



ILMATIETEEN LAITOS  
METEOROLOGISKA INSTITUTET  
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# Pre-convective environment

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Motivation – to understand forecaster perspective

## **What is the forecaster looking for in the storm environment to forecast**

- Thunderstorms
- Different type of severe thunderstorms (different severe weather)
- **Could satellite products help to forecaster in these questions?**



# Thunderstorm coverage

## • Instability

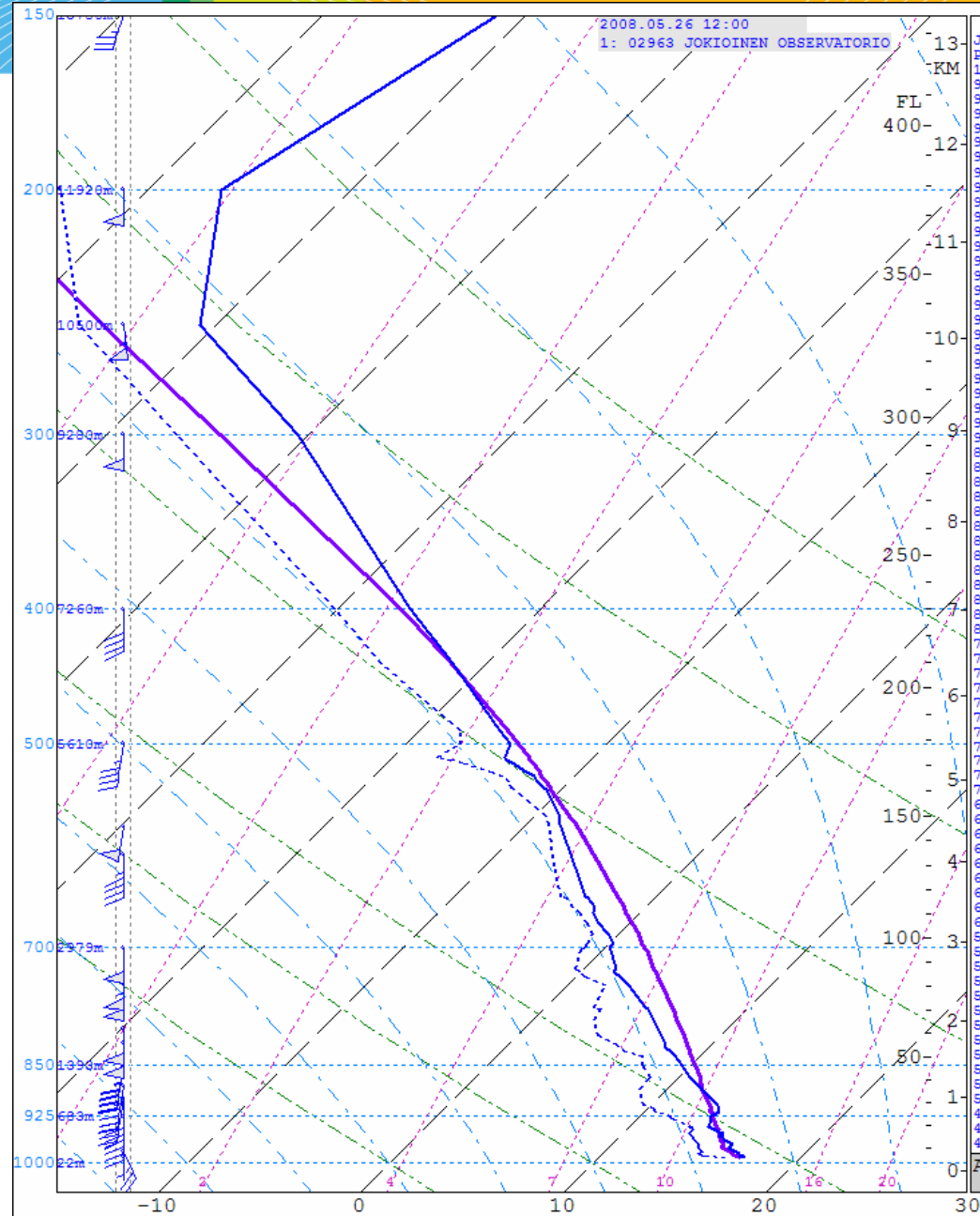
- Throughout the storm depth (storm top height, CAPE)
- Most important in storm low and mid-levels
- Low levels (0-3 km), stronger low level updrafts , tornadoes
- Mid-levels (500-700 hPa)
- High levels (-10...-40 C) lightning intensity

## • Moisture

- Low levels (needed for storm occurrence, 0-1,5 km, CAPE)
- Throughout the storm
  - Moist low and mid-levels, heavy precipitation
  - Dry layers, entrainment, downburst potential

## • Lift

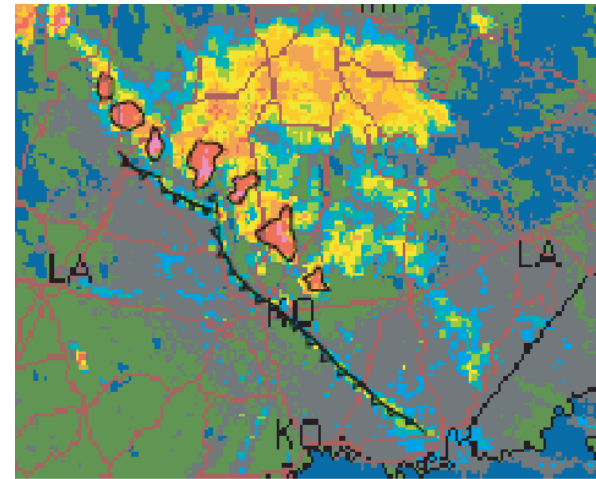
## • Inversion layers at low levels (CIN, convective inhibition)





# Lift mechanisms

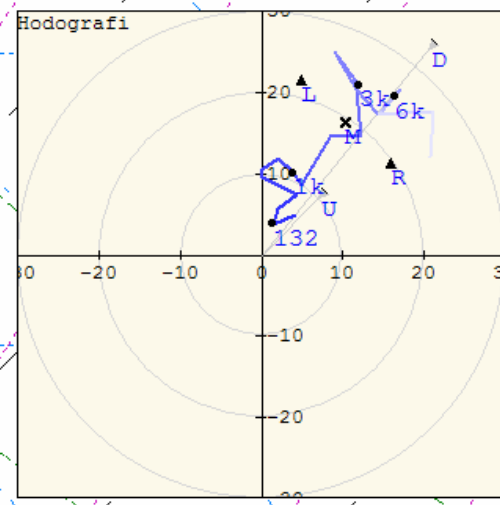
- **Diurnal heating, upslope flow, fronts**
- **Surface boundaries**
  - Outflow boundaries
  - Sea and lake breeze boundaries
  - Convergence zones
  - Moisture gradients
  - Differential heating do to cloud cover



Can we observe the cold pool?

Vertical wind profile  
• storm type (0-6 km bulk shear; single cell, multicell, supercell)  
• storm movement

Can we observe low-level jet?  
Or mid-level jet?



FL  
400-  
12-  
11-  
50-  
10-  
9-  
8-  
50-  
7-  
200-  
150-  
100-  
50-  
1-  
0-  
-- Surface --  
LCL=839  
LFC=839  
EL=250  
CAPE=987  
0-3kmCAPE=227  
-10-40CAPE=561  
CIN=0  
-- 500m mix --  
LCL=836  
LFC=836  
EL=300  
CAPE=185  
0-3kmCAPE=11  
-10-40CAPE=120  
CIN=0  
-- Most unstable  
LCL=839  
LFC=839  
EL=250  
CAPE=987  
-10-40CAPE=561  
CIN=0  
0-6km BS=21.7  
0-1km BS=6.8  
0-3km SRH=205.3  
0-1km SRH=110.9  
L-motion=193/22.1  
MeanWind=212/19.4  
R-motion=235/19.4  
WS1500m=13.4  
0-3kmThetaE=11.3

