Workshop on OA impacts to macroalgae, seagrasses and microphyto-benthos

MBA, Plymouth, June 2013.

Rationale

- Elevated CO_2 will have substantial consequences for benthic macro- and micro-phytes
- Several groups in UK and wider community are addressing these issues but in a loosely coordinated fashion
- We wanted an opportunity to foster knowledge exchange and enhance UKOA national linkages between consortia and individual groups.

Aim

- Produce an horizon scanning review

Participants

organisers

Our Approach

- Focus on the NE Atlantic
  - divided into arctic, boreal and lusitanian as per OSPAR regions
- Focus on the habitat formers
  - Un-calcified macroalgae
  - Calcified macroalgae
  - Seagrasses
  - and associated microphytobenthos
- Include other important aspects
  - Invasive species
  - Volatiles
  - Evolution
- Come up with predictions for the NE Atlantic

Main discussion points

- Un-calcified algae;
  - Increased CO_2 Vs temperature stress
  - Widespread loss of kelp species
  - Light penetration
  - Shifts from high productive, large, structural browns to smaller fleshy or filamentous species
- Calcified algae;
  - Mixed responses reported in the literature within and between different groups
  - Limited long term studies
  - Loss of structural integrity
  - The fate of maerl beds

Main discussion points

- Seagrasses
  - Carbon sequestration
  - Fate of epiphytes (calcareous / non-calcifying)
  - Seagrass stoichiometry
  - DOC and microbial loop
  - Protection means proliferation
- Microphytobenthos
  - Lack of data
  - Carbon acquisition
  - Cell size
  - Extracellular matrix production
  - Interactions with grazers

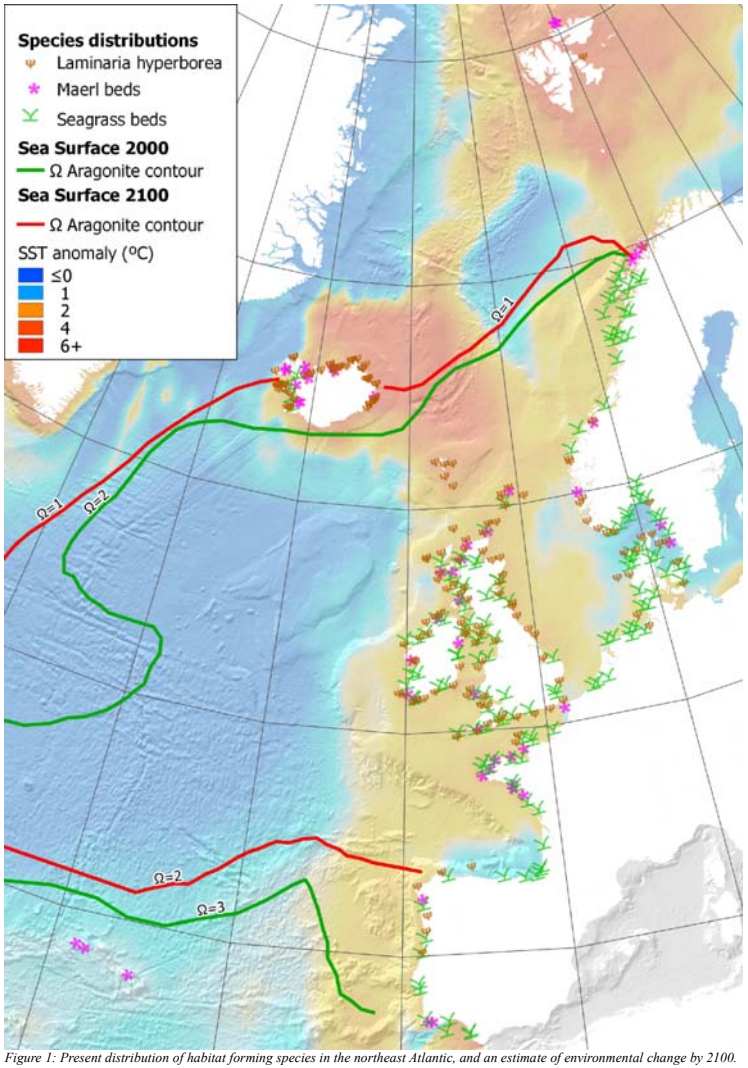

Figure 1: Present distribution of habitat forming species in the northeast Atlantic, and an estimate of environmental change by 2100. SST anamoly (change from the present) is based on annual mean from an A1B scenario ensemble as Jueterbock et al, 2013). Many species' ranges such the kelp L. hyperborea are thought to be limited by summer and winter thermoclines (van den Hoek, 1982, tom Dieck (Bartsch), 1993). Temperature changes are expected to impact distributions as species' ranges track these limits (Harley et al, 2012). Maerl are cacifying species utilising high magnesium calcite, which has a similar saturation state to aragonite in the NE Atlantic (Andersson et al, 2008). Presently, most maerl are found in locations supersaturated for aragonite (Ω>2). Predictions of the saturation state for 2100 (Steinacher et al, 2009) suggest most of NE Atlantic will be outside this range.

Output

“ The future of the NE Atlantic benthic flora in a high CO_2 world”

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