

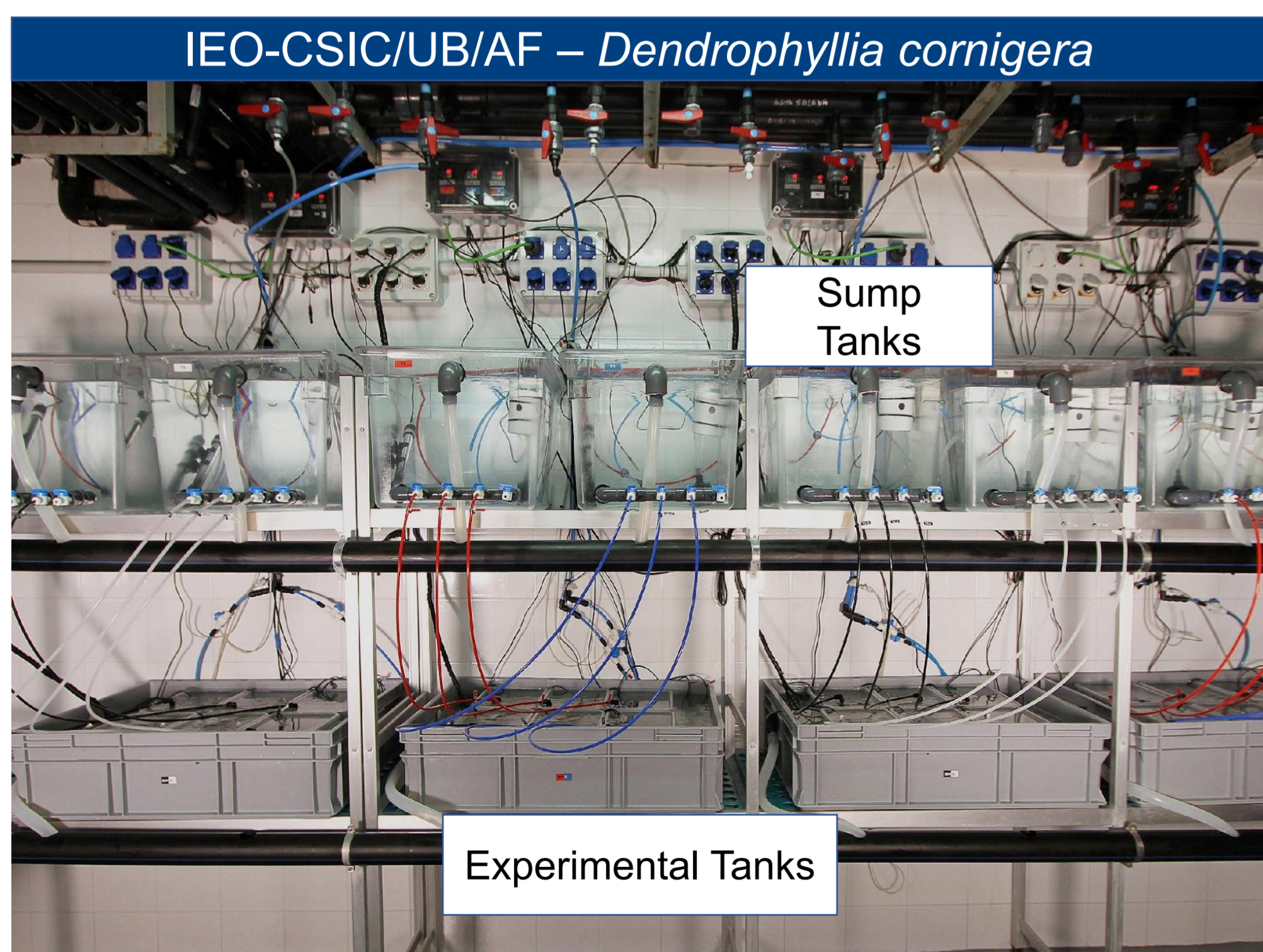
Ongoing and Upcoming Cold-Water Coral Multi Stressor Experiments

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Background & Overview

- Cold-water corals (CWC) form complex 3-D structures that are biodiversity hotspots. However, the knowledge about their ecophysiological response to global change stressors (i.e. warming, acidification, decrease of dissolved oxygen concentration) is still very limited, as well as their possible interactions with local stressors such as the impacts from mining and fishing activities.
- Three long-term, multi stressor experiments will explore the combined impact of several environmental and local stressors based on the IPCC projections on different CWC species across the North Atlantic.



Methods

- Three different experimental design with different combination of stressors and response variables (Table 1), considering the previous knowledge on the ecophysiology of the three studied species: the scleractinians *Lophelia pertusa* and *Dendrophyllia cornigera*, and the octocoral *Dentomuricea* aff. *meteor*.
- Response variables:
 - Skeletal growth, microporosity and density
 - Polyp behaviour
 - Respiration and excretion rates
 - Tissue retraction
 - Repeated 3-D imaging of the coral skeleton (*L. pertusa*)
 - Tissue regeneration rate (*D. cornigera*)
- Control of parameters:
 - ↓pH: CO₂ bubbling
 - ↓O₂: N₂ bubbling
 - ↑T°C: Heaters
 - ↓POC: Decrease of food concentration

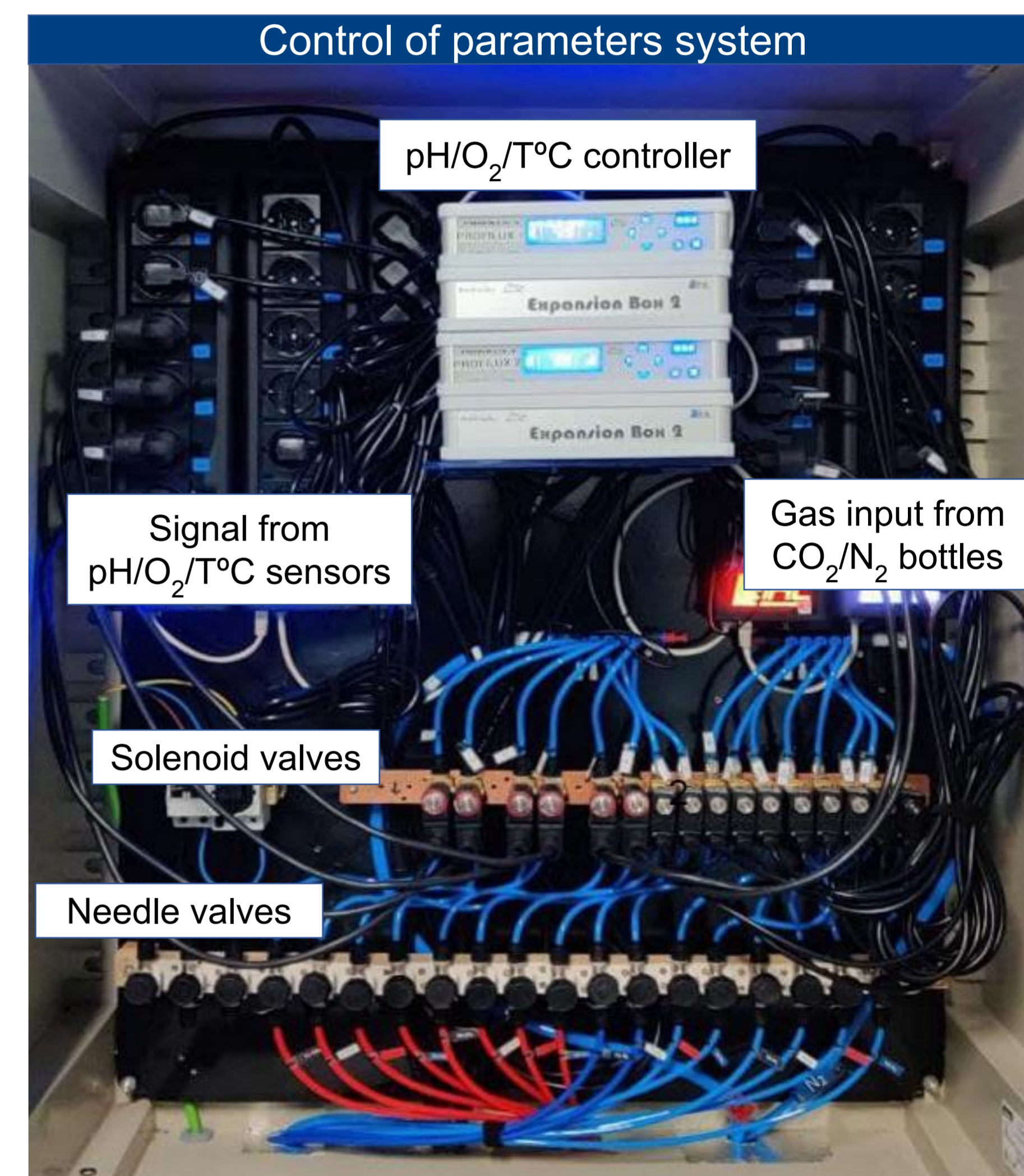
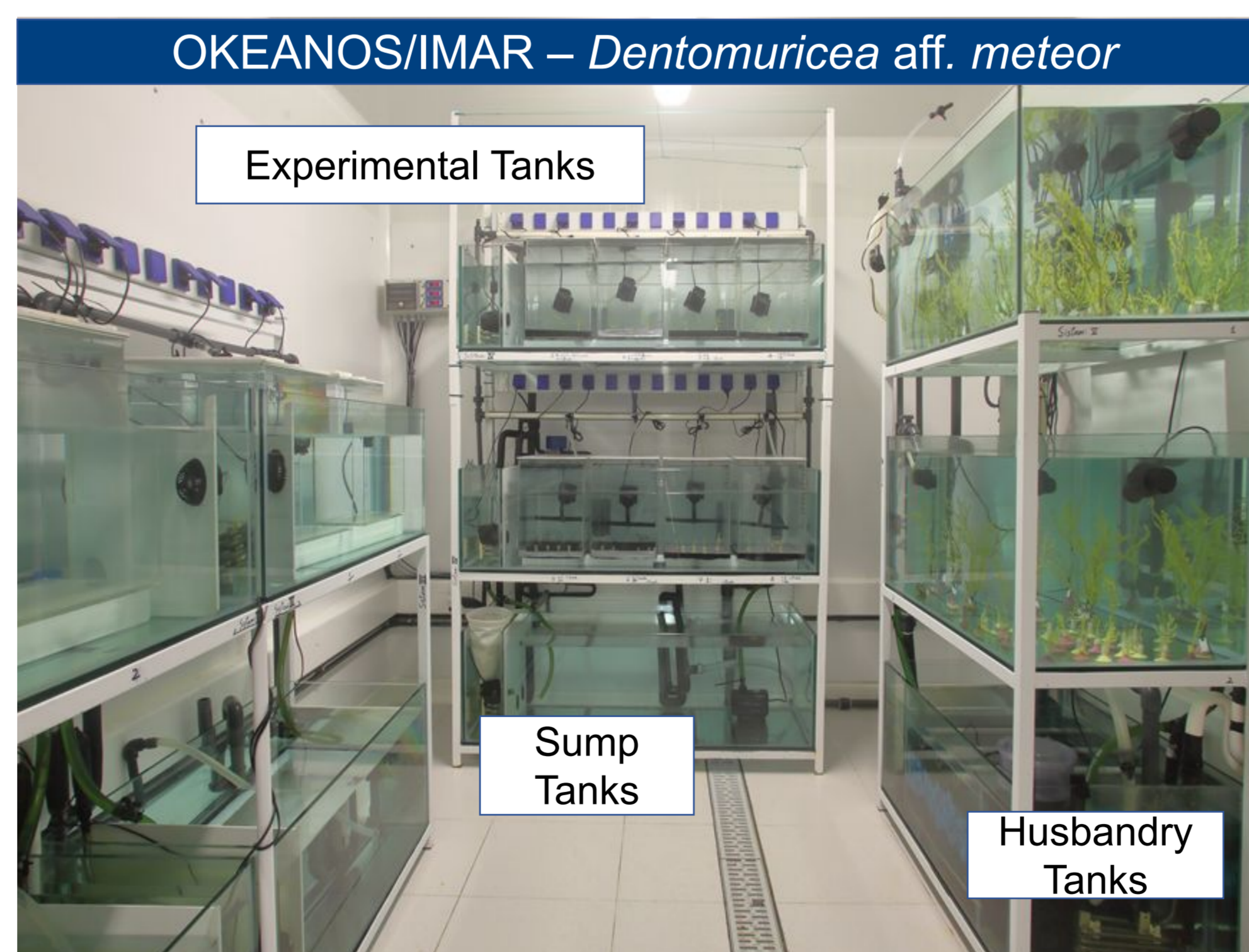


Table 1: Cold-water coral experimental treatments with the different stressors and their year of IPCC projection (2050 and 2100).

CWC species	Region	Treatments								
		1	2	3	4	5	6	7	8	
<i>Lophelia pertusa</i>	Norway	Control	2100 ↓pH ↓O ₂ ↑T°C	2100 ↓pH	2100 ↓O ₂	2100 ↓pH	2050 ↓pH	2100 ↓pH high range		
		Control	2100 ↓pH ↓O ₂ ↑T°C	2100 ↓pH	2100 ↓O ₂	2100 ↑T°C	2100 ↓pH ↑T°C	2100 ↓O ₂ ↑T°C	2100 ↓pH	2100 ↓O ₂
<i>Dentomuricea</i> aff. <i>meteor</i>	Azores	Control	2100 ↓pH ↓POC	2100 ↓pH	2100					



Looking Forward

- Further experiments will include the addition of particles from mining or sediment from trawling activities to all treatments after long-term experiments finish to study the potential physical damage and ecotoxicological effects.
- The results from these studies will increase our knowledge on the potential consequences of global change and local stressors and their possible interactions on CWC species and ecosystems that they form.
- The results will contribute to support science-based marine spatial planning for the North Atlantic.

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