

# CARBON CYCLE



## *Tundra and Ocean Clathrates*

What am I?

I am all the carbon frozen in tundra permafrost and in ocean bottom sediments.

In what form do I hold carbon?

Ice-like "cages" of water trap methane gas ( $\text{CH}_4$ ) in a structure called a clathrate. They are found in cold, northern muds and buried in ocean sediments.

How does carbon get in and out of me?

Methane is produced when organic matter decays in the absence of oxygen, such as in bogs and marshes, and during the formation of fossil fuels. In cold environments, under high pressure (buried), ice structures incorporate methane. When methane clathrates melt, the methane escapes into the ocean or atmosphere, possibly in a catastrophic fashion.

How much carbon do I store?

400 Gigatons of carbon (GtC) are stored in tundra clathrates.  
1000s Gigatons of carbon (GtC) are stored in ocean clathrates.

How much carbon moves in or out of me (flux)?

The rate of methane release from clathrates is not well known. Escaping methane may "burp" and leave a pockmark on the ocean floor or cause large underwater landslides (<1 GtC release). Tundra permafrost is leaking methane more slowly.