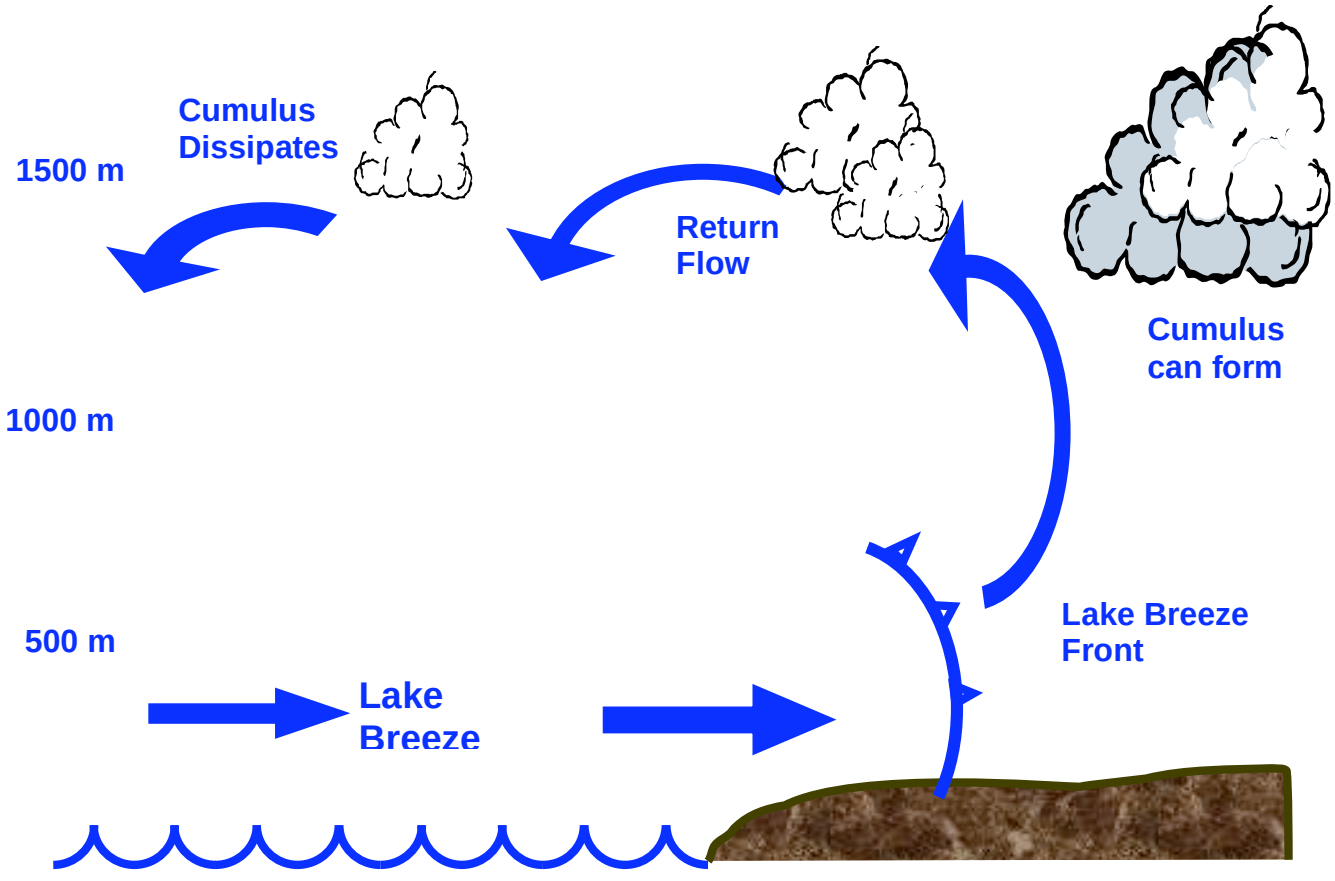
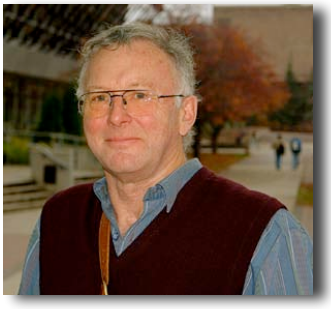
Lake Breeze


Cumulus
Dissipates
1500 m
Return
Flow
Cumulus
can form
1000 m
Lake Breeze
Front
500 m
Lake
Breeze

LAKE BREEZES

…Graham Saunders



A lake breeze is a common feature in spring and early summer. They are common around Lake Superior, although routinely take place at medium and larger lakes throughout Canada.

The land heats up quickly on a sunny day. This heating creates a great temperature contrast with air over nearby water. The air over the water is cooler because lakes have been ice-free only for a few weeks. The surface waters of Lake Superior have typically "warmed" only to 4˚ C (39˚ F) by June 1st.

Water and land surfaces have different thermal responses. It takes about three times as much heat to raise a unit volume of water through the same temperature interval as most soils. As well, there is more water to heat because of mixing and sinking of the warmed-up layer on the surface. Especially in large and deep lakes like Superior and Nipigon, the water warms very slowly and does not change much during the day.

The temperature of the air over the land often rises by several degrees per hour during the morning. This pronounced heating over land causes the air to expand and become less dense. The lighter air rises and colder, denser air nearby rushes to fill the void left by the ascending air (see diagram). Where there is a cold lake nearby, this phenomenon tends to take place all along the shoreline with cool air from over the lake moving inland from the shoreline. This mini cold front can travel many kilometres inland, especially if the land is relatively flat.

A lake breeze is a local effect and some special conditions are necessary for formation:

1) The land must be warmer than the water. This often happens by mid-morning in the spring, but occurs later as the summer progresses.
2) The prevailing winds need to be light. Moderate winds from a westerly direction for example could prevent an easterly lake breeze, or confine it to immediate lakeshore.
3) Sunshine is usually present but not always essential.

One of the joys of sailing, especially in a race, can involve the assessment of the above conditions to take advantage of wind changes. Larger islands can have personal lake breezes. Sailors who are alert and flexible can adjust to wind changes in archipelagos on Lake Superior and other lakes.

The lake breeze front (see diagram) can be a trigger for afternoon showers. Cumulus cloud can build during the afternoon and bring showers, even thunderstorms, to inland locations. Along the shoreline, perhaps with a rumble of thunder in the distance, rain seems to threaten but doesn't occur.

Lake breezes occur next to various large lakes in the Northwest. Lake of the Woods, Lac Seul, Lake Nipigon and many other lakes can generate their own weather. The contrast in temperature between land and water declines as the water warms. They can still occur with very hot days in mid and later summer. On these occasions the lake breezes are refreshing and don't require a jacket as in the spring season.