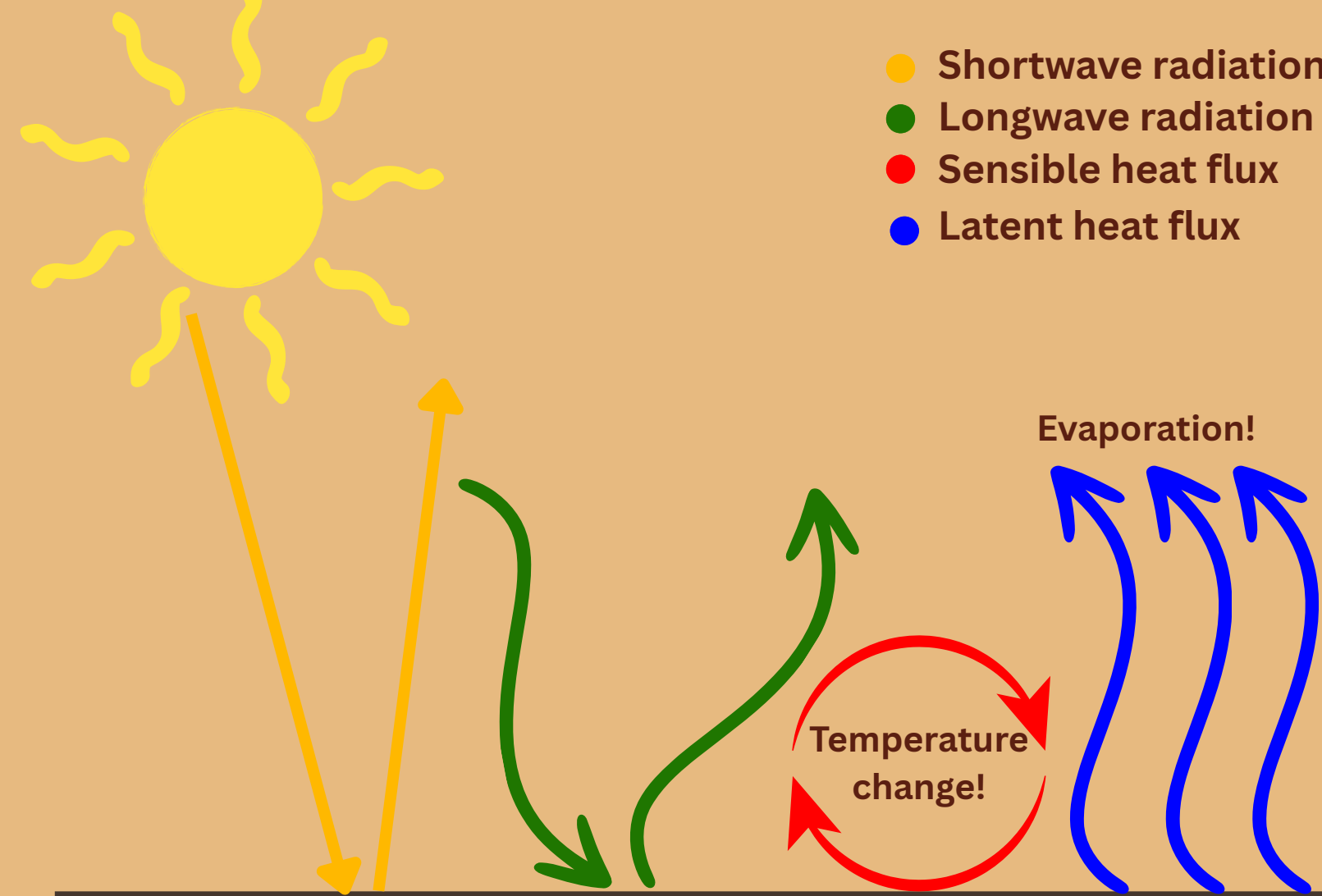


The Sahel is a climate vulnerable region that lies under the Sahara.



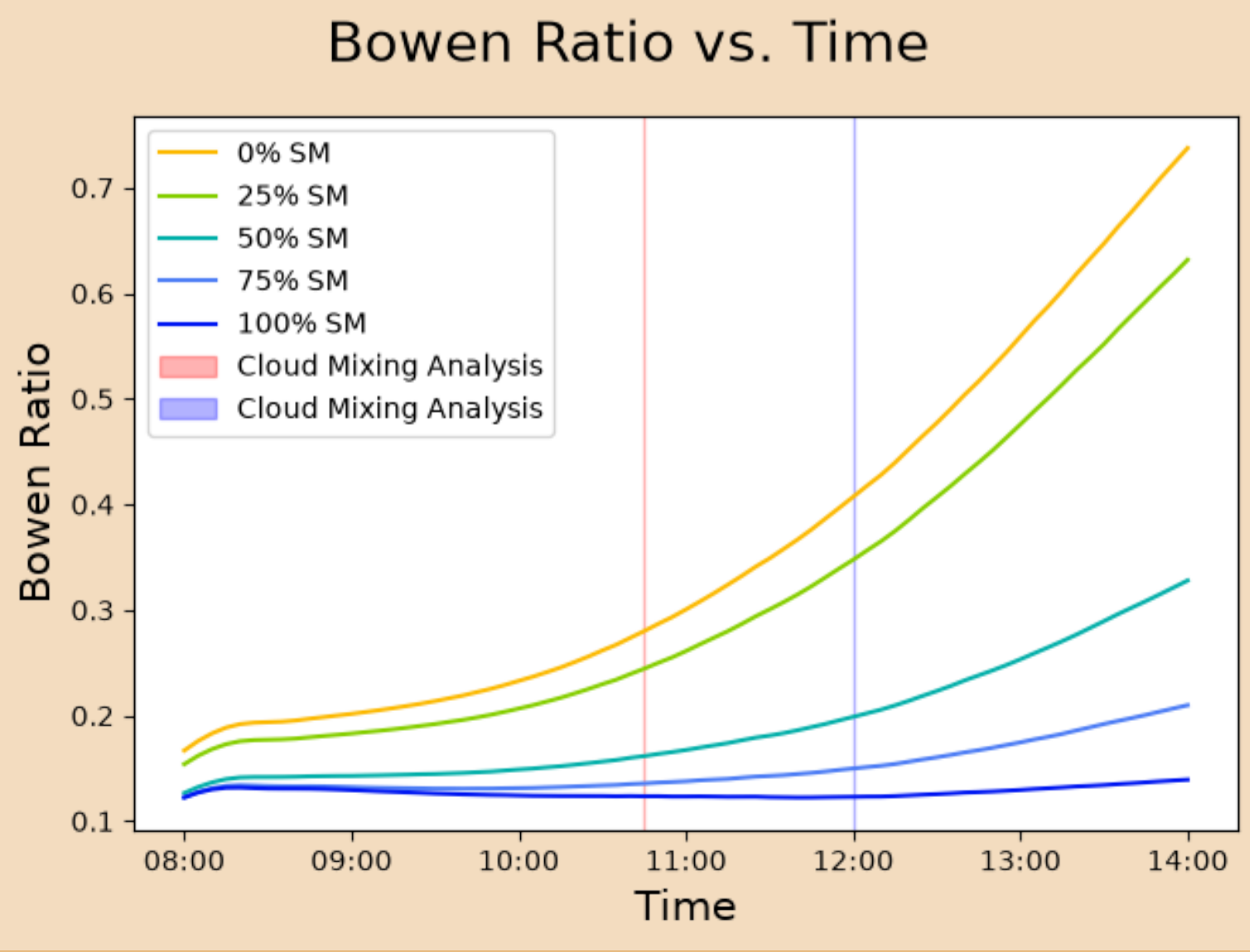
We are interested in the development of cloud streets in this area and how pre-existing soil moisture (SM) affects them.



To investigate this, we are using five simulations with different soil moisture levels.

We used the Regional Atmospheric Modeling System (RAMS; $dx=100m$) to model the surface energy budget and cloud development.

How does the Bowen Ratio change with SM?



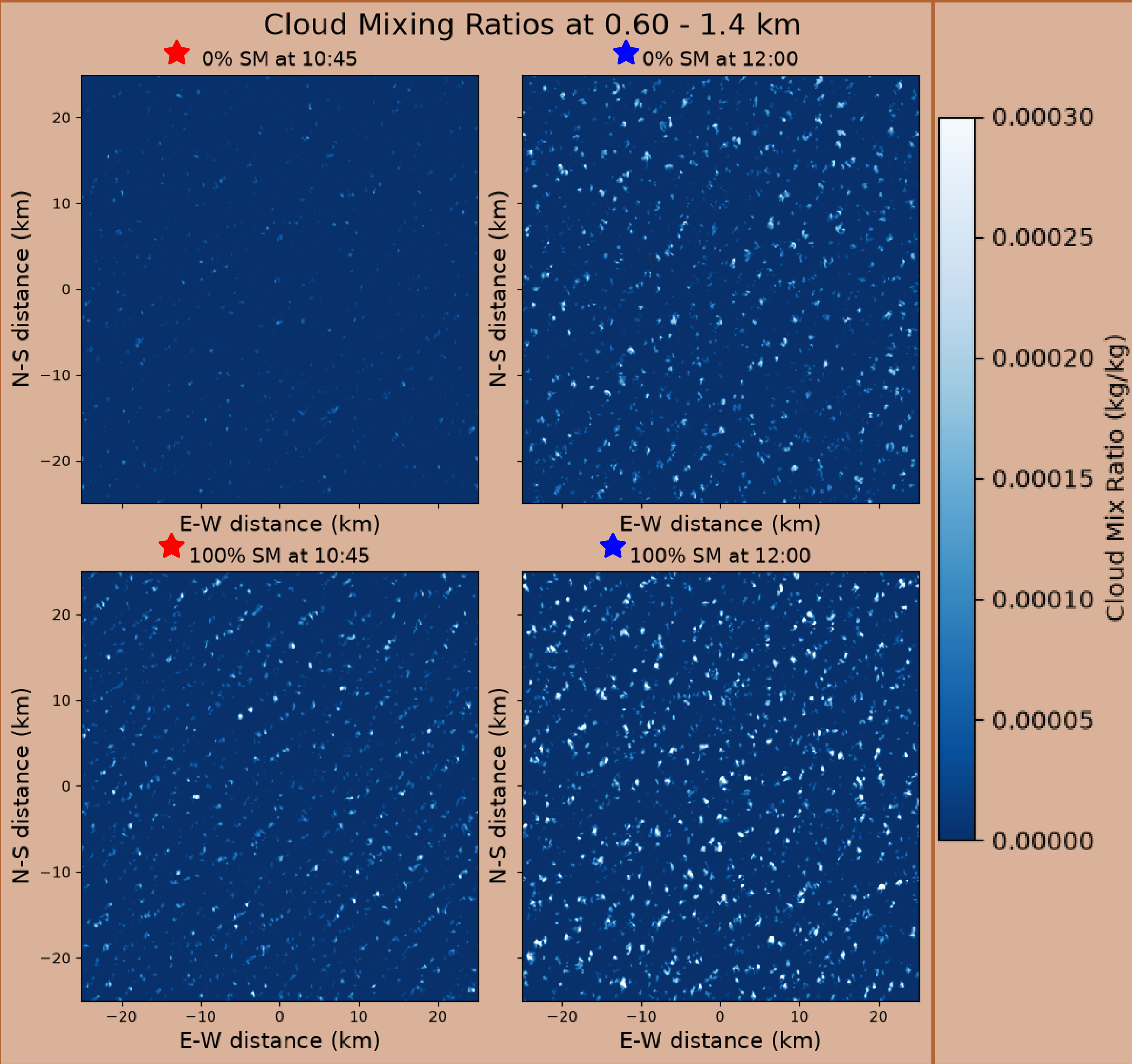
The two variables we are looking at are sensible and latent heat fluxes which make up the Bowen Ratio (BR; $\beta = SHF/LHF$). *The Bowen Ratio decreases as we look at moister soils.*

Word on the Streets: Soil moisture impacts on cloud streets over the Sahel

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Higher soil moisture levels show cloud formation early in the day when convective rolls are favored. However, as the day progresses the cloud streets become cellular.

Decreasing soil moisture makes clouds form later in the day and in cellular formation as opposed to starting as cloud streets.

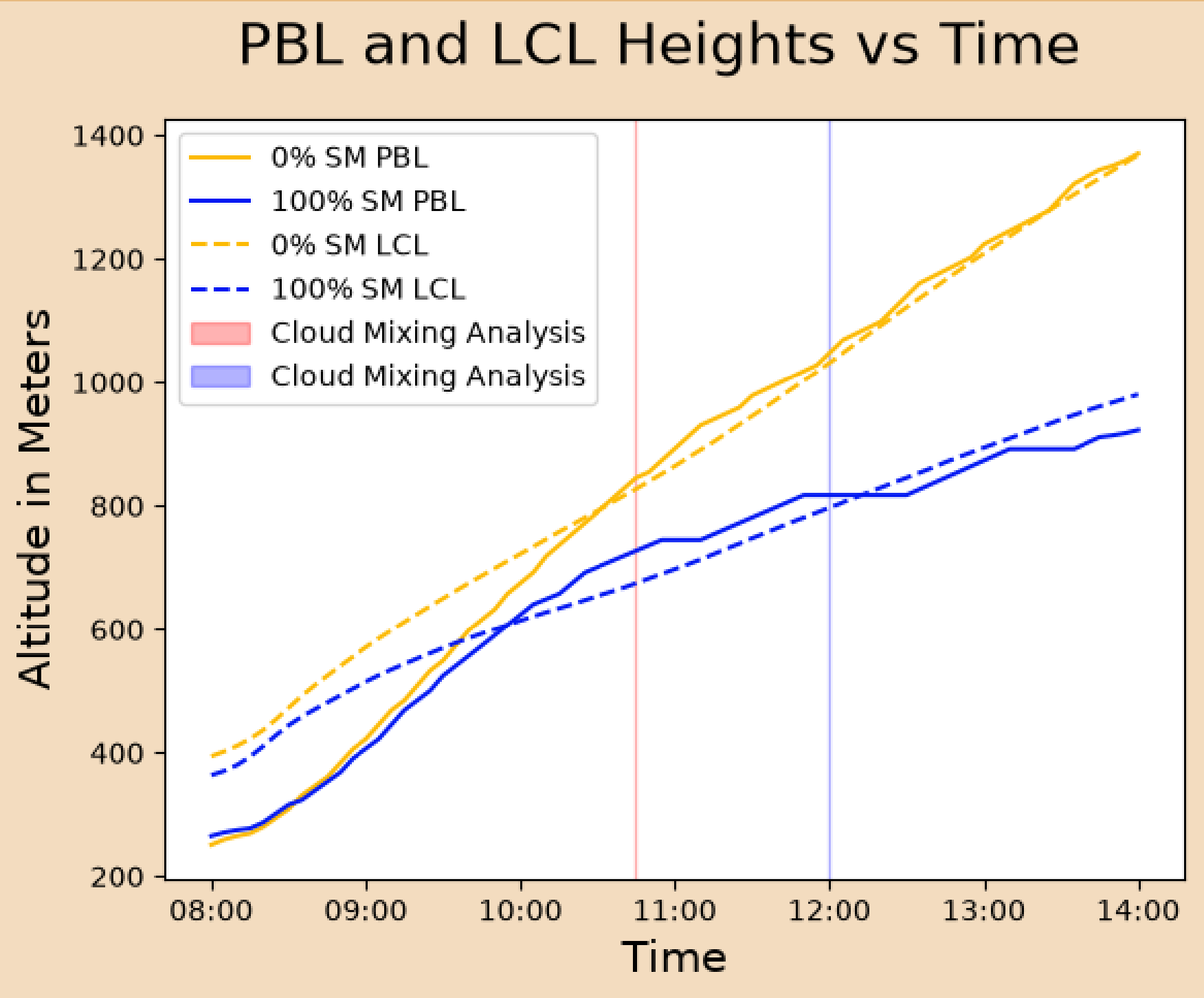


FUTURE QUESTIONS:

How does pre-existing soil moisture affect precipitation?

Do these cloud streets tell us anything about when and where rain will fall?

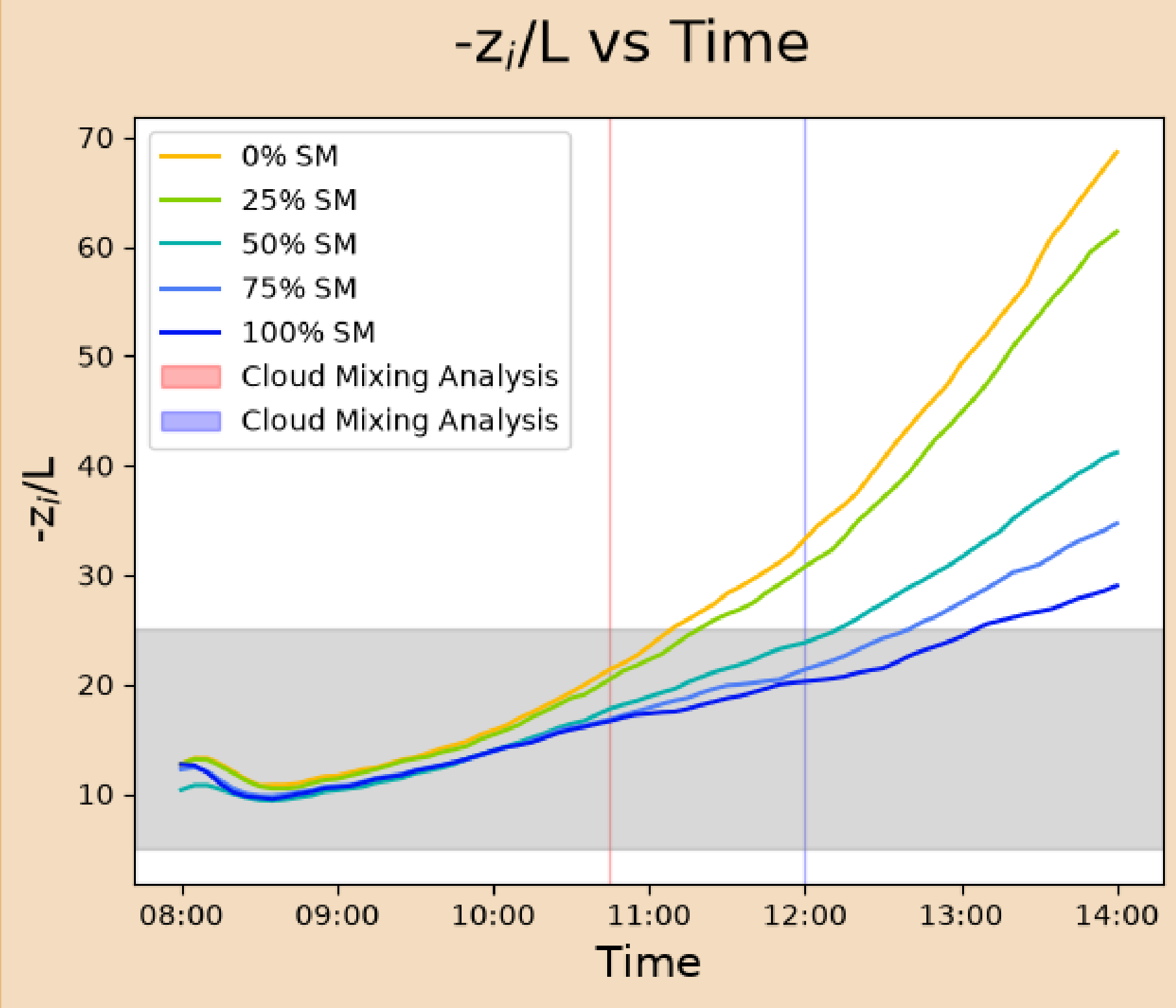
How does the BR affect the boundary layer and lifting condensation level?



For clouds to form, we need the LCL to be close to or less than the PBL. The higher the BR, the higher the PBL and LCL are.

Clouds form later in the lower SM run than the higher SM run.

How do we know we’re looking at cloud streets?



By taking the negative value of the PBL (z) and dividing it by the Monin-Obukhov Length (L), we get the roll threshold parameter. The PBL favors convective rolls and the formation of cloud streets if the values are between 5 and 25. (Weckwerth et al. 1999)

The higher SM run spends more time in the region where cloud streets are favored than the lower SM run.

