

# Rapid cryospheric change in the Arctic intimately linked to complex Earth & human systems

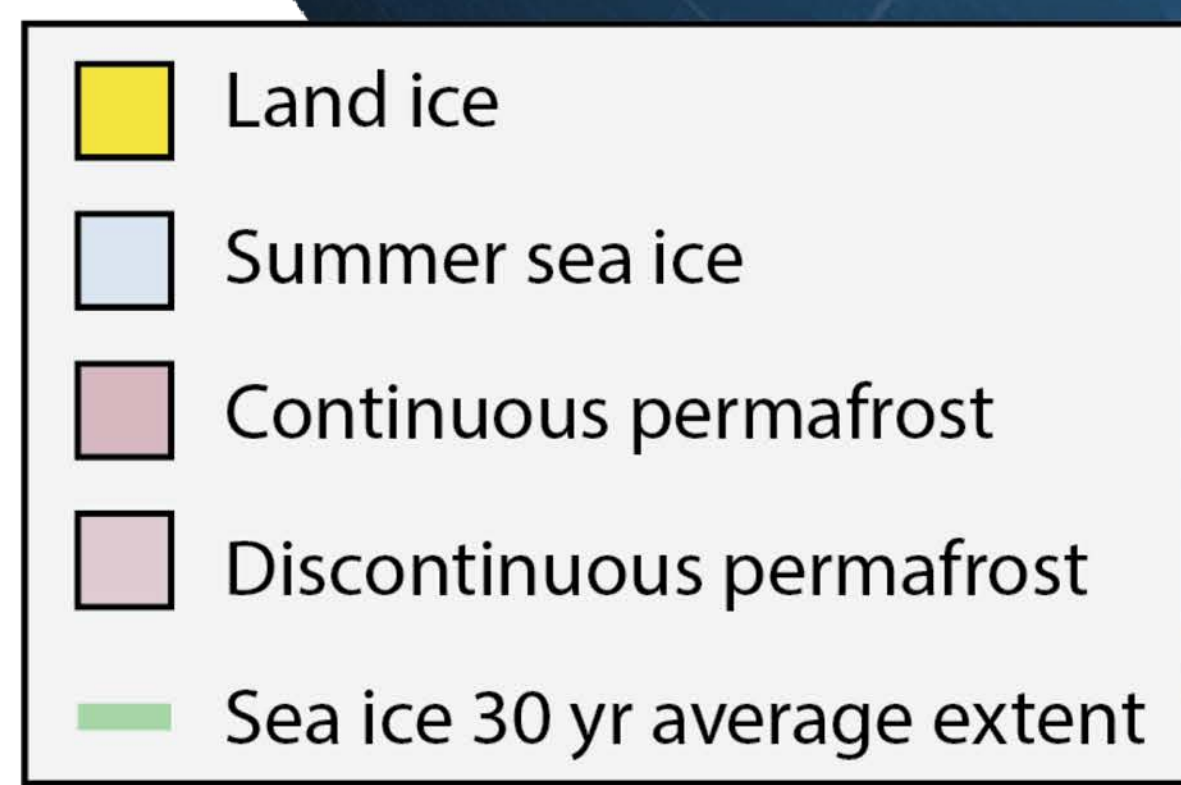
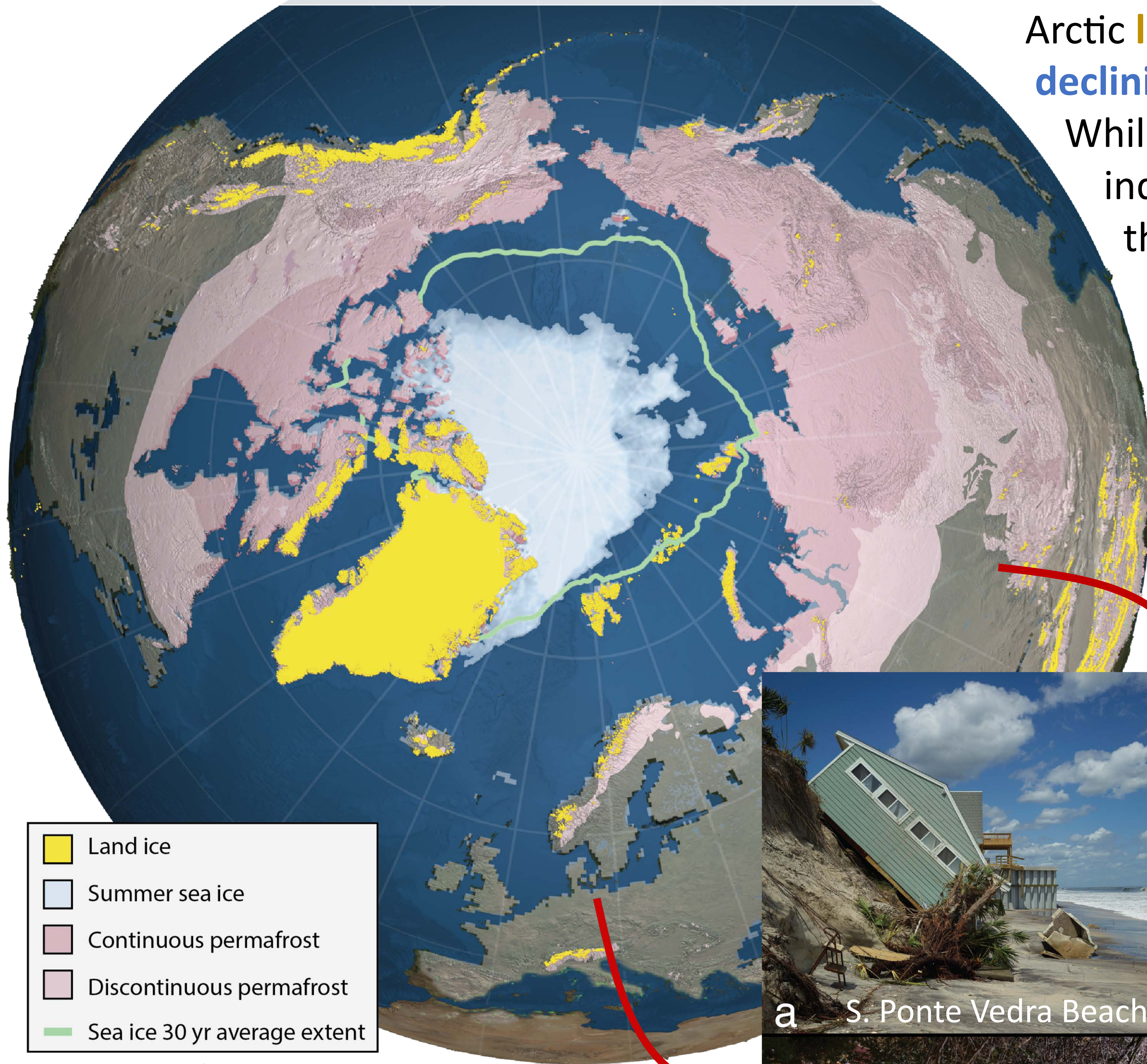


Image modified from NASA/Goddard Space Flight Center Scientific Visualization Studio [<https://svs.gsfc.nasa.gov/3885>].

Arctic **land ice is melting**, **sea ice is declining**, and **permafrost is thawing**.

While often studied or spoken about as individual environmental components, these elements are actually interconnected (e.g., sea ice melt allows ocean warming, which may increase land ice loss). Many physical system interactions lead to accelerated rates of change. The result is more rapid Arctic change, and more far-reaching impacts.



Images: James Balog/Earth Vision Institute.

Impacts are spread across the human-environment system, from infrastructure to natural systems, cultures to security, and including people, economics, flora, and fauna both inside and outside of the Arctic. Arctic changes are increasing sea levels globally, worsening storm and hurricane impacts in polar and temperate latitudes, and causing further exacerbation of warming by darkening vast areas of the far north (shorter snow-cover and ice-cover seasons). Coastal communities are already experiencing these effects, including more frequent flooding, drinking water contamination, and coastal erosion.

**Arctic environmental changes and impacts are interconnected. Human decisions are critical: mitigation will determine the level of future change and adaptation will determine how economies and communities fare.**

Reference: Moon, T. A. et al. (2019), The expanding footprint of rapid Arctic change, *Earth's Future*, 1–13, doi:10.1029/2018EF001088.



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