Why do we need to care for ocean acidification in coastal water

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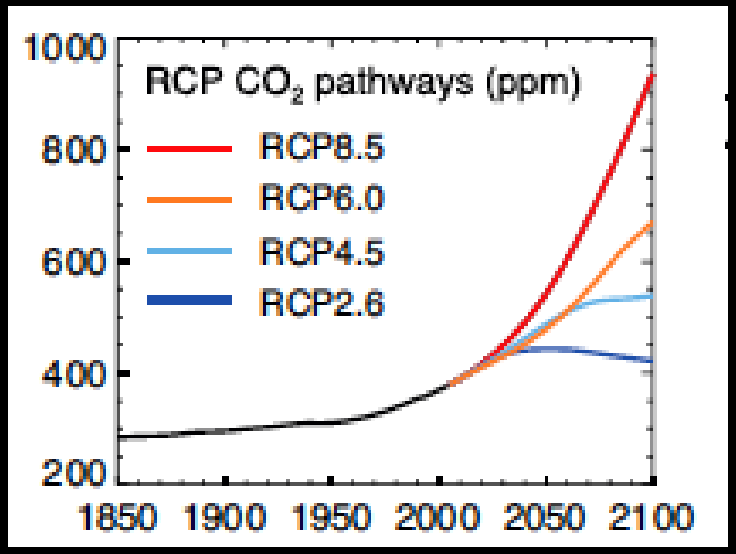
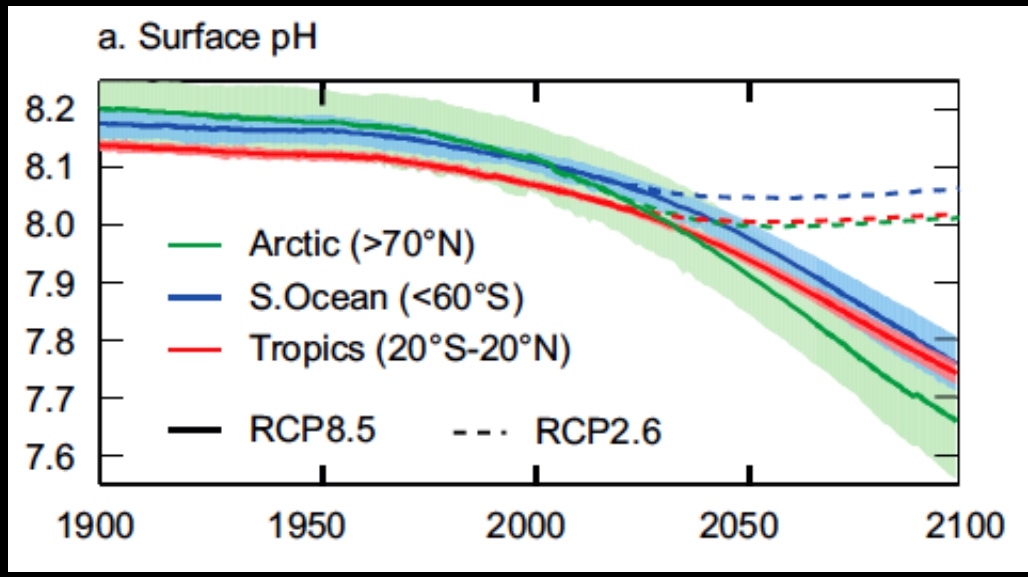
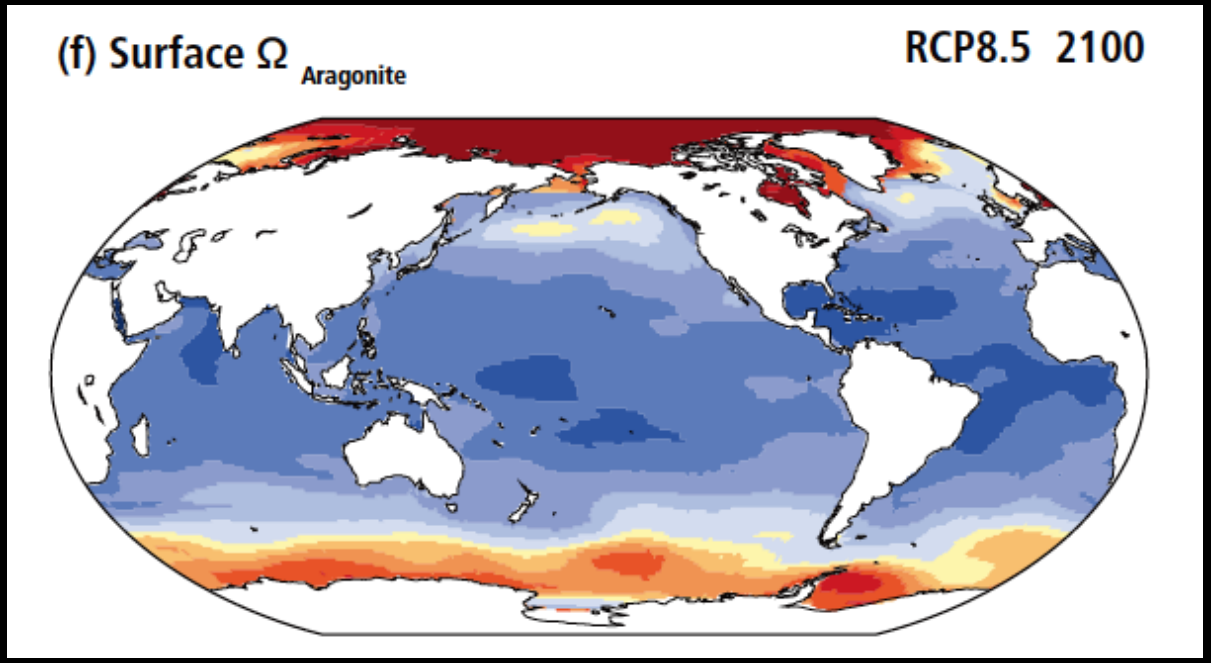
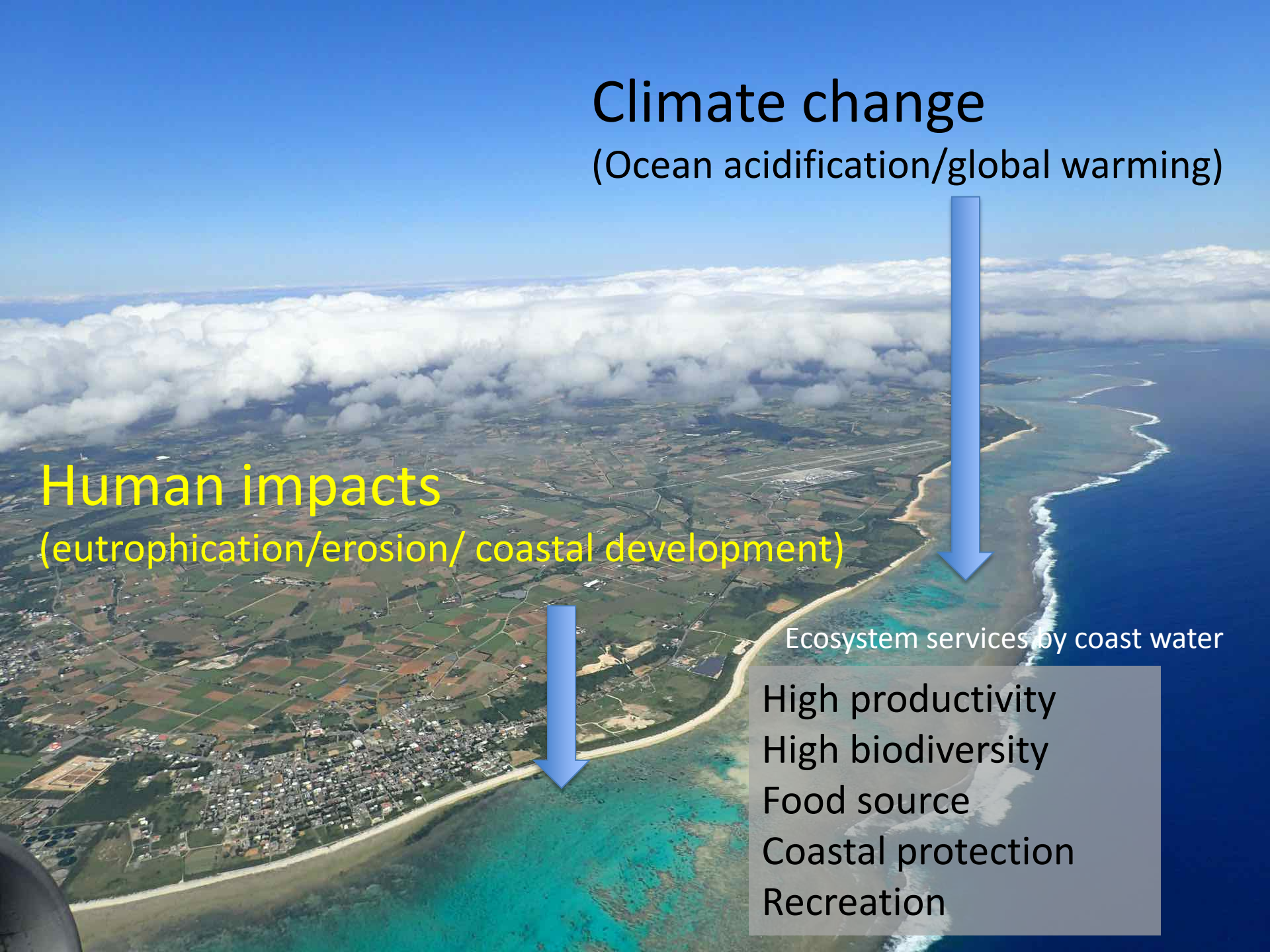

RCP CO_2 pathways (ppm)
RCP8.5
RCP6.0
RCP4.5
RCP2.6
1000
800
600
400
200
1850
1900
1950
2000
2050
2100


a. Surface pH
8.2
8.1
8.0
7.9
7.8
7.7
7.6
Arctic (>70°N)
S.Ocean (<60°S)
Tropics (20°S-20°N)
RCP8.5
RCP2.6
1900
1950
2000
2050
2100

IPCC AR5


(f) Surface Ω Aragonite
RCP8.5 2100


Climate change
(Ocean acidification/global warming)
Human impacts
(eutrophication/erosion/ coastal development)
Ecosystem services by coast water
High productivity
High biodiversity
Food source
Coastal protection
Recreation

nature climate change

LETTERS

PUBLISHED ONLINE: 24 MARCH 2013 | DOI: 10.1038/NCLIMATE1855

Spatial community shift from hard to soft corals in acidified water

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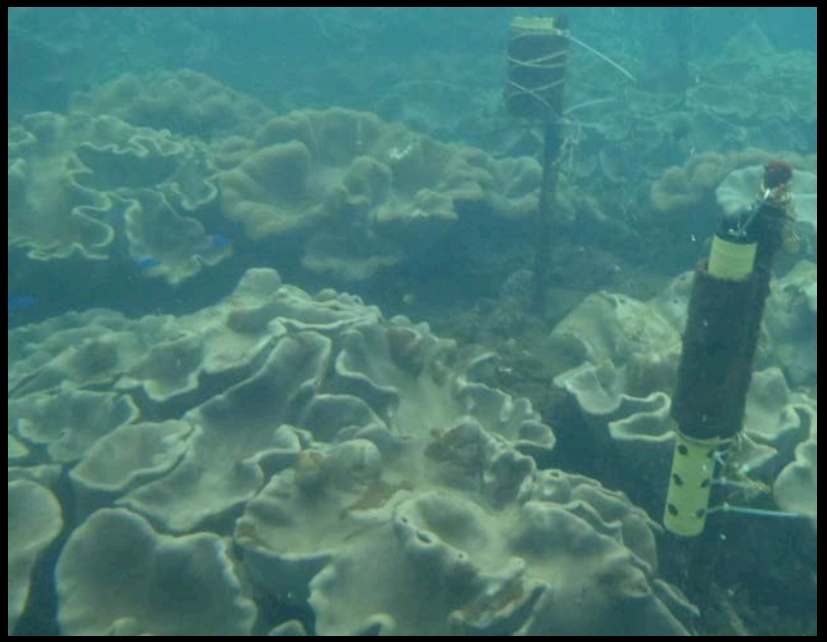
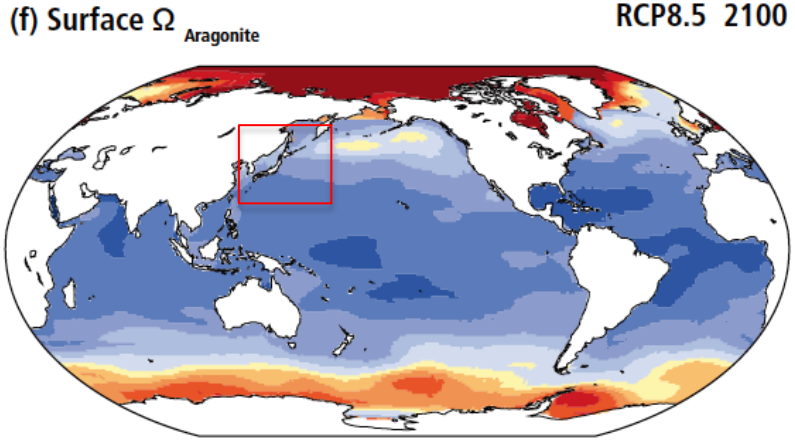
Control site

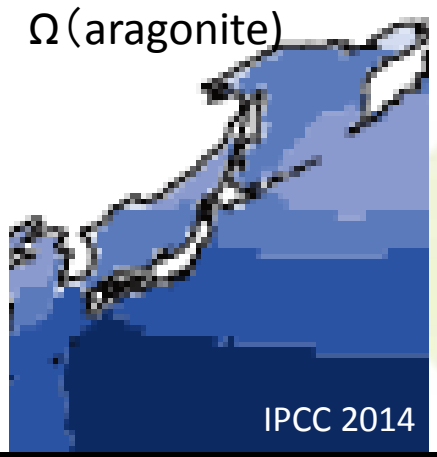
Hard coral

CO2 vent site（pH 7.8 1,000 atm）

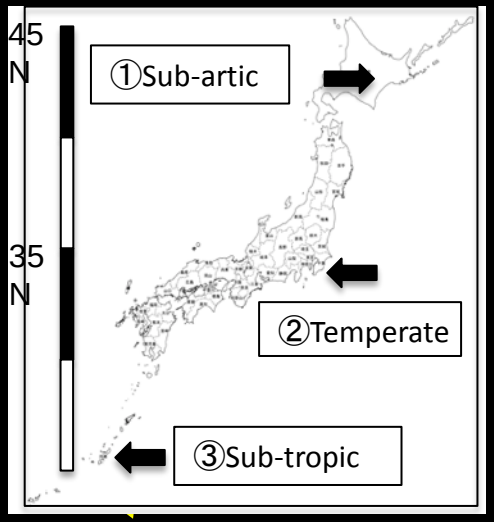


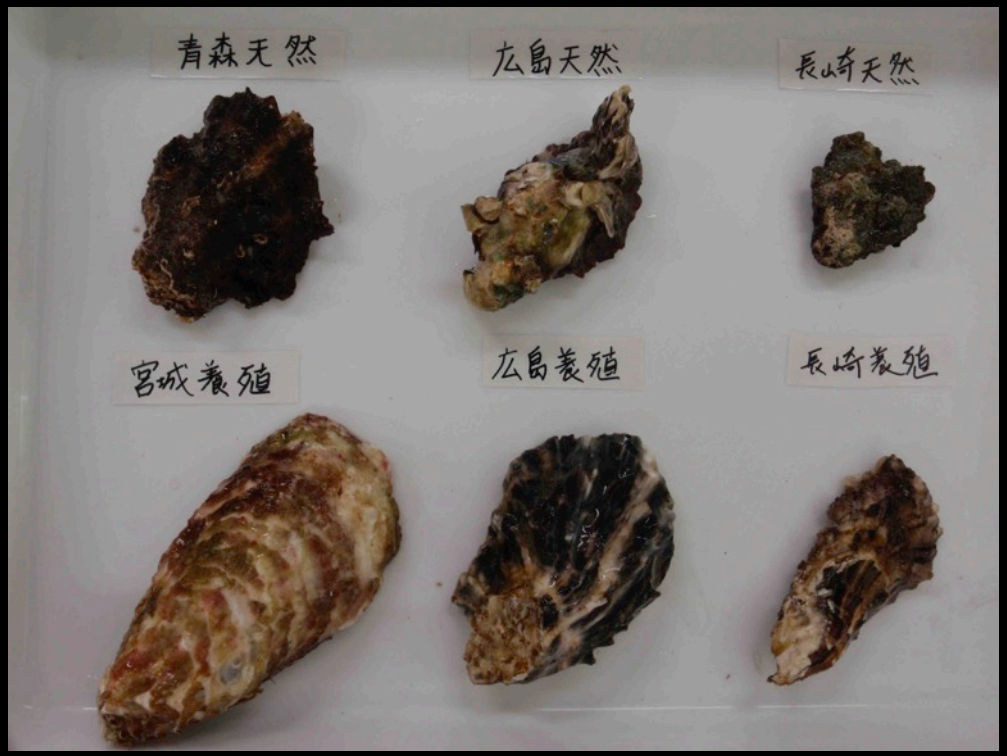
Soft corals


(f) Surface Ω Aragonite
RCP8.5 2100


Ω（aragonite）
IPCC 2014

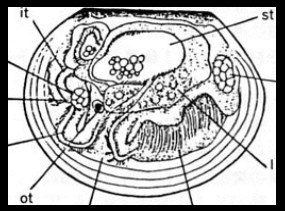

1
2
3
4
5
6
7
8
9
10
11
12


45 N
35 N
①Sub-artic
②Temperate
③Sub-tropic


青森天然
広島天然
長崎天然
宮城養殖
広島養殖
長崎養殖

Change on mineralization form

Benthic stage



juvenile

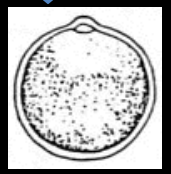
Oyster

Calcite

Mussel

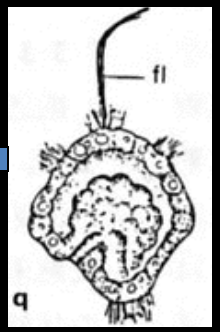
Aragonite
+ Calcite

Egg+sperm

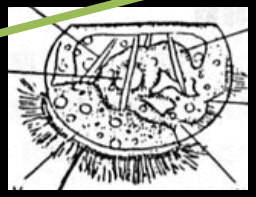


Fertilized
eggs

Start of amorphous $CaCO_3$ (ACC) synthesis



Trochophore



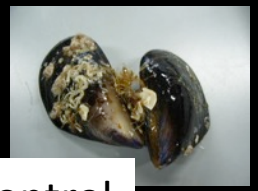
Veliger
Aragonite

Planktonic
stage

Oysters

Mussels

	Larva	Adult
Oysters	Amorphous $CaCO_3$ → Aragonite	Calcite
Mussels	Amorphous $CaCO_3$ → Aragonite	Aragonite + Calcite

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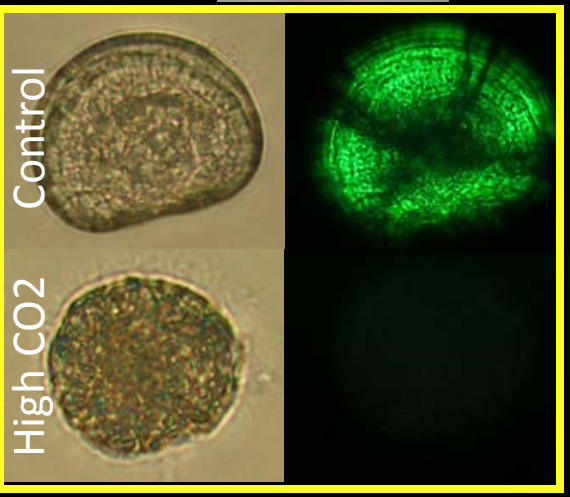
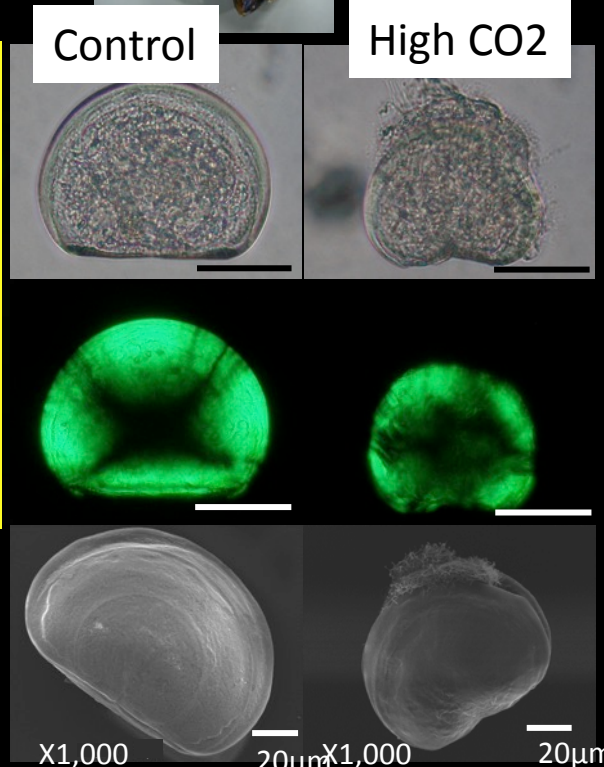
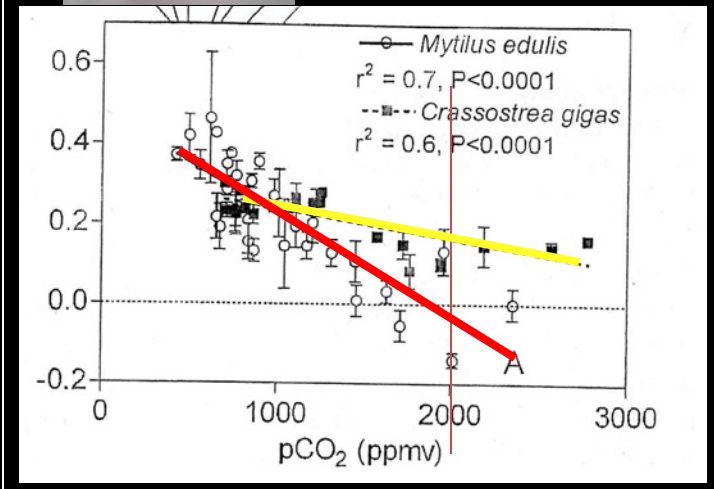


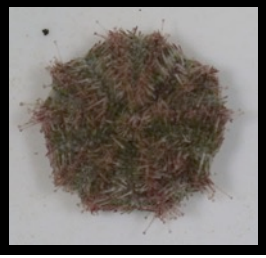
Kurihara et al. 2007



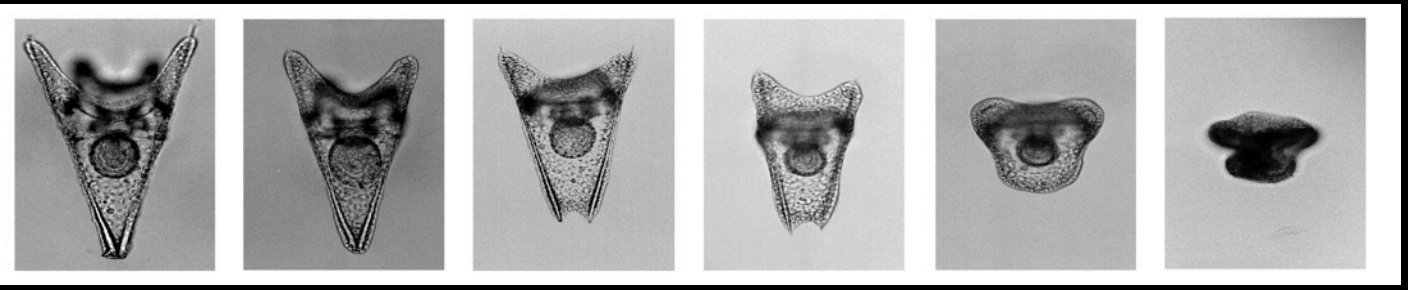
Kurihara et al. 2008



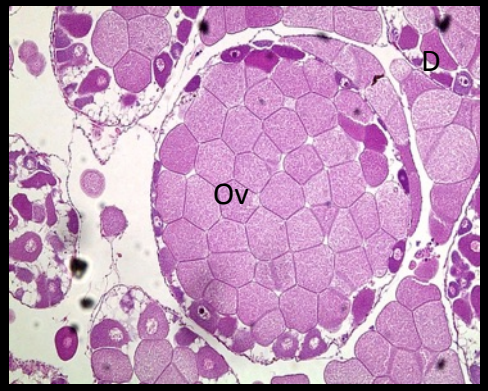
Gazeau et al. 2007



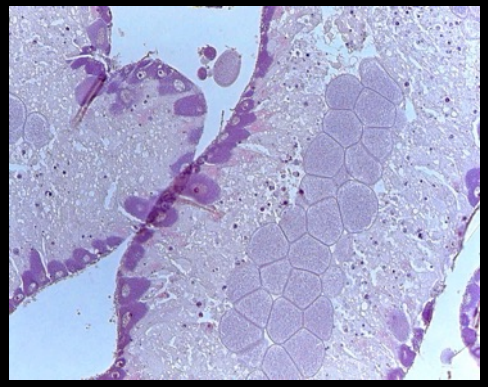
Kurihara & Shirayama 2004



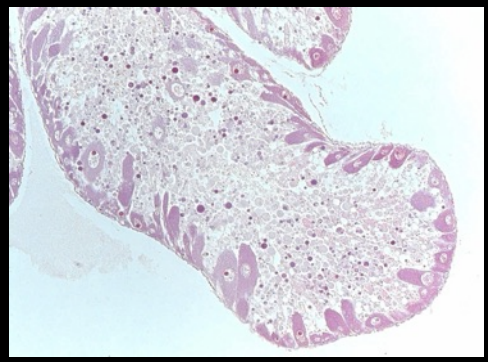
control



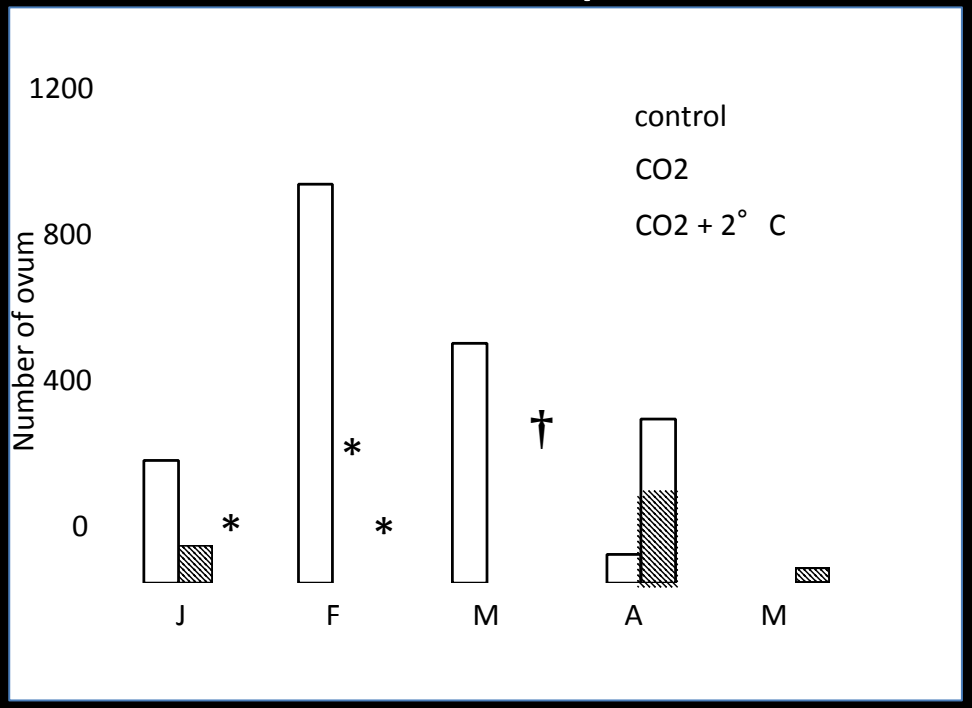
CO2 1,000 µatm



CO2 1,000 µatm + 2° C



Gonad development

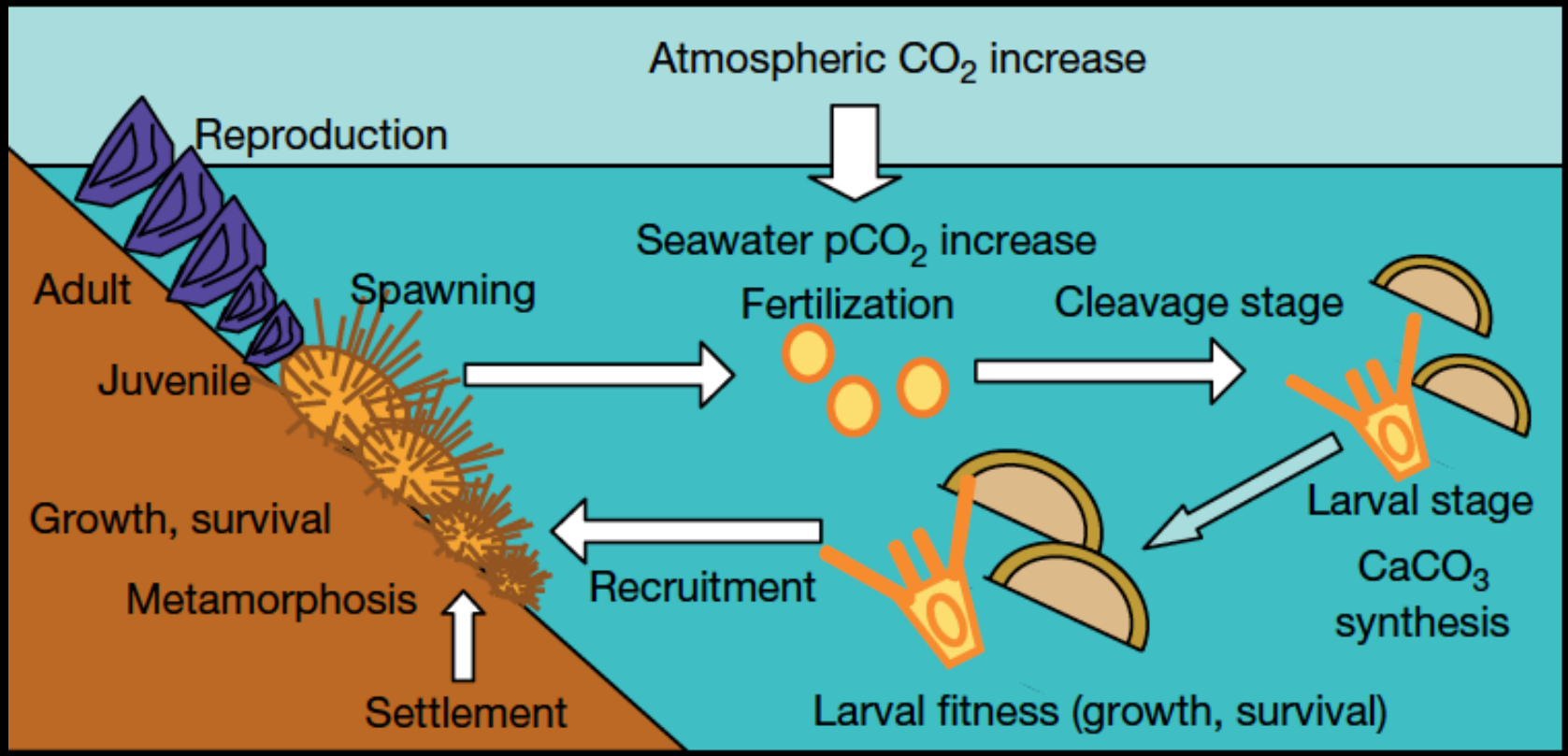


Kurihara et al. 2013

Ecological implication in coast water

Abundance/Population size

Dispersal potential



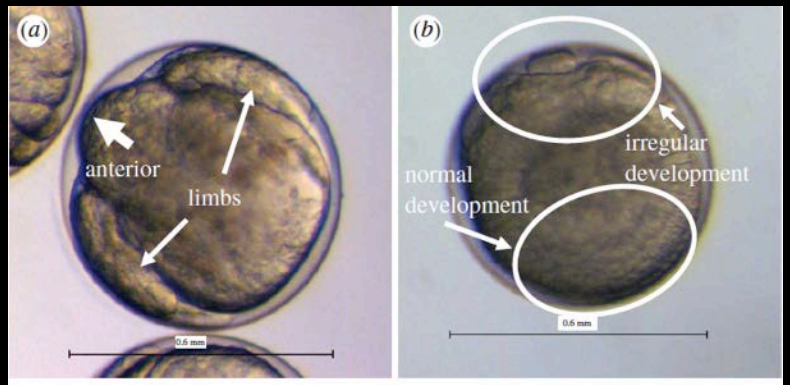
Distribution

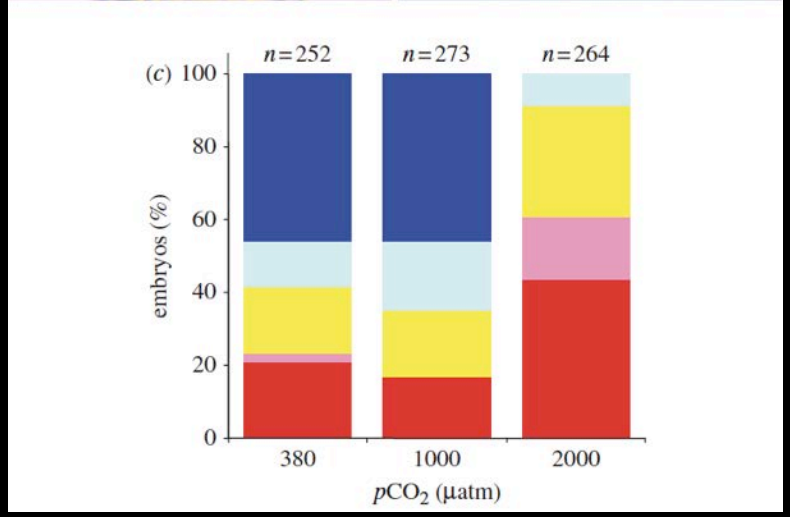
Recruitment

Larval fitness

Kurihara 2008

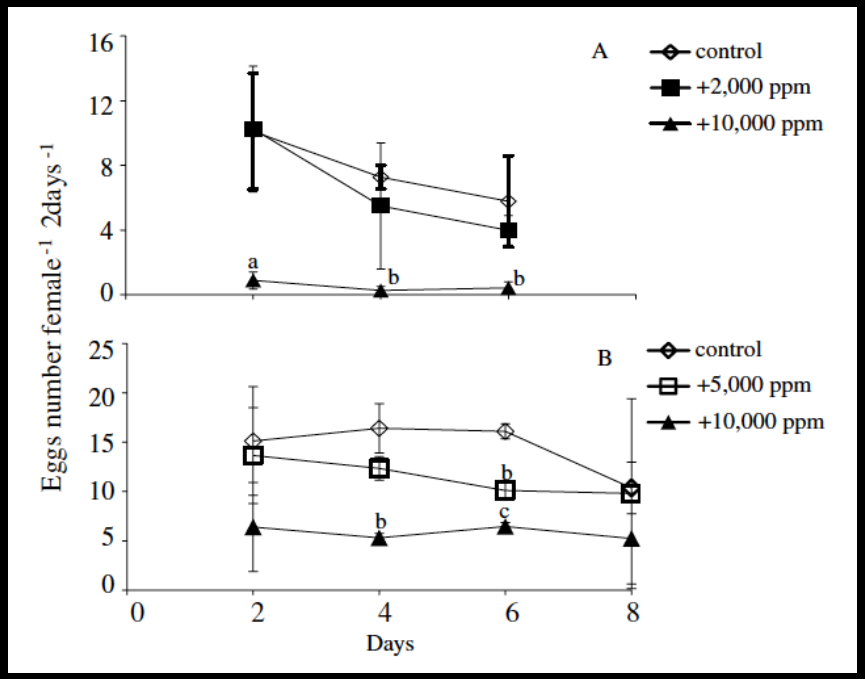
Antarctic krill



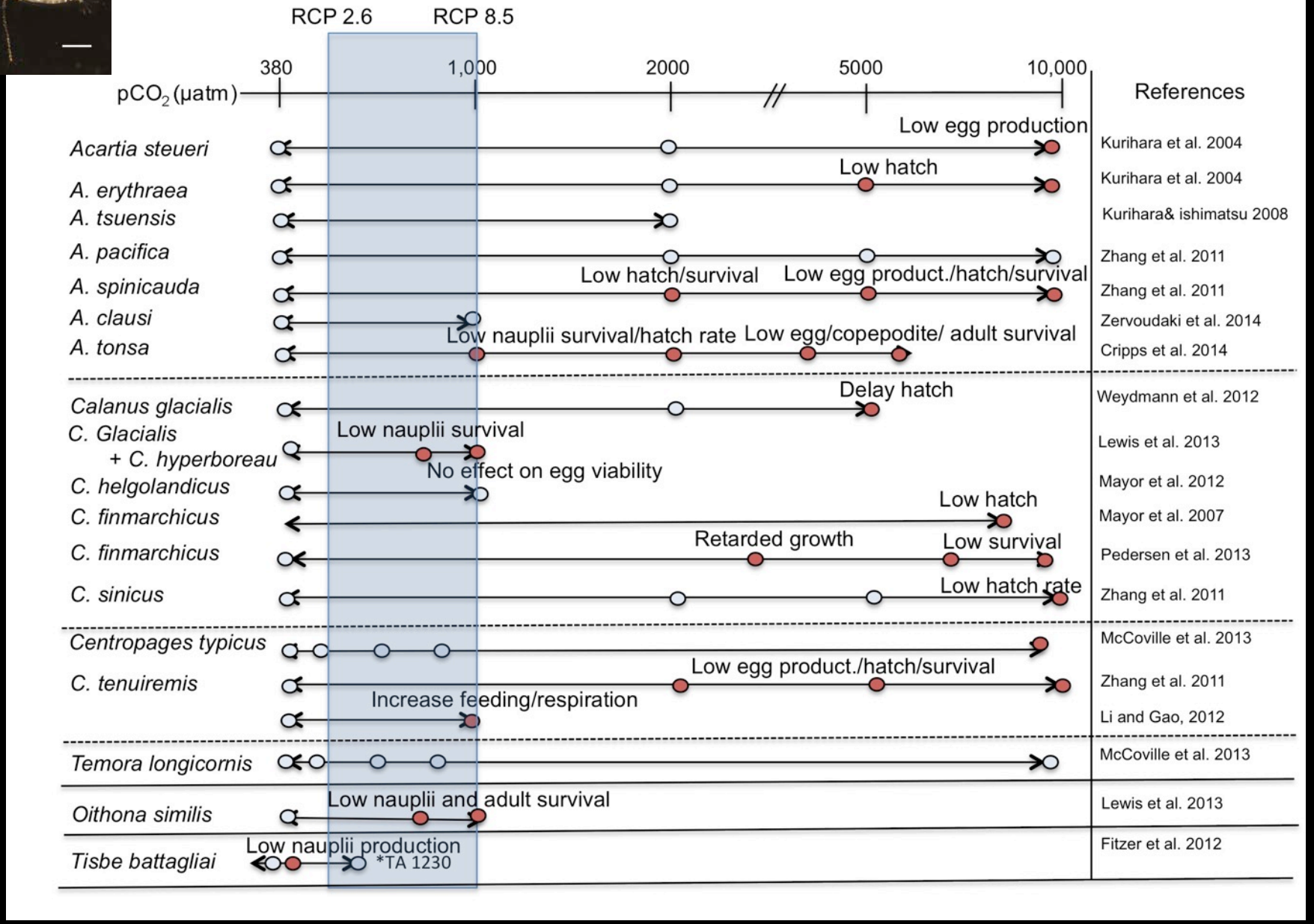


Kawaguchi et al 2010

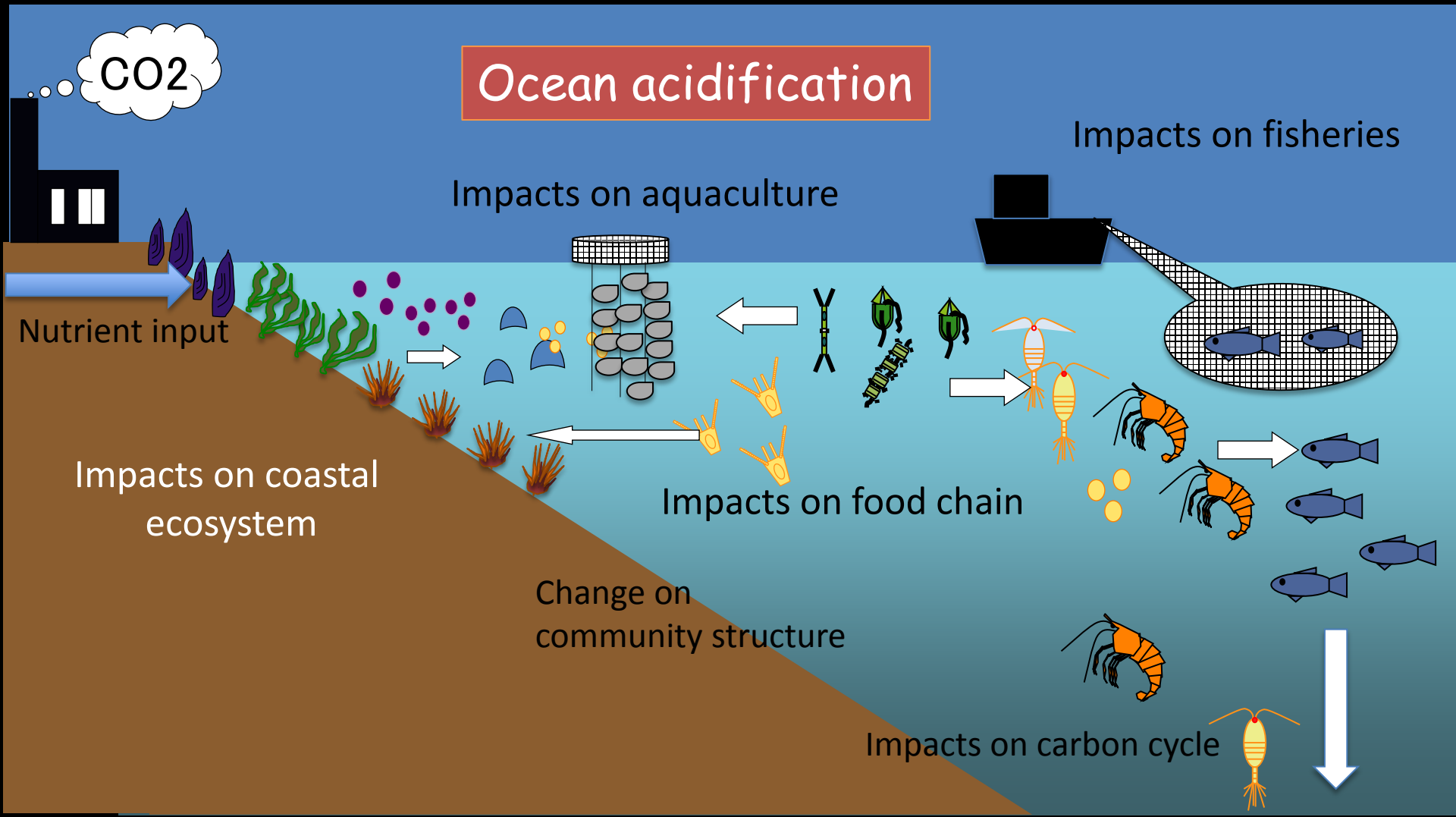
Copepods



Kurihara et al. 2004, 2008



SCAR report, Kurihara et al


CO2
Ocean acidification
Impacts on fisheries
Impacts on aquaculture
Nutrient input
Impacts on coastal ecosystem
Impacts on food chain
Change on community structure
Impacts on carbon cycle

Asia-Pacific

- High biodiversity
- High environmental diversity
- High population
- High environmental stress
- High rely on marine sources