

Possible topics for CLIVAR-IMBER cooperation: Upwelling regions (from CLIVAR Tiger Team)

Main themes:

- What controls interannual and long-term upwelling variability ?
What is influence of large-scale climate mode (ENSO, IOD, PDO/IPO...) against more local wind modulation in upwelling variability?
- How do climate and fisheries affect the dynamics of upwelling ecosystems, including exploited species such as small pelagic fish? Can a better understanding be achieved to inform management and policy?
- What is the expected physical response in the upwelling areas under climate change? How will these changes affect plankton and fisheries production?

Possible topics for CLIVAR-IMBER cooperation:

Natural decadal/multidecadal variability

Main themes:

- Can we improve the description of decadal ocean variability using proxies coming from biogeochemistry and fisheries research ?
- Can we improve our understanding of the decadal variability in the Pacific (PDO/IPO) and its predictability ?
- What are the dominant sources of decadal variability in the Indian Ocean? How does it affect plankton and fisheries production?
- Can we better separate out natural decadal/multidecadal variability from human induced signals?

Possible topics for CLIVAR-IMBER cooperation:

Bio-physical feedbacks

Main themes:

- How do phytoplankton spatio-temporal variations (via the upper ocean heat budget) affect ocean and ice physics, as well as large-scale climate variability?
- Does biologically-generated turbulence (through vertically migrating layers of swimming organisms) affect ocean physical properties and retroact on the chemistry and biology of the ocean?

Possible topics for CLIVAR-IMBER cooperation: Oxygen minimum zone (from SIBER SPIS)

Main themes:

- How will changes in precipitation rates and patterns impact river discharge rates and associated nutrient loadings to the coastal zones?
- How will changes in stratification and nutrient supply impact the balance between biological O₂ demand and ventilation in the OMZs?
- How will the large-scale circulation patterns respond to warming, and how will this affect the development and distribution of OMZs?
- How will changes in the OMZs impact biogeochemical cycles and ecosystem dynamics?

Possible topics for CLIVAR-IMBER cooperation:

Impact of ocean acidification on marine ecosystems

Main themes:

- How changes in phytoplankton production in response to ocean acidification, in conjunction with other changes in the environment (ocean warming, changes in currents...) would propagate in the trophic food web up to specific focus species and marine resources?
- What is the impact of climate change and ocean acidification on the functional diversity of oceanic communities?
- What are the potential shifts in community structure (replacement of one functional group by another) due to climate change and ocean acidification?

Possible topics for CLIVAR-IMBER cooperation:

Ocean carbon uptake

CLIVAR-IMBER cooperation:

The way forward

- Identify leading scientists to agree on the major CLIVAR/IMBER common issues
- Develop short summary documents on these issues
- Focused workshop to address one or more of these questions
- Common theme sessions at international meeting between CLIVAR/IMBER
- Encourage the development of eddy resolving/permitting coupled regional models (upwelling, OMZ, ...)
- Encourage the development/improvement of end-to-end ecosystem models
- Develop a common IMBER/CLIVAR Task Team?