

Convective Available Potential Energy (CAPE)

1. Positive Area:

When a parcel can rise freely because it is in a layer where the adiabat it follows is warmer than the surrounding environment, the area between the adiabat and the environmental temperature curve is proportional to the **Convective Available Potential Energy (CAPE)**, also called positive areas, which is available for conversion to kinetic energy of motion of the parcel. A parcel rising in these CAPE or positive areas finds itself warmer than the surrounding air and continues to rise freely. These are considered unstable areas and are regions where clouds of greater vertical extent can form.

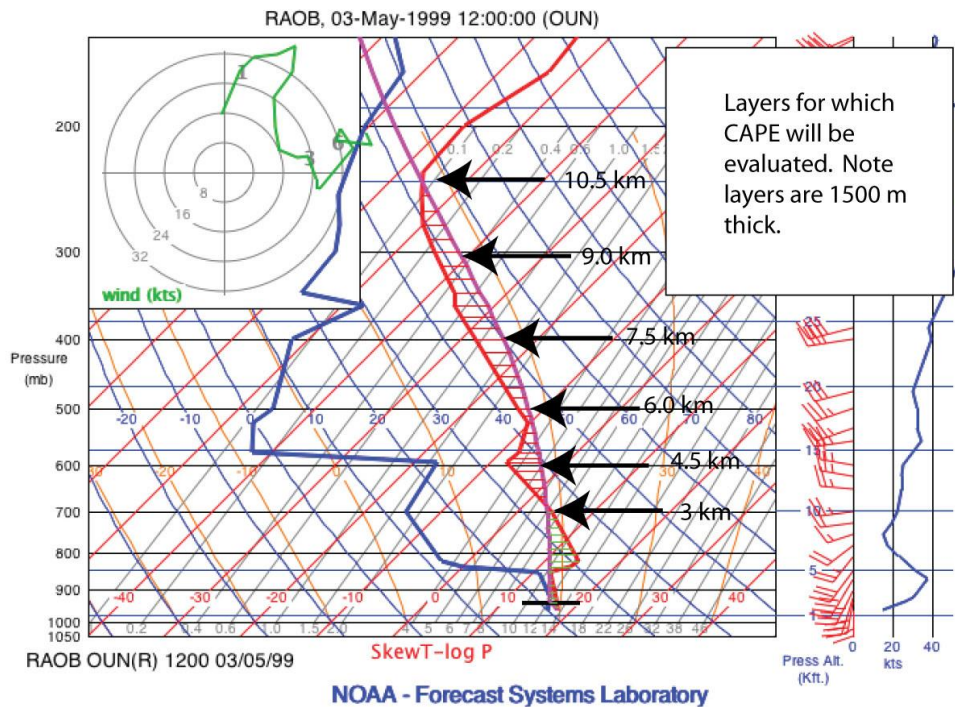
2. Negative Area:

When a parcel on a sounding lies in a negative area, energy has to be supplied to it to move it either up or down. The area between the path of such a parcel moving along an adiabat and the environmental temperature curve is proportional to the amount of energy that must be supplied to move the parcel. For this reason, this negative area is called a region of Convective Inhibition (CIN).

The negative and positive areas are not uniquely defined on any given sounding. They depend on the parcel chosen and on whether the movement of the chosen parcel is assumed to result from surface heating, (insolation), release of latent heat of condensation, or from forcible lifting, (i.e., convergence, orographic lifting, etc.).

CAPE Calculation Procedure:

Step 1: After you have examined the sounding and determined the LFC (or CCL) and EL, you should tabulate the environmental temperature and air parcel temperature (remember, in Kelvin) for each pressure level from the LFC (or CCL) to the EL. Fill in the



$$\text{Temperature Quotient} = (\text{Temp Diff}/\text{Temp Env}) \dots\dots(1)$$

Step 2: Using the information from Table 1, you will need to compute the values needed to solve Equation 1 at each level. I suggest having a second table like the one given as Table 2.

Pressure	"Layer" Number	Temp Parcel	Temp Env	Temp Diff	Temp Quotient*
700	1				
600	2				
500	3				
400	4				
300	5				
250	6				

Table 1: Tally Table for CAPE Calculations

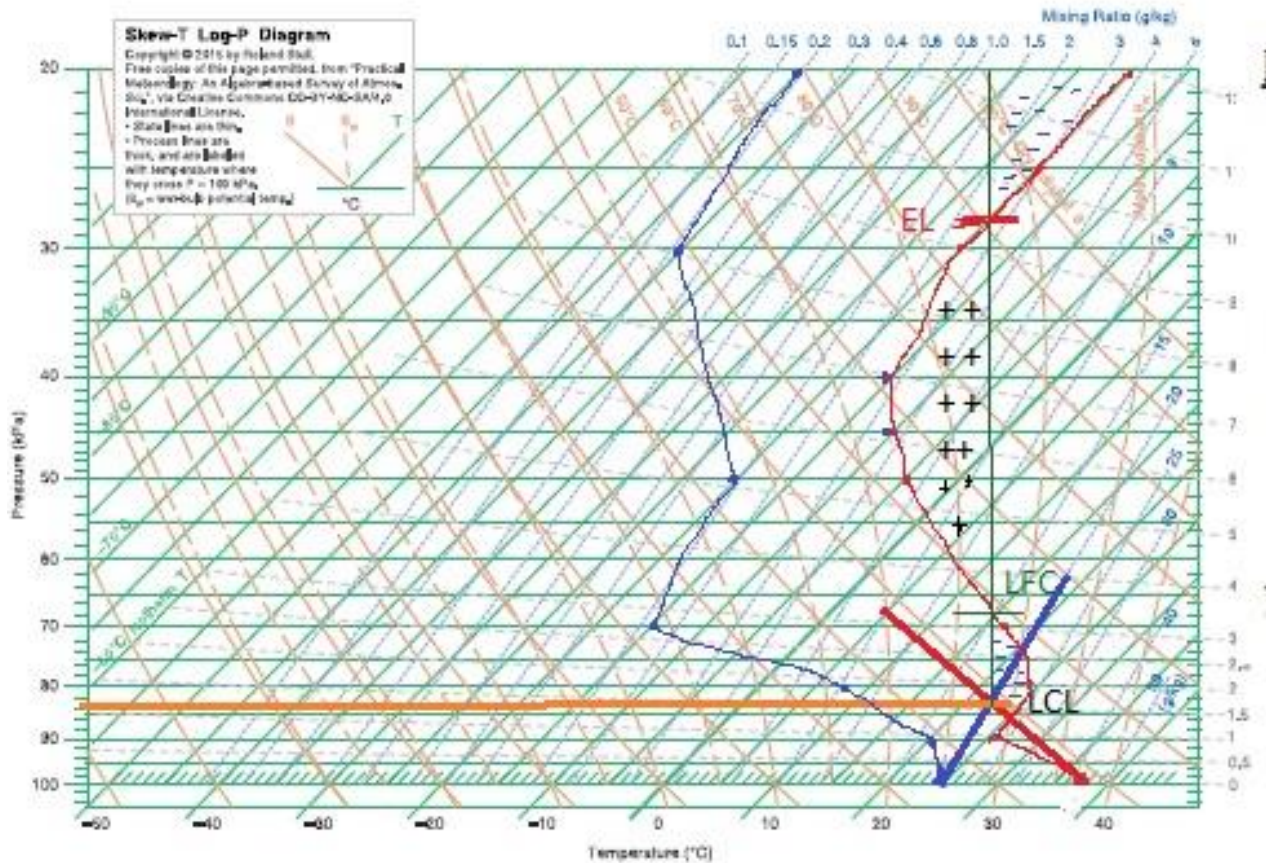
Layer	Delta z	gravity	Temp Quotient*	Layer CAPE**
1	1500 m	9.8 m s-2		
2	1500 m	9.8 m s-2		
3	1500 m	9.8 m s-2		
4	1500 m	9.8 m s-2		
5	1500 m	9.8 m s-2		
6	1500 m	9.8 m s-2		
			Total CAPE***	

Table 2: Computational Results (from Equation 1 and Table 1)

Should really be Layer Average Quotient but what we will simply use is the values from Table 1

$$\text{Layer Cape} = \text{Layer Average Quotient} \times \text{gravity} \times (\Delta z) \dots (2)$$

Total CAPE = the summation of Layer Cape.



From chart above calculate CAPE and discuss the result.

Note:

Pressure	Elevation
700	3000m
600	4500m
500	6000m
400	7500m
300	9000m
250	10500m