# 5. Airmasses and Airstreams

**Masses and Streams**

A mass of air that remains in contact with the earth's surface acquires the properties of the surface, particularly temperature and humidity. These stagnant airmasses are usually found in the polar and sub-tropical high pressure belts. From these sources the air flows out in airstreams which become modified by contact with the land or sea. Airstreams that flow over land are called continental airstreams and those that flow over water are called maritime airstreams.

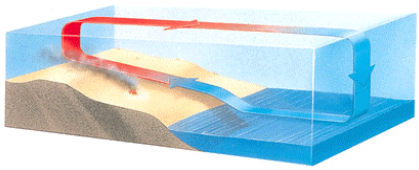
**Properties of Airstreams**

Polar air moving south is warmed from below and becomes unstable as it rises to form clouds and possibly rain. Tropical air moving north is cooled from below and becomes more stable; it does not tend to rise. A maritime airstream in contact with the ocean surface will tend to become saturated especially in its lower layers. A continental airstream on the other hand is likely to be dry. Airstreams from particular sources have very distinct characteristics and it is possible to reliably forecast the weather associated with them by considering the properties of the original air mass - polar or tropical - and how it is modified as it travels over the earth's surface - maritime or continental.

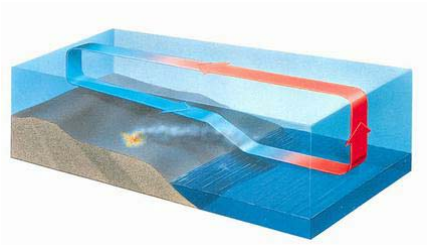
Land surfaces are poor conductors of heat; their temperature increases rapidly in sunshine and decreases equally quickly at night. The sea is different with little change of surface temperature from day to night except where it is exceptionally shallow. Because of this, the sea warms up and cools down more slowly than the land, creating temperature contrasts at different times of year. These contrasts produce local land and sea breezes along coastlines.

The sea acts as a reservoir of heat from the summer, keeping coastal regions milder in the autumn than regions inland. In summer, it warms up slowly providing cooling sea breezes keeping temperatures near coasts below that inland. On a global scale, temperature contrasts are responsible for the effect known as "continentality". The inland areas of continents tend to have a much greater temperature variation than coastal areas, where the influence of the sea produces a much smaller variation

**Local Coastal Breezes**

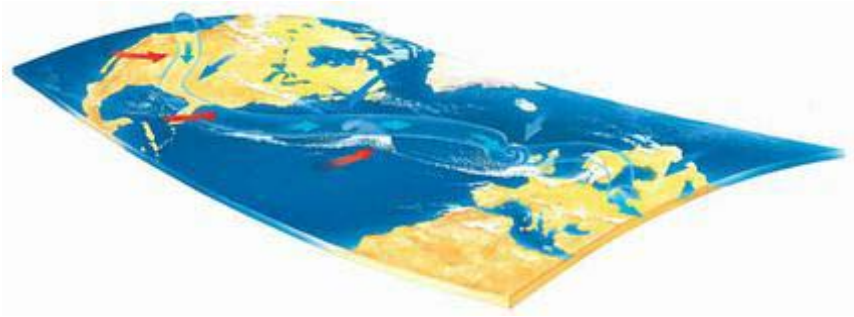


During the day the land heats up faster than the sea, warming the air above it, which then rises. Cool air blows inland from the sea to take the place of the rising warm air.



At night, the land cools faster than the sea so the wind changes direction and blows from the land out to sea.

**Jet Streams**



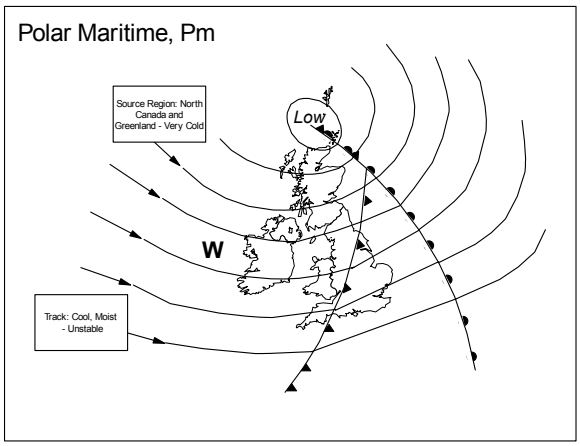
Weather fronts are driven by jet streams – fast flowing rivers of air that form a high level boundary in the Earth's atmosphere between tropical and polar air masses. They are about 300 miles wide and 4 miles deep and circle the earth from west to east at an altitude of about 6 miles. Jet streams blow at about 200-400 mph. Aircraft travelling east across the globe take advantage of powerful jet streams to cut down on travelling time and save fuel.

**Airstreams of the British Isles**

The British Isles lie in the northern belt of mid-latitude westerlies, close to the polar front, on the western edge of a continental land mass (Europe), and on the eastern side of the Atlantic Ocean. The British Isles can experience therefore weather resulting from many different types of airstreams. The principal ones are: Polar Maritime, Arctic Maritime, Returning Polar Maritime, Tropical Maritime, Tropical Continental, and Polar Continental.

In the following diagrams the weather associated with each of the six principal airstreams which affect the British Isles is shown and described.

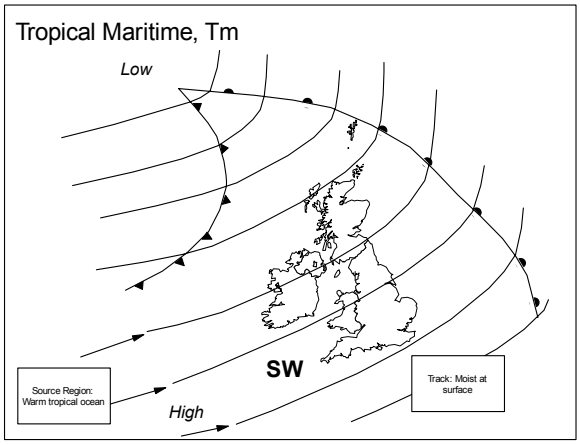
**Polar Maritime, Pm**




Summer: Heavy showers, thunderstorms over high ground.

Winter: Heavy showers in the west, snow in mountains. Clear skies in east at night giving ground frost. Dry in lee of mountains.

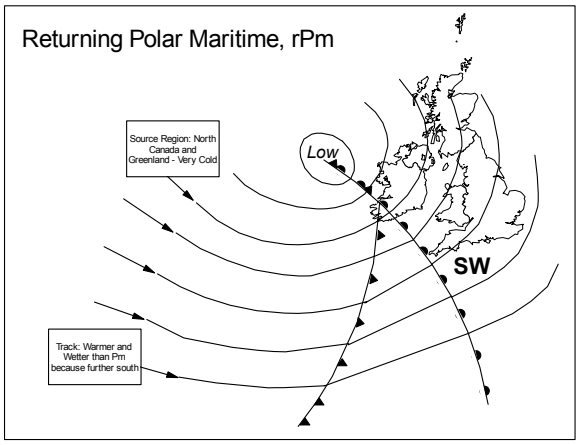
## Tropical Maritime, Tm




Summer: South-west winds associated with Azores high pressure system. Very warm and sunny inland. Low stratus clouds around western coasts with occasional drizzle.

Winter: Stratus clouds, hill fog, drizzle, clearing in north-east. Mild and muggy with prolonged rainfall in westerly mountains.

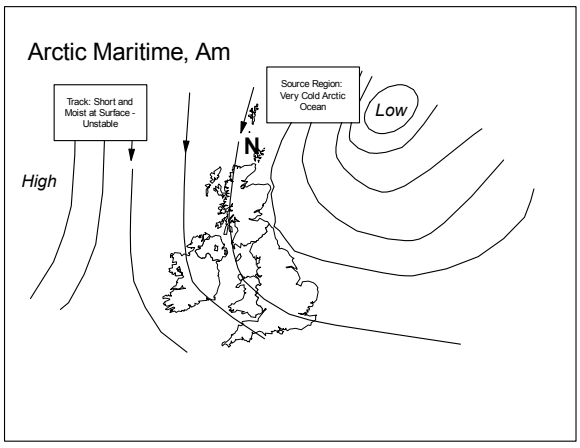
## Returning Polar Maritime, rPm




Summer: Very warm. Stratus cloud in south-west. Showers inland.

Winter: Stratus cloud. Showers in west.

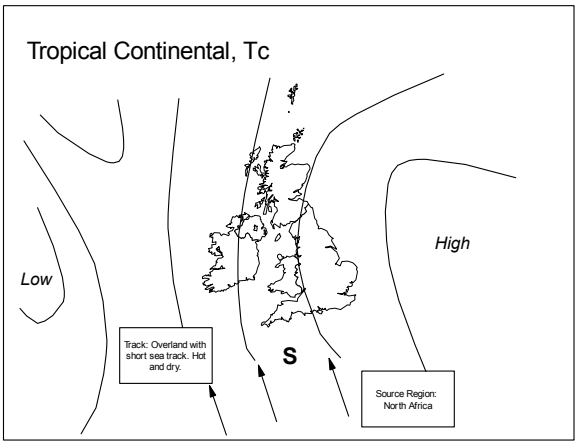
## Arctic Maritime, Am




Summer: Cool with frequent heavy showers and local thunderstorms.

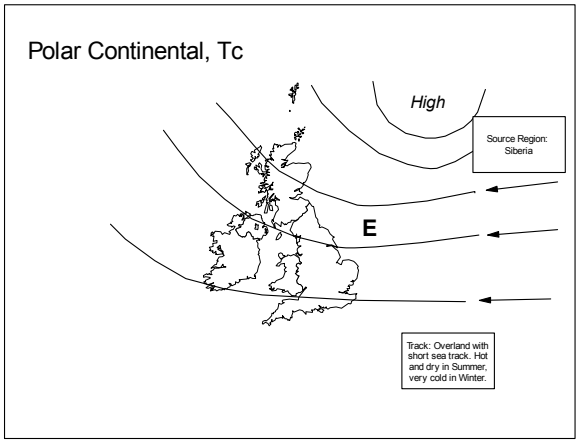
Winter: Very cold, strong winds from north and north-east. Heavy snow showers particularly in north. Cold and bright further south.

## Tropical Continental, Tc




Summer Only: Heat-wave weather, hazy with occasional thunder. Fog on eastern coasts next to cold North Sea.

## Polar Continental, Pc




Summer: Warm and dry, cloud-free, except near cooler east coast.

Winter: Snow showers on east coast, fewer in west. Very cold with strong easterly winds.