Global trade winds definition

Trade winds and oceanic trade routesThe opening of trade winds and the journey of ColumbusThe Discovery of Hadley Cells Trading winds are part of the air circulation, a cell when seen in a profile that begins with the rise of air in the tropics. This rising air is determined by the energy received from the Sun, which is almost above its head at the equator throughout the year. Vertical air movement implies convergence, meaning air rising from the bottom of the atmosphere is replaced by winds blowing from higher latitudes. This mechanism of trade winds was first postulated by the famous astronomer and atmospheric physicist Edmond Halle in 1686. There was, however, a problem with Halley's suggestion: he did not explain why the winds were actually blowing as much from the east as observed. What keeps trade winds from direct to the convergence zone at the equator? This puzzle was solved by the English meteorologist George Hadley (1685-1768), which is why we are talking about Hadley Cage, not the Gully Cage. Hadley realized that wind particles moving to the equator would come from a lower speed to the east and enter a higher-speed area to the east as they move toward the equator. So the wind will have a movement to the west as it is really observed. George Hadley published his theory in a famous article on the cause of general trading winds, in 1735. This was exactly one hundred years before Gustave-Gaspar Coriolis (1792-1843) created equations describing movements in the rotating coordinate system. So Hadley was right, but now we credit Coriolis for describing how the winds bend west of their path as they move towards the equator. In any case, trade winds have a strong eastern component, and they feed the convergence and air lift zone there. A diagram illustrating how Hadley's cells create deals. The growing warm air in the tropics creates a void that is filled with air coming from higher latitudes, which generates trade winds. Compensating airflow for trade wind is a kind of anti-trade wind in the upper troposphere, located above the trades, where the air flow goes east and away from convergence. Compensating for the rise of air in convergence is the downward movement of air in the desert zone, concentrated between 20 and 30 degrees latitude. This falling air is heated as the pressure increases and is therefore significantly undersaturated with water vapor. This leads to clear skies, evaporation on the surface of the sea (or soil) and general aridity. (To check this check out the positions of the main deserts on the map.) Surface air from subtropical regions returns to the equator (like Passat) to replace rising air, thus completing the air circulation cycle in Hadley's cell. Page 2 Calspace Courses Changes Part 1 Climate Change 1 Sillabus 1.0 Introduction 1.1 - Climate Spotlight 1.2 - Sci Specification. Opinion 1.3 - Pundits, Adv., and Apocalypse 1.4 - How to Tell Science from South Africa 2.0 - Earth's Natural Greenhouse Effect 3.0 - Greenhouse Gases 4.0 - CO2 Emissions 5.0 - Earth Carbon Reservoirs 6.0 - Carbon Cycling: Some Examples 7.0 - Climate and Weather 8.0 - Global Wind Systems 9.0 - Clouds Storms and Climate 10.0 - Global Ocean Circulation 11.0 - El Nino and Southern Oscillation 12.0 - Prospects for Future Climate Change Part Two Introduction to Astronomy of Life in the Glossary Universe : Climate Change Glossary: Astronomy Glossary: Life in the Universe Trading Winds have been introduced in Chapter 1 (Global Weather Conditions) as the equator blows part of Hadley's cell. Since many cruising boats spend a lot of time in the region of commercial wind, some more details are given in this chapter. Typical wind trading characteristics power liabilities - like all winds in the world - are predominantly determined by the pressure gradient. Since the pressure of the equatorial trough, or ITH, is relatively stable at around 1008-1012 hPa, the strength of the trade winds is mainly determined by the strength and location of subtropical high pressure. The stronger the high pressure and the closer it is to the equator, the stronger the pressure gradient and trade winds. Figure 1 shows a subtropical high pressure of 1037 MB, centered at 37 degrees Celsius, 147 degrees Celsius. This creates a large area of eastern trades of 15-30 knots between 30 and ITH. Figure 1. Surface pressure analysis in the North Pacific shows high pressure at 37 degrees Celsius, 147 degrees Celsius. The wind belt extends from about 30 degrees Celsius to ITH (red line between 0 and 10 degrees Celsius). (Image courtesy of NOAA.) Trading is usually the most common and steady during the summer months. For example, in Hawaii, i.e. in the middle of the Pacific wind trade belt, trades occur about 90% of the time in the summer months and about 50% of the time in winter results in a total of 70% of the time of year. In winter, low pressure in mid-latitudes tends to be stronger, and they follow the more southern (northern) route in the northern (southern) hemisphere disrupt the subtropical high-pressure model. Cold fronts from these low pressures can extend up to 15-20 degrees latitude. In summer, subtropical high pressure is quite stable and well-established, so the speed of the trading wind is also stable. Typical speeds range from 12 to 18 knots. In winter, the wind speed changes more. For example, if The storm broke high pressure, the winds can be quite light as high pressure is re-built. On the other hand, in certain environmental conditions high pressure can create and become very strong. (In fact, in December 1978, hurricane forces were recorded in Waikoloa, Hawaii, and the wind speed is about 14 knots in the summer and winter. is usually about 2 meters with a peak period of 9 seconds. It should be noted that the direction of trading can vary quite strongly depending on the location and shape of the subtropical high pressure. In Figure 1, winds northerly near the California coast while over Hawaii trades have a typical east or northeast direction. Approaching medium-readiness low-pressure systems and their cold fronts can significantly alter high levels, often making it longer north-south rather than east-west. Figure 2. Average average sea level pressure for January (upper) and July (below). (Image courtesy of NOAA.) Figure 2 shows the average sea level pressure for January and July. Some notable features can be seen for each ocean basin: the dominant feature of the weather over the North Atlantic is the North Atlantic Anticyclone, or Azores (sometimes also known as Bermuda High). On the southern flank of this large high-pressure system is a North Atlantic commercial wind farm that transports sailors from the Canary Islands to the Caribbean. On the north side of high, western moving lows are dominated by weather (especially in winter) and form a western belt in the midlatitudes. In the winter months, the Azores' high shifts a little to the south. In addition, low pressure systems in the North Atlantic tend to take a more southern route and can change or even completely break the Azores high when the western ones can spread to 20 N or even 15N. Fortunately, these lows usually move fairly quickly and high pressure builds up again in a few days. Over the north Pacific, high pressure is shifting to the southeast, closer to the California coast, during the winter from its summer position north of Hawaii. The Aleutian low dominates at high latitudes. As in the North Atlantic, low pressure can break high pressure, and their cold fronts can extend far south to the wind belt. Seasonal changes in the southern hemisphere are less dramatic than in the northern hemisphere. Over the South Atlantic, the southern part of the Ocean and the southern Indian Ocean high pressure slightly shifts north during the winter from their summer positions. Winds over the northern Indian Ocean are dominated by monsoons. During the time there is a great high pressure over the Asian continent and a large-scale flow over the region from the northeast. During the summer monsoon, a large low pressure is formed over the Asian continent and the wind direction reverses with a dominant wind direction from the southwest. Figure 2. A trading wind inversion. Near the subtropical center of high pressure (right) strong inversion of trade wind and clouds are small. Closer to the equator (left) the inversion weakens and clouds can grow high. (Image courtesy of UCAR/COMET.) Typical weather features Typical weather in the trade wind belt is partly sunny with some cumulus clouds or stratocumulus and a chance of showers. Clouds in the region of trade winds tend not to grow very high due to a layer of warm air called inversion of trade wind. The descent of air in the subtropical high pressure along with the streams of the ascending surface creates a layer of warm air at an altitude of about 500-3000 m. Air is stable on the inversion layer, so clouds cannot grow above the inversion floor. For example, if you sail from the Canary Islands to the Caribbean or from California to Hawaii, the inversion of the trade wind becomes taller and weaker along the way. The bottom of the inversion rises from about 500-1000 m to about 1500-3000 m along these routes. In practice this means that higher clouds and more showers as one gets closer to the equator. While the weather is generally fair in the area of commercial wind, sometimes the synoptic scale of disruption can weaken or break inversions and thunderstorms can develop. These disturbances include upper tropospheric lows, cold fronts, subtropical lows (Kona lows) and tropical cyclones. The last three can be seen and predicted from surface charts. However, the upper tropospheric lows are only visible on top-level charts (e.g. 500MB). These disturbances can lead to severe thunderstorms and a flurry of lines locally, although a normal pattern of wind trading can be observed elsewhere on the surface. Some of these topics will be discussed in the forthcoming chapters. Next chapter: tropical cyclones. Cyclones.