**Documentation for the SBI( SEA BREEZE INDEX) and Air Density**

The Formula to calculate the Sea Breeze Index according to the Simpson and Walsh is

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Where *U* is the cross-coast component of the synoptic wind with offshore winds taken as positive. The SBI represents the ratio of synoptic wind kinetic energy to thermal gradient potential energy.Values of SBI that are above some critical value (SBIcrit) typically indicate situations in which synoptic airflow blocks sea breezes; values below (SBIcrit) typically indicate conditions conducive to sea breezes.

Δ*T* = *T*air − *T*sea is the difference in temperature between the ocean surface and the overland air.

After taking reference from the Bernouli’s equation and modifications and calculations, equation can be modified as

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Where h represents the thickness of the air mass that exchanges heat with the surface

**Formula to calculate Air Density :**

Calculate the saturation vapor pressure at given temperature T using the formula

 Svp = 6.1078 \* 10^[7.5\*T /(T + 237.3)],

where T is measured in degrees Celsius. Saturation vapor pressure is the vapor pressure at 100% relative humidity.

Find the actual vapor pressure, multiplying the saturation vapor pressure by the relative humidity:

Actual(pv) = Svp \* RelH.

Subtract the vapor pressure from the total air pressure to find the pressure of dry air:

pd = p - pv

The formula to calculate the air density is given by

ρ = (pd / (Rd \* T)) + (pv / (Rv \* T))

where

pd is the pressure of dry air in Pa

pv is the water vapor pressure in Pa

T is the air temperature in Kelvins

Rd is the specific gas constant for dry air equal to 287.058 J/(kg·K), and

Rv is the specific gas constant for water vapor equal to 461.495 J/(kg·K)

After substituting the values in the equation we get

ρ = (pd / (287.058 T)) + (pv / (461.49 T))