated carbon dioxide in the atmosphere is negligible.

The oceans and rainfall have a major influence in helping to regulate climate on earth.

Recent data on global average sea surface temperatures derived from satellite observations has revealed some interesting correlations between sea temperatures and atmospheric carbon dioxide.

Figure 1 shows the global average sea surface temperature anomaly since 1980. The anomaly is defined as the departure of the actual temperature from the mean global average for the past century (1901-2000). The data is derived from satellite coverage, and is much more consistent than previous data based on surface measurements.

Note the cyclic behaviour and the peak in 1999. There has been overall cooling since 1999. The causes of the cyclic behaviour are not known. The major influences are probably the El Nino and La Nina events, and variations in heat flow

on the ocean floor from undersea volcanoes and vents. These factors may be related through a common cause. It is difficult to see any influence of human activity in the variations of sea surface temperatures shown in the chart.

The present winter in the northern hemisphere has been the coldest for several decades.

Scientists studying solar behavior report that the sun is relatively quiet and that we may expect a further cooling of earth climate. Thus it seems probable that the recent general cooling of sea surface temperatures may continue.

Figure 2 shows the direct relationship between sea surface temperature and carbon dioxide levels in the atmosphere since 1980. It is based on a 21-year moving average of sea surface temperatures, and a 12-month moving average of carbon dioxide levels.

As the sea temperature has increased, so has the carbon dioxide level. This reflects the normal solubility relationship between carbon dioxide and water. As the sea temperature increases, the oceans breathe out carbon dioxide into the atmosphere. Thus, if sea surface temperatures now continue to fall, we may expect carbon dioxide levels to decrease.

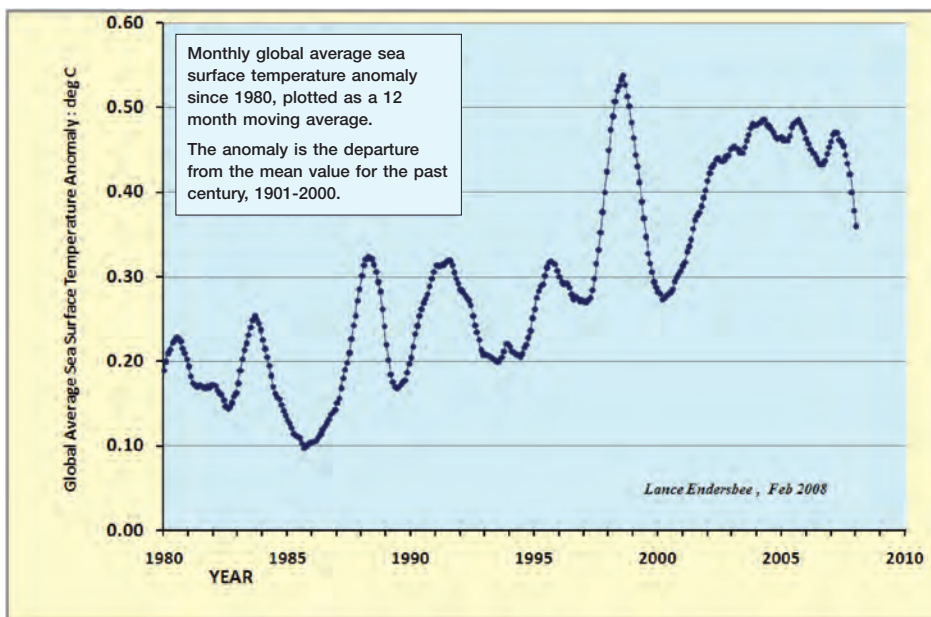


Figure 1: Global average sea surface temperature anomaly since 1980, plotted as a 12 month moving average. The anomaly is defined as the departure from the 20th century average (1901-2000) of sea surface temperature.

There is strong consistency from December 1984 onwards, which reflects the better accuracy and consistency of the temperature records from satellite data. During the period of record on the chart, the sea temperatures have been rising. Sea temperatures are now starting to fall and it is expected that the strong relationship between sea surface temperature and CO₂ will continue to hold.

The 21-year moving average of sea surface temperatures was used in the chart to cover a complete solar cycle including the change in polarity of the sun. It also covers the cycle of El Nino and La Nina influences on global climate.

Such a long term moving average also recognises the vast storage capacity in the deep oceans for

carbon dioxide, and the slow changes. The 12-month moving average of carbon dioxide levels was used to cover the annual cycle. It is emphasised that this chart is a plot of actual experience. There is a

clear and strong relationship between levels of atmospheric carbon dioxide and long-term average sea surface temperature. This would be expected from the solubility curves for carbon dioxide in water at various temperatures and pressures.

The experience curve shows the huge capacity of the oceans to absorb the carbon dioxide emissions of humankind.

It seems likely that within about three years we will be experiencing natural global cooling, and with that a decline in levels of carbon dioxide in the atmosphere.

In essence, it is impossible for carbon dioxide to accumulate in the atmosphere other than to the level determined by the long-term behaviour of the oceans. As a consequence, there is no need for carbon trading or geosequestration.

Energy conservation is rational and does not have to be justified by fear of climate change. ■

Emeritus Prof Lance Endersbee is a past national president of Engineers Australia.

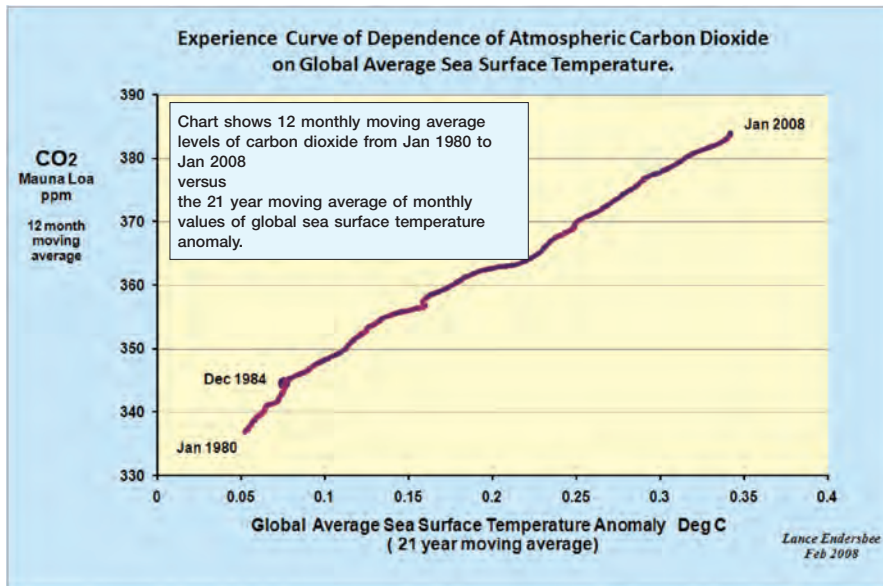


Figure 2: Experience curve relating actual atmospheric carbon dioxide levels with actual global average sea surface temperature. It is not a time scale, just the simple relation between two physical parameters independent of time. The line shown is just the sequence of actual plotted points for each end month of the two moving averages.