Intertropical convergence zone pdf

Inter Tropical Convergence Zone Definition The Inter Tropical Convergence Zone, or ITCZ, is a low pressure belt that generally surrounds the Earth near the equator where commercial winds from the northern and southern hemisphere swell. It is characterized by convective activity that often generates vigorous storms on large areas. It is most active over continental masses of daytime land and relatively less active across the oceans. Description The position of ITCZ varies according to the seasons and remains behind the relative position of the sun above the Earth's surface by about 1 to 2 months and generally correlates with the thermal equator. Because water has a higher thermal capacity than earth, ITCZ propagates more visibly on land than over water, and over the northern hemisphere than over the southern hemisphere. In July and August, over the Atlantic and Pacific, ITCZ lies between 5 and 15 degrees north of the Equator, but further north of the land masses of Africa and Asia. In East Asia, ITCZ can propagate up to 30 degrees north of the equator. In January, across the Atlantic, ITCZ is generally no more south of the equator, but extends much further south over South America, South Africa and Australia. On land, ITCZ tends to follow the zenith point of the sun. If commercial winds are weak, ITCZ is characterized by isolated cells Cumulus (Cu) and Cumulonimbus (Cb) (Cb). However, if commercial winds are stronger, ITCZ can generate a solid line of active Cb cells embedded with other types of clouds developing as a result of instability at higher levels. CB peaks can reach and sometimes exceed an altitude of 55,000 feet, and ITCZ can be as wide as 300 nautical miles in places with a formidable obstacle to aircraft transit. Effects Aircraft flying through an active ITCZ (strong commercial winds) will probably face some or all of the dangers associated with Cb clouds, such as icing, turbulence, lightning and wind shear. However, it is in this area that the most severe effects can often be encountered. In particular, convective discoveries of tropopause often occur within ITCZ, most of which occur on land, especially in the second half of each day. Convective penetration of the tropopause is less common in oceanic areas where the phenomenon is more likely to occur in the early hours of each day, generating more isolated cells. Research sponsored by the National Aeronautics and Space Administration has shown that 1% of deep tropical convection activity exceeds 46,000 ft altitude, with a small portion of it reaching much higher elevations. For more information on the potential dangers of transit through or near the Cb cloud, see the article Cumulonimbus (Cb). Articles Related to Trade Tropical Winds Storm Weather Radar: Storm Avoiding Further Reading Calms redirects here. For other uses, see Calm (disambiguation). Doldrums redirects here. For other uses, uses, Doldrums (disambiguation). The ITCZ meteorological phenomenon is visible as a strip of clouds that surrounds the Earth near the Equator. The Intertropical Convergence Zone (ITCZ), known by sailors as its goals or calm due to its monotonous, windless weather, is the area where commercial winds in the northeast and southeast converge. It surrounds the Earth near the thermal equator, although its specific position varies seasonally. When it is near the geographical equator, it is called the near-equatorial trough. If ITCZ is drawn in and merges with a monsoon circulation, it is sometimes referred to as a monsoon gutter, a more common use in Australia and parts of Asia. ItCZ meteorology was initially identified from 1920 to 1940 as the Intertropical Front (ITF), but after recognition in 1940 and 1950 of the significance of wind field convergence in tropical meteorological production, the intertropical term Convergence (ITCZ) was then applied. [1] ITCZ appears as a band of clouds, usually storms, that surround the globe near the Equator. In the northern hemisphere, trade winds move in a south-west direction from the northeast, while in the southern hemisphere, they move northwestfrom the southeast. When ITCZ is positioned north or south of the Equator, these directions change depending on the Coriolis effect transmitted by the Earth's rotation. For example, when ITCZ is located north of the equator, the south-east commercial wind changes to a southwest wind as it crosses the equator. ITCZ is formed by vertical motion that occurs largely as convective activity of storms driven by solar heating, which effectively attract air in; These are the commercial winds. [2] ITCZ is effectively a tracer of the ascending branch of the Hadley cell and is wet. The descending dry branch is the latitudes of the horse. The location of ITCZ varies gradually according to the seasons, roughly corresponding to the location of the thermal equator. Because the thermal capacity of the oceans is greater than that of above ground air, migration is more prominent on land. Across oceans, where the convergence zone is better defined, the seasonal cycle is more subtle, because convection is constrained by the distribution of ocean temperatures. [3] Sometimes an ITCZ DUBLU is formed, one located to the north and another south of the equator, one of which is usually stronger than the other. When this happens, a narrow ridge of high pressure is formed between the two convergence zones. ITCZ across oceans vs. land Seasonal variability of the Intertropical Convergence Zone (ITCZ), The Congo Air Limit (CAB), tropical rain belt and surface winds over Africa (adapted from Dezfuli 2017 with changes). This scheme shows that ITCZ and the region of maximum rainfall can be decoupled on continents. [4] ITCZ is commonly defined as an area where commercial winds converge. Seasonality of rainfall is traditionally attributed to the north-south migration of ITCZ, which follows the sun. Although this is largely true over the equatorial oceans, ITCZ and the region of maximum rainfall can be decoupled on continents. [4] [5] Equatorial precipitation on land is not just a response to surface convergence. Rather, it is modulated by a number of regional features, such as local atmospheric jets and waves, proximity to oceans, ground-induced convective systems, moisture recycling and spatial variability of land cover and albedo. [4] South Pacific Convergence Zone Vertical air speed at 500 hPa, July average. Ascension (negative values) is concentrated close to the solar equator; the descent (positive values) is more diffuse The South Pacific Convergence Area (SPCZ) is oriented backwards, or oriented west-northwest to east-southeast aligned, by extending from the warm Basin of the Western Pacific to the southeast to the French Polynesia. It lies just south of the equator during the warm southern hemisphere season, but can be more extratropical in nature, especially east of the 140th meridian west longitude during cold or neutral el niño-stoic (ENSO) oscillation models. When ENSO reaches its warm phase, otherwise known as El Niño, the language of low sea surface temperatures due to upwelling on the South American continent disappears, making this convergence zone disappear as well. [7] Effects on ITCZ weather are more distant from the equator during the northern summer than the southern summer due to the northern arrangement of the continents. The variation in the location of the intertropical convergence zone drastically affects rainfall in many equatorial nations, resulting in the wet and dry seasons of the tropics, rather than in cold and warm seasons of higher latitudes. Longer-term changes in the intertropical convergence zone can lead to severe drought or flooding in neighbouring areas. In some cases, ITCZ may become narrow, especially when moving away from the equator; ITCZ can then be interpreted as a front along the peak edge of the equatorial air. [8] There appears to be a 15 to 25-day cycle in storm activity along ITCZ, which is about half the wavelength of the Madden-Julian oscillation (MJO). [9] Within ITCZ, average winds are light, unlike areas north and south of the equator, where commercial winds feed. As sea travel became more common, 18th-century sailors called this belt of calm because of calm, stagnant or inactive winds. The role in the formation of tropical cyclone Hurricanes Celia and Darby in eastern Pacific and the precursor of Hurricane Alex in the Intertropical Convergence Zone. (2010) Tropical cyclogenesis depends on low-level vorticity as one of its six requirements, and ITCZ occupies this role, as it is an area of wind change and speed, also known as horizontal wind shear. As ITCZ migrates at tropical - subtropical latitudes and beyond (Shandong Province of the People's Republic of China) during the summer season of that hemisphere, the increase in Coriolis force makes it possible to form tropical cyclones in this area. Higher pressure surges at high latitudes can increase tropical disturbances along its axis. [10] In the North Atlantic and the North-East Pacific, tropical waves move along the ITCZ axis causing an increase in storm activity, and storm groups may develop under weak vertical wind shearing. Dangers Storms along the intertropical convergence zone played a role in the loss of Air France flight 447, who left Rio de Janeiro-Galeão International Airport on Sunday, May 31, 2009, at approximately 7:00 p.m. local time (6:00 p.m. EDT or 10:00 p.m. UTC) and was expected to land at Charles de Gaulle Airport near Paris on Monday, June 1, 2009 , at 11:15 a.m. (5:15 a.m. EDT or 9:15 a.m. UTC). [11] The aircraft crashed without survivors while flying through a series of large itcz storms, and the rapid formation of ice on the speed sensors was the precipitous cause for a cascade of human error that eventually condemned the flight. Most aircraft flying these routes are able to avoid larger convective cells without incident. [citation required] In the Age of Sail, finding himself becmalmed in this region in a hot and muggy climate could mean death when the wind was the only effective way to propel ships overseas. Periods of calm inside doldrums could strand ships for days or weeks. [12] Even today, recreational and competitive sailors try to cross the area as quickly as possible, as erratic weather and wind patterns can cause unexpected delays. ITCZ also caused the crash of Air France flight 447, which flew in a storm in the area that, in short, froze the pitot tube and combined with the pilot's error caused the crash. In literature, the smallest are described in Samuel Taylor Coleridge's poem The Rime of the Ancient Mariner (1798) and also provide a metaphor for milo's initial state of boredom and indifference, the child hero of Norton Juster's classic children's novel, The Phantom Tollbooth. See also earth sciences portal Weather portal Asymmetry of the Intertropical Convergence Zone Monsoon by Chemical Equator Note ^ Barry, Roger Graham; Chorley, Richard J. (1992). weather and climate. London: Routledge. ISBN 978-0-415-07760-6. OCLC 249331900. Atmosphere, weather and climate. ^ Intertropical convergence zone. JetStream - Online school for the weather. Noaa. 2007-10-24. Taken 2009-06-04. ^ Intertropical intertropical convergence (ITCZ) - Skybrary Aviation Safety. www.skybrary.aero. Retrieved 2018-04-12. ^ a b c Dezfuli, Amin (2017-03-29). Climate of Central and West Equatorial Africa. Oxford Research Encyclopedia of Climate Science. two:10.1093/acrefore/9780190228620.013.511. ISBN 9780190228620. ^ Nicholson, Sharon E. (February 2018). ITCZ and the seasonal cycle on Equatorial Africa. Bulletin of the American Meteorological Society. 99 (2): 337–348. Bibcode:2018BAMS... 99.337N. two:10.1175/bams-d-16-0287.1. ISSN 0003-0007. ^ E. Linacre and B. Geerts. The South Pacific Convergence Zone Movement was taken over in 2006-11-26. ^ Semyon A. Grodsky; James A. Cardboard (2003-02-15). Intertropical Convergence Area of the South Atlantic and Equatorial Cold Language (PDF). University of Maryland, College Park. Taken 2009-06-05. ^ Djurić, D: Weather analysis. Prentice Hall, 1994. ISBN 0-13-501149-3. ^ Patrick A. Harr. Tropical cyclone formation/Structure/Movement studies. Naval Research Office Taken 2006-11-26. Archived November 29, 2007, at Wayback Machine ^ C.-P. Chang, J.E. Erickson and K.M. Lau. Cold northeast surges and near-equatorial disturbances in the MONEX winter area in December 1974. Part I: Synoptic aspects. Retrieved on 2007-04-26. ^ Q & A Turbulence 1.June.2009 The Guardian ^ [1] NOAA. What are the most unadum day? National Ocean Service website, 01/07/20 External links Search doldrums in Wiktionary, free dictionary. Wikimedia Commons has media related to the Intertropical Convergence Zone. ITCZ in Africa, through the University of South Carolina A rain shiftshifting strip of rain from March 2011 Scientific American Duane E. Waliser and Catherine Gautier, 1993: A Satellite-derived Climatology of ITCZ. J. Climate, 6, 2162–2174. Taken from