

Issue 1: Ocean Climate

Educational Resource Packet



**WORLD OCEAN
Observatory**

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Table of Contents

CARBON EMISSIONS AND THE OCEAN CARBON CYCLE

Images.....	3
Diagrams.....	4
Video, Animation, Interactives.....	5
News, Articles and Organizational Websites	6
Lesson Plans and Teaching Resources.....	6

POLAR MELT

Images.....	7
Diagrams.....	8
Video, Animation, Interactives.....	9
News, Articles and Organizational Websites	10
Lesson Plans and Teaching Resources.....	10

OCEAN CURRENTS | EXTREME WEATHER

Images.....	11
Diagrams.....	12
Video, Animation, Interactives.....	13
News, Articles and Organizational Websites	14
Lesson Plans and Teaching Resources.....	15

OCEAN ACIDIFICATION

Images.....	16
Diagrams.....	17
Video, Animation, Interactives.....	18
News, Articles and Organizational Websites	19
Lesson Plans and Teaching Resources.....	19

OceanClimate Educational Resources

CARBON EMISSION & THE OCEAN CARBON CYCLE

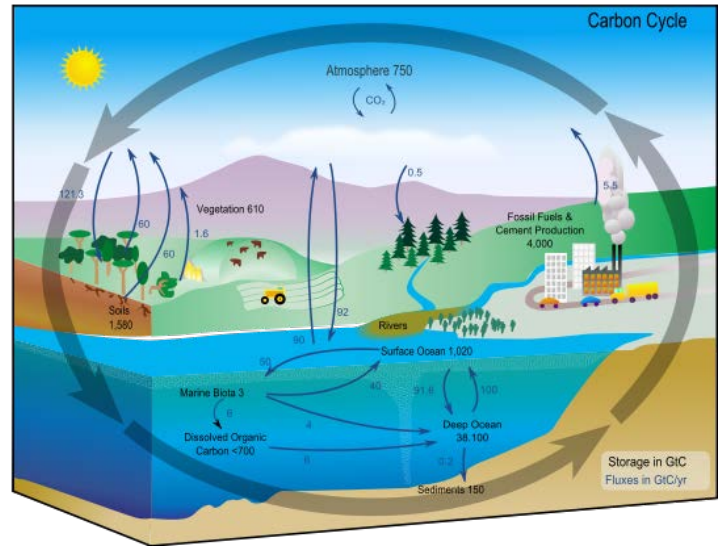
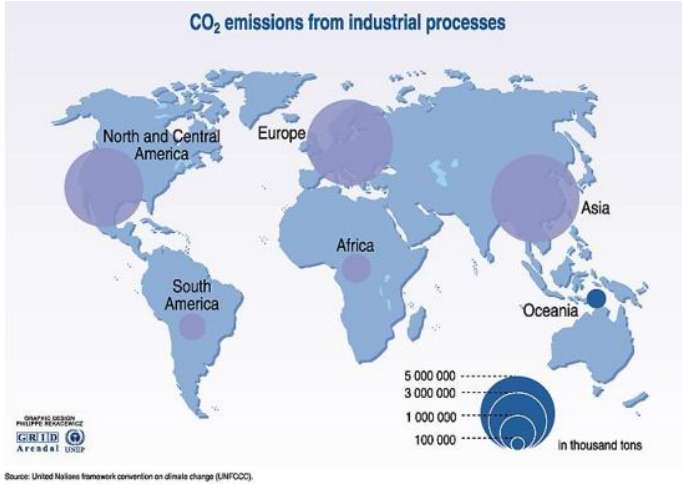
Images | Click on Image for Link



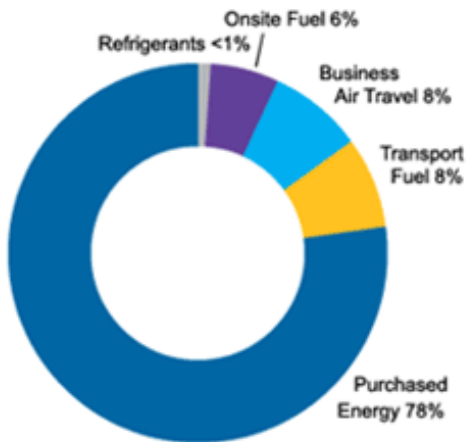
OceanClimate Educational Resources

CARBON EMISSION & THE OCEAN CARBON CYCLE

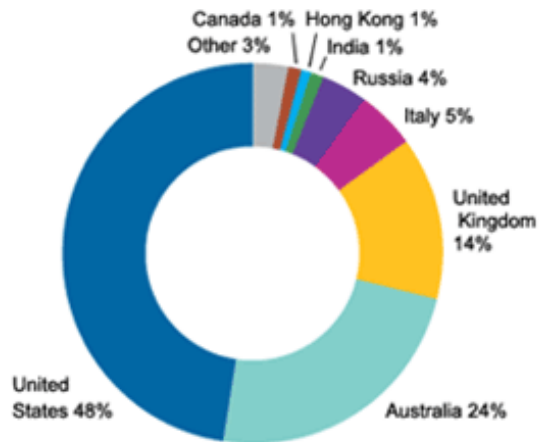
Diagrams | Click on Image for Link



GHG Emissions By Source



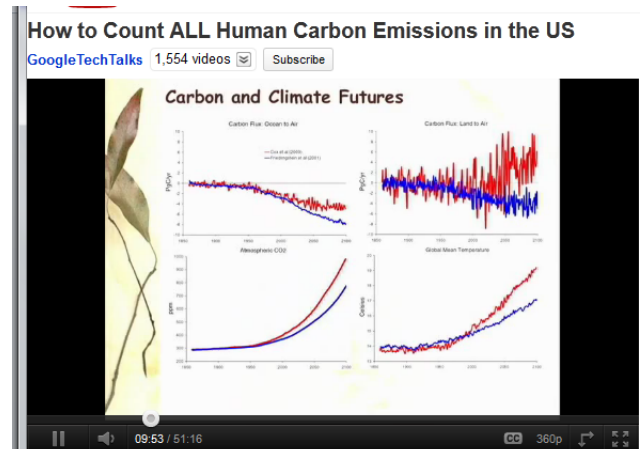
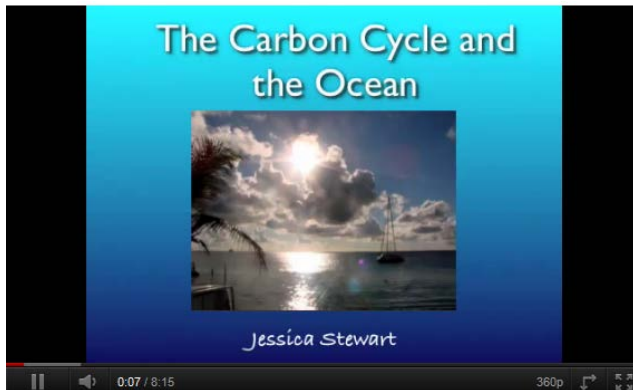
GHG Emissions By Geography



OceanClimate Educational Resources

CARBON EMISSION & THE OCEAN CARBON CYCLE

Videos, Animation, Interactives



OceanClimate Educational Resources

CARBON EMISSION & THE OCEAN CARBON CYCLE

News, Articles, and Organizational Websites

[The Ocean's Carbon Balance. NASA Earth Observatory](#)

[COP 15](#)

[A Look at Human CO₂ Emissions -vs-Ocean Absorption](#)

[Anthropogenic Carbon and Ocean pH \(pdf\)](#)

[Carbon Dioxide and Our Ocean Legacy](#)

[Is the airborne fraction of anthropogenic CO₂ emissions increasing?](#)

[Seas Grow Less Effective at Absorbing Emissions](#)

Lesson Plans and Teaching Resources

[Global Sustainability Free Curriculum Guides](#)

[Teachers' Guide to Climate Change and Global Warming](#)

[Go Green Teachers' Guide: What's My Carbon Footprint? \(pdf\)](#)

[Teachers' Guide: Assessing Carbon Footprints \(pdf\)](#)

OceanClimate Educational Resources

POLAR MELT

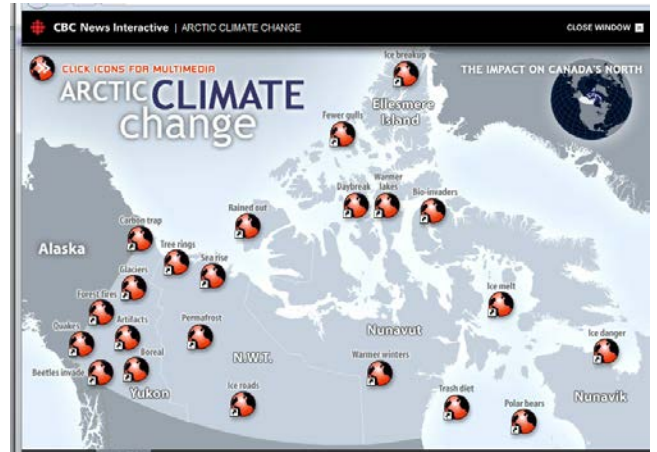
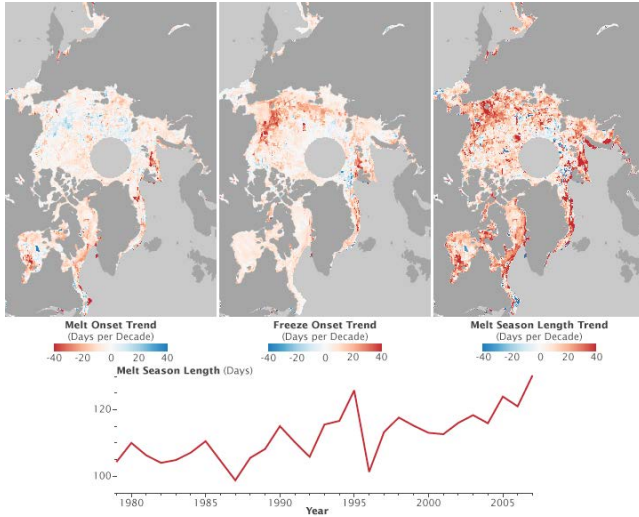
Images | [Click on Image for Link](#)



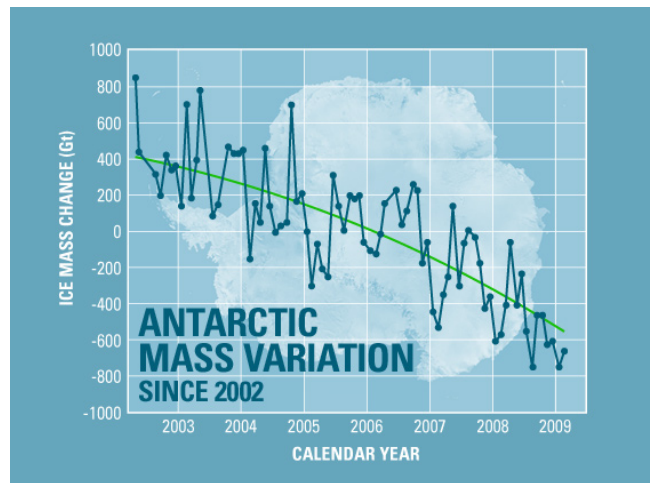
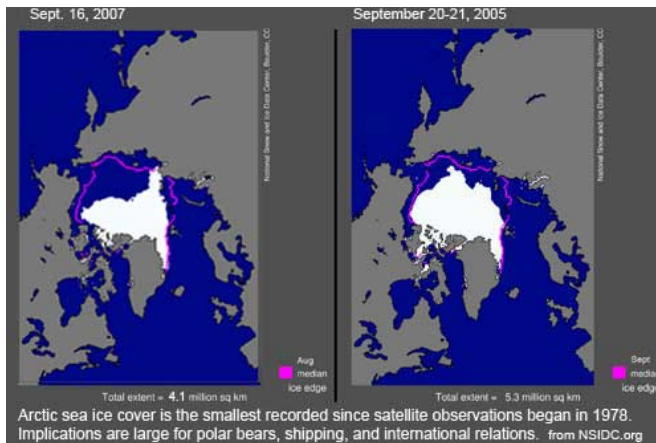
OceanClimate Educational Resources

POLAR MELT

Diagrams | Click on Image for Link



Interactive



OceanClimate Educational Resources

POLAR MELT

Videos, Animation, Interactives

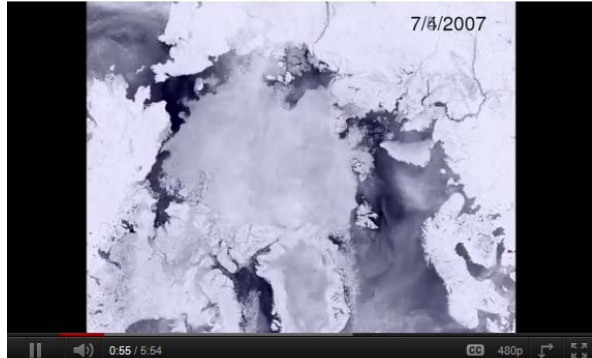
Dr. Martin Sommerkorn - Senior Climate Scientist - WWF
OceanClimate 17 videos



0:06 / 2:17 360p

This video features Dr. Martin Sommerkorn, a Senior Climate Scientist at WWF, speaking in front of a massive wall of ice. The video player interface shows a progress bar at 0:06 / 2:17 and a resolution of 360p.

Bruno Tremblay: Melting polar ice caps
mcgilluniversity 230 videos



7/4/2007
0:55 / 5:54 480p

This video shows a satellite view of the Arctic region, with a date stamp of 7/4/2007. The video player interface shows a progress bar at 0:55 / 5:54 and a resolution of 480p.

YouTube Search Browse Movie

GLOBAL WARNING - Antarctica Ice Melting Fast Global Warming Pote



0:57 / 2:04 360p

This video shows a person in a red jacket standing in a snowy, icy environment. The video player interface shows a progress bar at 0:57 / 2:04 and a resolution of 360p.

Sea Level Rise Animation in Google Earth
dspringmeyer 1 video



0:15 / 6:24 360p

This video shows a globe with a sea level rise animation. A text box titled "Sea Level Rise Awareness" is overlaid on the globe, providing information about catastrophic sea level rise. The video player interface shows a progress bar at 0:15 / 6:24 and a resolution of 360p.

OceanClimate Educational Resources

POLAR MELT

News, Articles, and Organizational Websites

[International Polar Year](#)

[Center for Ice and Climate](#)

[British Antarctic Survey](#)

[Arctic Monitoring and Assessment Program](#)

[Polar Information Commons](#)

[Glaciers and Glacial Warming: Receding Glaciers](#)

[Climate Change and Arctic Impacts](#)

[Is Antarctica Melting?](#)

[If the polar ice caps melted, how much would the oceans rise?](#)

[Polar Melt: The Arctic Ice Cap](#)

[Arctic Sea Ice News and Analysis](#)

[Are Extremes Increasing? And if so, why?](#)

Lesson Plans and Teaching Resources

[Melting Ice: Lesson Plan for Grades 6-12](#)

[Biomes: Wild Arctic Teachers' Guide](#)

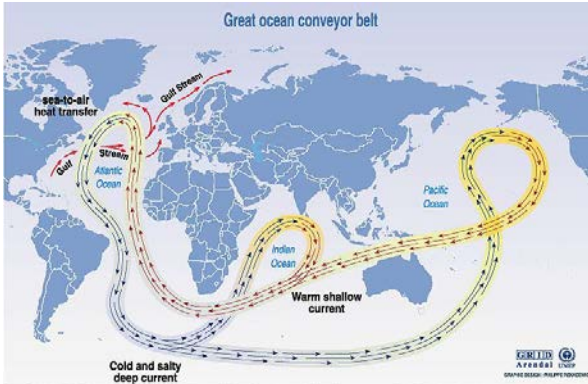
[Resources for Teaching About the Poles and the Cryosphere](#)

[Teacher's Guide For Glaciers and Ice Caps – The Melting \(For grade 7 – College\)](#)

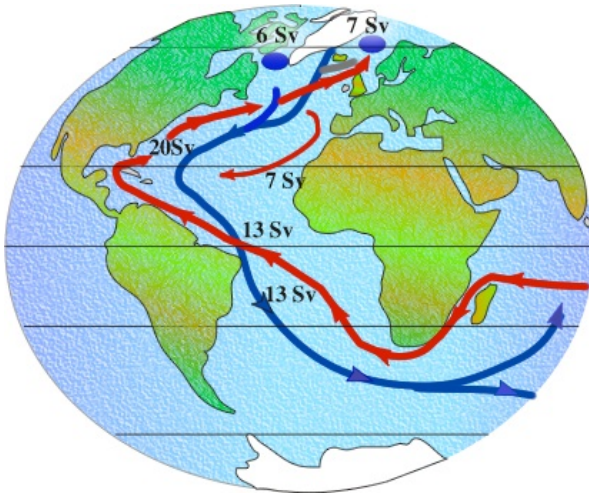
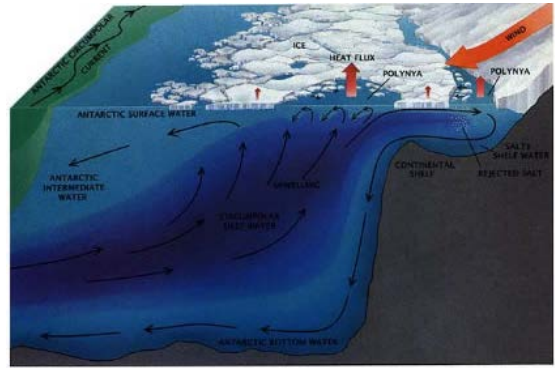
OceanClimate Educational Resources

OCEAN CURRENTS | EXTREME WEATHER

Images | Click on Image for Link



Source: Deserai, 1991, in Climate change 1995, impacts, adaptation and mitigation of climate change: scientific technical analysis, contribution of working group 2 to the second assessment report of the intergovernmental panel on climate change, UNEP and WMO, Cambridge press university, 1996.



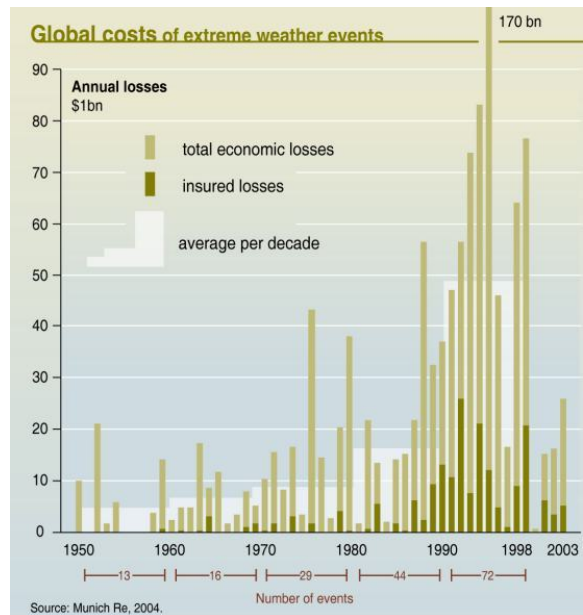
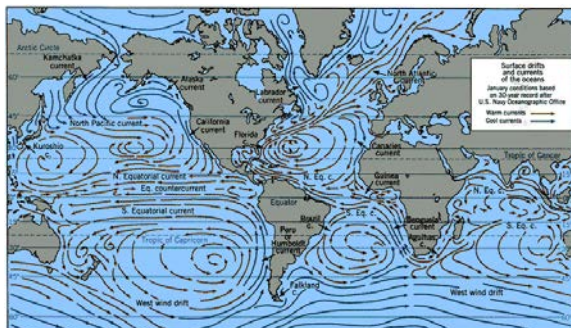
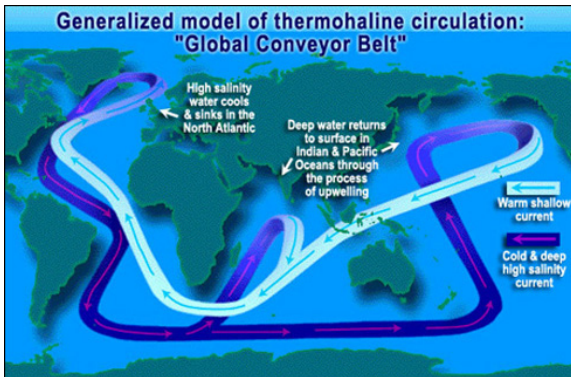
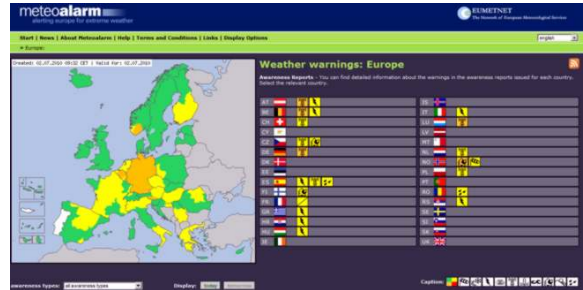
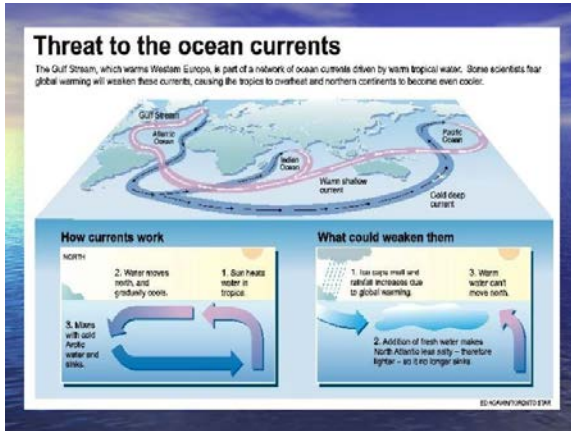
The cover of Science magazine features the article "The Global Ocean Conveyor Belt". The cover image shows a map of the world with red and blue arrows representing ocean currents. The title "The Global Ocean Conveyor Belt" is prominently displayed in large, bold letters.



OceanClimate Educational Resources

OCEAN CURRENTS | EXTREME WEATHER

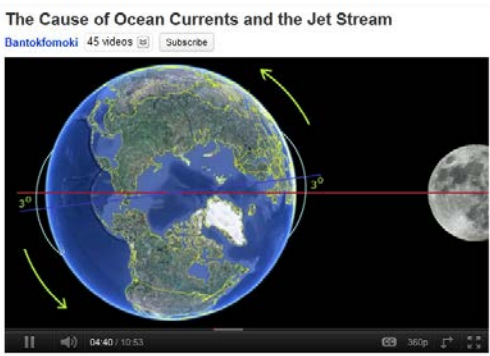
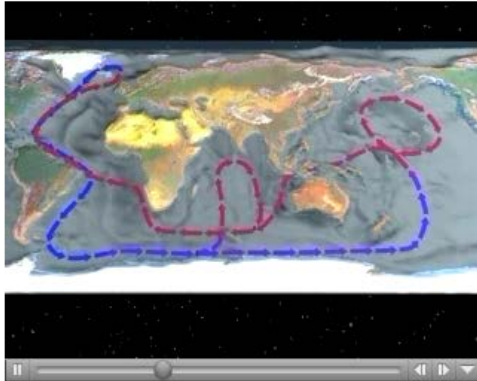
Diagrams | Click on Image for Link



OceanClimate Educational Resources

OCEAN CURRENTS | EXTREME WEATHER

Videos, Animation, Interactives



OceanClimate Educational Resources

OCEAN CURRENTS | EXTREME WEATHER

News, Articles, and Organizational Websites

OCEAN CURRENTS

[A Guided Tour of the Thermohaline Circulation System](#)

[The Inside Story: Ocean Circulation by Robert Perry \(PPT Presentation\)](#)

[Ocean Circulation | Thermohaline Circulation \(pdf\)](#)

[Thermohaline Ocean Circulation Fact Sheet](#)

[The Catlin Arctic Survey: Thermohaline Circulation](#)

EXTREME WEATHER

[Climate Change | Extreme Events](#)

[WWF | Climate Change and Extreme Weather Events](#)

[EPA | Extreme Events](#)

[Storm Warnings: Extreme Weather is a Product of Climate Change](#)

[Extreme Weather and Climate Change: Understanding the Link](#)

OceanClimate Educational Resources

OCEAN CURRENTS | EXTREME WEATHER

Lesson Plans and Teaching Resources

OCEAN CURRENTS

[Learning Ocean Science through Ocean Exploration: \(Curriculum Grades 6-12\)](#)

[Ocean Currents Lesson Plan: NOAA](#)

[Climate Research Facility | Ocean Currents Lesson Plan](#)

EXTREME WEATHER

[Weather Channel Kids](#)

[Weather Lesson Links | Morehead Planetarium & Science Center](#)

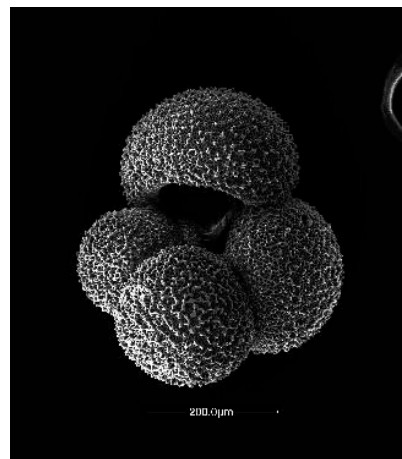
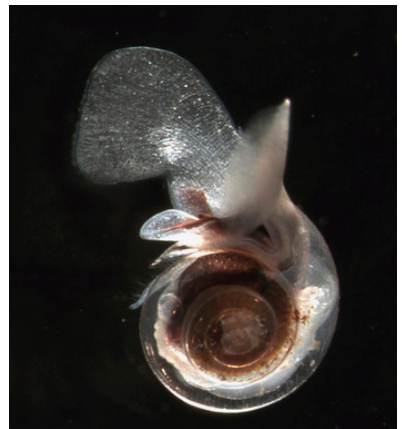
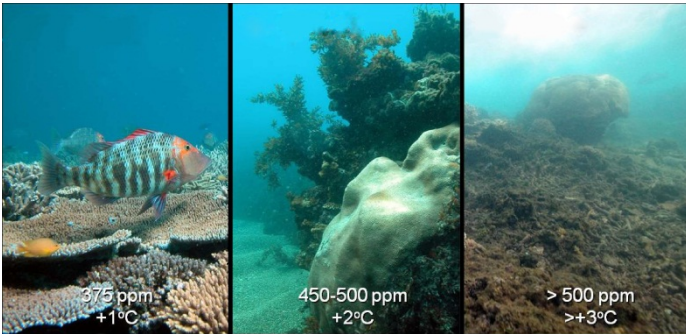
[Tsunami Teachers' Guide \(Grades 4-9\) \(pdf\)](#)

[Teachers' Guide to High Quality Educational Materials on Climate Change and Global Warming \(For K-12\)](#)

OceanClimate Educational Resources

OCEAN ACIDIFICATION

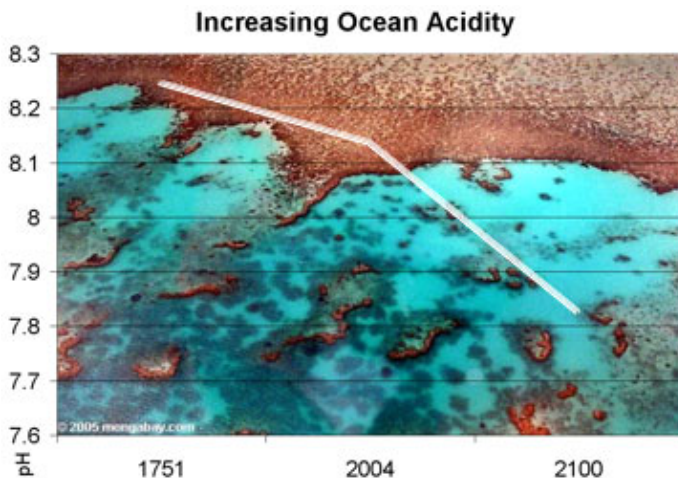
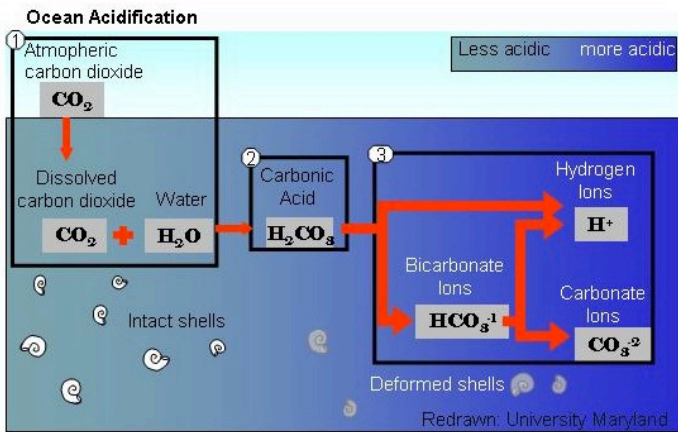
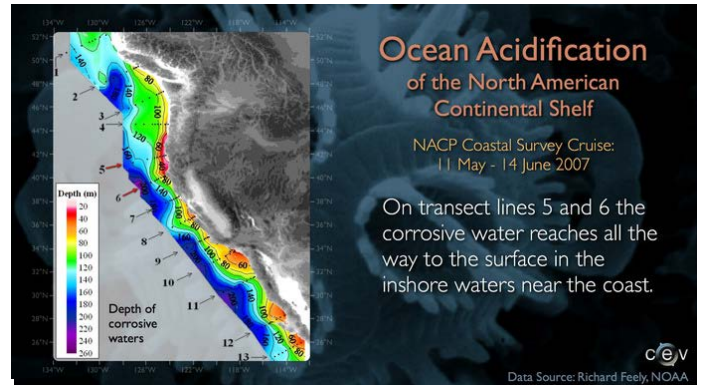
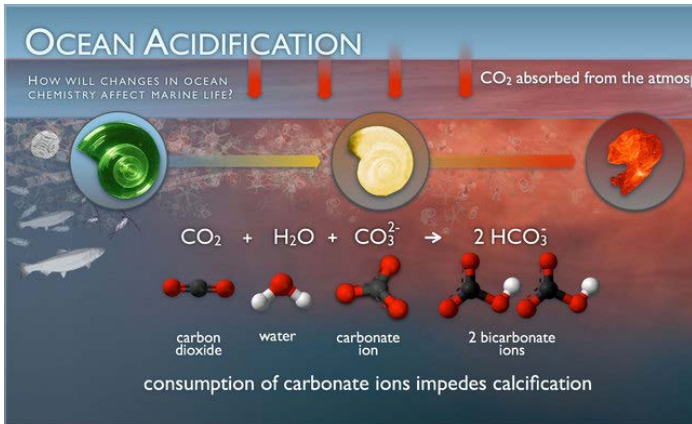
Images | Click on Image for Link



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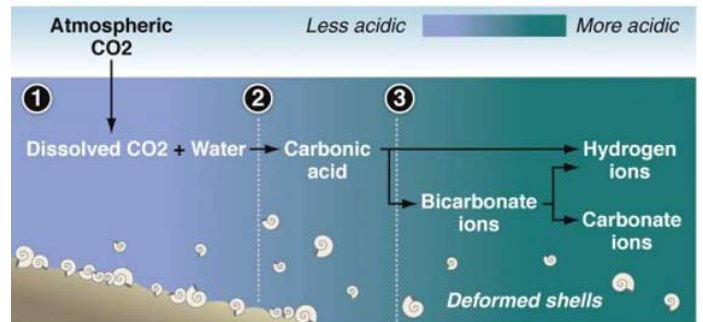
OCEAN ACIDIFICATION

Diagrams | Click on Image for Link



Ocean acidification

CO₂ emissions from human activities are acidifying the oceans and threaten a mass extinction of sea life, scientists warn.



- Up to 50% of the CO₂ released by burning fossil fuels over the past 200 years has been absorbed by world's oceans
 - Carbonic acid lowers water's pH level, making it more acidic
 - This raises hydrogen ion concentration in water, limits organisms' access to carbonate ions, which are needed to form hard parts
- Since the Industrial Revolution, CO₂ emissions have already turned the sea about 30% more acidic

© 2009 MCT
 Source: University of Maryland
 Graphic: Jutta Scheibe, Junie Bro-Jorgensen

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OCEAN ACIDIFICATION

Videos, Animation, Interactives



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OCEAN ACIDIFICATION

News, Articles, and Organizational Websites

[EPOCA: Ocean Acidification Blog](#)

[Ocean News from the Bamfield Science Center – Ocean Acidification issue](#)

[Ocean Acidification: The Facts](#)

[UNEP: Global Ocean Acidification](#)

[Ocean Acidification: The Other Threat of Rising CO₂ Emissions](#)

[The World Ocean Observatory Online Event: Ocean Acidification](#)

Lesson Plans and Teaching Resources

[Acidic Oceans Lesson Plan](#)

[Virtual Lab](#)

[Benthic Reef Environment: Ocean Acidification –Teaching Resource Guide](#)

[Ocean Acidification Activities](#)

[Teacher Guide: Understanding Ocean Acidification](#)

[Course Material: Ocean Acidification Short Course](#)

[NRDC: Ocean Acidification Lab Kit for Teachers \(pdf\)](#)