

Mobilization and methylation: coastal erosion sets mercury in motion along the Yukon coast, Canada

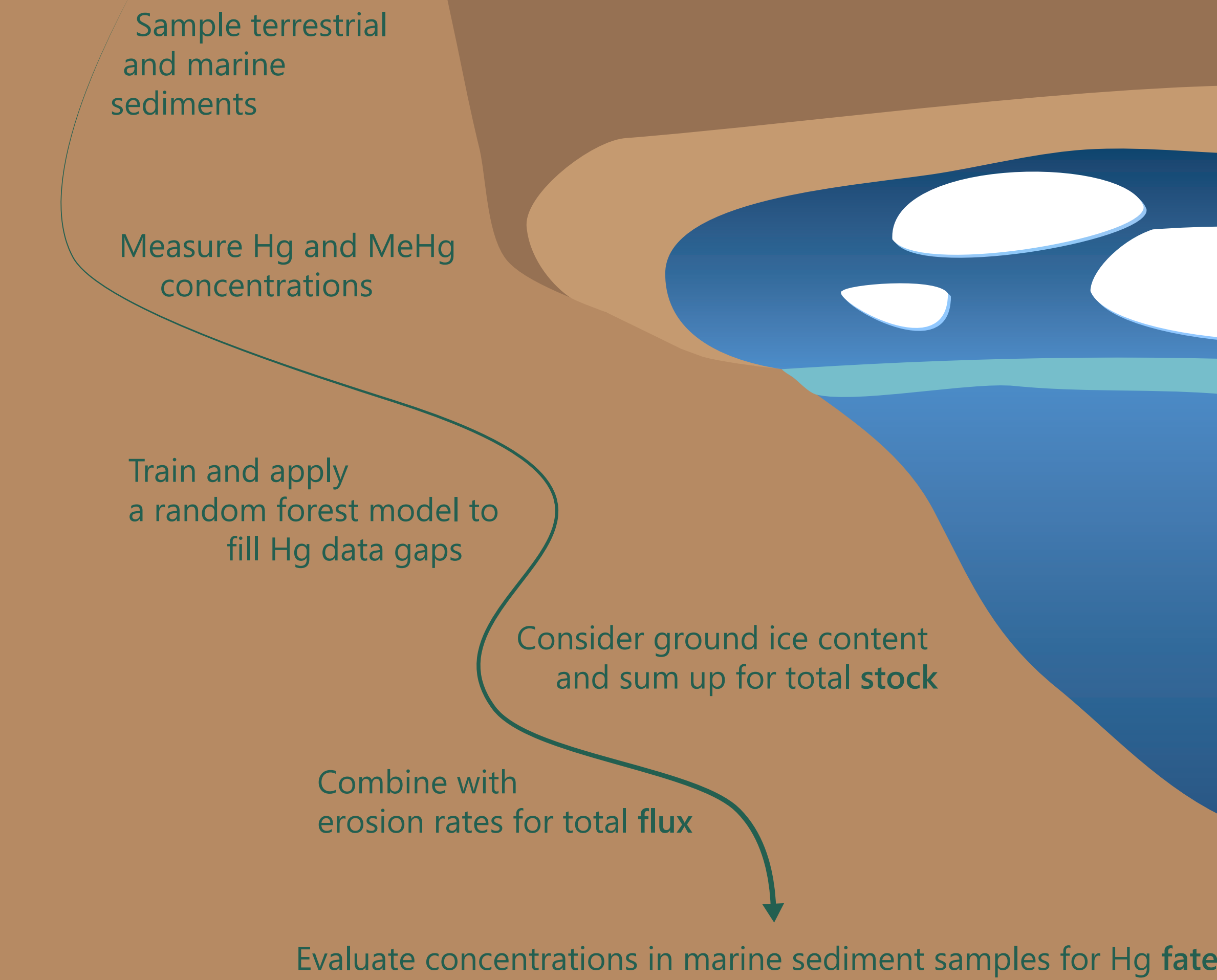
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Thawing permafrost causes the destabilization of Arctic un lithified coasts. Coastal erosion rates at the Yukon coast reach up to 22 m yr⁻¹ (Obu et al. 2017).

Methylmercury (MeHg) is a highly toxic form of Hg that bioaccumulates along the food chain, posing elevated risks to top predators and Arctic Indigenous Peoples who count on traditional hunting and fishing (AMAP 2021).

Mercury (Hg) is a neurotoxic element. Long-range atmospheric transport northwards combined with geological sources and slow decomposition rates resulted in its accumulation in permafrost where it has been safely locked away until now (Schuster et al. 2018).

Methodology



Hg stock:
381,080 kg
(271,540 to 501,930 kg)

According to this stock estimate and given it's small area, the Yukon coast stores more Hg than the average permafrost area.

Hg flux from coastal erosion:
113 kg yr⁻¹
(87 to 163 kg yr⁻¹)

This flux estimate is consistent with the sediment contribution from coastal erosion of the Yukon coast to the Arctic Ocean.

Hg fate:
transport,
transformation,
gas exchange

Terrestrial vs. marine

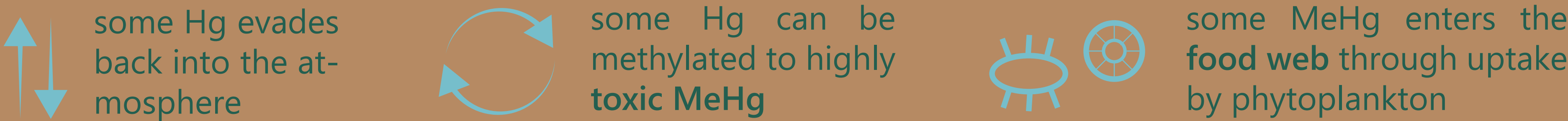
Hg and MeHg concentrations were lower in marine than in terrestrial sediments.

	terrestrial	marine
Hg	74.52 ± 29.91, n = 158	52.04 ± 27.93, n = 87
MeHg	0.29 ± 0.25, n = 52	0.21 ± 0.08, n = 24

Table 1: Measured Hg and MeHg concentrations (mean ± standard deviation) in µg kg⁻¹.

- Sources of uncertainties in stock and flux estimates include:
- limited amount and resolution of model predictors
 - small sample and training data set

... and not all of the released Hg may just be buried in marine sediments.



The actual pathway determines the risk associated with mobilized Hg.

Acknowledgements

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References

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