A survey of the summer coccolithophore community in the western Barents Sea

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Résumé en anglais	The Barents Sea is particularly vulnerable to large-scale hydro-climatic changes associated with the polar amplification of climate change. Key oceanographical variables in this region are the seasonal development of sea-ice and the location and strength of physico-chemical gradients in the surface and subsurface water layers induced by the convergence of Arctic- and Atlantic-derived water masses. Remote sensing imagery have highlighted the increasing success of calcifying haptophytes (coccolithophores) in the summer phytoplankton production of the Barents Sea over the last 20 years, as a response to an overall larger contribution of Atlantic waters to surface and sub-surface waters, as well as to enhanced sea-ice melt-induced summer stratification of the photic layer. The present study provides a first thorough description of coccolithophore standing stocks and diversity over the shelf and slope of the western Barents Sea from two sets of surface and water column samples collected during August–September 2014 from northern Norway to southern Svalbard. The abundance and composition of coccolithophore cells and skeletal remains (coccoliths) are discussed in view of the physical–chemical–biological status of the surface waters and water column based on in-situ (temperature, salinity, fluorescence) and shore-based (microscope enumerations, chemotaxonomy) measurements, as well as satellite-derived data (Chl a and particulate inorganic carbon contents). The coccolithophore population is characterized by a low species diversity and the overwhelming dominance of Emiliania huxleyi. Coccolithophores are abundant both within the well stratified, Norwegian coastal water — influenced shallow mixed layer off northern Norway, as well as within well-mixed cool Atlantic water in close vicinity of the Polar Front. Bloom concentrations with standing stocks larger than 4 million cells/l are recorded in the latter area north of 75°N. Our limited set of chemotaxonomic data suggests that coccolithophores contribute substantially (ca. 20% of the total Chl a) to the summer phytoplankton community which is made essentially of small-sized algal groups. Excluding the bloom area, coccolith calcite accounts for an average of 20% to the bulk particulate inorganic carbon content in the surface waters, and explains to some extent the satellite-derived spatial distribution of this parameter. Deep water living coccolithophore species thriving below the pycnocline as well as populations present in well-mixed cool Atlantic water are rapidly transferred to depth in the form of intact coccospheres down to at least 200 m. High amplitude internal waves which, according to our observations, affect a wide range of water depth up to the lower photic zone, might strengthen the vertical transfer of this sinking population.
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