



The Polar Front Jet Stream in the Northern Hemisphere

Jet streams are important because they control our weather. The meteorologist Oishi Wasaburo detected the jet stream in the 1920's from a site near Mount Fuji but his work went largely unnoticed outside Japan. The term "jet stream" was first coined by the German Meteorologist Heinrich Seilkopf in 1939 in a research paper. It was only in 1944 during the Second World War when the high altitude B 29 bomber was used in the Pacific that the jet streams were actually recognised. Jet streams are narrow fast flowing "rivers" of air. They are formed by temperature differences in the upper atmosphere between the cold polar air and the warm tropical air. This abrupt change in temperature causes a large pressure difference which forces the air to move. In our latitude the jet stream is generally found at around 35,000 feet and is called the Polar Front Jet Stream. The polar jet stream as its name implies separates the cold polar air to the north and the warm sub-tropical air to the south. With the temperature contrast of these air masses greatest in the winter time the jet stream is stronger at this time of the year reaching 300 miles per hour but have been measured at over 400 miles an hour in south-west Scotland. Jet streams are typically thousands of miles long hundreds of miles wide and a few miles deep. The strong winds along the jet stream generally blow from west to east due to the rotation of the earth. Jet streams move north and south following the boundary between warmer and colder air. These boundaries are also where weather fronts generally develop so when a front passes overhead bringing wind and rain it is quite likely that a jet stream is passing undetected too. The wind direction in the jet stream can change from the normal west to east to almost north to south. This is one of the methods that the Earth uses to transport excess heat from the equatorial regions towards the poles and in turn bring cold polar air southwards. It also helps to steer our Atlantic weather depressions from their normal eastward movement. At times it can even block their movements altogether. Jet streams can strengthen up or even die out so. The winds in the jet stream do not necessarily blow at a constant speed or in a straight line. Within this fast moving air there are accelerations and decelerations as the air speeds up slows down or in fact changes direction. It is at these points in the atmosphere that high and low pressures starts to form and either moves quickly in the wind flow or develops into a bigger depression or anticyclone. These positive or negative acceleration points are very important to the weather forecaster and these occur at the entrance and exits of the jet stream. By looking at a simple diagram of a jet stream it is possible to pick out the areas below which a depression or anticyclone is most likely to form. Weather forecasters use the polar jet to predict medium-term temperatures because it acts as a barrier between cold Arctic air and warmer tropical air. If the polar jet moves north then areas just south of it will be warmer and drier than normal. If it moves south then areas just to the north will be cooler and wetter.