

5. There is no connection between the horizontal wind field at 500 mb and relative humidity at 850 mb, however, there is a connection between 500 mb vertical motion (ω) and 850 mb relative humidity. For example, when comparing 500 mb horizontal wind field to the 850 mb relative humidity field, there are areas of high relative humidity in regions of both high wind speeds and low wind speeds. Looking at the month of July as an example, we can see that there is high relative humidity over India with high wind speeds, but over the Pacific Ocean just west of Central/South America, there is high relative humidity over a region of lower wind speeds. When vertical motion is taken into account (ω), we can see that in areas of negative ω , or upward motion, there are higher values of relative humidity. This is due to air parcels rising and condensing, forming clouds. In areas of positive ω , or downward motion, there are lower values of relative humidity.

6. Sensible and latent heat are related inversely to each other along with latent heat being proportional to relative humidity and negative ω . For example, in Australia, there is almost 0 ω and a low relative humidity value, which leads to a high sensible heat flux and a low latent heat flux. In Brazil, there is negative ω (upward motion), which leads to a high latent heat flux and a low sensible heat flux. In Japan, there is positive ω (downward motion), which leads to a low relative humidity, a moderate latent heat flux, and a high sensible heat flux. These relations are expected. We know that in areas with clear skies, we can expect a higher sensible heat flux, and lower latent heat flux, due to shortwave radiation hitting the surface and being absorbed due to the fact that there are no clouds (high 850 mb relative humidity). We also expect there to be a high latent heat flux and a low sensible heat flux in areas where there are high values of 850 mb relative humidity. The low sensible heat flux is due to shortwave radiation being reflected back into the atmosphere by cloud cover and the high latent heat flux is due to condensation from cloud formation.