

These files have been reprocessed during the spring of 2015 in order to account for the time lag of water from the ship's intake to the pCO<sub>2</sub> system. The timing of the seawater temperature data measured with ThermoSalinoGraph (TSG) unit was adjusted to match the timing of input temperature (T<sub>eq</sub>) of the pCO<sub>2</sub> equilibrator. The time lag of be 3 or 6 minutes was applied depending upon cruises. The corrections applied to corresponding pCO<sub>2</sub> data points are up to about ±8 µatm for the Palmer and Gould data and ±16 µatm for the Healy data, while the mean of the corrections for each cruise is less than ± 1 µatm.

When the TSG (Thermosalinograph) temperature was judged unreliable, equilibrator temperature was used to estimate SST by applying a constant off-set estimated using the data from other legs. Therefore, the time-lag correction is not necessary.

As to atmospheric CO<sub>2</sub> measurements, with the surface pCO<sub>2</sub> observations, we have chosen to reject air observations from these ships. It is not possible to accurately determine amount of CO<sub>2</sub> contamination from local sources including the ships exhaust systems, even with the benefit of wind data. Severe CO<sub>2</sub> spikes were found during a nearly head-on relative wind conditions, suggesting local source of contamination.

With the benefit of 10 plus years of observations, editing, and analysis of surface water pCO<sub>2</sub>, we consider that the running mean is not a satisfactory criterion for rejecting "outliers." Often large and rapid changes occur naturally in open ocean systems due to patchiness of biological activities as well as to hydrodynamic conditions including eddies, meandering of currents, local weather: yet these observations are valid and should not be deleted. We, therefore, hand edit the data taking the coherence of pCO<sub>2</sub> values with other measured variables into consideration.