Introduction To Ice

Ice exists in the natural environment in many forms. The figure below illustrates the Earth's dynamic ice features. At high elevations and / or high latitudes, snow that falls to the ground can gradually build up to form thick consolidated ice masses called glaciers. Glaciers flow downhill under the force of gravity and can extend into areas that are too warm to support year-round snow cover. The snow line, called the equilibrium line on a glacier or ice sheet, separates the ice areas that melt on the surface and become snow free in summer (net ablation zone) from the ice areas that remain snow covered during the entire year (net accumulation zone). Snow near the surface of a glacier that is gradually being compressed into solid ice is called firn.

Ice sheets, which are the largest forms of glaciers in the world, cover much of Greenland and Antarctica. Smaller ice caps are located in Iceland, Canada, Alaska, Patagonia, and mountainous regions of central Asia. These types of large ice mass have smaller outlet glaciers or ice streams near their margins. Mountain glaciers, smaller than ice sheets or ice caps, flow from high mountain areas and are present on all continents except Australia. In some places where the ice sheets reach the ocean, large floating ice shelves or floating glacier tongues are formed. Icebergs are floating ice masses that have broken away from ice shelves, glacier tongues, or directly from the grounded ice sheet in some locations. Sea ice, which is produced when saline ocean water is cooled below its freezing temperature of approximately -2°C or 29°F, extends on a seasonal basis over great areas of the ocean.

Sea ice and icebergs are both carried by winds and currents into warmer waters. Melt water from sea ice, ice shelves, ice tongues, and icebergs does not contribute to sea level rise, because these ice masses already displace an equivalent amount of sea water. However, sea level rise is caused by the flow of grounded glacial ice into the ocean and by surface or subsurface melt water discharged from the glacier, if the sum of those amounts exceeds the amount of ice accumulated from snowfall on the glacier or ice sheet.

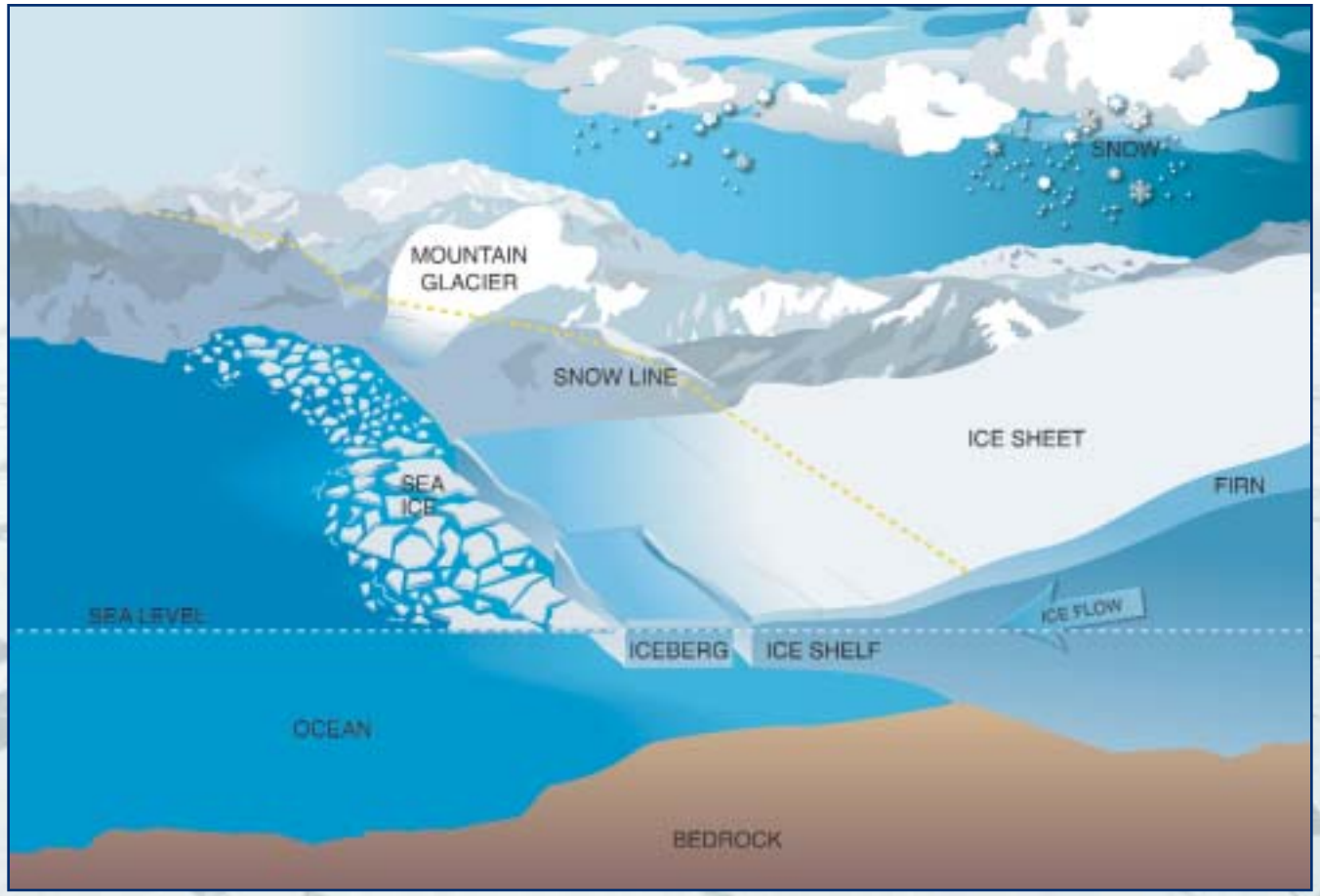

Illustration of ice in the natural environment. Graphic courtesy of Christopher Shuman, Claire Parkinson, Dorothy Hall, Robert Bindschadler, and Deborah McLean.