Aerosol Indirect Effect on Rainfall at SGP Site

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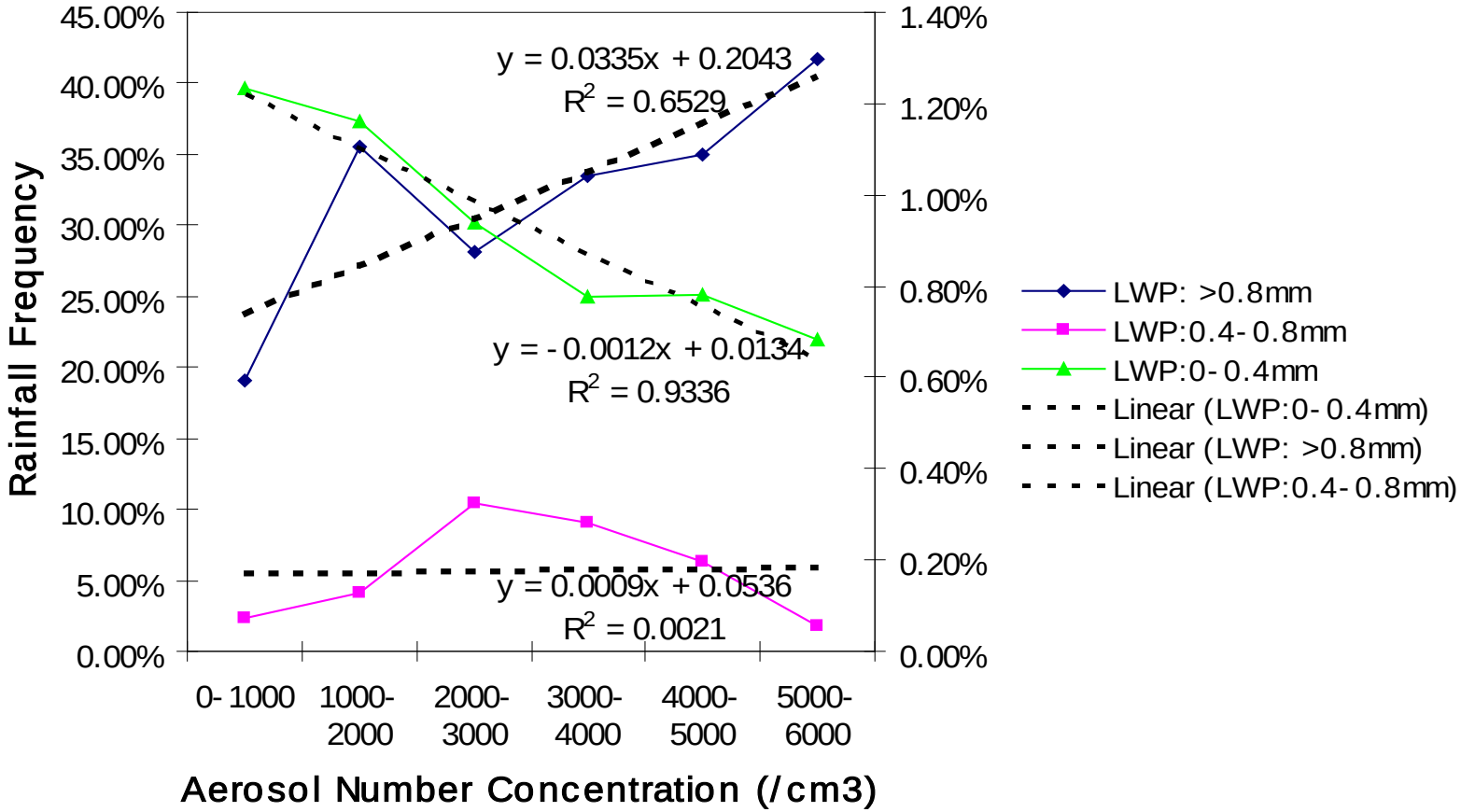
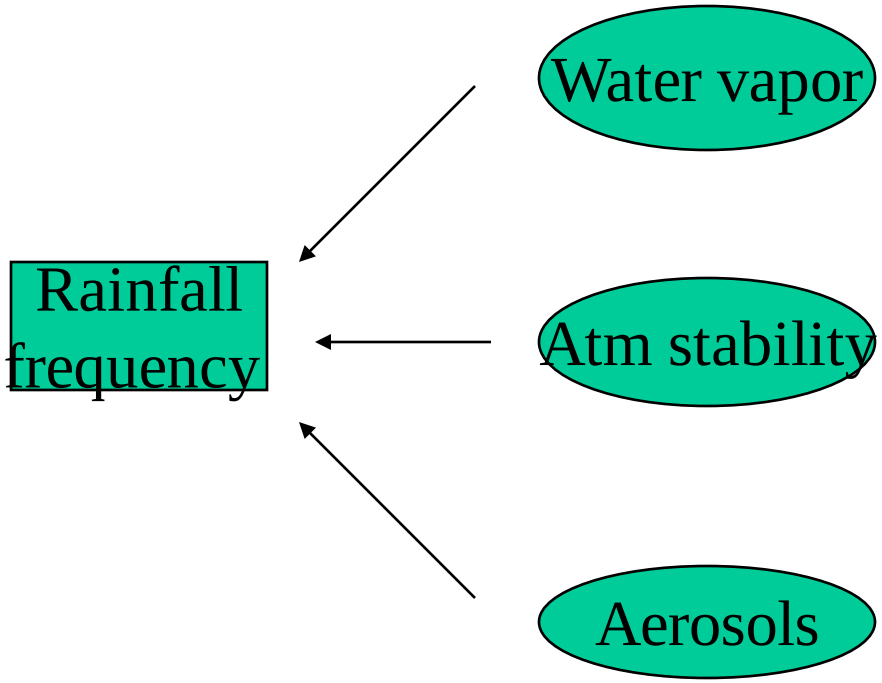
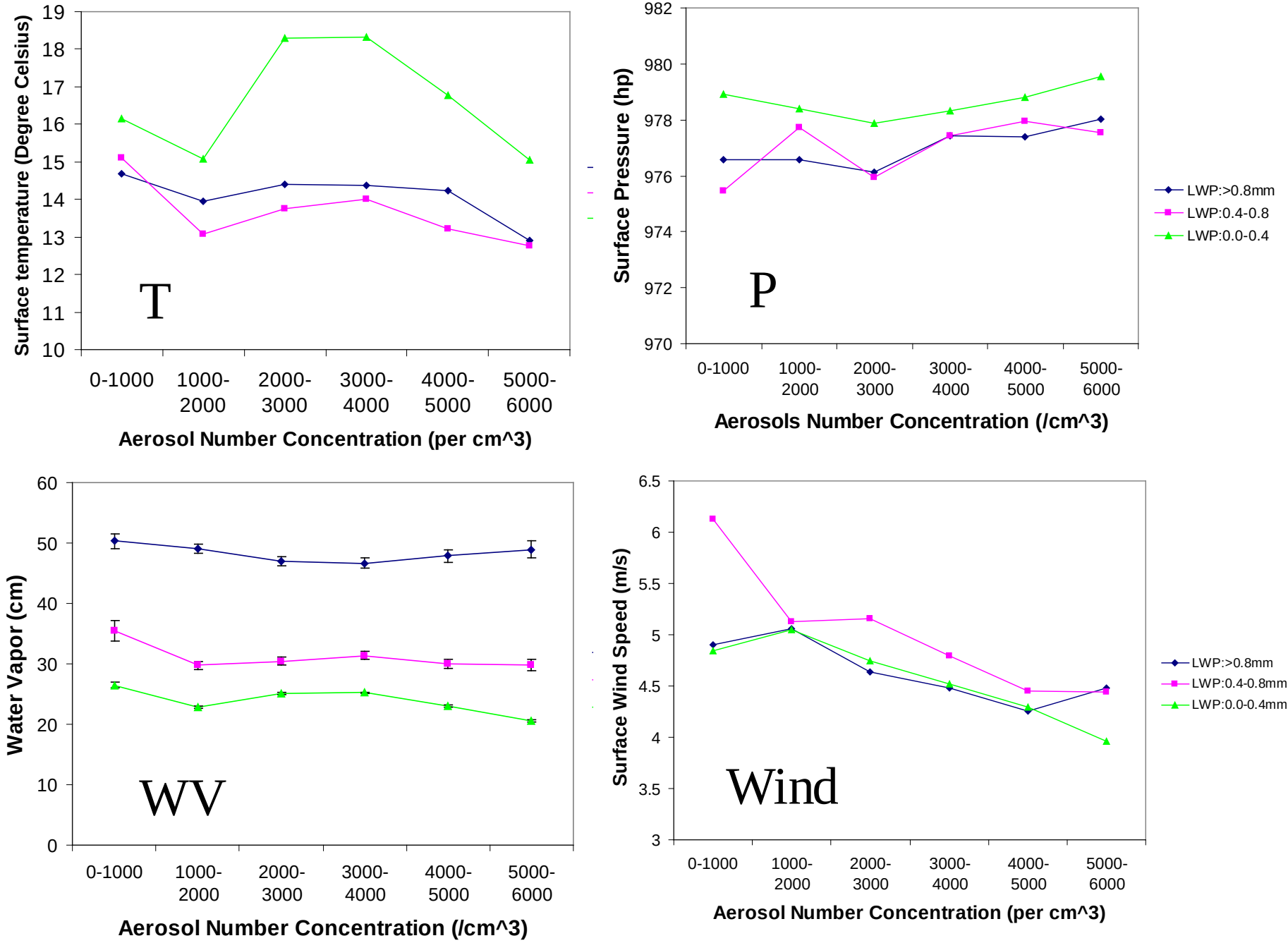
Rainfall Frequency



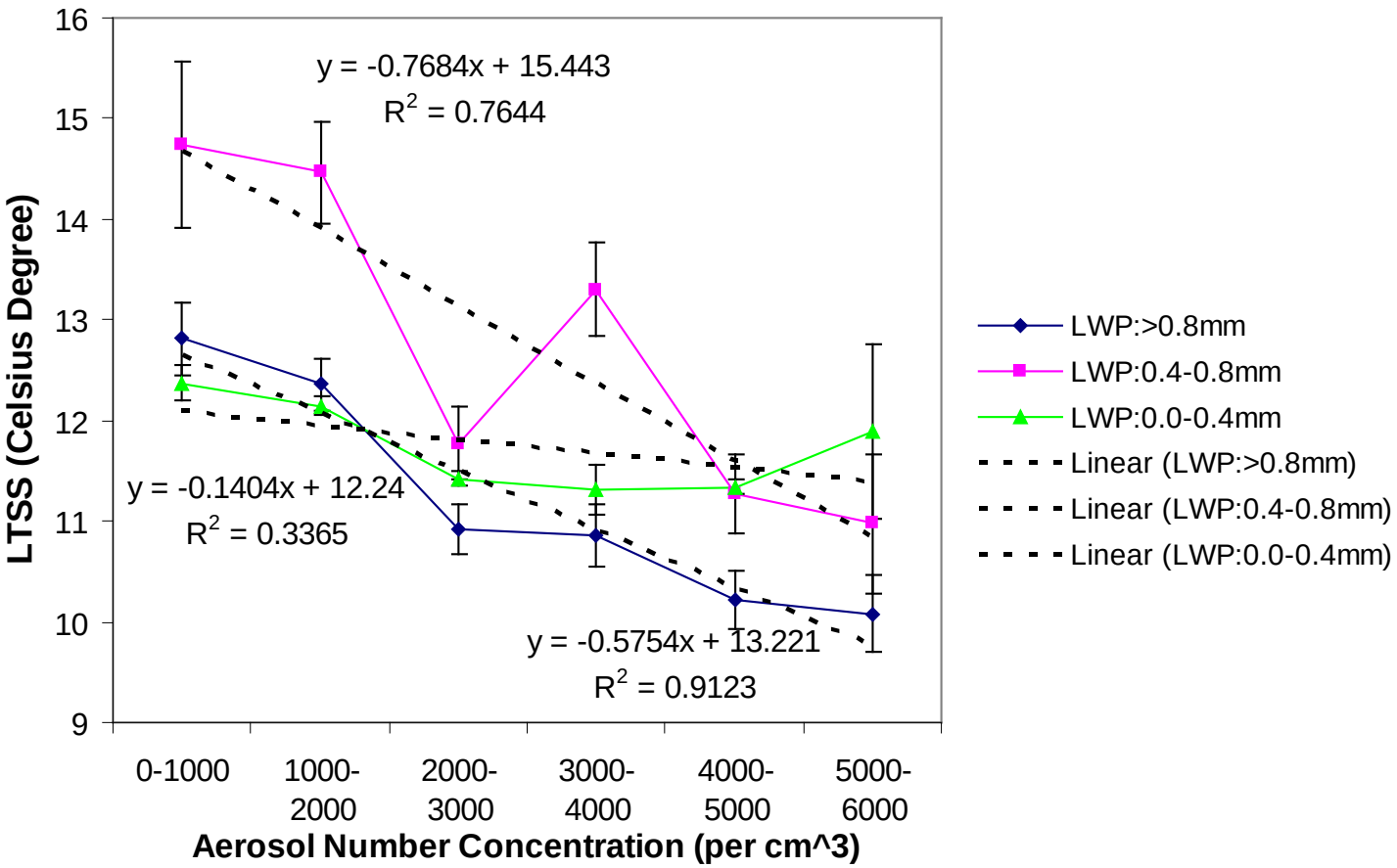
Main Factors Affecting Rainfall



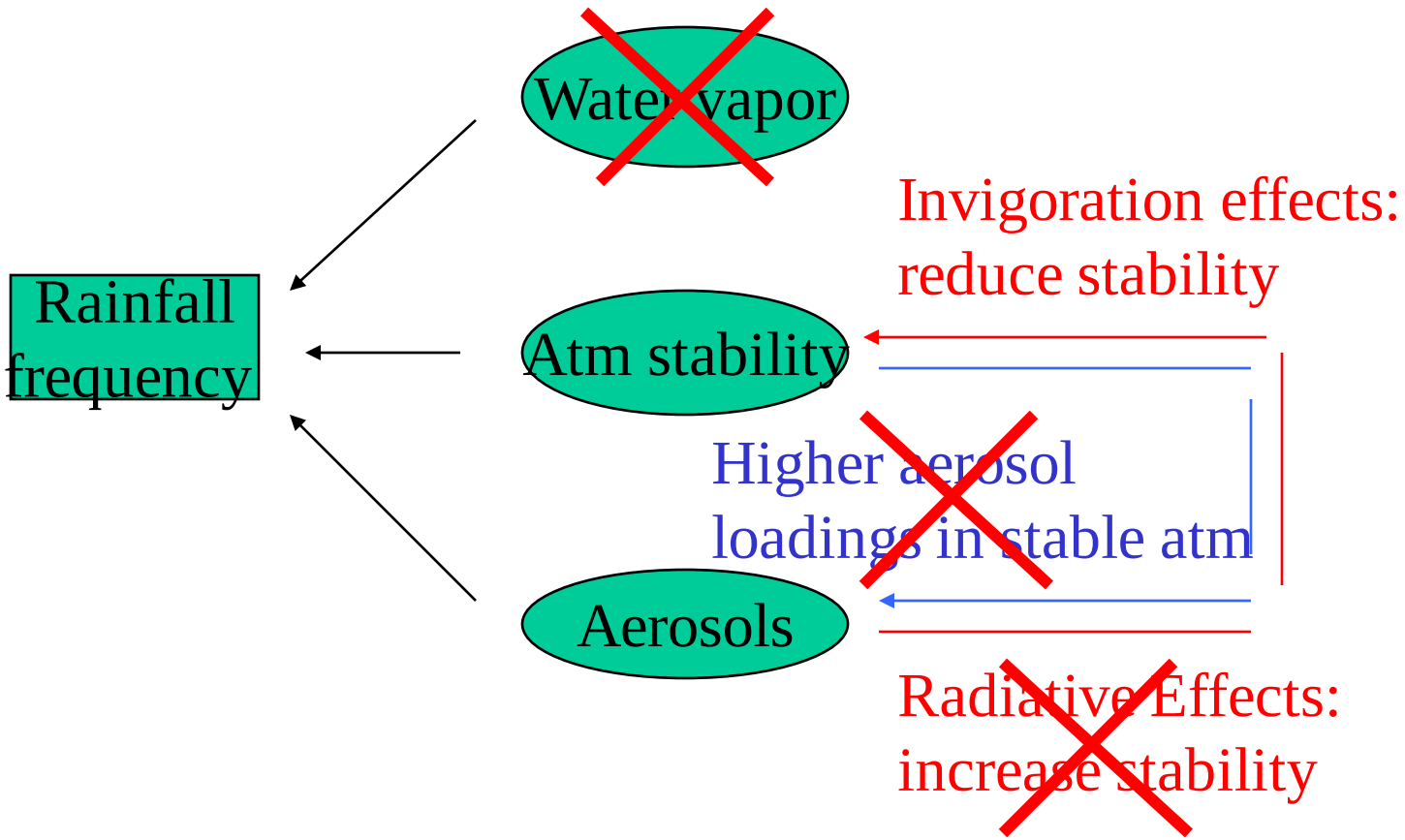

T
Surface temperature (Degree Celsius)
19
18
17
16
15
14
13
12
11
10
0-1000
1000-2000
2000-3000
3000-4000
4000-5000
5000-6000
Aerosol Number Concentration (per cm^3)
P
Surface Pressure (hp)
982
980
978
976
974
972
970
Aerosols Number Concentration (/cm^3)
LWP:>0.8mm
LWP:0.4-0.8
LWP:0.0-0.4
WV
Water Vapor (cm)
60
50
40
30
20
10
0
Aerosol Number Concentration (/cm^3)
Wind
Surface Wind Speed (m/s)
6.5
6
5.5
5
4.5
4
3.5
3
Aerosol Number Concentration (per cm^3)
LWP:>0.8mm
LWP:0.4-0.8mm
LWP:0.0-0.4mm

Lower Tropospheric Static Stability (LTSS)

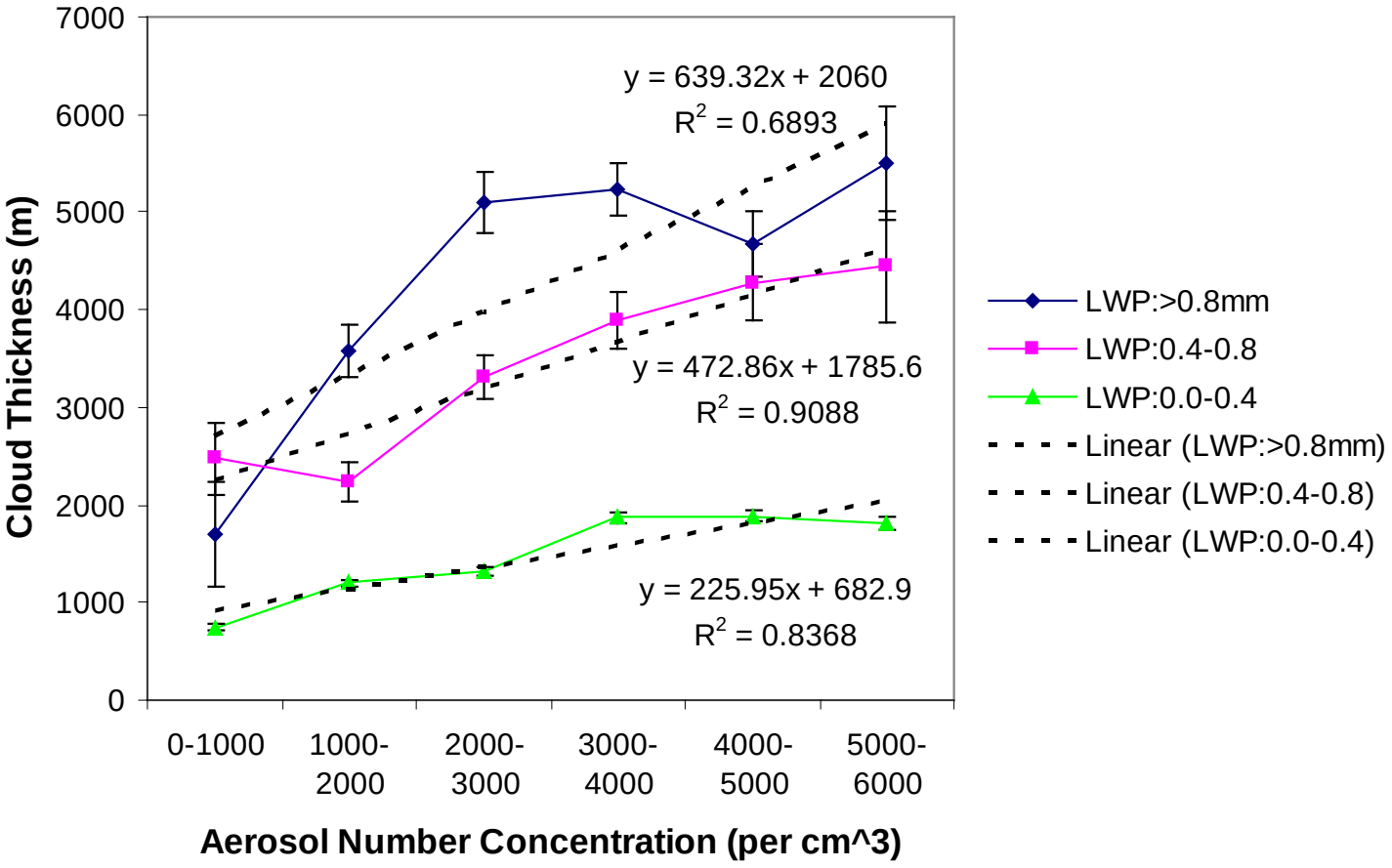
More unstable



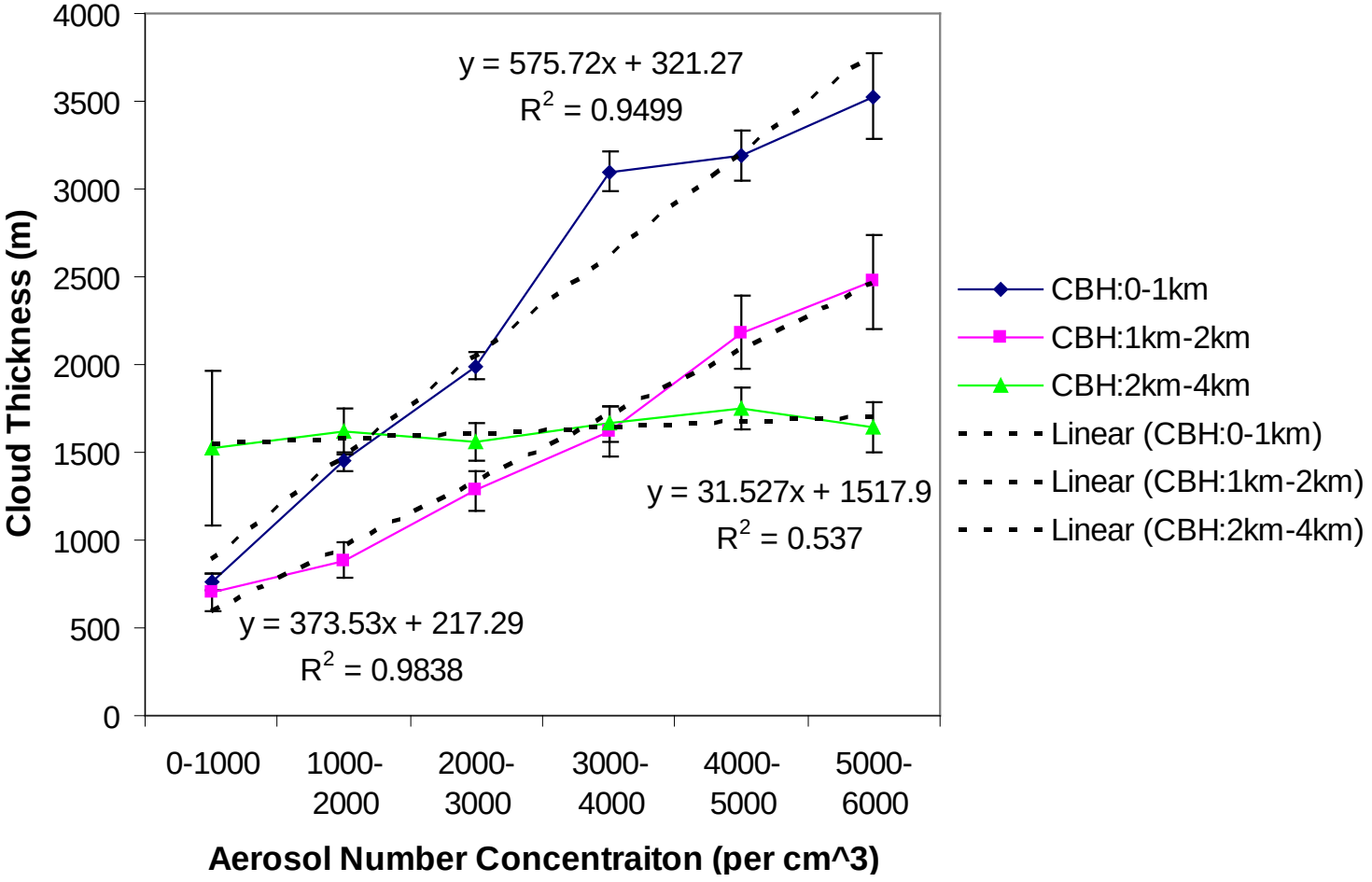
Stability and Aerosols



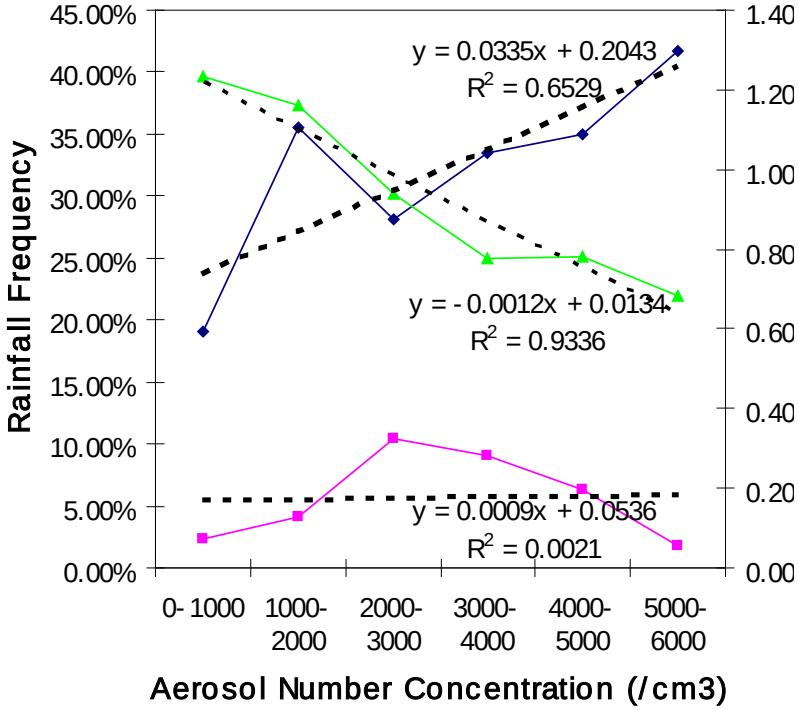
Cloud Thickness

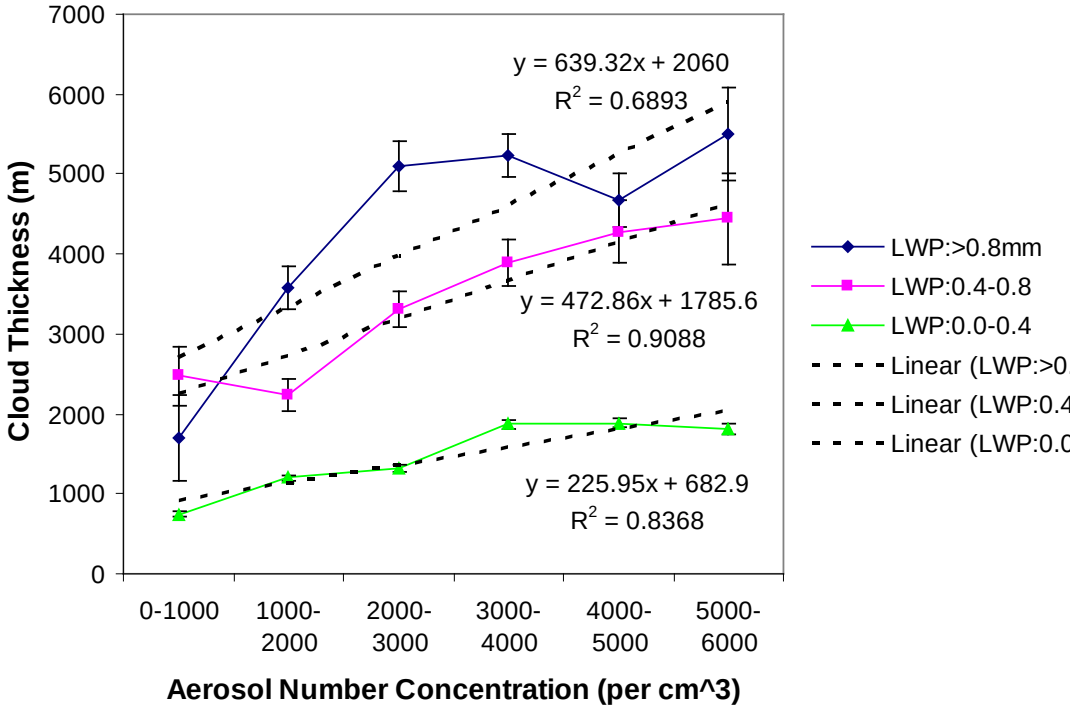


Cloud Thickness for Different CBH

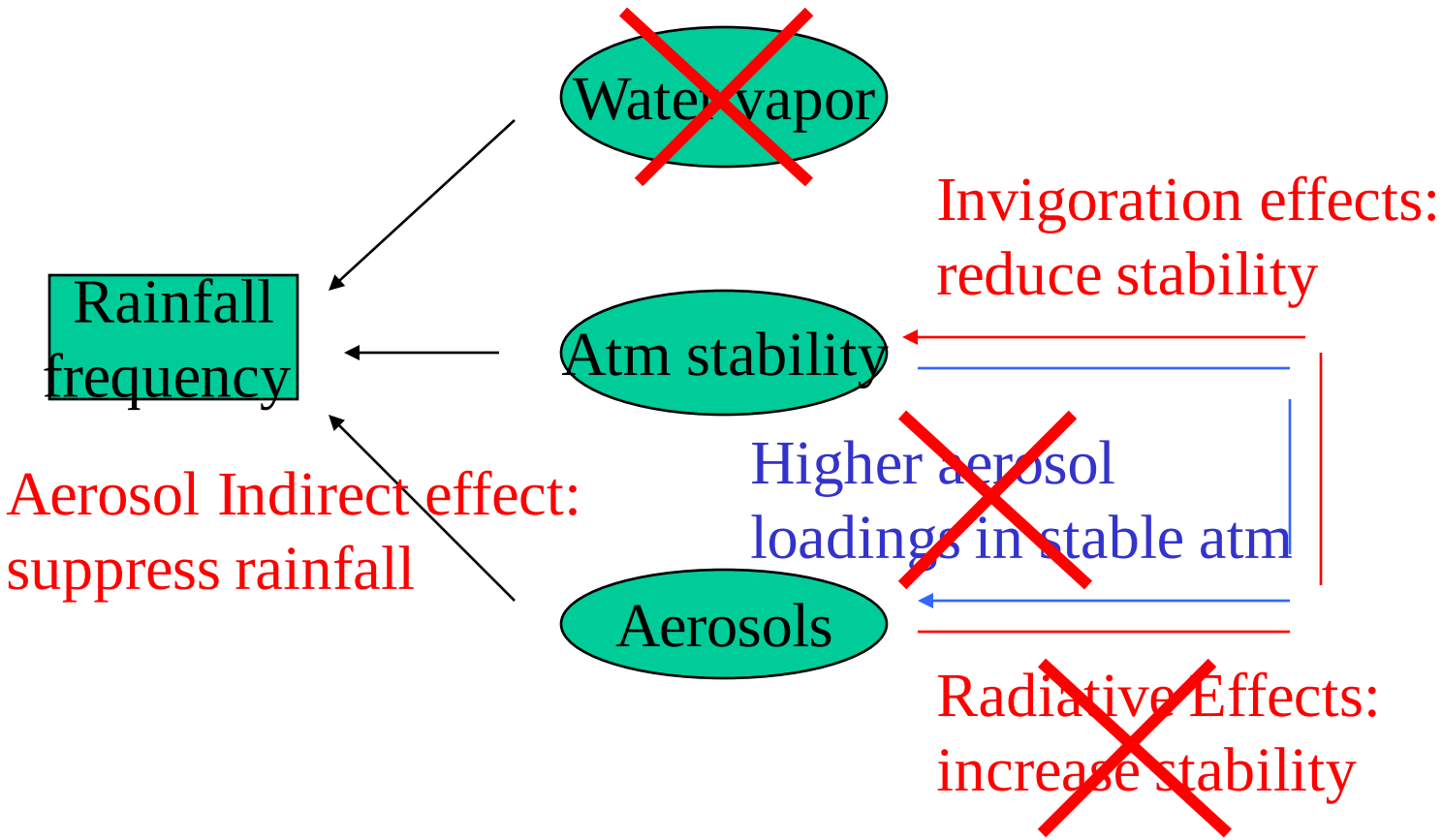


Another Effect?

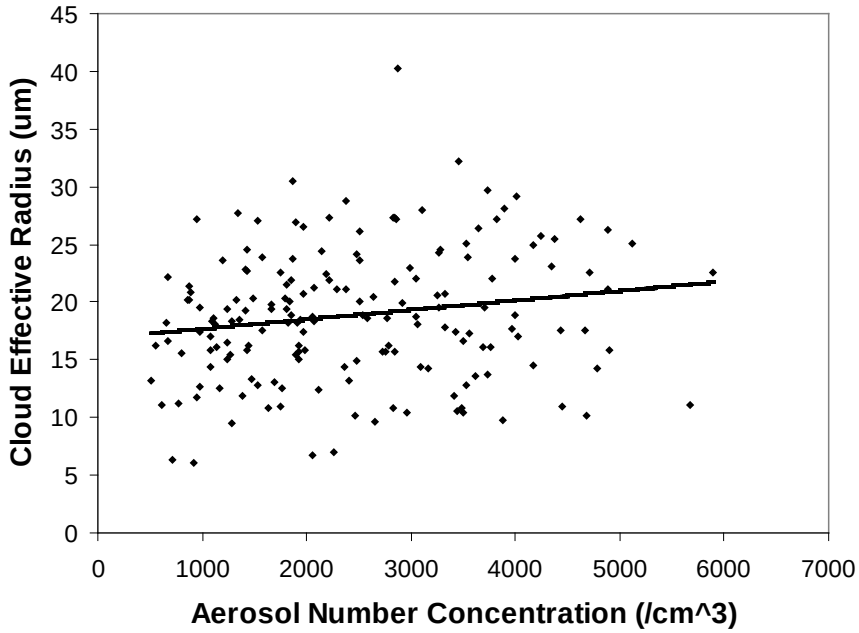




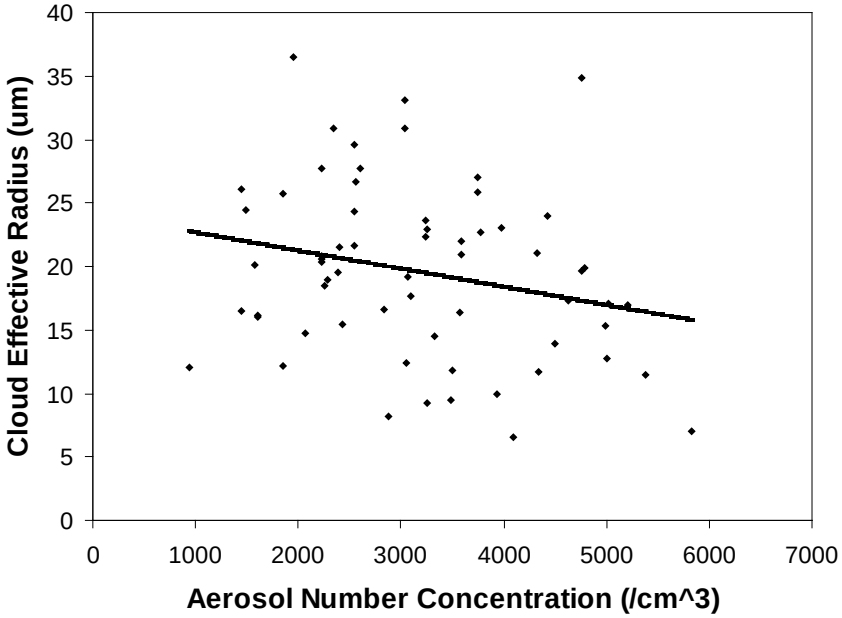
Invigoration Vs Suppression



Co-location with MODIS retrieval



Lower base clouds
(CBH<1km)



Higher base clouds
(CBH>1km,<4km)

Conclusion

- Two effects are identified to be able to explain the relationship between the rainfall frequency and aerosol number concentration.

- These two effects compete with each other, and the cloud base height is a factor determining the relative strength of these two effects.