A Simplified Estimate of Contribution to Change of CO_2 Concentration by the Statistical Method

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The atmospheric CO_2 concentration has been continuously observed at Anmyeon Island, Korea (36° 32'N, 126° 19'E) since 1999. The raw data of CO_2 concentration measured at Anmyeon Island have gone through the quality assurance and quality control procedures, which are the same methodology advised by the World Data Center of Green House Gases. In the last outputs, three components of CO_2 concentration variation remain and this timeseries of CO_2 concentration is called the 'keeling curve'. The dominant components of variations of CO_2 concentration are the seasonal variation, the long-term trend, and interannual variation. Figure 1 shows the three components of CO_2 concentration measured at the Korea Global Atmosphere Watch Center from 1999 to 2009. Each component of CO_2 variations is separated by a low-cut pass filter and a single liner regression analysis. If it is assumed that total variance of CO_2 concentration has three components: the long-term trend forced by combustion of fossil fuels, seasonal variation by biosphere and atmospheric transport, and interannual variation related with oceanic sink and release, we can comfortably estimate the contribution of change of CO_2 concentration from ratios of each variance against total variance. Our results are that over 72% by combustion of fossil fuels, ~27% by biosphere and transport, and ~1% by ocean has contributed to total change of CO_2 concentration in Anmyeon Island, Korea from 1999 to 2009.

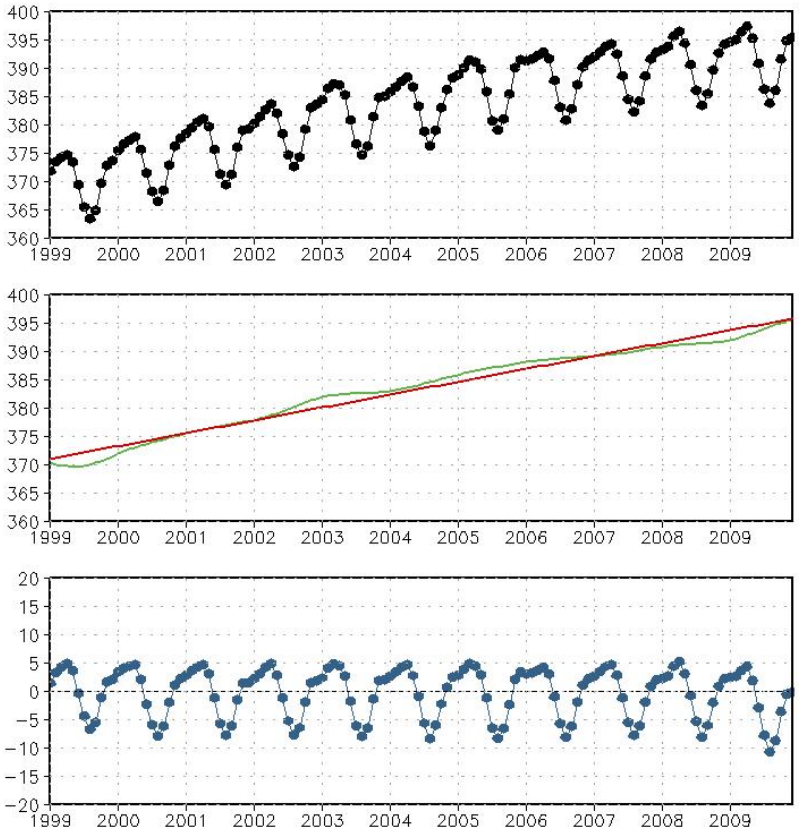

Figure 1. Timeseries of CO_2 concentration measured at Anmyeon Island, Korea from 1999 to 2009, and three dominant components of CO_2 variation. Long-term trend (red line), interannual variation (green line), and seasonal variation (blue line).