

# グリーンランド氷床北西部 Thule 地域沿岸における高濁度海水域の変動

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## Temporal variations in the extent of high turbidity water off the Thule region, northwest Greenland

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The magnitude and timing of glacial meltwater discharge give impact to the coastal marine biological productivity (e.g. Statham et al., 2008). Despite its importance in the environment near the Greenland coast, little is known about the behavior of high turbidity water affected by ice sheet melt in the coastal ocean. Here, we report temporal variations in the extent of high turbidity water off the Thule region in northwest Greenland (76°–78°N, 65°–75°W) based on remote sensing data analyses (Fig. 1). We defined high turbidity water by high remote sensing reflectance at the wavelength of 555 nm ( $R_{rs555} \geq 0.0070 \text{ sr}^{-1}$ ) (e.g. Caballero et al., 2014) and the extent of high turbidity water was determined from 2002 to 2014. High turbidity area was generally observed near the coast where many outlet glaciers terminate in the ocean and on the land (Fig. 1b). Temporal variations in high turbidity area was correlated with changes in air temperature at Thule Air Base. These results suggested that the source of the turbid water is the discharge of glacial meltwater. Assuming the linear relationship between the annual maximum extent of high turbidity area and summer temperature, the extent of high turbidity water would have increased under the influence of increasing amount of glacial meltwater input that is consistent with the current warming trend in temperature.

氷床から海洋に流出する融解水は海洋の生物生産に強く影響を与えている(e.g. Statham et al., 2008)。しかしながら、沿岸海洋域において氷床融解の影響を反映した高濁度水の挙動に関する研究事例は少なく、その詳細は明らかでない。そこで本研究では、グリーンランド氷床北西部 Thule 地域沿岸(76°–78°N, 65°–75°W)における高濁度海水域の面積変動を人工衛星データによって解析した(Fig. 1)。波長 555 nm のリモートセンシング反射率( $R_{rs555}$ )が  $0.0070 \text{ sr}^{-1}$  以上の値を示す地域を高濁度海水域と定義し(e.g. Caballero et al., 2014)、2002–2014 年の過去 13 年間にわたってその面積を算出した。解析の結果、高濁度海水域は氷床や氷帽から溢流する氷河前縁部に形成されることが確認された(Fig. 1b)。その面積の時間変動は Thule 空軍基地における気温変化と有意な相関を示した。以上のことは、高濁度海水域面積が気温上昇による氷河融解水の流入によって決定されることを示唆している。さらに、本研究で得られた夏期平均気温と高濁度海水域の最大面積の正の相関関係から、近年の気温上昇傾向に伴う融解水の流入増加によって、高濁度海水域の面積が増加しつつあることが予想された。

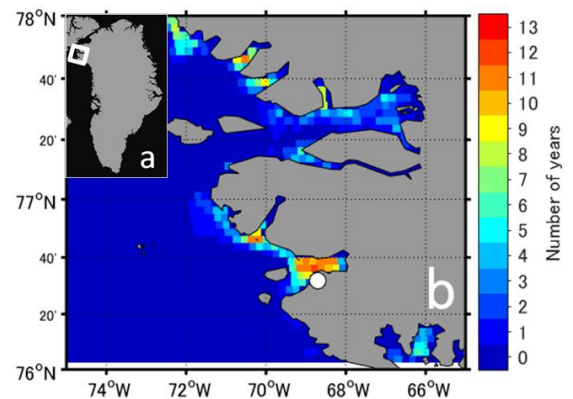


Figure 1. (a) Study area in Greenland. (b) Number of years over which the pixel was covered by the high turbidity area when it reached annual maximum. The location of Thule Air Base is indicated by white dot.

## References

Statham, et al., Inputs of glacially derived dissolved and colloidal iron to the coastal ocean and implications for primary productivity, *Global Biogeochemical Cycles*, 22, 1–11, 2008.

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