

*Introduction to the special issue on polar
night studies conducted onboard RV
Helmer Hanssen in the Svalbard area*

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Introduction

Polar night studies at high latitudes have during the last years become a major research focus for ARCTOS researchers, spearheaded by research cruises lead by UiT and MSc/PhD courses lead by UNIS. During the last 4 years, the RV *Helmer Hanssen* have been assigned to conduct research well into the nautical polar night (Berge et al. [in press](#)), a temporal and spatial part of the Arctic Ocean that until now have remained more or less unstudied.

For a long time, ice-covered areas of the Arctic were presumed to be unproductive and early scientific studies in the Arctic generally supported this paradigm (Nansen 1902). Evidence of human settlements in the high Arctic over several thousand years, however, conflicted with these early observations and constituted a paradox as to how human populations could subsist in regions considered to be biological deserts. Further investigations revealed the existence of productivity hot spots on par with some of the most productive places on earth and provided the first indications of complexity and the importance of the links

between ice, ocean, and land in Arctic ecosystems. During the last 20 years, culminating with the third International Polar Year (IPY 2007–2009), however, national and international research efforts in the Arctic have sharply increased. This increase in attention and research efforts are paralleled by an increased awareness of both the fisheries and petroleum resources available at high latitudes as well as new shipping routes emerging following a reduction of the Arctic ice cover (see e.g. Barber et al. [in press](#)). Despite the fact that attention, awareness and research efforts have increased, there are still major and fundamental gaps in knowledge, preventing a holistic understanding of the Arctic as a single, linked system undergoing unprecedented change and in an earth science perspective. Perhaps the most obvious and largest of these known gaps is centred around the widely accepted paradigm that Arctic marine ecosystems are best compared with a marine desert during the long and dark polar night. Just as the paradigm of the Arctic Ocean being an unproductive biotope was refuted a hundred years ago, the prevailing view of the polar night as devoid of biological activity has recently been challenged (Berge et al. [in press](#) for a review).

This article belongs to the special Polar Night issue, coordinated by Ole Jørgen Lønne.

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Highlights and outlook

Here we report on a diverse set of biological studies, all conducted onboard the RV *Helmer Hanssen* in January 2012 and 2013, reporting on various aspects of polar night biology (Fig. 1). This special issue can roughly be divided into three categories: (1) studies with light as the main theme, including solar, lunar, and biologically produced light; Johnsen et al. (2014) on bioluminescence, Webster et al. (2013) on influence of moon on nekton, Morata, and Soreide (2013) on effect of light on *Calanus* spp., and

science with the potential for radically altering our fundamental perception of basic Arctic ecosystem processes, current state of the ecosystem and connections between the biosphere, hydrosphere and cryosphere within the Polar Region. To this end, this volume and the ten papers included are important and significant steps towards a more holistic and general understanding of the Arctic marine ecosystem.

Acknowledgments We would like to thank all the reviewers on the individual manuscripts that together make up this special issue. Thanks to them and their constructive suggestions it is possible to publish this rather unique collection of information on polar night ecology. Moreover, we gratefully acknowledge the input and team effort from all the participants of the two polar night cruises in 2012 and 2013, and for their willingness to publish their results in this special issue. Last but not least, we thank the editor in chief of Polar Biology Dieter Piepenburg, and his team, for the help and guidance needed to put this collection of manuscripts together. This special issue is a contribution to the Marine Night project (project number 226417) funded by the Norwegian Research Council.

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