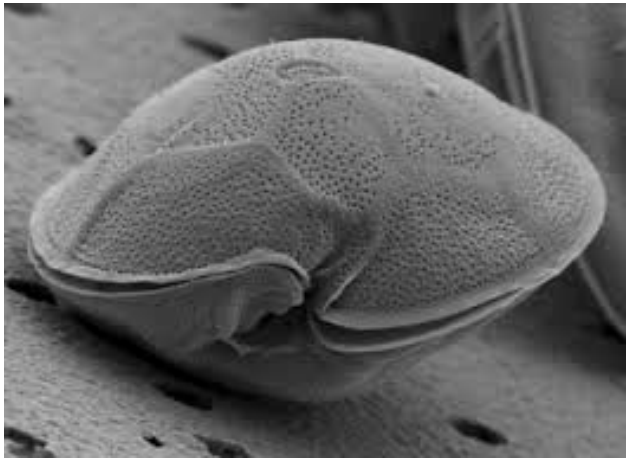
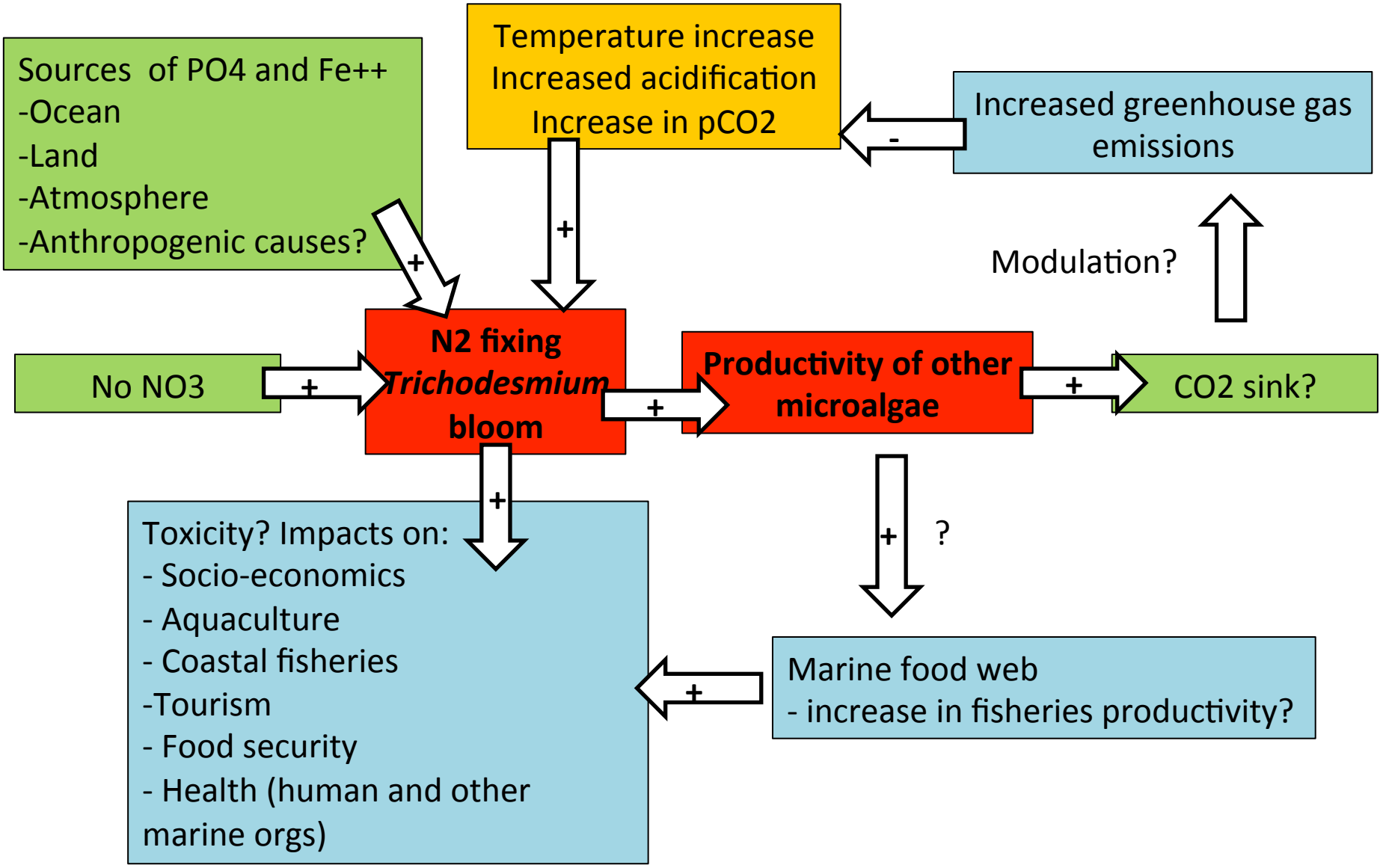
Group 3:
Effects of climate change and environmental disturbance on HABs

Day 1 summary results

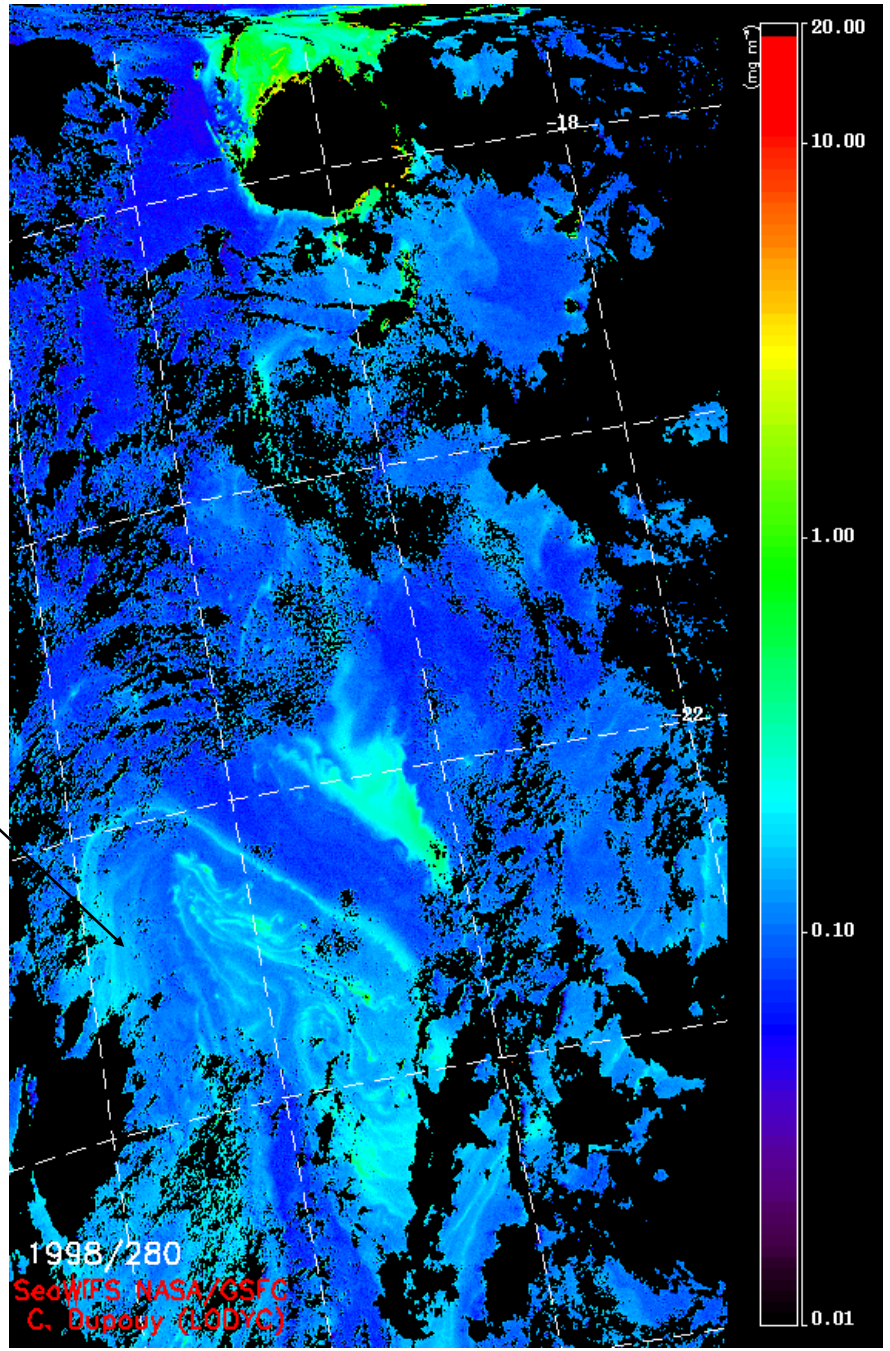


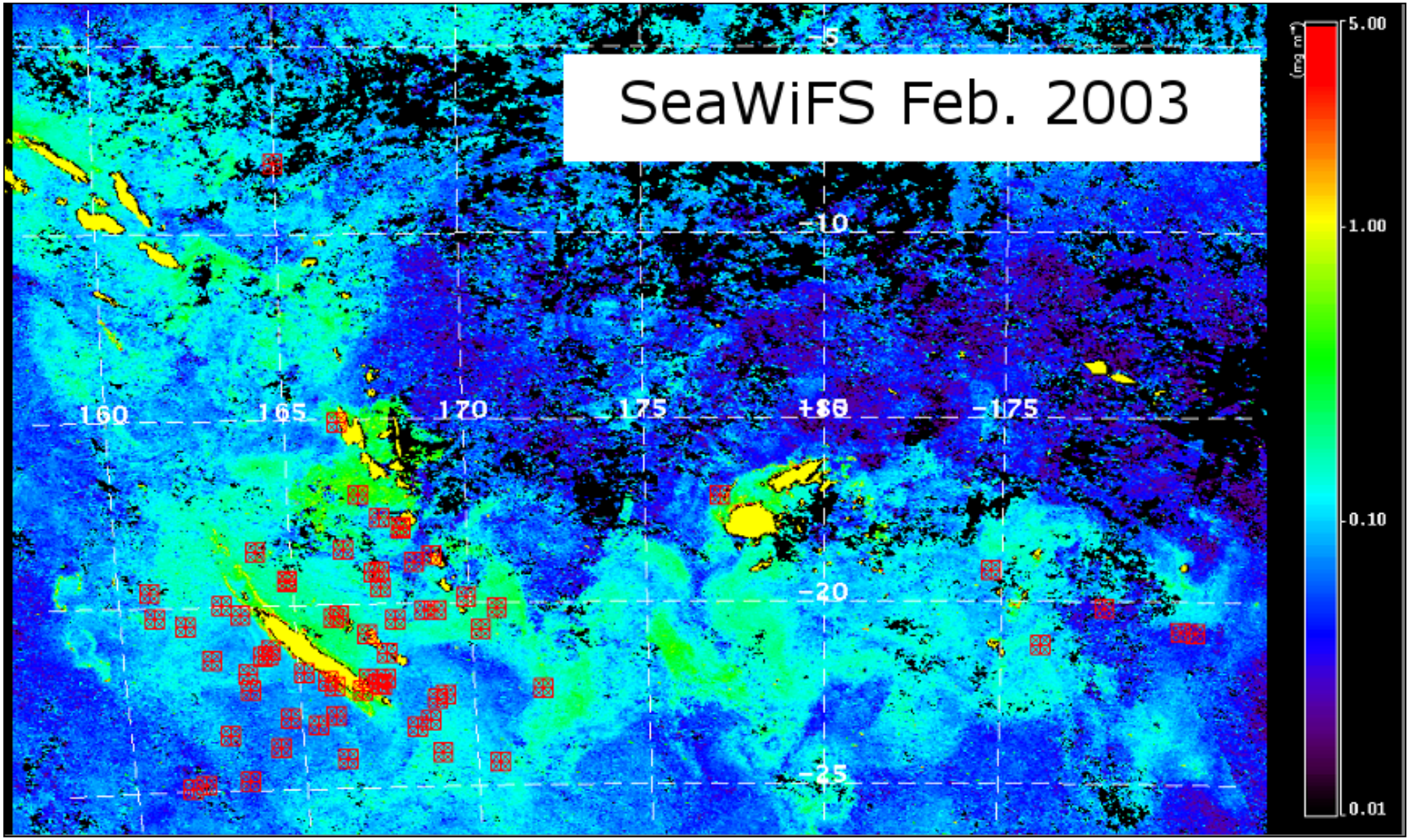
Case study 1: *Trichodesmium* in the South Pacific



Trichodesmium bloom
In November 1998

Marine Nationale, 1998



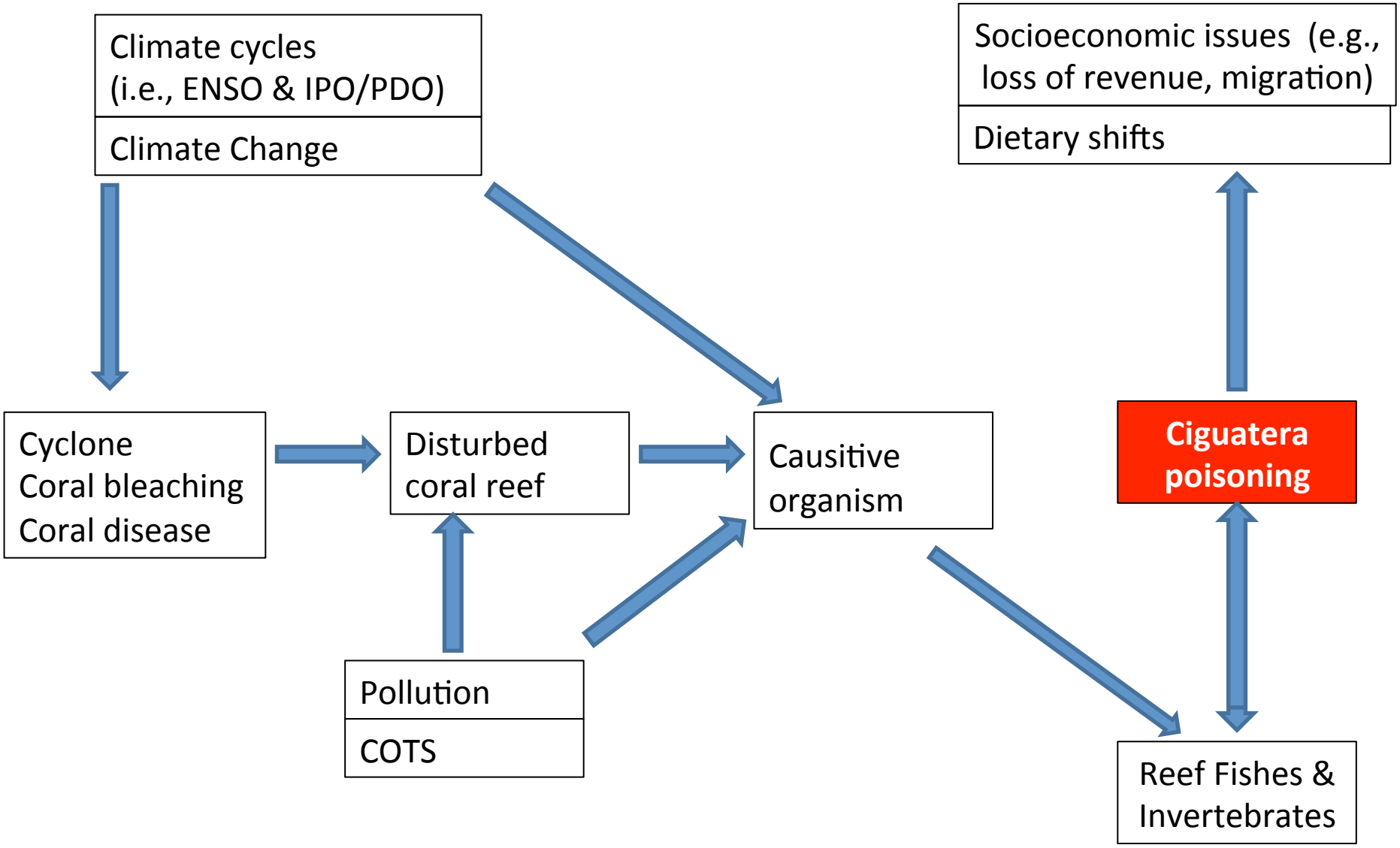

SeaWiFS Feb. 2003
-5
-10
-20
-25
160
165
170
175
-180
-175
5.00
1.00
0.10
0.01

Case 2: Study location

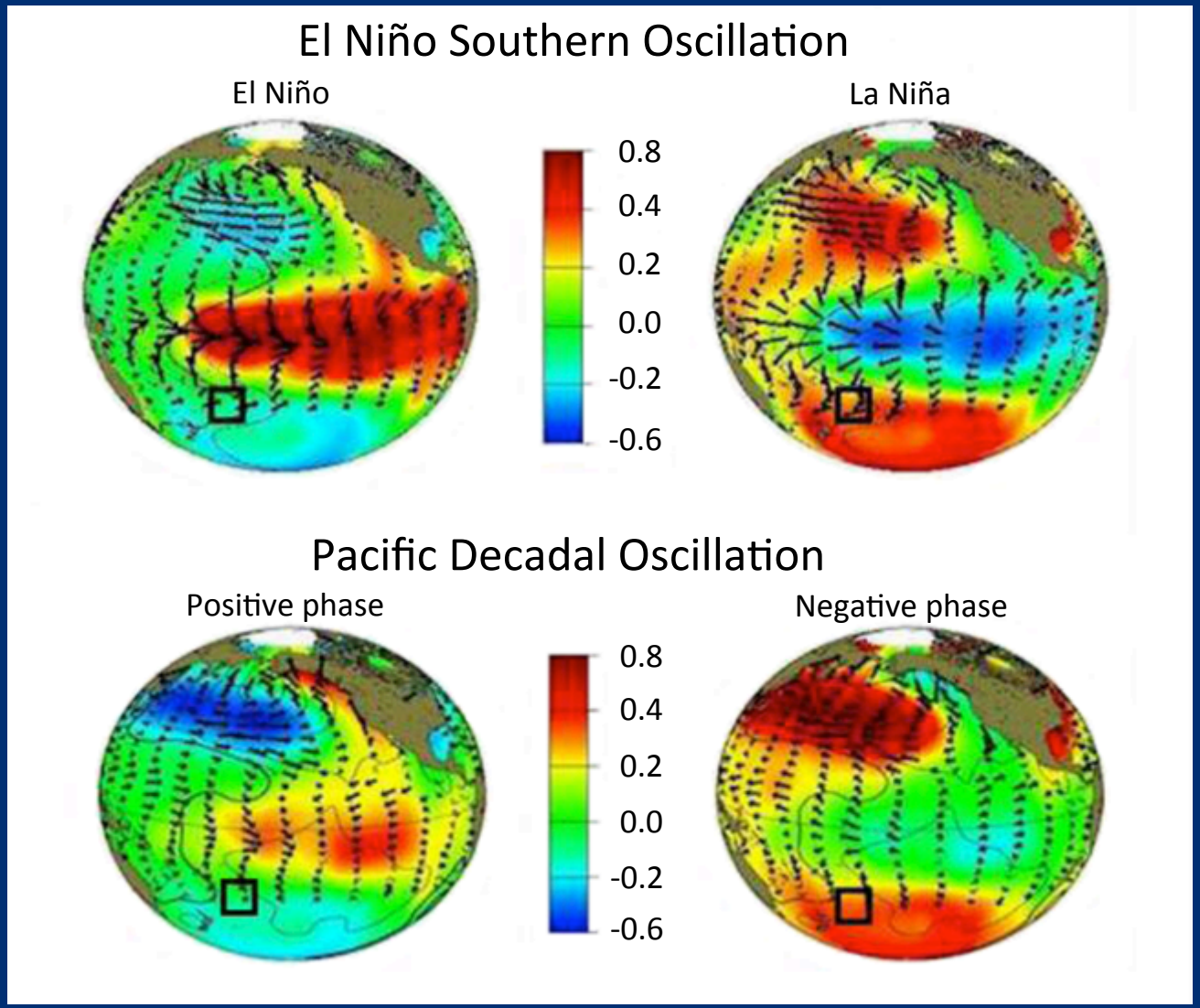
Ciguatera poisoning has been problematic for over 20 years

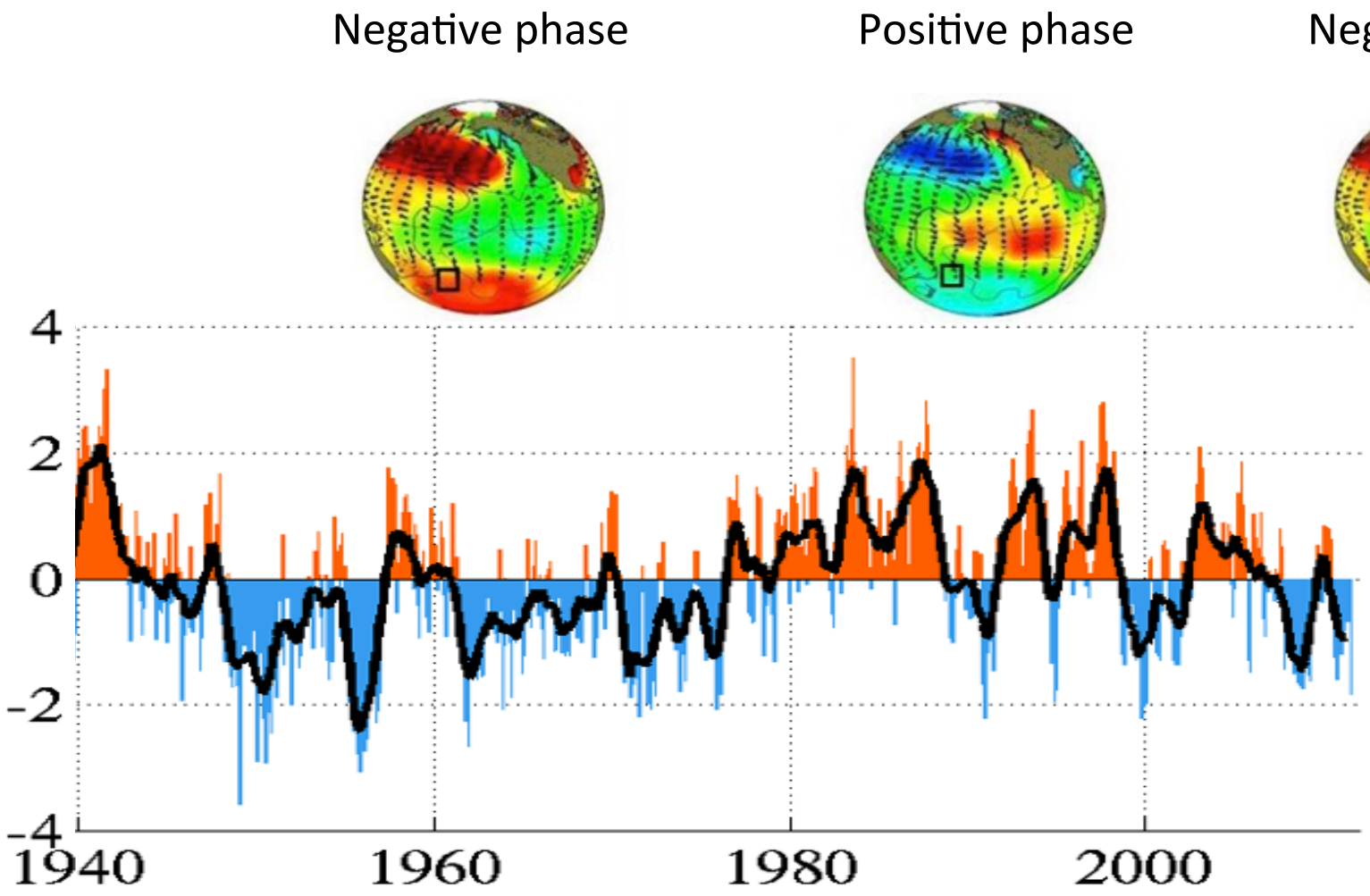
- five deaths , few partial paralysis
- up to 1000 people affected each year
- 52% have experienced ciguatera at least once in the past

Rarotonga


Climate cycles
(i.e., ENSO & IPO/PDO)
Climate Change
Socioeconomic issues (e.g., loss of revenue, migration)
Dietary shifts
Cyclone
Coral bleaching
Coral disease
Disturbed coral reef
Causitive organism
Ciguatera poisoning
Pollution
COTS
Reef Fishes & Invertebrates

Climate Oscillations

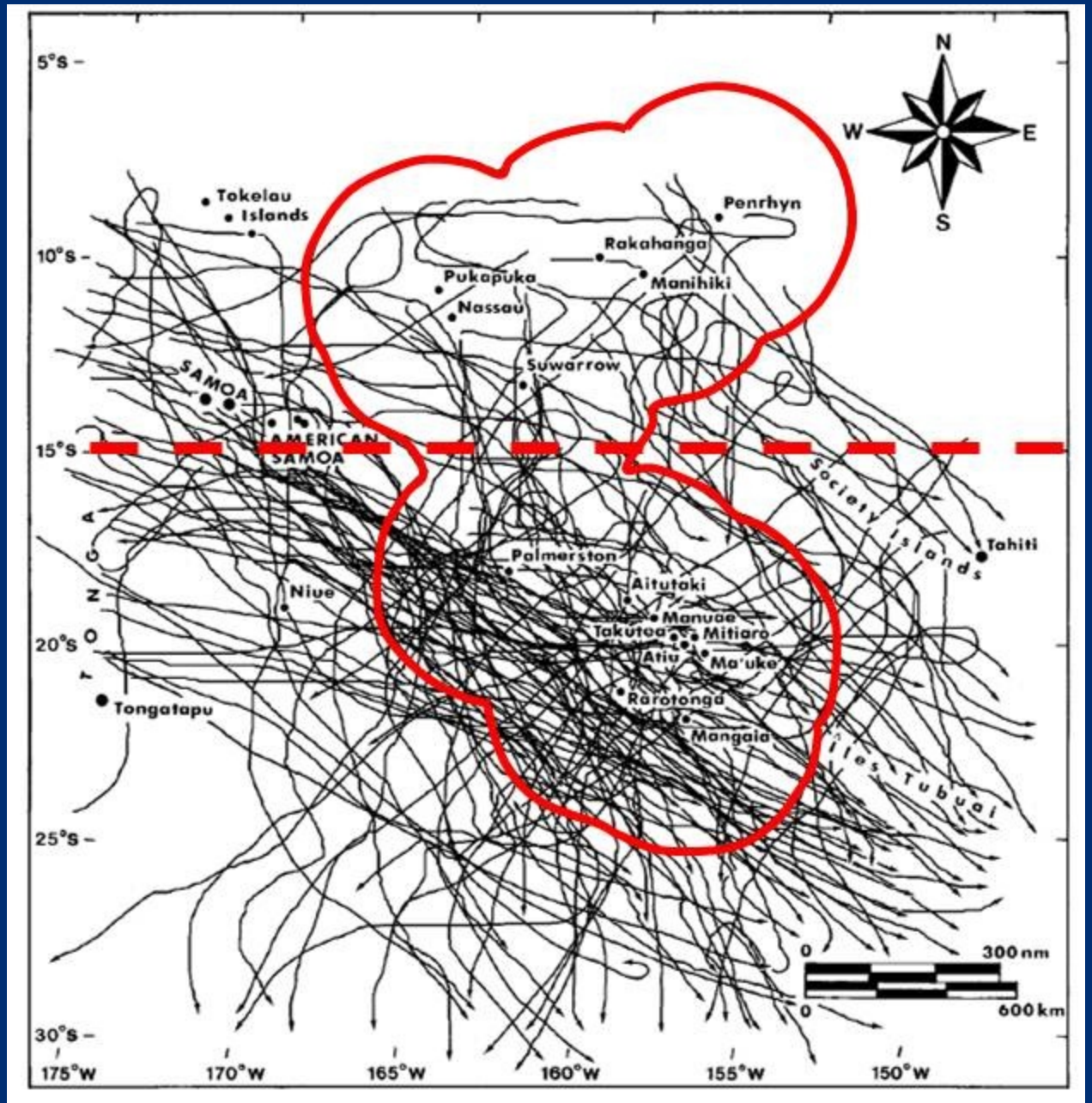




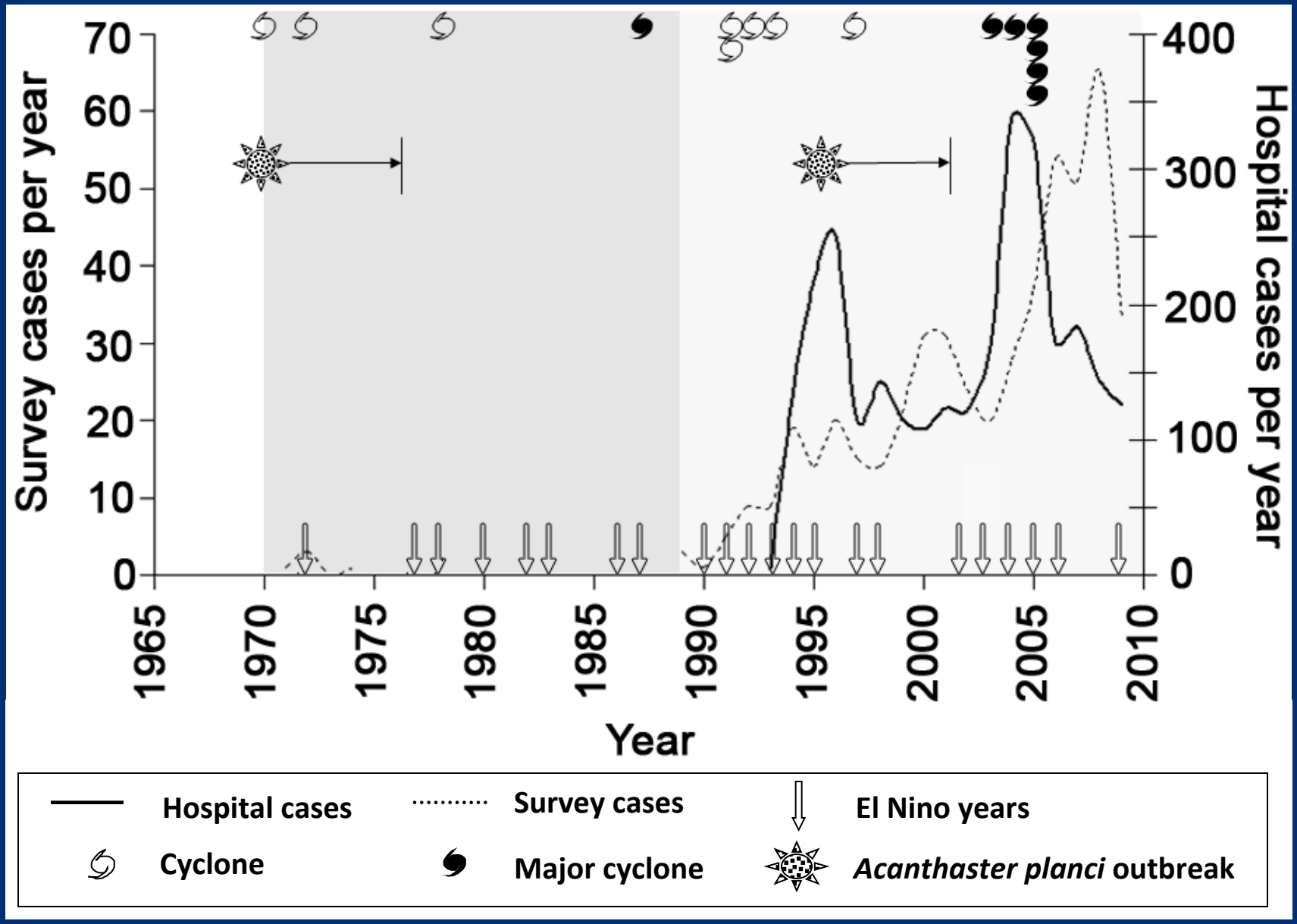
http://jisao.washington.edu/pdo/

Cyclone tracks in the Cook Islands

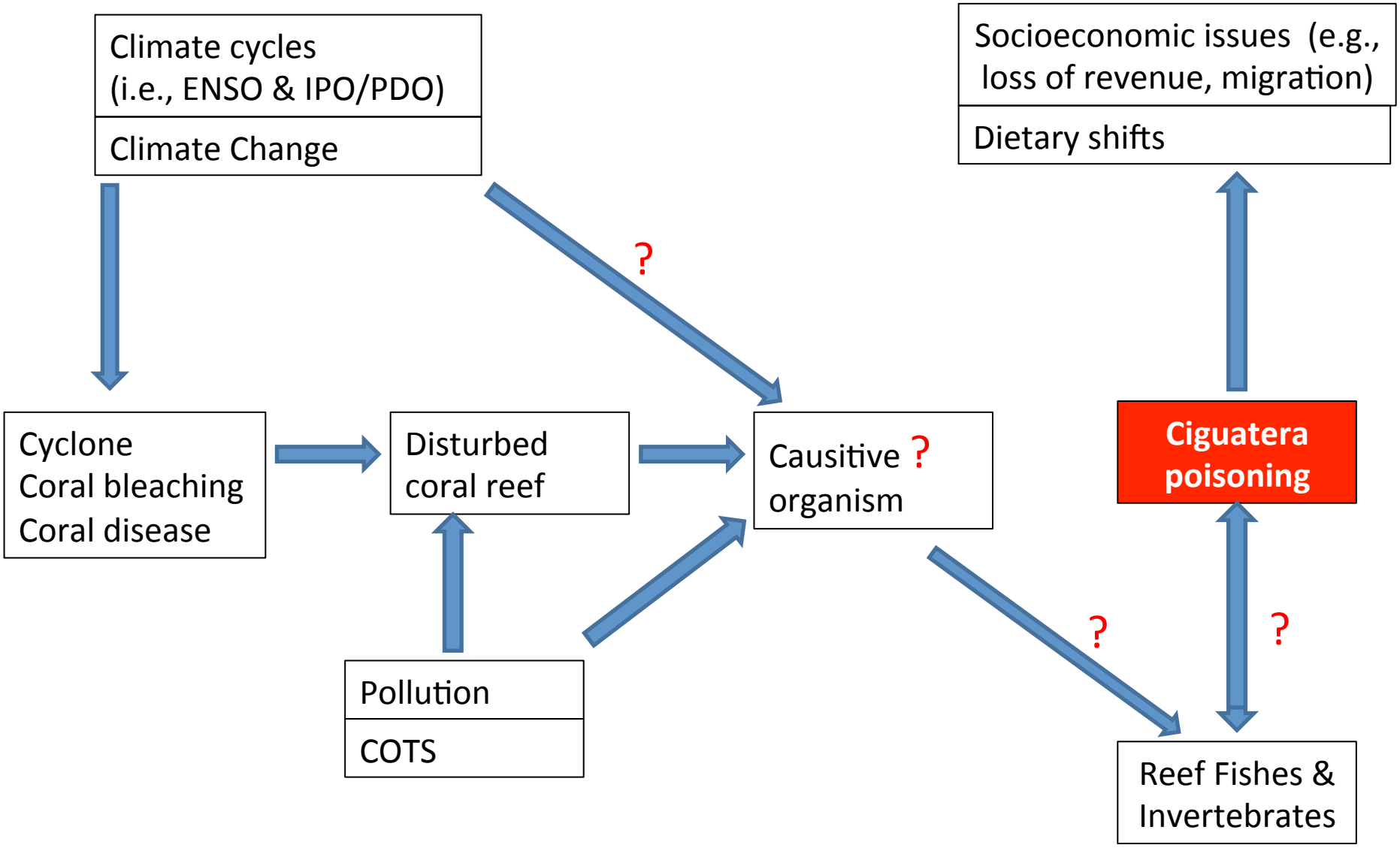
Tracks of 104 cyclones in the Cook Islands from 1820–2006 (de Scally, 2008)



Coral bleaching from extreme low tide events



$(\chi^2_{(1,\ N=39)} = 4,\ p < 0.037)$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Disturbed
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organism
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poisoning
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?
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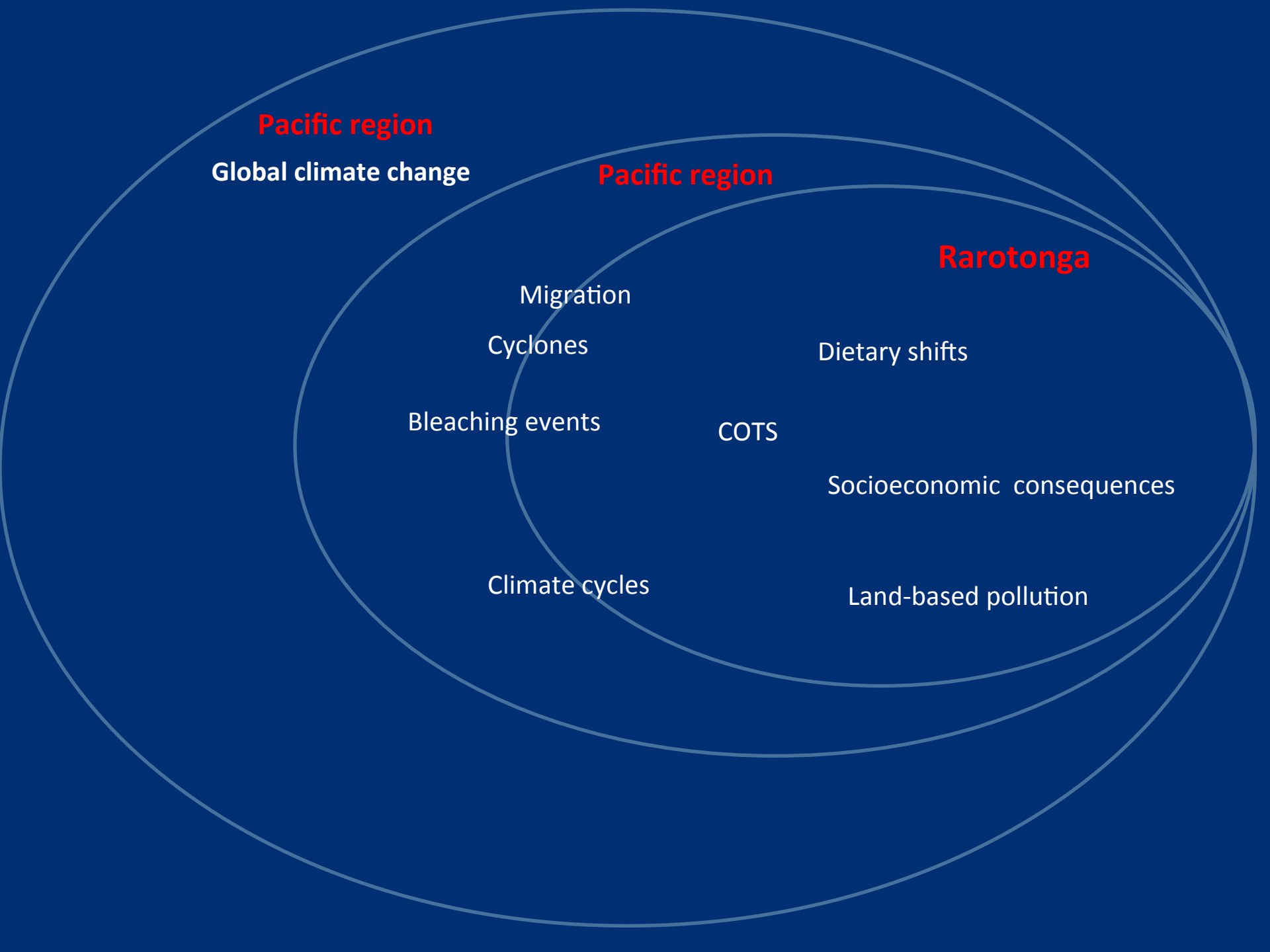
Pacific region
Global climate change
Pacific region
Rarotonga
Migration
Cyclones
Dietary shifts
Bleaching events
COTS
Socioeconomic consequences
Climate cycles
Land-based pollution

Problems and gaps

7 - Lack of consistent monitoring

5 - Lack of capacity in research and monitoring

4 - Lack of ability to predict when blooms will occur

3 - Lack of specific causative chain & baseline info

3 - Lack of long-term data (time series)

1 - Insufficient use of data (e.g., remote sensing)

1 - Lack of sharing of data & knowledge among scientists, managers, communities

1 - Lack of knowledge of species & locations affected (-> awareness)

1 - How do toxins affect fish?

1 - Lack of understanding of CC forces, esp. Ocean acidification

What works well

5 - Good general understanding of systems

4 - Highly dedicated researchers that complement each other

2 - Networking among groups

1 - Traditional/local knowledge

Priorities in research

10 – Start regional long-term monitoring using consistant approaches / methodologies that incorporates all drivers

4 – Identifying toxins involved

4 – Better understanding of potential positive effects (e.g. *Trichodesmium* as CO_2 sink and MPAs)

4 – Feeding ecology in HAB systems, e.g. role of sea cucumbers

Priorities in technology & innovation

8 – Integrated meta-data web portal or similar data sharing system

6 – Cost-effective rapid-detection test

3 – Developing new automated sensors (e.g. buoys) for key species and key drivers

2 – Data mining & automated meta-analysis system

1 – Information dissemination technology for reporting cases

1 – Nano-technology /microsensors for remote sensing

1 – Unmanned drones for monitoring blooms and coastal areas