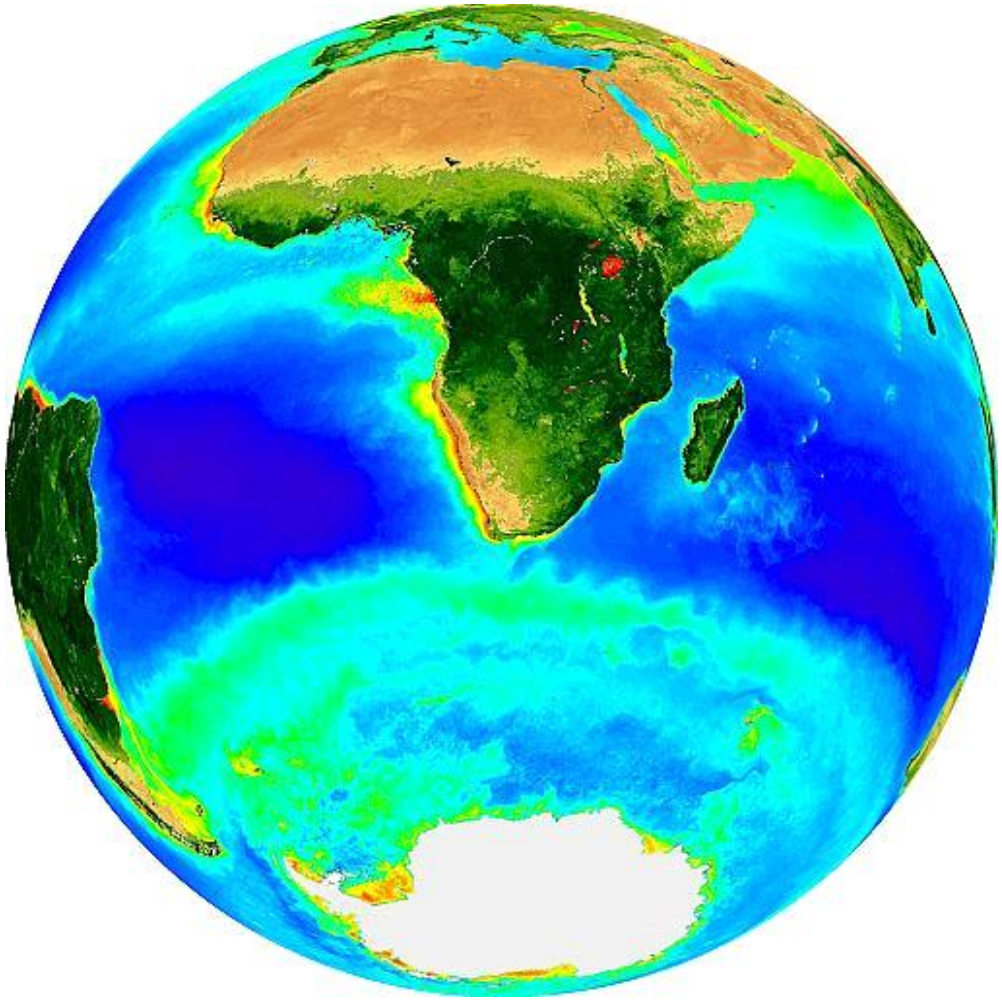
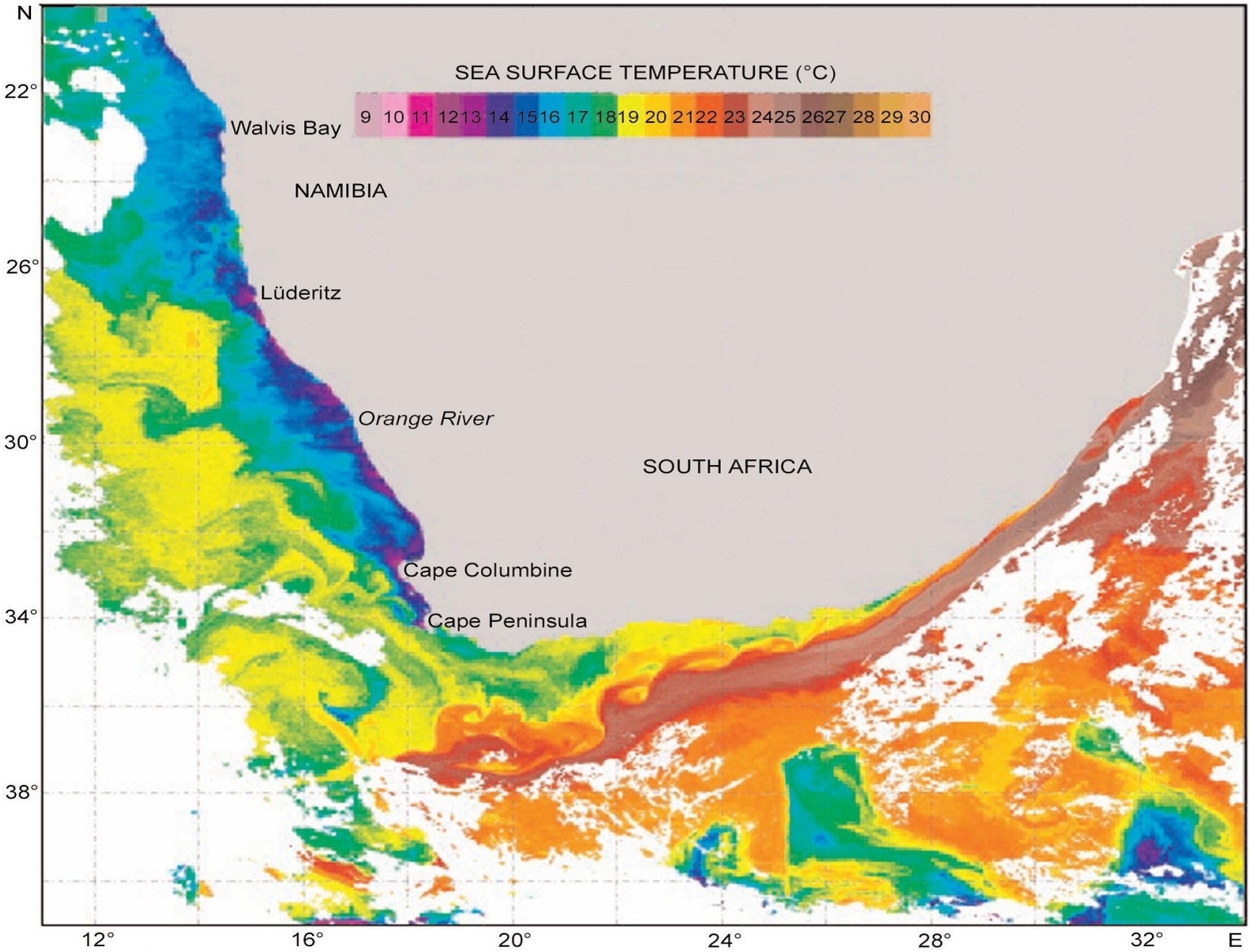
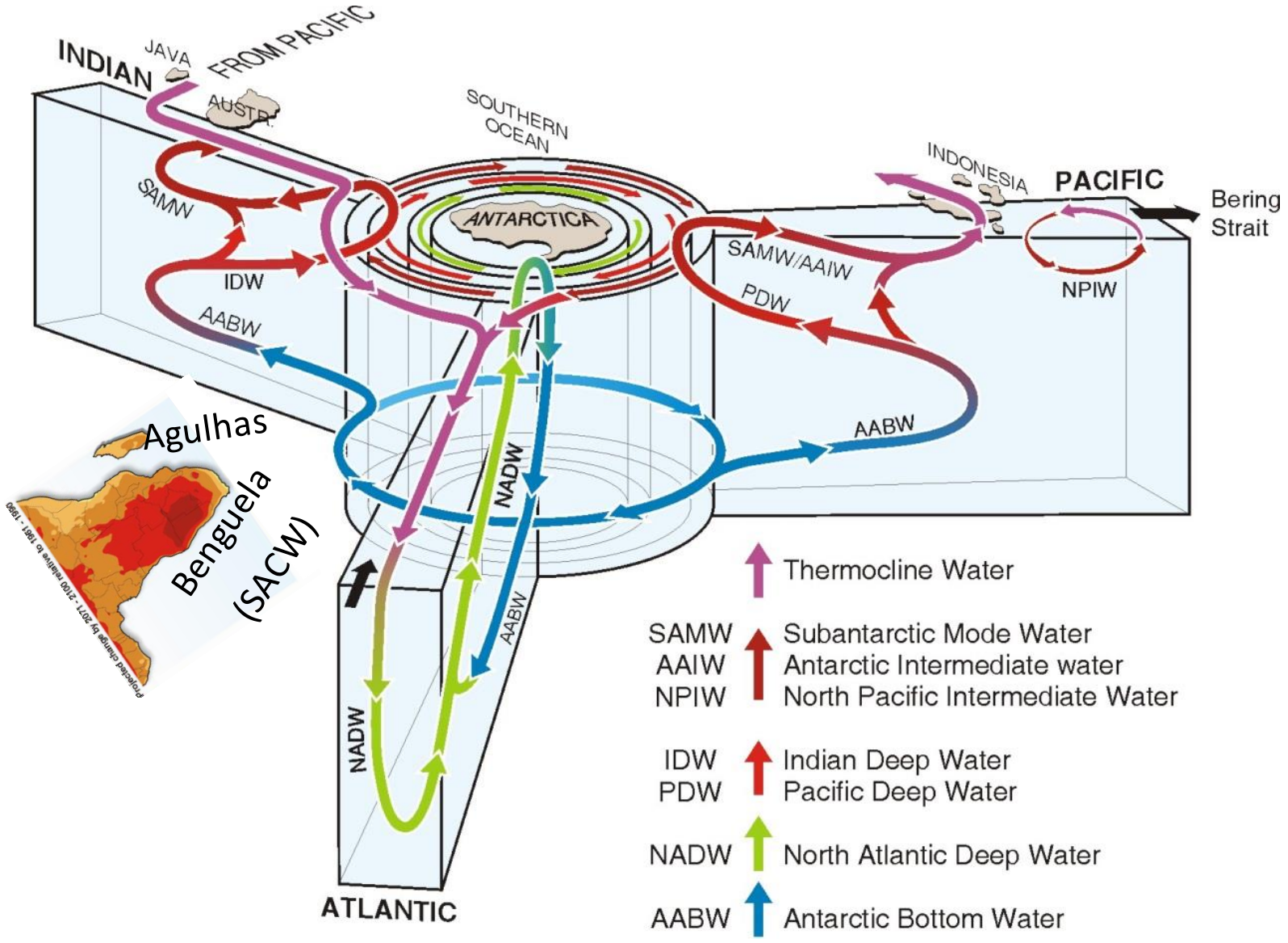
Falling Benguela pH & high variability – why?

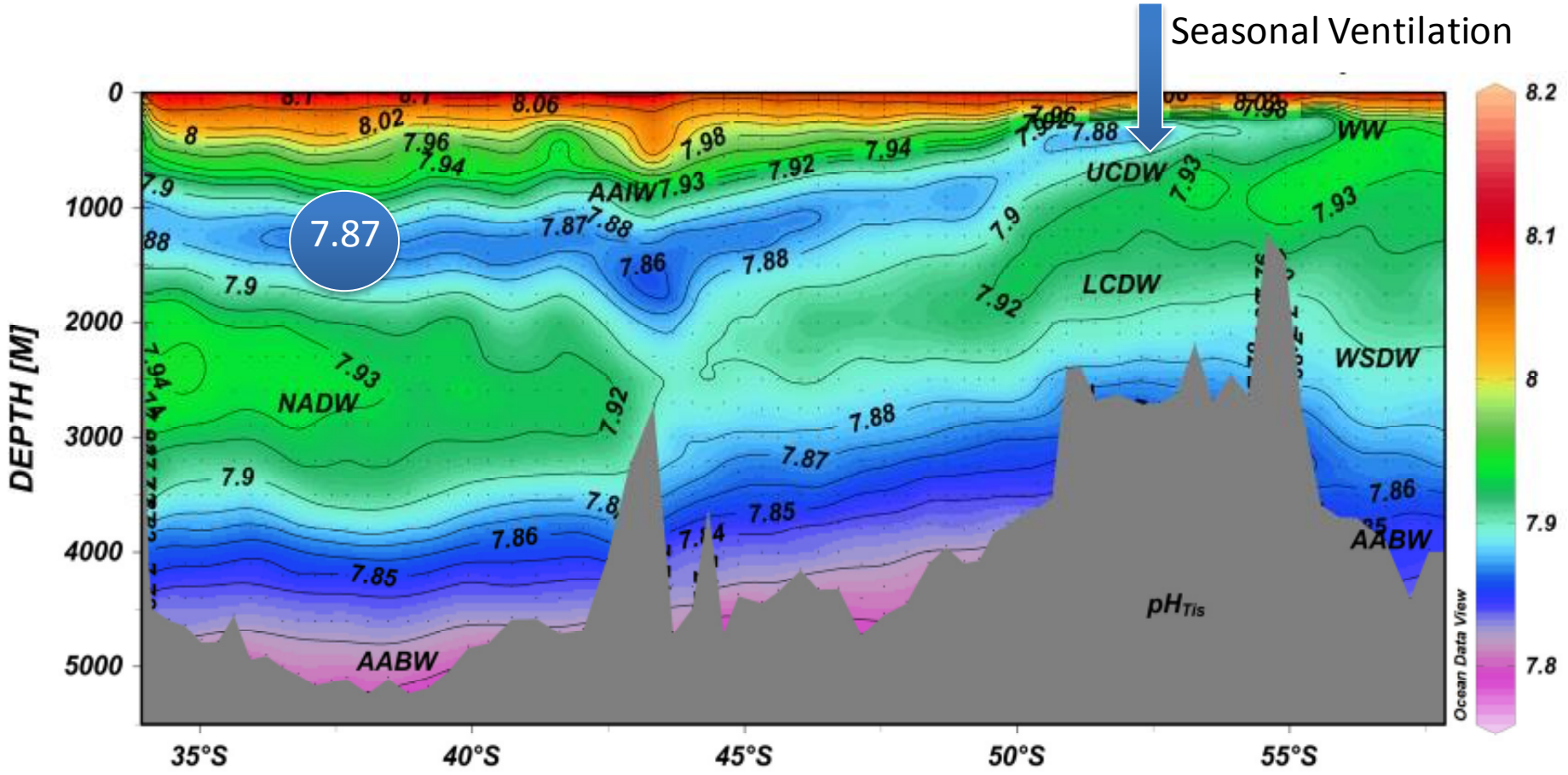


Mike Lucas, Biological Sciences
UCT


N
22°
26°
30°
34°
38°
SEA SURFACE TEMPERATURE (°C)
9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
Walvis Bay
NAMIBIA
Lüderitz
Orange River
SOUTH AFRICA
Cape Columbine
Cape Peninsula
12°
16°
20°
24°
28°
32°
E

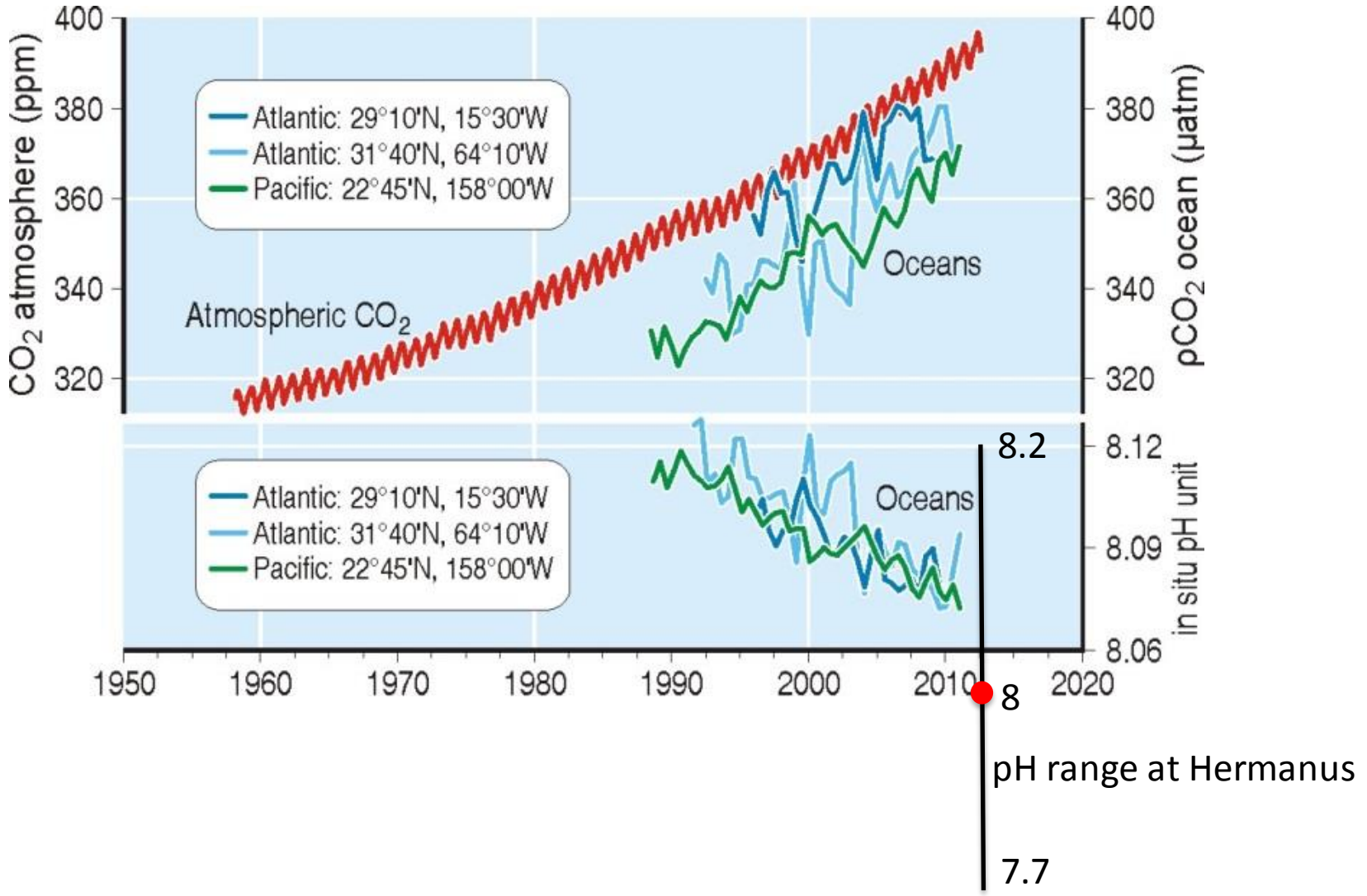
Indian, Atlantic and Pacific Ocean currents link to the Antarctic Circumpolar Current around Antarctica



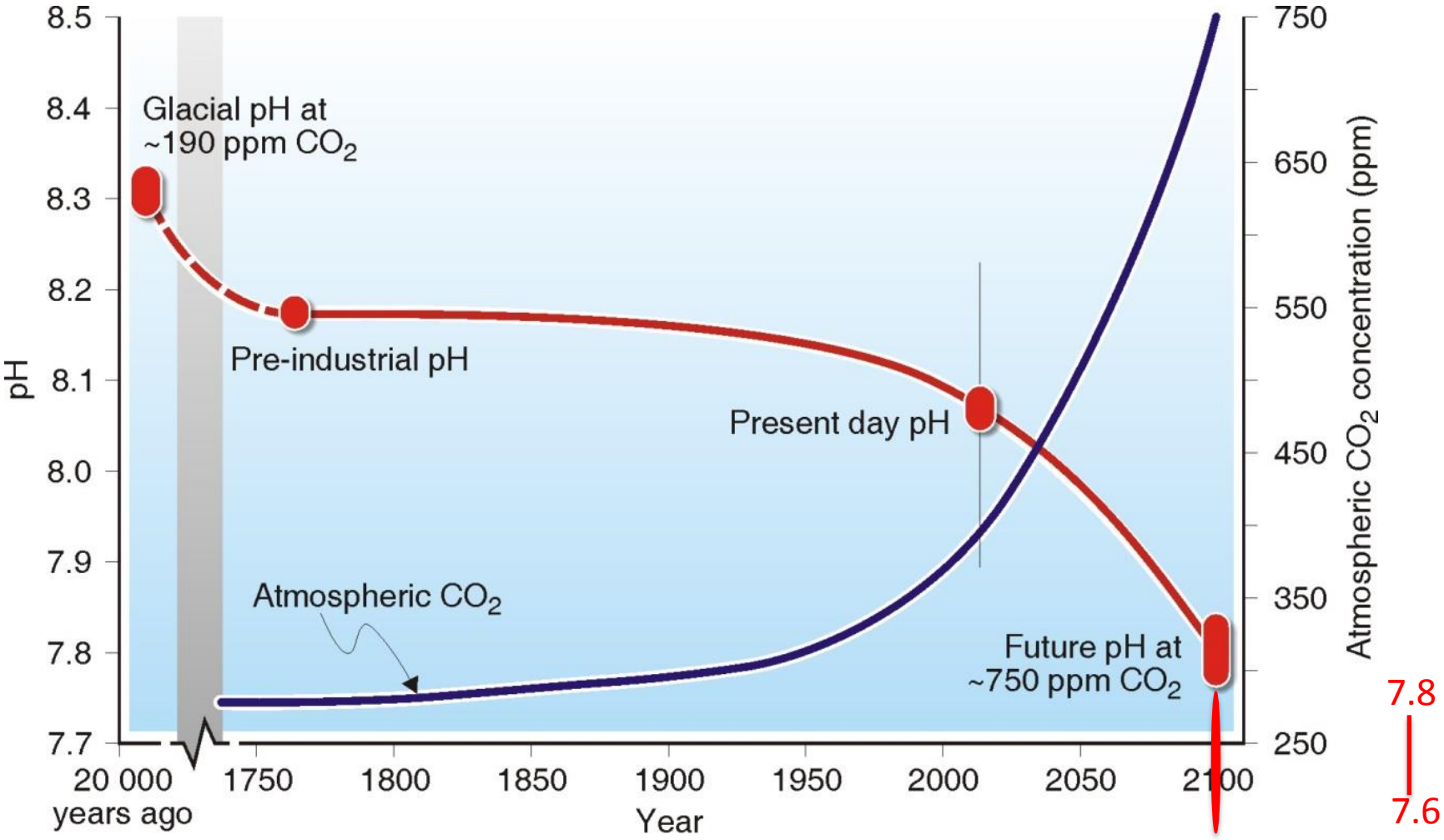


M. Gonzalez-Davilla *Biogeosciences*, 8, 2011

Carbonate system of the Southern Ocean, Atlantic Sector

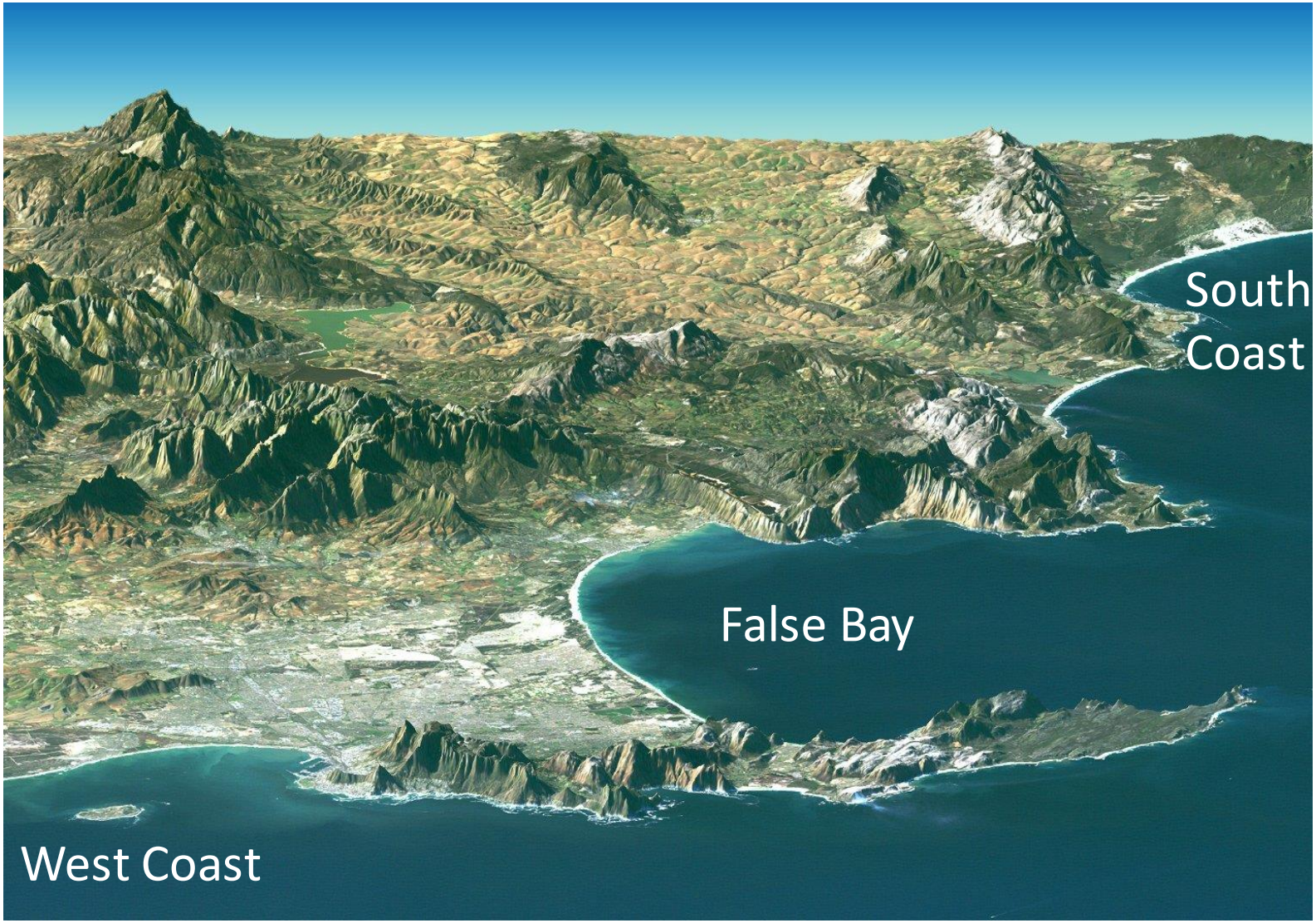


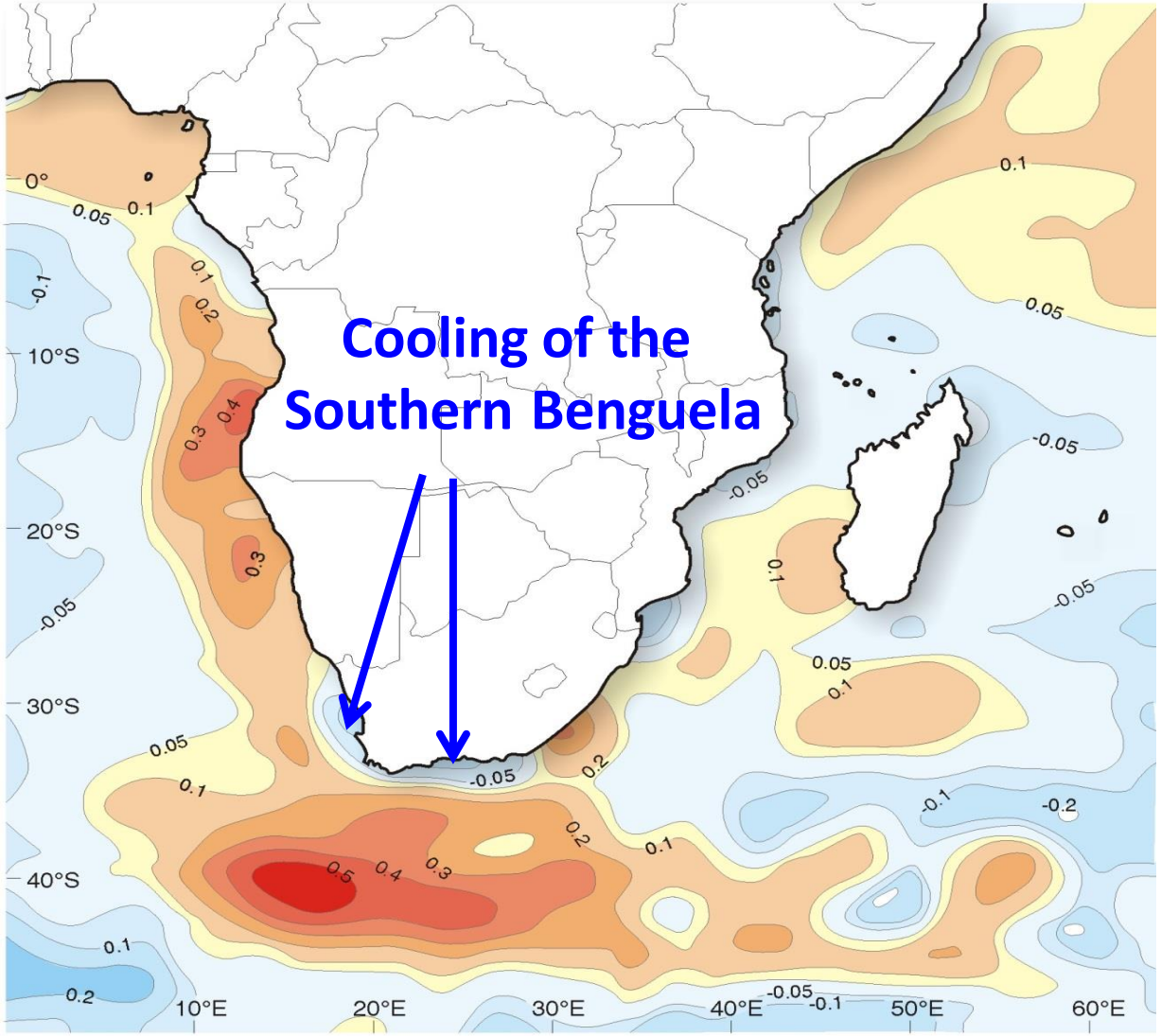
Adapted from IPCC 2014



Average future ocean pH could fall from ~8.1 to ~7.8 by 2100

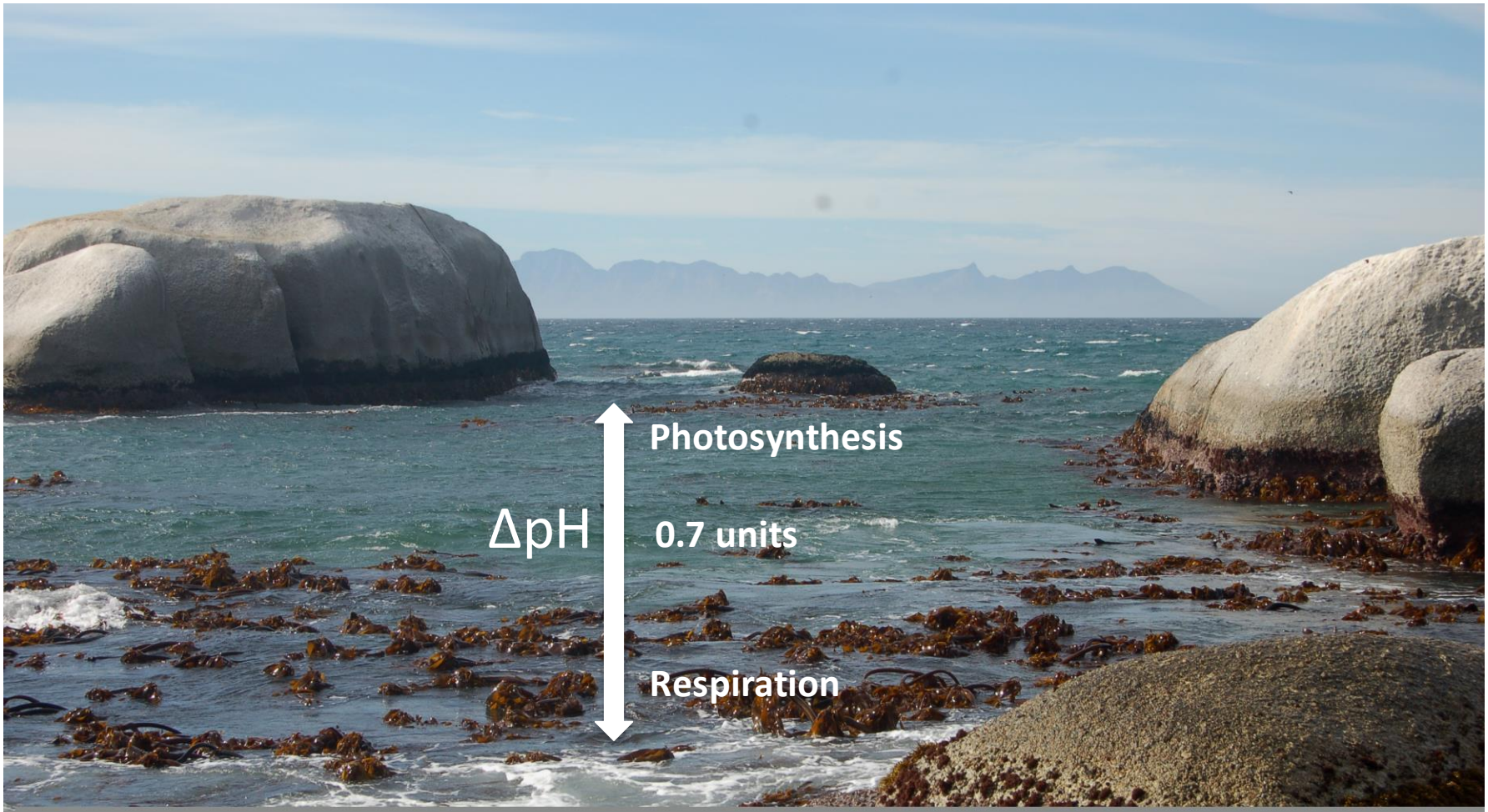
Adapted from IMBER & IPCC (R Bellerby)


South
Coast
False Bay
West Coast



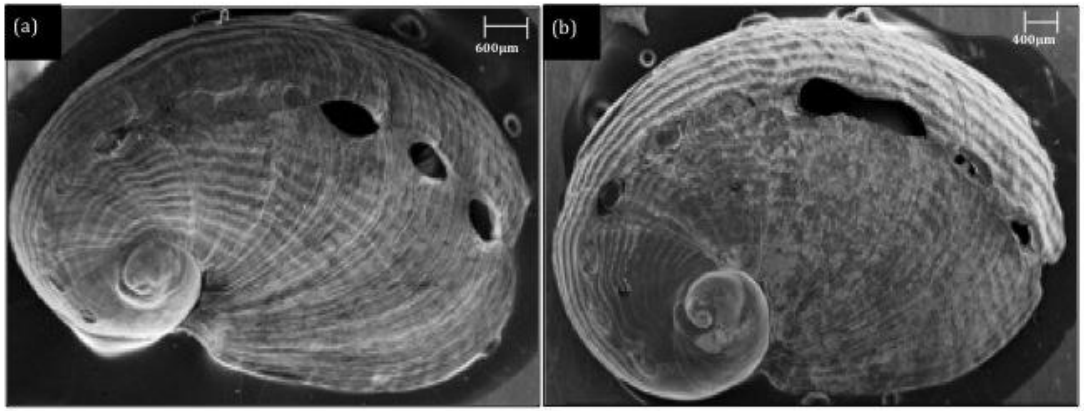
Adapted from M Rouault, 2011

Variability due to day-night photosynthesis-respiration



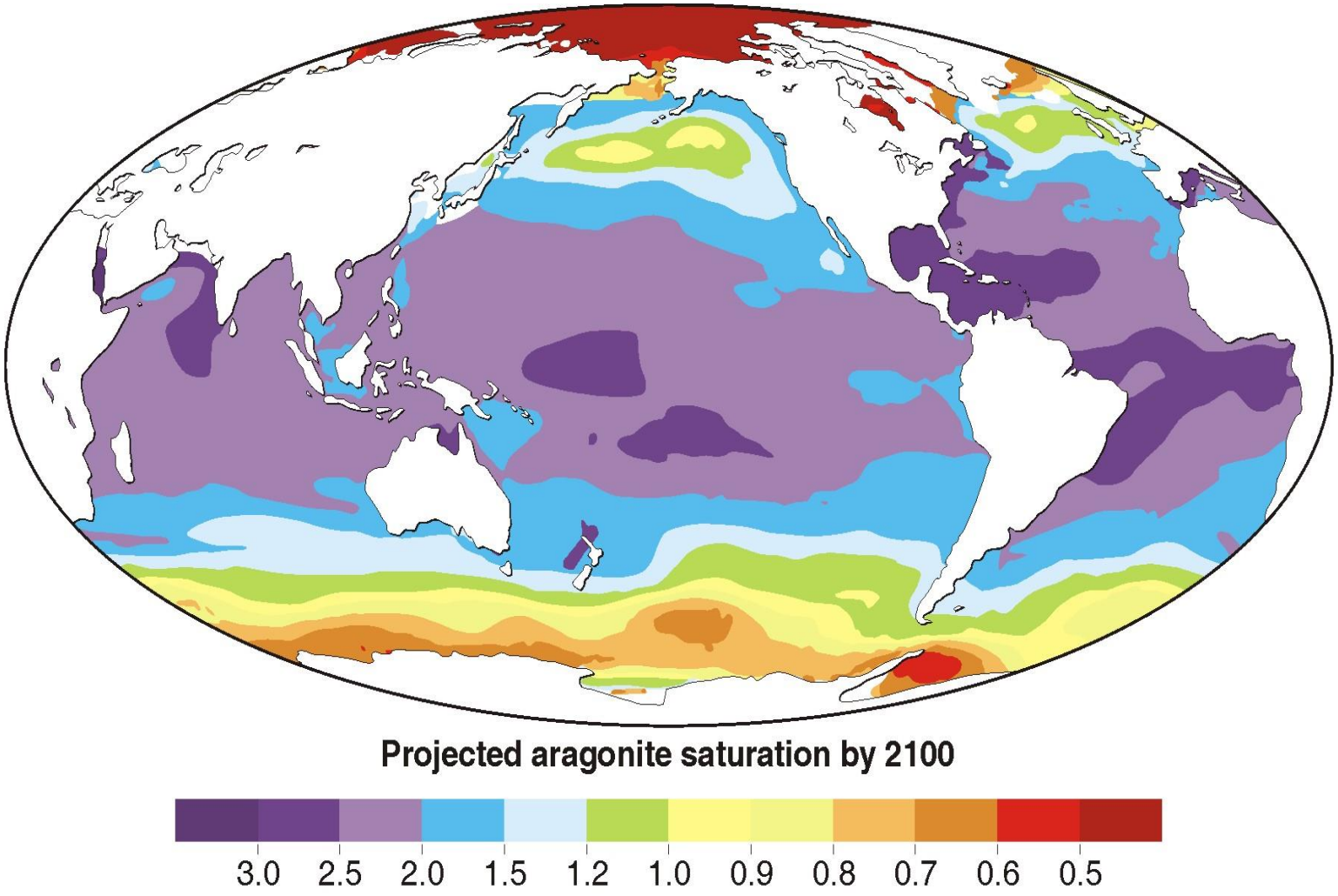
California

Abalone subjected to natural pH variability – but what will be the long term impacts of lower pH and changing SST?

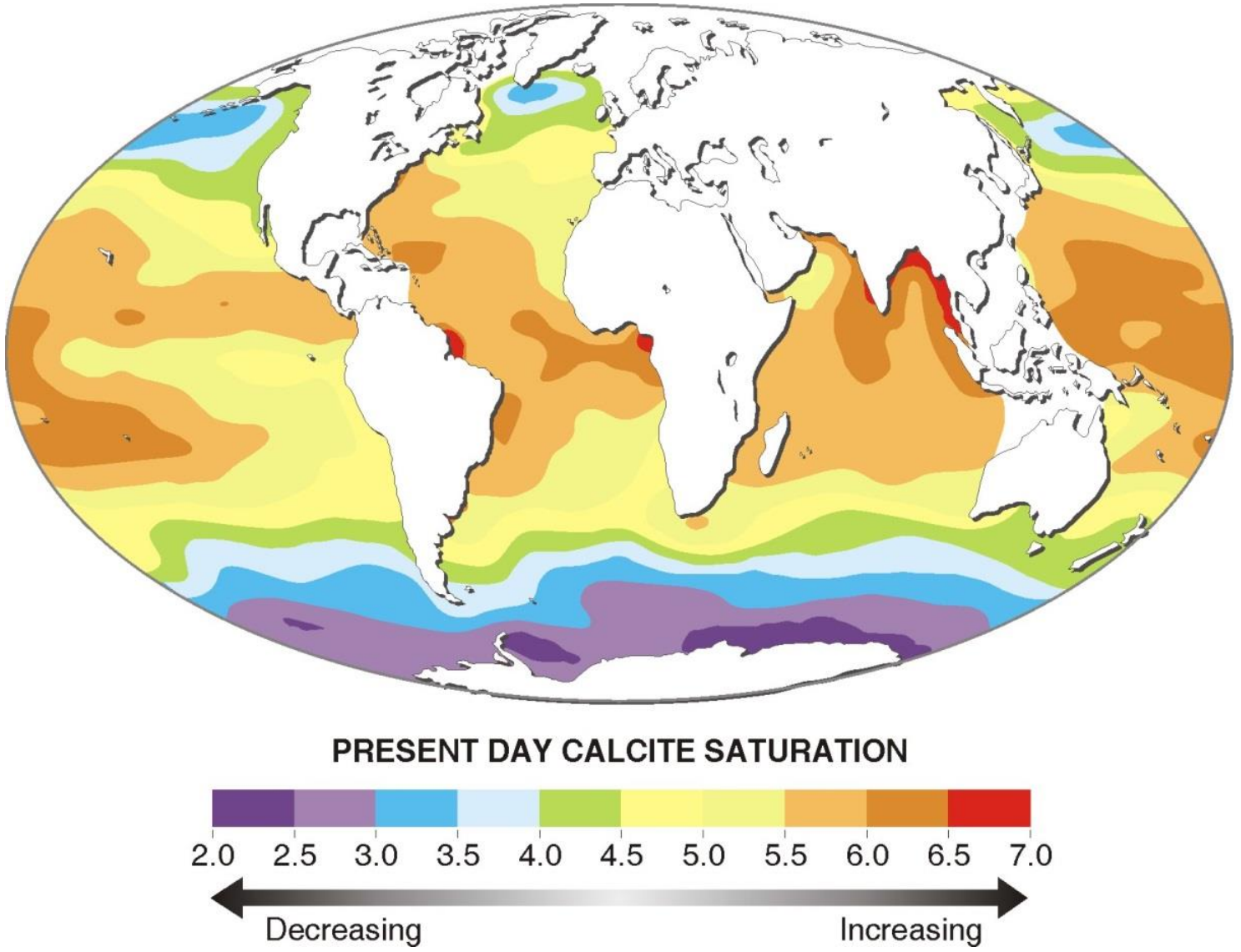


SEM pic showing some shell dissolution at low pH (7.6) after 48 hours (Nina Lester)

Project funded by the Abalone Farmers Association of South Africa (AFASA)


Projected aragonite saturation by 2100
3.0
2.5
2.0
1.5
1.2
1.0
0.9
0.8
0.7
0.6
0.5

IPCC 2014


PRESENT DAY CALCITE SATURATION
2.0 2.5 3.0 3.5 4.0 4.5 5.0 5.5 6.0 6.5 7.0
Decreasing
Increasing

IPCC