

The K-Index is one of the main stability indices that we use to determine the probability of thunderstorm activity in our area. The American Meteorology Society's (AMS) Glossary of Meteorology defines a stability index as: "Any of several quantities that attempt to evaluate the potential for convective storm activity and that may be readily evaluated from operational sounding data." AMS (2017) i.e. weather balloon data. High pressure generally is associated with a stable atmosphere and a minimized chance of showers and thunderstorms. Low pressure is generally associated with an unstable atmosphere and an increased chance of showers and thunderstorms. The K-Index is thus defined "K-index: This index is due to George (1960) and is defined by

$$K = (T_{850} - T_{500}) + D_{850} - (T_{700} - D_{700}).$$

The first term is a lapse rate term, while the second and third are related to the moisture between 850 and 700 mb, and are strongly influenced by the 700-mb temperature–dewpoint spread. As this index increases from a value of 20 or so, the likelihood of showers and thunderstorms is expected to increase." AMS(2017) In simpler terms, the K-Index evaluates the change in temperature from 850mb in height to 500mb in height, adds the dewpoint at 850mb in height and then subtracts the difference of the temperature and dewpoint at 700mb in height. This relationship between temperature and moisture is one way to measure stability. In Bermuda, a value of 30 or higher suggests at least a moderate risk of airmass thunderstorms. Bermuda Weather Service (BWS) (2017)

There are many other stability indices that can be calculated from weather balloon and weather model data. Some are more useful at different times of the year as our climate shifts from a maritime tropical to a maritime mid-latitude or temperate climate. Through experience, we at the Bermuda Weather Service have found that the K-Index is very reliable year round and is an excellent starting point in evaluating the stability of the atmosphere in our area.

Other information included on this graph is a satellite overlay of clouds and lightning strikes for the past hour. This can be used as a verification of the model K-Index data. There are also wind streamlines which is a method of analysing a windfield in order to clearly present converging or diverging winds. BWS (2017) Converging winds, where the streamlines are moving closer to each other, are also an indication of atmospheric instability whereas diverging winds, where the streamlines are moving farther away from each other, are an indication of atmospheric stability. This animation continues the model data about 3 hours into the future to show how the UK Global model expects the stability and streamlines to evolve in our area.

References:

American Meteorology Society, cited 2017: "Stability Index". Glossary of Meteorology. [Available online at [http://glossary.ametsoc.org/wiki/Stability\\_index](http://glossary.ametsoc.org/wiki/Stability_index)]

Bermuda Weather Service, cited 2017: "K-Index". Glossary [Available online at <http://www.weather.bm/glossary/Glossary.asp>]

Bermuda Weather Service, cited 2017: "Streamlines". Glossary [Available online at <http://www.weather.bm/glossary/Glossary.asp>]