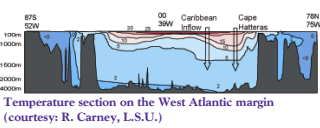


Continental Margin Ecosystems on a worldwide scale

Continental margins in the plural

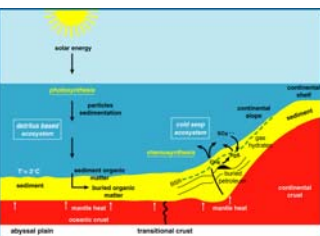
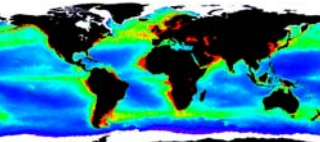
Continental margins are transitional zones between oceans and continents where most sediments on earth are deposited. Sediment inputs widely vary from basin scale (Atlantic vs Pacific), to local scale (deep-sea canyons).

Continental margins encompass a 4000 m depth range, crossing all water masses, gradients in food inputs, temperature, pressure and bottom currents.



Continental margins can be active sites of tectonic activity, with a narrow shelf dropping off quickly into the depths of subduction trenches or they can be passive, with large accumulation of sediments on wide shelves and gentle slopes.

Continental margins, including the shelves, make up 20% of the ocean's surface but concentrate 50% of the global marine production. Primary production varies in space (depth and latitudinal gradients) and in time (seasonality).



On continental margins, accumulations of organic matter over geological time scales and past or present tectonic activities favor the seepage of fluids rich in sulfide and methane.

Continental margins are also reservoirs for living and minerals resources.

Collectively, these processes create unique ecosystems, which are only being discovered but are already under anthropogenic pressures.

Continental margin ecosystems

The sedimentary environment

Local species diversity of slope sediments exceeds the diversity of shelf and deep-sea zones.

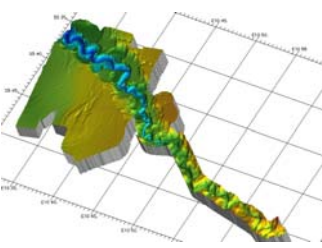
Most species, which appear to be rare locally, are unknown and have not yet been described.

Mid-depth maxima in species diversity and zonation of the deep biota have been reported but the processes driving the patterns are not well understood.



Oxygen Minimum Zones

OMZs are formed beneath highly productive, upwelled waters by degradation of organic matter. Where these low oxygen regions intercept the continental seabed, faunal densities and diversity are reduced, the taxonomic composition is modified and chemosynthetic pathways can occur. At the edge of OMZs, faunal densities are enhanced.



The small-size macrofauna is highly diverse in continental slope sediments (courtesy: A. Fifts, Ifremer)

Cold seeps

Cold seep ecosystems have been recently discovered in a variety of geological settings. The presence of these unique ecosystems in regions of low animal density highlights the crucial role of local resource enrichment on benthic community composition and productivity. COMARGE interest for seeps focus on the interactions with the normal sedimentary environment.



Shrimps and Rattails at the edge of an Oxygen Minimum Zone on Volcano 7, 900 m (courtesy: L. Levin, Scripps)

Canyons

Canyons contain complex ecosystems including hard substrata and mobile sediments on the canyon floor. Many endemic species may inhabit canyons. We do know that there is considerable inter-canyon variability in dominant species which may be related to particular environmental characteristic of each individual canyon. What is not know is the role of canyon as a source of biodiversity to the wider continental slope.

Deep-sea corals

Cold-water reefs can be several kilometers long and form carbonate reefs that provide distinct habitats for various communities such as sponges, clams, soft corals, echinoderms and crustaceans.

The questions of COMARGE

Biodiversity on a global scale

- The validity of margin diversity maxima?
- The consistency of margin zonation?
- The role of food gradients?

Biodiversity on a hot-spot scale

- Interaction of seep and normal margin fauna
- Interaction of corals and normal margin fauna
- Interaction of canyons and normal margin fauna
- Interaction of hardgrounds and normal margin fauna
- ⇒ Trophic exchanges, predatory pressure, gene flow?

The approach of COMARGE

Coordination of current and new sampling programs

- Identify recent, ongoing, and planned projects sampling ocean margins.
- Encourage data sharing, standard sampling practices & data archiving
- Promote common taxonomic identifications - Assure a high level of taxonomic quality and comparability
- Develop standard analytical methodologies

Data collation and synthesis

- Identification of existing datasets on continental margin species composition and habitat parameters
- Prioritization of datasets: data quality, applicability to major margin questions, need for extensive taxonomic updating, feasibility of timely conversion to the OBIS system.
- Development of a COMARGE database, including archiving of environmental parameters, open to the margin community.

COMARGE steering committee

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