Macrozoobenthic production and productivity on the northern Norwegian shelf

background & methods
Benthic animals produce food resources for organisms from higher trophic levels (fish, birds, mammals, and ultimately humans). The spatial distribution of benthic production and productivity are of direct relevance for the identification of essential feeding habitats (i.e. highly productive areas). This is important information for sustainable ecological management. In this context, the MAREANO programme aims to map the environment and fauna off the Norwegian coast by linking environmental parameters to the benthic ecosystem.

In a case study, 6 different biotopes were defined from benthos sampled at the Tromsøflaket Bank (Barents Sea) (fig.1, Buhl-Mortensen et al. 2009). Species biomass (B) and abundance were recorded at each station (N = 23, grab and beam-trawl). Production (P), and productivity (P/B) was estimated by using the model of Brey (2001) and correlated with terrain/environmental parameters from multibeam echosounder/videos (see Buhl-Mortensen et al. 2009, Dolan et al. 2009).

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Environmental correlations

Production was lowest in deep, muddy and sandy muddy biotopes (B1, B2) and highest on shallow sandy to gravel banks (B3, B4: mainly Mollusca & Brachiopoda). Production decreased with depth but increased towards harder bottoms (fig. 4; Nilsen et al. 2006, Cusson & Brachioica). Productivity of infauna was diametrically affected by depth and bottom structure (fig. 2, high P/B by Polychaeta). Bottom-trawling frequency was higher on soft sediments, thus trawling indirectly affected benthic production at the Norwegian shelf (fig. 4).

At the spatial scales investigated, terrain parameters are poor descriptors of spatial variability of production and productivity (see low % -values in fig. 4). Other environmental variables such as organic inputs into the system and biological parameters (e.g. biodiversity, species life-span, mobility, feeding mode) seem to be locally more important than terrain parameters (Buhl-Mortensen et al. 2012, Gogina et al. 2010, Cusson & Bourget 2005, see also fig. 3 & table 1). At broader scales (e.g. landscape scale), terrain parameters might be more appropriate descriptors for mapping of production (fish-feeding habitats) for e.g. ecological management (Buhl-Mortensen et al. 2012, see talk of Tandberg et al. 2013, this conference).