Understanding modern cold-water corals habitats in Canada using multi-scale bathymetric data analysis

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Abstract

This project uses multi-scale analysis of seafloor morphology to study the **role of scale on the scientific understanding of modern cold-water coral habitats.**

High-resolution multibeam sonar, video and oceanographic data were collected from two different altitudes above the seafloor, providing **centimetre-** and **decimetre-scale** bathymetric data. Ship-based multibeam data and the General Bathymetric Chart of the Oceans (GEBCO) world dataset provide **two additional scales of analysis**.

Different **terrain parameters** were derived from these bathymetric datasets using a GIS, in order to **quantitatively characterize seabed morphology** in coral habitats.

Introduction

Context

Knowledge on modern cold-water corals has significantly improved in the last decade due to data from scientific trawl surveys and commercial fisheries bycatch [1,2,3].

Figure 1: More than 500 kg of corals and sponges bycatch in a 2-hour commercial trawl
Credit : Harry Mercer, Sea Watch May 2007

Trawling can lead to severe damage to corals and their habitats (Figure 1), which inhibits their important ecological role [4,5].

Research Problem

Coral **distribution patterns** must be better understood and described at relevant and appropriate **scales** in order to prevent severe damage from threats like trawling [3,6].

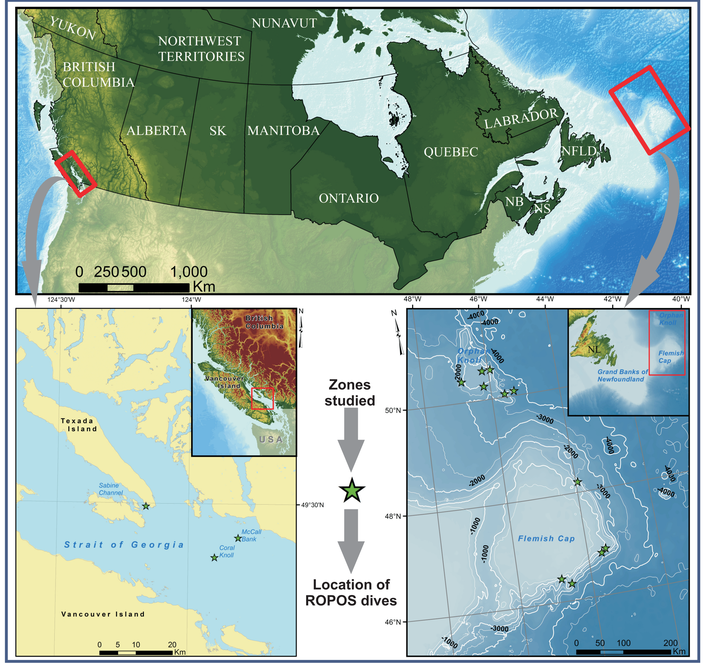
Bycatch data improve scientific understanding of cold-water coral biogeography at a **global scale**, but present challenges for the local scale [7,8].

Direct observations using Remotely Operated Vehicles (ROV) allow descriptions of corals habitats at a **local scale**, but can miss larger-scale habitat features [9].

Research Objectives

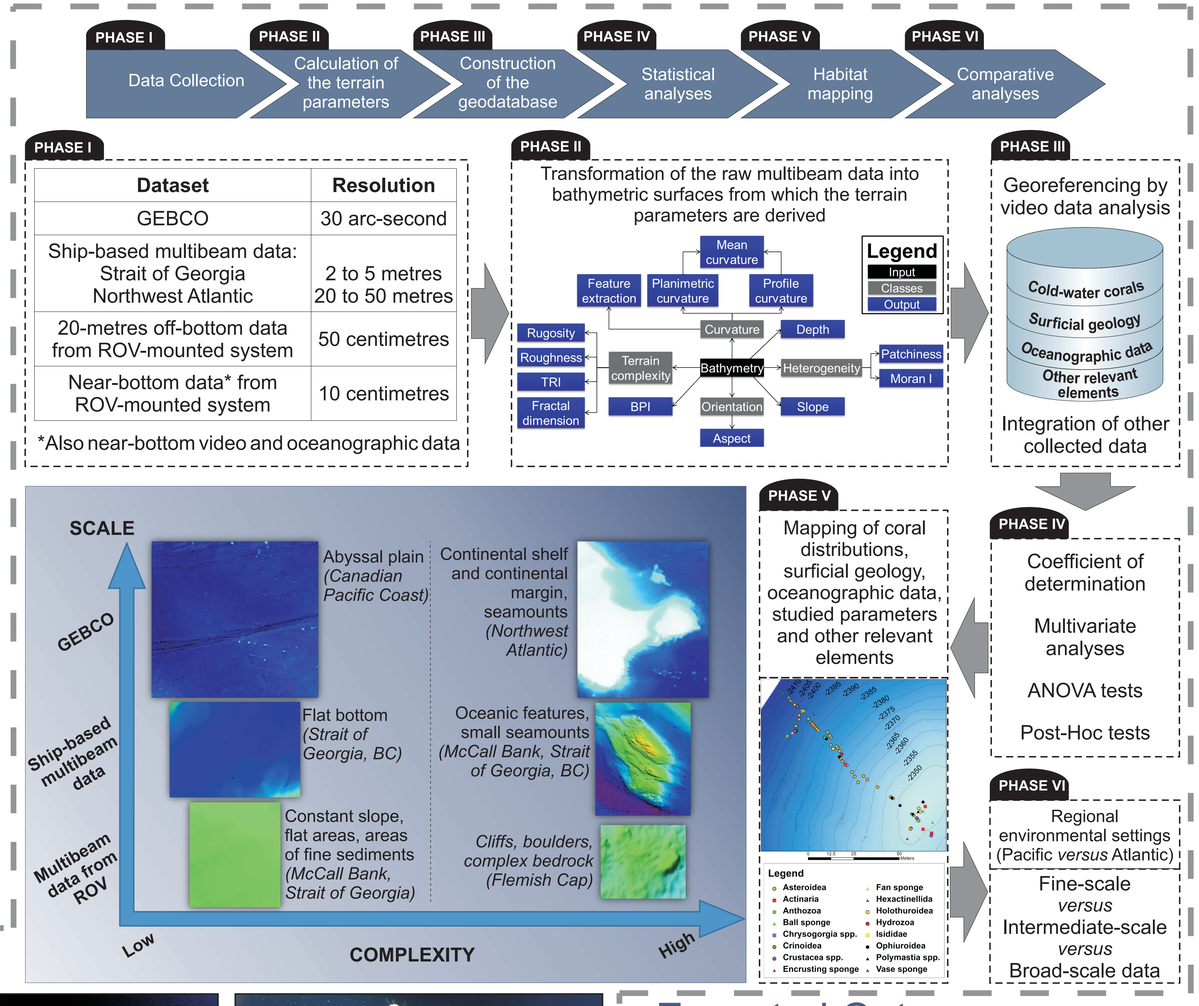
- **Quantify** the seafloor morphology of modern cold-water coral habitats at different scales using **terrain parameters** derived from bathymetric data of different resolutions
- Determine the **distribution** and **abundance** of corals by **video analysis** of the seafloor
- **Statistically analyze** the **relationships** between seafloor morphology, surficial geology, oceanographic data, bathymetry and modern cold-water corals
- **Assess the role spatial scale plays** in the characterization of cold-water coral habitats
- Evaluate the **influence of regional environmental settings** on the distribution and abundance of corals

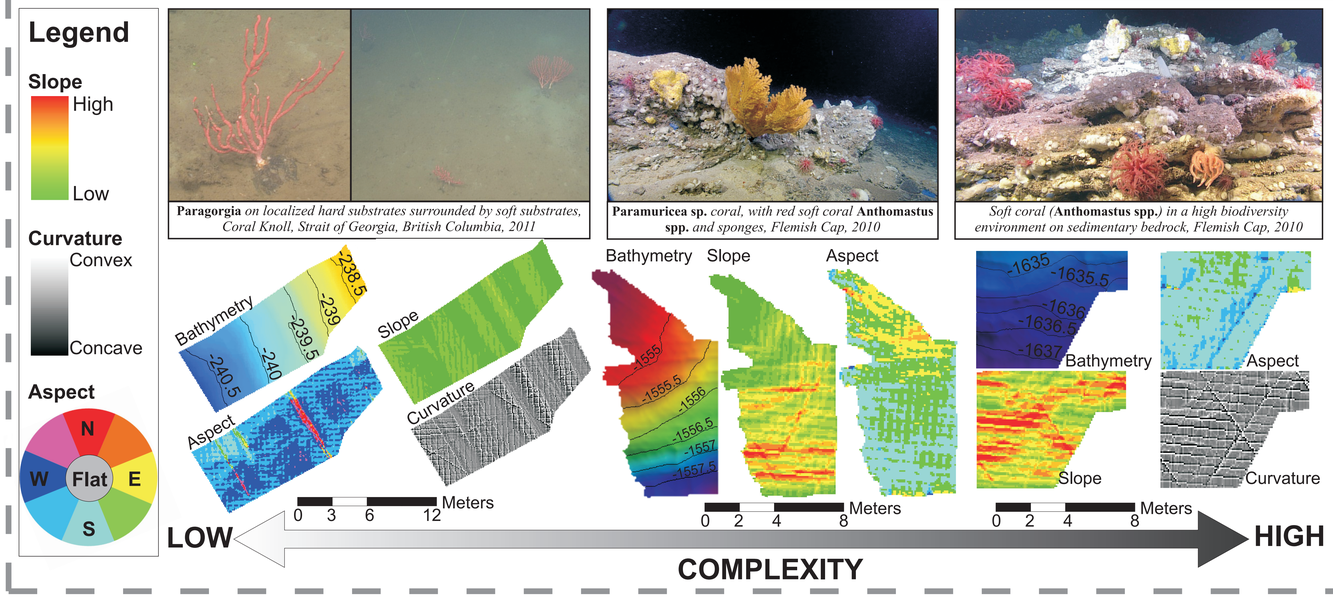
Study areas



Strait of Georgia, BC		Northwest Atlantic
Sabine Channel, Coral Knoll, McCall Bank	**Study Regions**	Flemish Cap, Orphan Knoll, Orphan Seamount
100 to 500 metres	**Depths**	1000 to 3000 metres
Gorgonians (mainly *Paragorgia* and *Primnoa*), glass sponge reef	**Biology**	Gorgonians, Anthipatharians, solitary scleractinians, soft corals
Glacially scoured bedrock and soft substrates	**Surficial Geology**	Bedrock, ice-rafted debris, bedrock-derived talus

Approach





Expected Outcomes

- **Maps** of the distribution of modern cold-water corals for three areas of the Canadian continental shelf, with environmental factors and terrain parameters
- Better knowledge of **(1)** modern cold-water coral habitats, **(2)** the issue of scale in the study of these habitats, and **(3)** the environmental factors and terrain parameters that can be used as surrogates for their distribution
- **Local-scale knowledge** could help increasing the efficiency of protection mechanisms, and additional results could help inform conservation decisions and guide future research
- **Surrogates** could help implement better habitat suitability models

References

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