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Title

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Theme -Theme 1: Design, Optimization and Implementation of the Observing System

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Poster title (brief) Arctic Ocean as a significant source of atmospheric methane: year-round satellite data.

Abstract - text box

Seven operational Thermal Infrared (TIR) spectrometers launched at sun-synchronous polar orbits supply huge amounts of information about Arctic methane (CH₄) year-round, day and night. TIR data are unique for estimating CH₄ emissions from a warming Arctic, both terrestrial and marine. This report is based on publicly available CH₄ concentrations retrieved by NOAA and NASA from spectra of TIR radiation delivered by EU IASI and US AIRS sounders. Data were filtered for high thermal contrast. Validation versus aircraft measurements at three US continental sites reveal a reduced, but still significant sensitivity to CH₄ anomalies in the lower troposphere. The focus area is the Barents and Kara Seas (BKS). BKS is impacted with warm Atlantic water and mostly free of sea ice. It is a shelf area with vast deposits of oil and natural gas (~90%CH₄), as well as submarine permafrost and methane hydrates. Although AIRS and IASI observe no significant difference in CH₄ between summer BKS and N. Atlantic, a strong, monthly positive CH₄ anomaly of up to 30ppb occurs during late autumn-winter. We propose that this difference is explained by stable summer thermal ocean stratification and its fall/winter breakdown, which enhances BKS emissions due to deep winter mixing.