Statement of Mary S. Booth, PhD, Partnership for Policy Integrity
EPA's teleconference on Biogenic C Science Advisory Board draft report
May 29, 2012

I am Mary Booth, Director of the Partnership for Policy Integrity. Thank you very much to the panel for your thoughtful deliberations on the best approach for biogenic carbon accounting. Today I wanted to share with you some information I learned last week from a webinar on ocean acidification, to remind you all that the near-term consequences of carbon emissions from the power sector are important for more than just net climate impacts and the arrival date of "peak warming".

The following slides and information are taken from a talk given May 23, 2012 by Richard Feely of the NOAA Pacific Marine Environmental Laboratory. They make several key points.

1. Surface water concentrations of CO2 are increasing along with atmospheric CO2. We see a commensurate decrease in pH with the rise in the concentration of CO2 in ocean waters.

2. Water with a pH lower than 7.0 is considered "corrosive". When the oceans become too acidic, this interferes with survival and growth of shell-forming organisms, including coral reefs.

3. Ocean acidification from excess CO2 dissolution is already occurring at a rate 10 times faster than at any time in the last 300 million years. The average acidity of the oceans has increased by about 30 percent.

4. Modeling predicts that by the end of century under a business as usual scenario, the acidity of the oceans could increase by as much as 100 – 15%.. The IPCC BAU scenario assumes CO2 increases at 1% per year, but at present, we are increasing it at 3.4% per year.

5. Modeling predicts that coral reef calcification rates in the tropics may decrease by 30% over the next century.

To summarize: Carbon dioxide is a pollutant with more than one kind of environmental impact. The panel should bear in mind that near-term carbon dioxide emissions have serious impacts on planetary function, and that EPA needs a truly robust and defensible system for quantifying biogenic carbon.

Ch1. Introduction to Ocean Acidification in Washington State Waters

Definition: Ocean acidification (OA) is the reduction of pH in the oceans over an extended period of time, typically decades or longer, caused primarily by the uptake of carbon dioxide from the atmosphere.

What do we KNOW about OA in the global open ocean?

In the open ocean, the **rate of acidification is more than 10 times faster** than at any time over the past 300 million years:

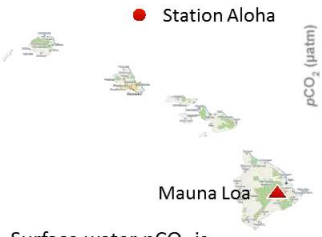
- average pH decrease: 0.02 pH units/decade
- average aragonite saturation state (Ω_{arag}) decrease: 3.5%/decade

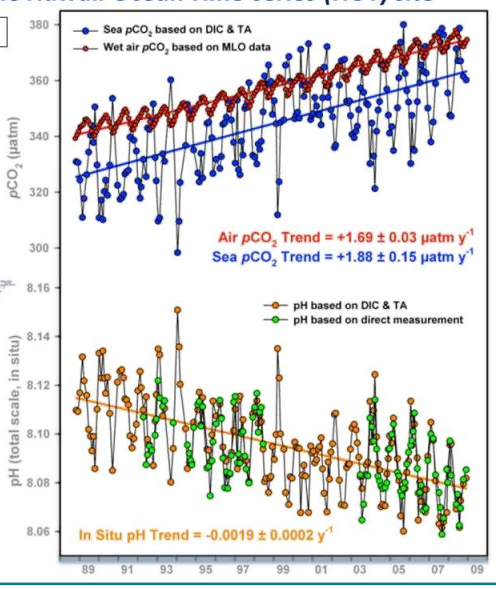
The average acidity (the H^+ concentration) of the oceans **has increased by about 30%**. By the end of this century, the acidity of the oceans could increase by as much as 100-150%.

The average **Ω_{arag} will drop below the current range** of variability **within 12-40 years**.

Carbon Changes at the Hawaii Ocean Time-series (HOT) site

pCO_2 is the 'partial pressure' of CO_2





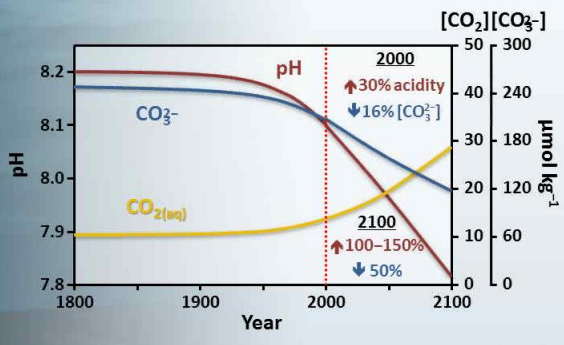
Surface water pCO_2 is increasing at about the same rate as atmosphere

We see a commensurate decrease in pH with the rise in surface water pCO_2

Doney, Science 2010
Dore et al., PNAS 2009

Ocean Acidification

$$CO_2 + CO_3^{2-} + H_2O \Leftrightarrow 2HCO_3^-$$



Wolf-Gladrow et al. (1999)