Convective Available Potential Energy (CAPE): This field is a measure of the buoyant energy that is potentially available in the atmospheric environment. It is generally computed based on an observed or simulated sounding or other vertical profile of potential temperature within in the atmosphere. In computing CAPE, it is assumed that a rising air parcel reaches its level of free convection (LFC) where it's potential temperature becomes warmer than the surrounding environment and is thereby naturally buoyant. From that point on, the parcel rises, and in fact, accelerates, until it reaches its equilibrium level (EL), that being the level at which its potential temperature is once again equal to that of the environment, and above which the parcel's potential temperature becomes cooler than the surrounding environment.

The amount of CAPE is that amount of buoyant energy available between the LFC and EL and is given by the following relation:

$$CAPE = g \int_{LFC}^{EL} \frac{(\theta(z) - \bar{\theta}(z))}{\bar{\theta}(z)} dz$$

where θ represents potential temperature and the overbar signifies the potential temperature of the environment as determined by the sounding or simulated profile. g is the acceleration of gravity and is assumed constant. The parcel potential temperature is assumed to change following the dry adiabatic lapse rate until it is saturated, after which time it follows the moist adiabatic lapse rate.

CAPE can be calculated assuming any parcel sounding point. A common assumption is to use a parcel starting at the surface or the top of the boundary layer. Here we take the most unstable parcel ascent that can potentially occur with the vertical profile and use it in the CAPE computation.