

## Coral Reefs



## Coral Reefs



Lophelia.org

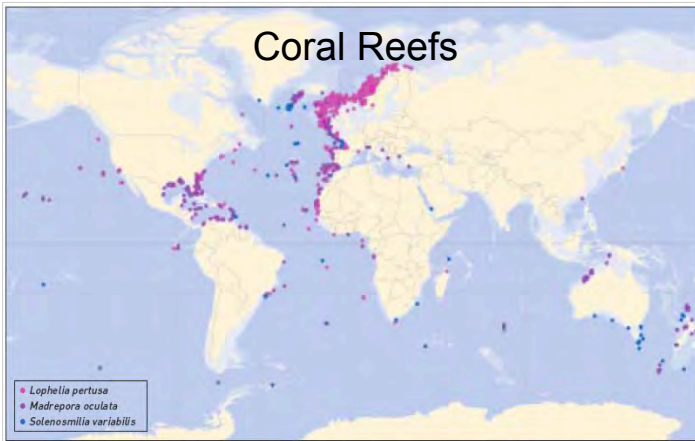
## Coral Reefs



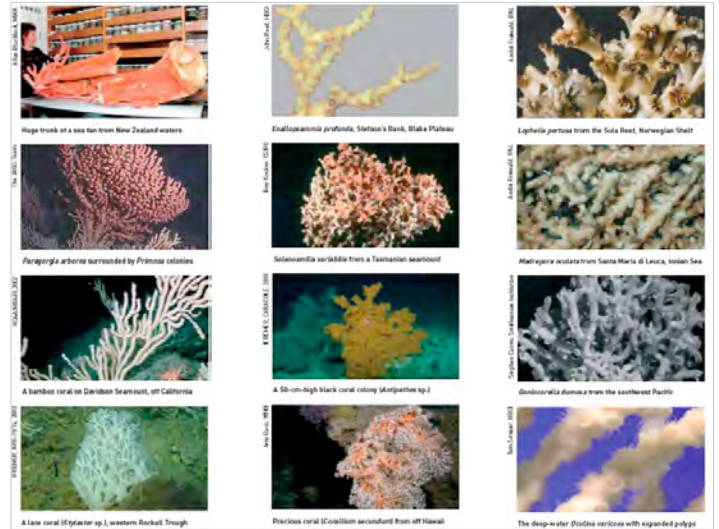
<http://www.youtube.com/watch?v=85YtHgRAV3I>

## Coral Reefs

- Focus: *Lophelia pertusa* (Linnaeus)
  - Other reef-forming corals:
    - *Oculina varicosa* (Florida)
    - *Goniocorella dumosa* (New Zealand, PNG)
    - *Dendrophyllia cornigera* (NE Atlantic)
    - *Madrepora oculata*, *Solenosmilia variabilis* (worldwide)
- Requires hard substrate to attach, may propagate by fragmentation
- Requires cold, oceanic water, not found near sources of freshwater (glacial melt, river mouths)



Global distribution of cold-water coral reefs: points on the map indicate observed reefs of varying size and stages of development, but not the actual area covered. The high density of reefs shown in the North Atlantic most probably reflects the intensity of research in this region. Further discoveries are expected worldwide, particularly in the deeper waters of subtropical and tropical regions  
 UNEP-WCMC, sourced from A. Freiwald, from various sources



## Coral Reefs

- Enormously important ecologically!
  - Carbonate framework provides 3D habitat and structure
  - Carnivorous ecosystem → dependent upon POM flux and zooplankton
  - Aggregate fish schools
  - Harbor 1000s of species!
  - \* H' > shallow reefs



## Coral Reefs

- Why are there so many species at deep-sea reefs?
  - Stable environment with little fluctuation in physical parameters (i.e. temp, salinity)
  - Predictable food supply, areas with a decent amount of productivity (occupy zone between slopes and abyss)
  - Reef structure provides a catchment for detritus
  - Coral framework is resistant to erosion and can last for last 1000s of years (ecosystem engineer)
    - Though bioerosion can play a big role in the system → trade off between reef growth and bioerosion

## Coral Reefs



Figure 8: Schematic sketch of the major habitats of a *Lophelia* reef (not to scale)

Photos: the JAGO-Team

## Coral Reefs

Is there a link between reefs and seeps?

- Hovland: based on seismic reflection noticed pockmarks (seeps) at bases of some coral mounds in NE Atlantic

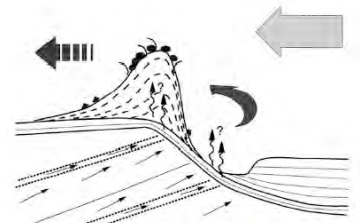
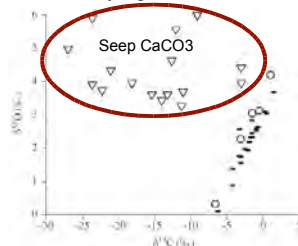


Fig. 8. A conceptual sketch illustrating the 'hydraulic theory' for deep-water coral reefs (Hovland and Mortensen, 1999).

## Coral Reefs

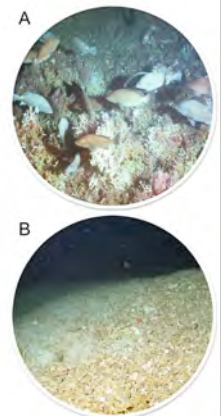
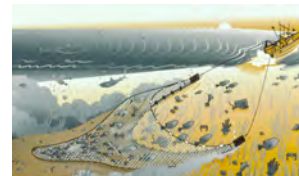
- Becker et al. 2010 found similarities in species occurrence between corals and seep fauna in the Gulf of Mexico
  - No evidence from stable isotopes of carbon and sulfur that *Lophelia* relied on seep nutrition at any age
  - Oxygen isotopes confirm separate origin of CaCO<sub>3</sub>

Are reefs the final stage of succession to seeps??



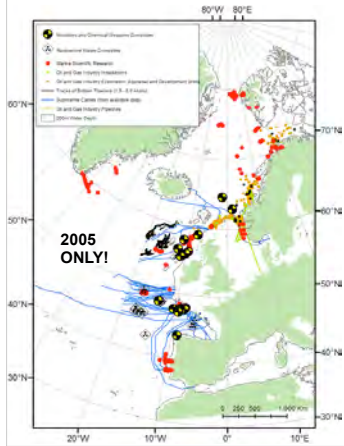
## Coral Reefs

- Reefs are extensive, long-lived, slow-growing structures, providing important habitat in the deep
- The biggest immediate threat to their persistence is trawling



Oculina reefs off Florida. a) Groupers were abundant before trawls swept past, leaving nothing but rubble in its wake (b) © (A) R.G. Gilmore (B) L. Horn.

## Coral Reefs



Reefs occur in areas of seepage and/or off continental shelves → where humans have the most activity

- Fishing
- Oil/Gas Exploration
- Dumping Waste (radioactive, chemical and munitions)
- Laying cables
- Scientific Research