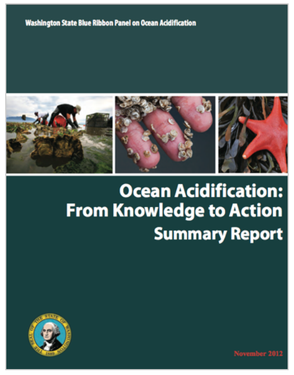
Understanding the role of science in current ocean and climate legislation in the State of Washington

Ashley E. Maloney, Andrea Fassbender, Seth Bushinsky, Emily Newsom
School of Oceanography, University of Washington, Seattle, *ashjames@uw.edu*

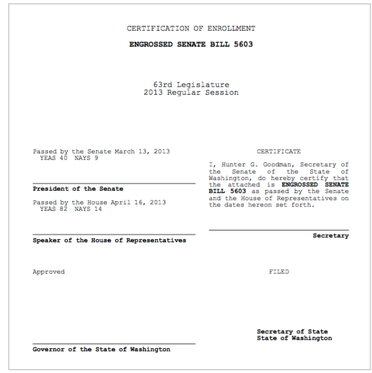
ABSTRACT

The IGERT Program on Ocean Change at the University of Washington is committed to training scholars to use integrative, cross-disciplinary, and cross-scale approaches to investigate problems of ocean change. Trainees learn how to address these problems from a coupled social-ecological perspective and communicate with diverse groups. Our diverse disciplinary research projects have indirect implications for society, but as trainees in the IGERT Program on Ocean Change, we are interested in how scientific findings are used by policy makers for the benefit of society. To learn how environmental science is used in the development of policy, we worked with Washington State policy makers as they developed draft legislation concerning ocean acidification and greenhouse gas emissions for Washington State. Going forward, we will serve as a resource for the Marine Resources Advisory Council and the Executive Work Group on Greenhouse Gas Emissions.

OCEAN CHANGE LEGISLATION IN WASHINGTON STATE



In November 2012 the recommendations set forth by the Washington State Blue Ribbon Panel on Ocean Acidification were presented to the Governor. This spring Senate Bill 5603 was passed by the Washington State Senate and House of Representatives. This bill establishes the Washington Marine Resources Advisory Council which will function to increase Washington State's ability to address impacts of ocean acidification. As IGERT trainees we observed the progress of this bill as it moved through the legislative process. We will continue to learn how science is used in the policy process by observing the actions of the Washington Marine Resources Advisory Council and by responding to the science-based information needs of policy makers. Our goals are to learn first-hand about legislative and policy processes and to contribute to solutions that address the tough problems of ocean change.


CERTIFICATION OF ENROLLMENT
ENGROSSED SENATE BILL 5603

63rd Legislature
2013 Regular Session

Passed by the Senate March 13, 2013
YEAS 40 NAYS 9

President of the Senate

Passed by the House April 16, 2013
YEAS 82 NAYS 14

Speaker of the House of Representatives

Approved

Governor of the State of Washington

CERTIFICATE

I, Hunter G. Goodman, Secretary of the Senate of the State of Washington, do hereby certify that the attached is ENGROSSED SENATE BILL 5603 as passed by the Senate and the House of Representatives on the dates hereon set forth.

Secretary

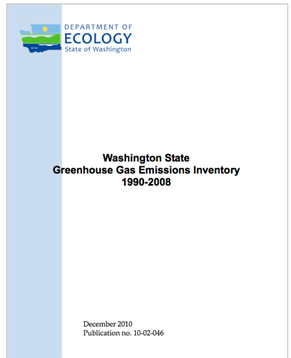
FILED

Secretary of State
State of Washington

CLIMATE LEGISLATION IN WASHINGTON STATE

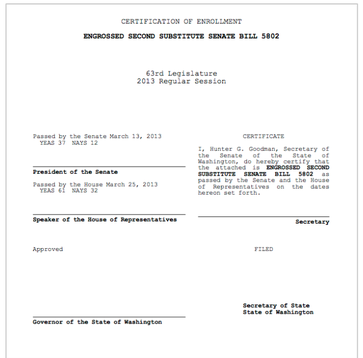
Washington State greenhouse gas emission limits put into law in 2008 require a reduction in emissions to 1990 levels by 2020, 25% below 1990 levels by 2035, and 50% below 1990 levels by 2050. In 2008 Washington State total emissions were 101.1 million metric tons of CO2 equivalents, 8.2 million metric tons beyond 1990 levels. Emissions come from transportation (46%), electricity (20%), industrial sources (16%), residential and commercial buildings (9%), agriculture (6%), and waste (3%). Washington State has adopted a suite of policies to help reduce greenhouse gas emissions (http://www.ecy.wa.gov/climatechange/laws.htm).

The State is interested in adopting additional policies to reduce emissions to target levels. To do so, independent consultants will investigate the success of other strategies being used in the Pacific Northwest, on the west coast, in nearby Canada, and elsewhere to evaluate which approaches will work best for Washington State.


DEPARTMENT OF ECOLOGY
State of Washington

Washington State
Greenhouse Gas Emissions Inventory
1990-2008

December 2010
Publication no. 10-02-046


CERTIFICATION OF ENROLLMENT
ENGROSSED SECOND SUBSTITUTE SENATE BILL 5802

63rd Legislature
2013 Regular Session

Passed by the Senate March 13, 2013
YEAS 37 NAYS 12

President of the Senate

Passed by the House March 25, 2013
YEAS 61 NAYS 32

Speaker of the House of Representatives

Approved

Governor of the State of Washington

CERTIFICATE

I, Hunter G. Goodman, Secretary of the Senate of the State of Washington, do hereby certify that the attached is ENGROSSED SECOND SUBSTITUTE SENATE BILL 5802 as passed by the Senate and the House of Representatives on the dates hereon set forth.

Secretary

FILED

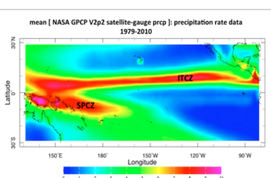
Secretary of State
State of Washington

Governor Jay Inslee's statement on March 25th about SB 5802:

"Today's bipartisan support for the climate action bill is welcome news. We've seen the impacts of climate change already affecting some of Washington's key industries with shellfish growers moving operations due to ocean acidification and the farmers in Eastern Washington seeing reduced water supplies as a result of reduced snowpack."

IGERT trainees will learn how science is used during the evaluation of potential climate policy options. Trainees will assist policy makers by providing information and answers to questions about climate science.

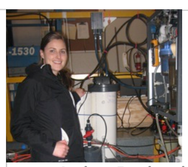
University of Washington
College of the Environment
disciplinary research of
IGERT TRAINESS
in the School of Oceanography
and the School of Earth and Space Science

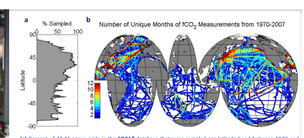


Ashley Maloney

The tropical Pacific hydrologic cycle is dominated by two prominent rain belts, the Intertropical Convergence Zone and the South Pacific Convergence Zone. The position of these rain belts is influenced by climate change. Understanding how tropical precipitation has changed during the late Holocene has implications for people who depend on rainfall to support their subsistence lifestyles.

I collect tropical Pacific lake sediment cores that contain well preserved phytoplankton lipids. I use stable hydrogen isotopes of specific lipids as a tool to infer past environmental changes. I also grow phytoplankton in controlled conditions to asses the applicability of stable hydrogen isotopes as a proxy for paleoenvironmental conditions.



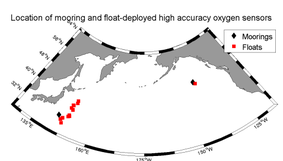


(a) Percent of 1°x1° ocean grids in the **SOCAT** database that were sampled per latitude band between 1970 and 2007. (b) The number of unique months out of the year that an fCO_2 observation was made in each grid cell. White spaces indicate regions where fCO_2 has not yet been measured.
Adapted from Sabine et al. (2013), Surface Ocean CO_2 Atlas (SOCAT) gridded data products. Earth Syst. Sci. Data.

Andrea Fassbender

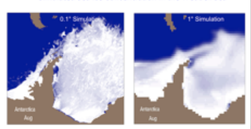
The oceans absorb 1/4 of human CO_2 emissions annually, but it is unclear how global warming and ocean acidification will influence the ocean carbon sink in the future. The first step in addressing this question is to develop a baseline for how the ocean carbon sink works today.

I am working with scientists at NOAA PMEL to develop an instrument that will monitor ocean carbon cycling on moorings. In addition to instrument development, I work with CO_2 data from moorings located in the North Pacific Ocean to evaluate the processes driving seasonal and interannual variability in regional carbon cycling. By understanding how the ocean carbon sink operates today, we can begin to understand how future climate change may influence the ocean's role in global climate.



Seth Bushinsky

Oxygen and carbon are linked through the biological processes of photosynthesis and respiration. In order to better understand the influence of basic marine life on the movement of carbon dioxide between the atmosphere and the ocean, we make detailed measurements using anchored moorings and profiling floats equipped with special oxygen sensors. Our goal is to better understand the mechanisms behind the current ocean carbon cycle and what that cycle might look like in the future.



Emily Newsom

Heat transport in the Southern Ocean is important to both local and global climate, and sea level, via its influence on the stability of the Antarctic Ice Sheet. I study the fundamental drivers of heat transport and circulation in the Southern Ocean. Specifically, I work to understand how changes in the density of seawater near the ocean surface associated with climate changes, such as changes in sea ice, precipitation, glacial melt, and heat fluxes, can modulate the effects of changing wind patterns on the circulation of the Southern Ocean. To address these questions, I run perturbation experiments in fully coupled global climate models at resolution high enough to resolve ocean and sea ice eddies. Exploring the effects of local climate changes on the Southern Ocean will help us predict how the global climate system will evolve in the future.

References
Washington State Blue Ribbon Panel on Ocean Acidification Summary Report: http://www.ecy.wa.gov/water/marine/oceanacidification.html
Center for Ocean Solutions WA state Ocean Acidification Toolbox: http://www.centerforoceansolutions.org/content/washington-states-legal-and-policy-options-combating-ocean-acidification-state-waters
Senate Bill 5603: http://apps.leg.wa.gov/billinfo/summary.aspx?bill=5603
Washington State Greenhouse Gas Emissions Inventory: https://fortress.wa.gov/ecy/publications/publications/1002046.pdf
Senate Bill 5802: http://apps.leg.wa.gov/billinfo/summary.aspx?bill=5802&year=2013

Acknowledgements
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