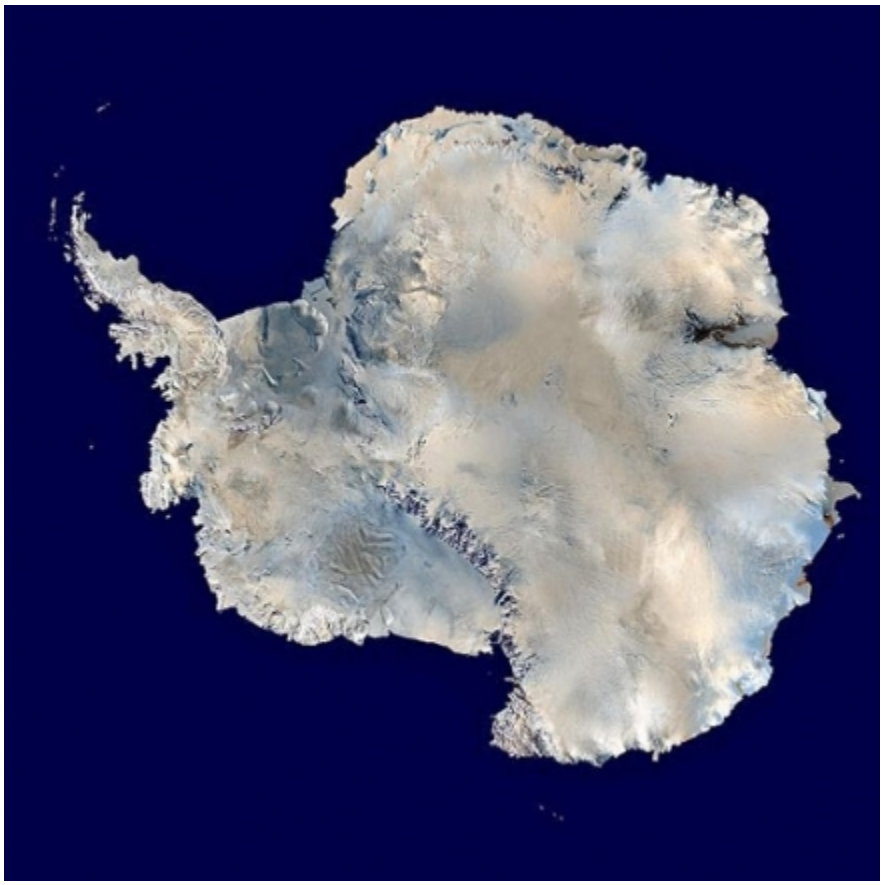
ICE SHEET



Satellite view of the Antartic Ice Sheet that covers 98% of Antarctica. Source: NASA

An **ice sheet** is the contiguous assemblage of glaciers of sizeable extent; there are presently a number of well defined ice sheets, the two largest being the Antarctic Ice Sheet and the Greenland Ice Sheet. Sheets of less than 50,000 square kilometers in extent are often called **ice fields**.
Some of the signicificant extant ice fields are the Northern Patagonian Ice Field and Southern Patagonian Ice Field of South America along with the Tierra del Fuego Cordillera of that continent. Other major ice fields are found in Canada, Alaska, Norway and New Zealand.

The occurrence of significant areas of ice sheeting are associated with long term climatic periods called Ice ages.
Extremely large ice sheets are often called **continental ice sheets**; presently only the Greenland and Antarctic expanses qualify for this term.

The geometry of an ice field is comprised of dozens to hundreds of fused glaciers, with overall thickness of typically one to several kilometers. Most of the Earth's Ice fields originated millions of years ago, with hundreds of vicissitudes of advance and retreat over their lifetimes.

Major Occurrences

The chief extant occurrences of these permanent ice landforms are:

- Antarctic Ice Sheet, Antarctica (14,000,000 square kilometers)
- Greenland Ice Sheet, Greenland (1,710,000 square kilometers)
- St. Elias-Kluane-Malaspina-Eastern Chugach Ice Field, Alaska, USA (25,000 square kilometers)
- Southern Patagonian Ice Field, Chile and Argentina (16,800 square kilometers)
- Stikine Ice Field, Canada & USA (6,500 square kilometers)
- Baglety Ice Field/Bering Glacier, Alaska, USA (5,200 square kilometers)
- Northern Patagonian Ice Field, Chile and Argentina (4,200 square kilometers)

Certain other glacial formations functionally may qualify as ice fields due to sheer size, even though their names are termed as individual glaciers or glacial clusters. for example the Baltero glacier in Pakistan has a massive size, larger than some of the recognized ice fields when ints tributary glaciers are added to its individual exten. This occurrence is all the more notable due to the existence of this alpine glacial field at a latitude of 35 degrees. Other significant ice fields occur in New Zealand, Norway, Canada and China

Ice Field Dynamics


High altitude view of the Patagonian Ice Field. @ C.Michael Hogan

Throughout much of the history of the Earth, ice expanses have oscillated in areal extent due to a variety of factors. Some of the major variables that influence the expansion or contraction of ice fields are:

- Changes in ocean thermohaline circulation
- Volcanic activity beneath ice sheets
- Cyclical changes in sunspots and Earth orbit
- Areal growth due to stress-strain relationships
- Changes in precipitation over ice sheets
- Changes in atmospheric temperature

Not surprisingly, with this assortment of diverse factors in play, some glaciers may be advancing at the same time that other glaciers are retreating within the same ice field. For example in the last several decades the Brüggen glacier within the Southern Patagonian Ice Field is advancing, while O'Higgins Glacier is rededing in that same ice field. The explanation lies in opposing trends in volcanic activity (namely the Lautero Volcano cessation beneath Bruggen Glacier) versus precipitation and atmospheric temperature within the ice field itself.

Age of Ice Fields

There are two ways to discuss the age of ice fields:

1. the age of initial formation of the ice field; or alternatively,
2. the time it takes for formative ice to become calved ice.

Using the first definition, some of the oldest ice formations have been documented to be tens of millions of years old; for example, the Antarctic Ice Sheet is documented to have been formed about 45.5 million years before present. This manner of viewing things is further complicated by the fact that ice sheets in Antarctica are thought to have existed in even earlier times.

Under the second defintion, the age of glacial ice is measured from the time a given water molecule enters solid state, usually at the head of a glacier, until that molecule is part of a calving event or dissolution at a tidewater glacial face. Even for a small glacier, the age of this ice movement is typically on the order of centuries.

Source : http://www.eoearth.org/view/article/51cbee337896bb431f69615f/?topic=51cbfc78f702fc2ba8129e73