Primjeri analize i prognoze vremena u zrakoplovnoj meteorologiji

Meteorološki praktikum

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Hrvatska kontrola zračne plovidbe
svibanj 2020.,Zagreb

Sadržaj

1. Zrakoplovna meteorologija

2. Analiza i dijagnoza vremena
   primjer pregled trenutne situacije

3. Primjeri - konvekcija

1 Zrakoplovna meteorologija

Tko smo i što radimo (koje područje pokrivamo i tko su nam korisnici)

Koje met elemente dijagnosticiramo i prognoziramo

Koje produkte izrađujemo

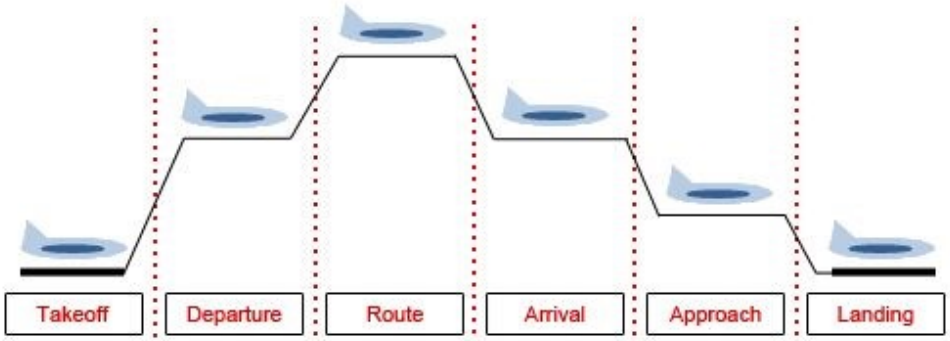
Koje podatke koristimo

Zrakoplovna meteorologija

Grana primjenjene meteorologije

-dio prometne

Zrakoplovi (i druge letjelice) lete u atmosferi, pružamo podatke o stanju atmosfere



CROATIA CONTROL

Zračni promet u Hrvatskoj

9 zračnih luka + pristaništa : promet 10mil./god

- Zagreb, Split ~3mil putnika,
- Dubrovnik, Zadar, Pula, Rijeka, Osijek, Brač, Lošinj

Bitno - preleti iznad Hrvatske

Nacionalni zračni prijevoznik - Croatia airlines

Zračni promet

https://www.flightradar24.com/45.17,15.5/7

Zračni promet

https://www.flightradar24.com

Zrakoplovna meteorologija HKZP

Hrvatska kontrola zračne plovidbe

MET- HKZP

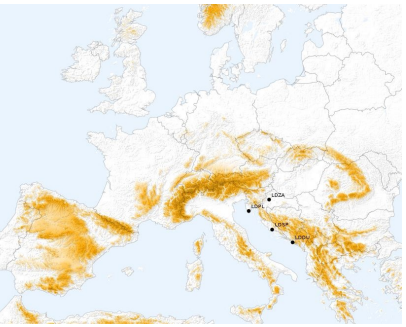
- mjerenja, prognoze i upozorenja

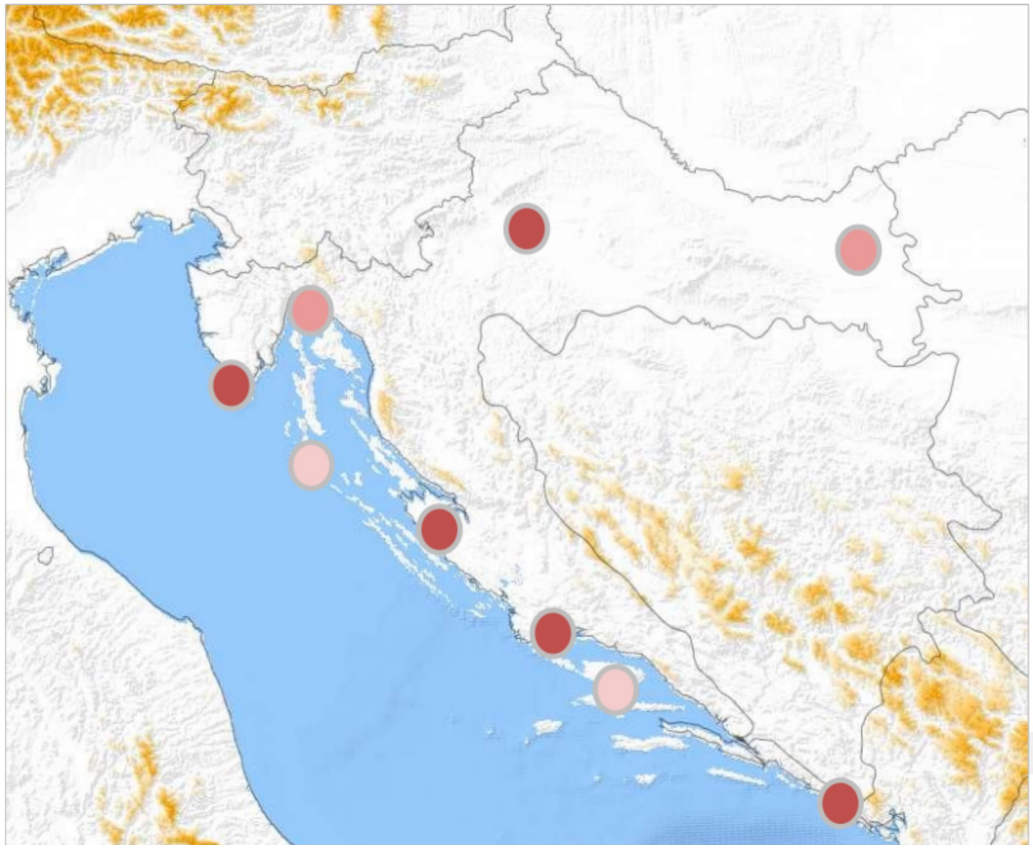
Najznačajnije su meteorološke pojave opasne za zrakoplovstvo:

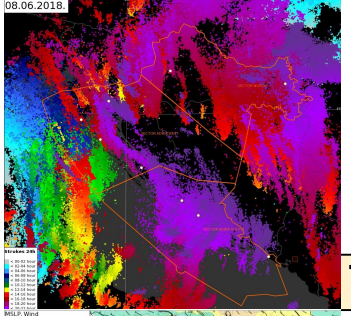
- jak vjetar, turbulencija, smicanje vjetra, planinski valovi
- zaleđivanje zrakoplova
- smanjena vidljivost
- grmljavinska oluja

CROATIA CONTROL

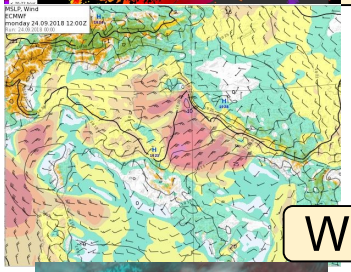
ZM - Hrvatska glavne teme



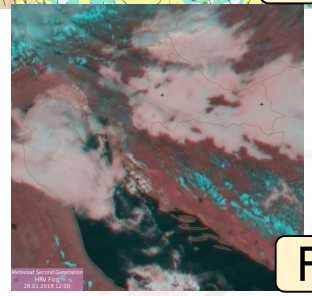




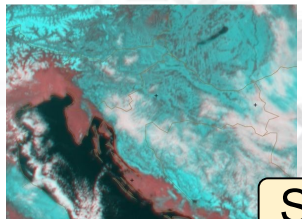
TS



Wind

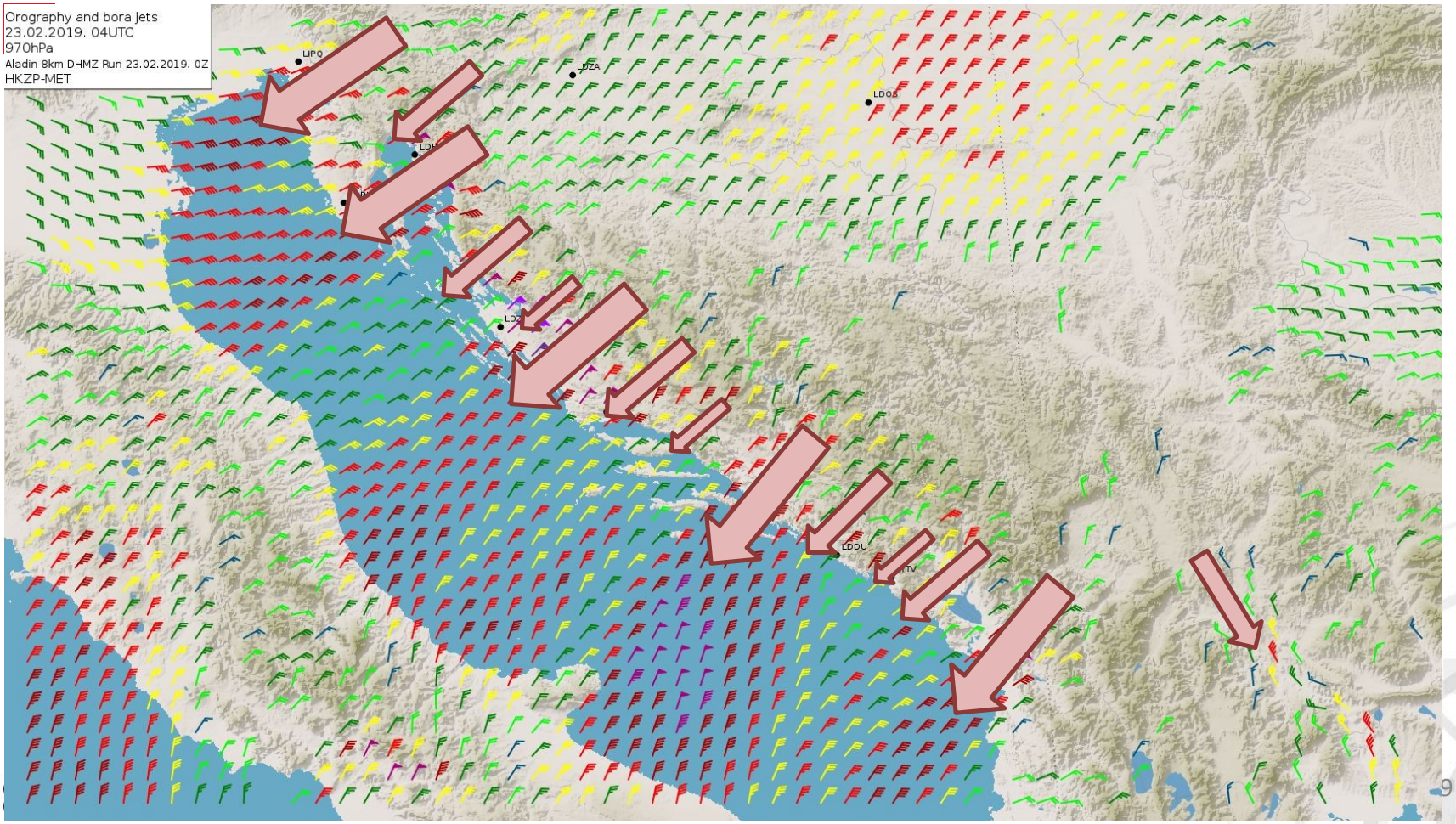


Fog

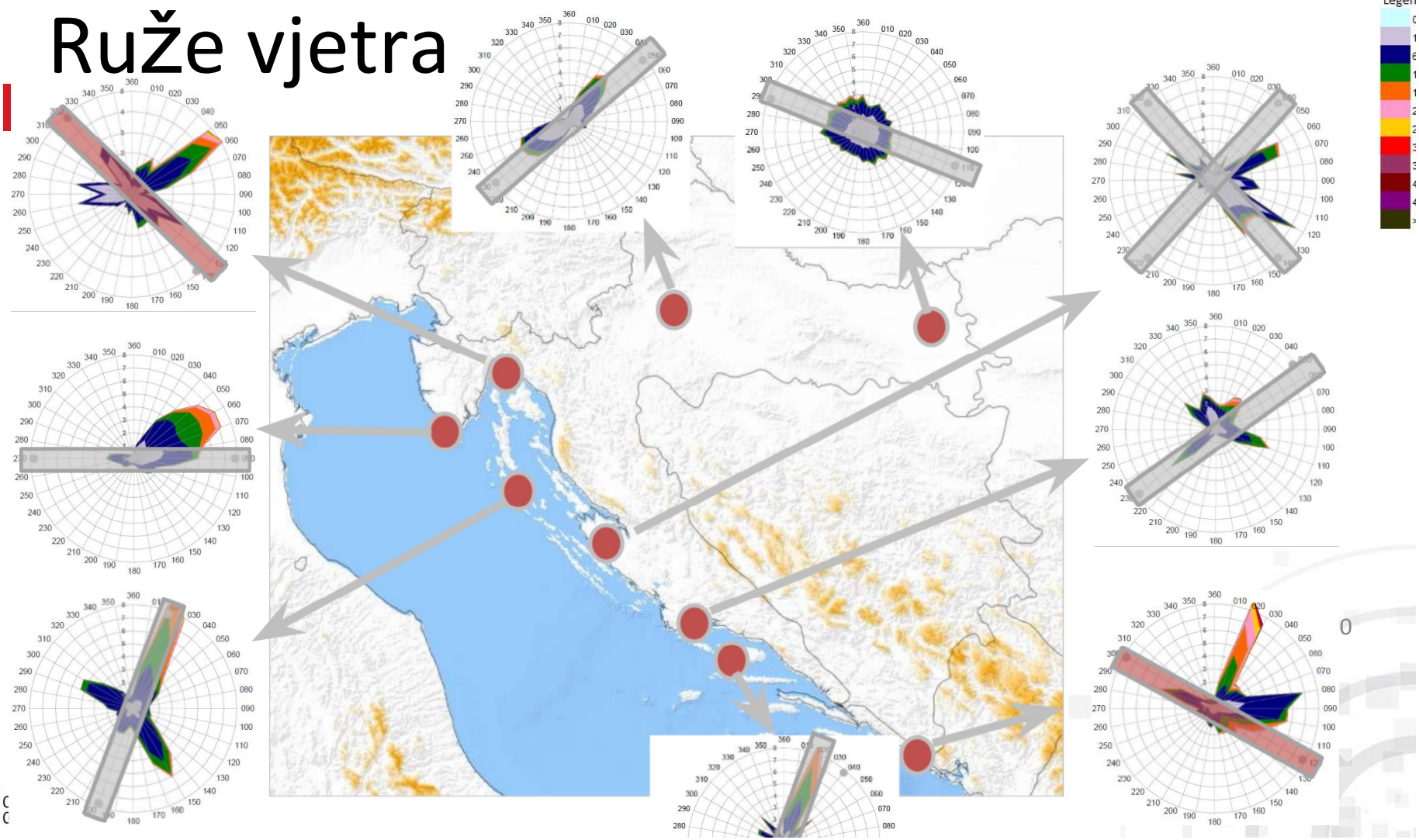


Snow

CROATIA CONTROL


Orography and bora jets
23.02.2019. 04UTC
970hPa
Aladin 8km DHMZ Run 23.02.2019. 0Z
HKZP-MET
LIPQ
LDZA
LDOS
LDDU

Ruže vjetra



MET HKZP - produkti

METAR

```
METAR LDZA 061230Z 03008KT 300V100 CAVOK 16/00 Q1019 NOSIG =
METAR LDSP 061230Z VRB03KT 9999 BKN060 13/07 Q1015 BECMG 23010KT=
METAR LDDU 061230Z 03025KT 320V090 9999 -RA SCT045 14/05 Q1013 BECMG 02015KT =
METAR LDZD 061230Z 34006KT 280V070 9999 FEW050 18/05 Q1015 BECMG 28008KT =
METAR LDPL 061230Z 10015KT CAVOK 19/03 Q1016 NOSIG=
METAR LDOS 061230Z 29013KT 260V330 9999 FEW047 14/02 Q1017=
METAR LDRI 061230Z 35013G28KT 300V050 CAVOK 19/04 Q1016=
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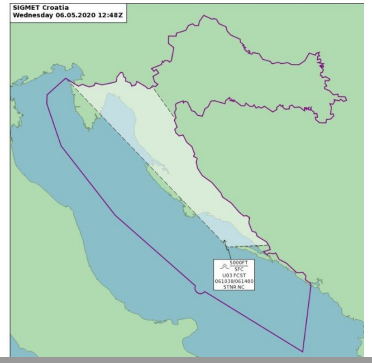
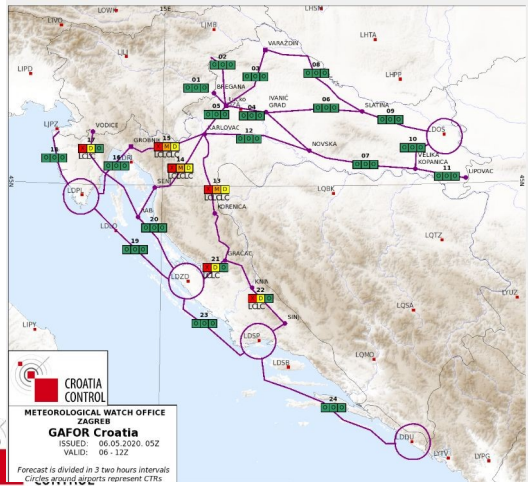
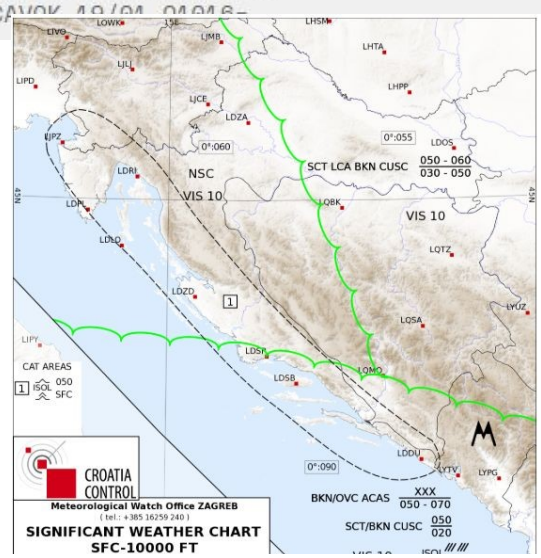






SIGMET Croatia

```
LDZO SIGMET U03 VALID 061030/061400 LDZA-
LDZO ZAGREB FIR SEV TURB FCST WI N4541 E01436 - N4526 E01517 - N4302
E01742 - N4301 E01650 - N4534 E01323 - N4541 E01436 SFC/5000FT STNR
NC=
```

MET korisnici

Kontrola leta

oblasna, prilazna, toranjska

Piloti i drugo zrakoplovno osoblje (Croatia airlines)

Zračne luke (zimske služba)

Vojska, policija, HGSS

Malo zrakoplovstvo (mali zrakoplovi, jedriličari i dr.)

CROATIA CONTROL

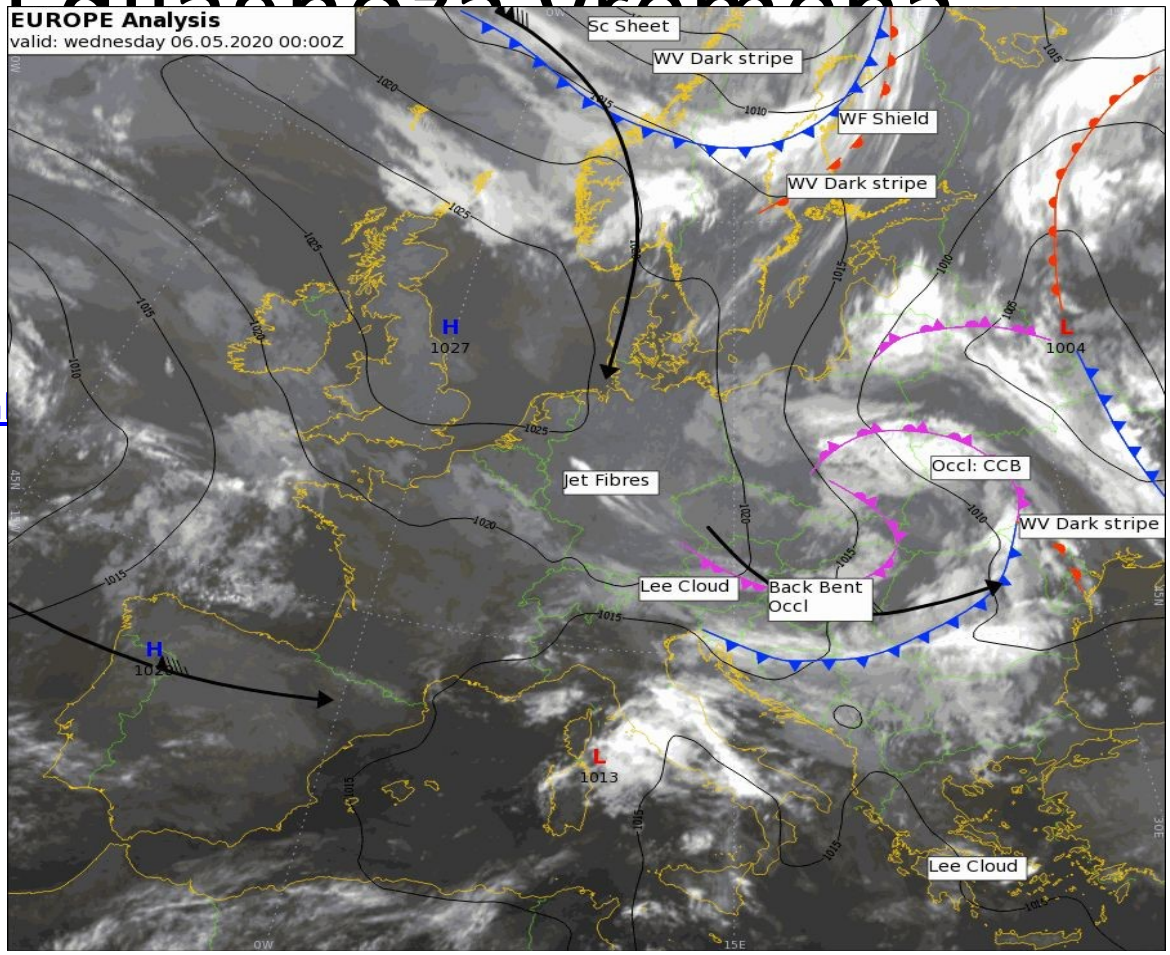
2 Analiza i dijagnoza vremena

http://wxmaps.org/pix/euro.00hr

http://weather.uwyo.edu/upperair/sounding.html

Eumetrain ePorts (Int.Explorer)

http://212.232.25.232/MapViewer.html



CROATIA CONTROL

3. Konvekcija i prognoziranje

Uvod

Primjeri različitosti

Klimatologija

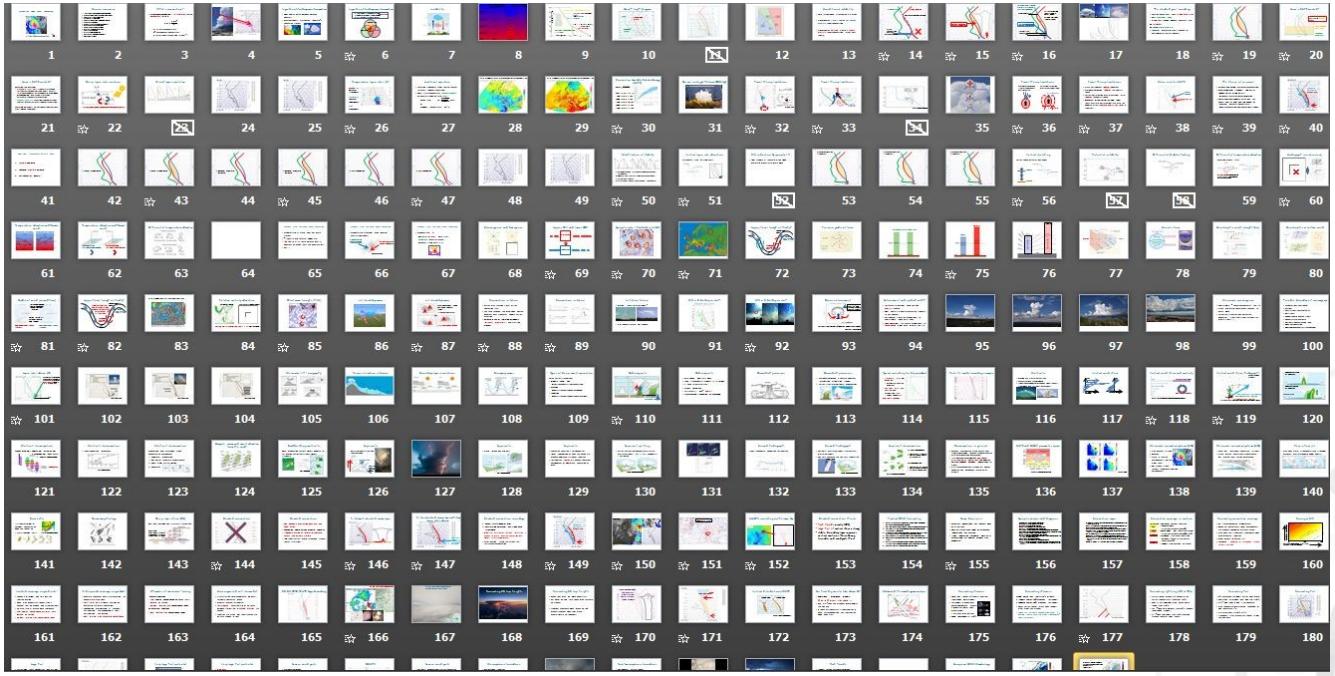
Uzgon

Osnovne prognostičke podloge

Organizacija konvekcije

3. Konvekcija i prognoziranje

Vinko Šoljan - MET instruktor



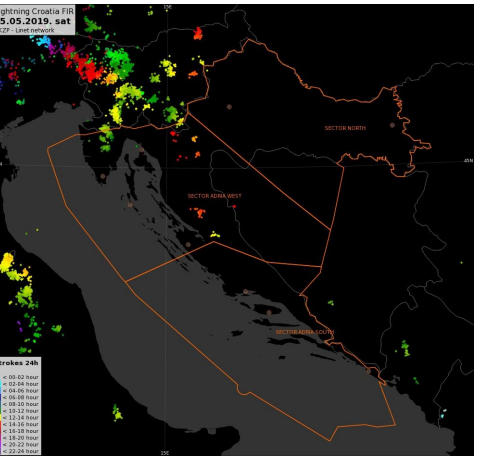
CROATIA CONTROL

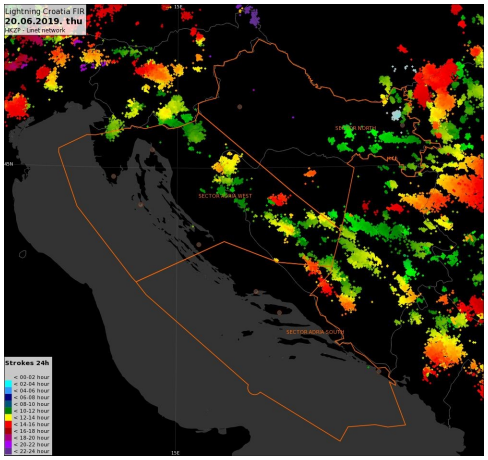
Zašto je konvekcija bitna

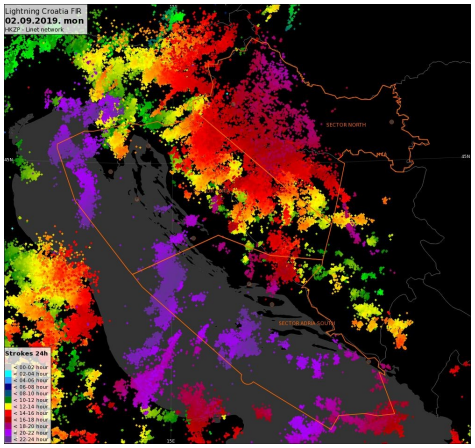
- Sudjeluje u ciklusu kruženja vode u prirodi (transportu vlage)
- Većinski izvor vlage u tlu ljeti u Hr
- Utječe na svakodnevni život (roštilj, …)
  - zračni promet - izbjegavanje grmljavine na ruti i aerodromu
- Opasne pojave - tuča, jak vjetar, velika količina oborine, munje, …
- Kod nas je vrlo učestala ljeti (zimi Jadran)

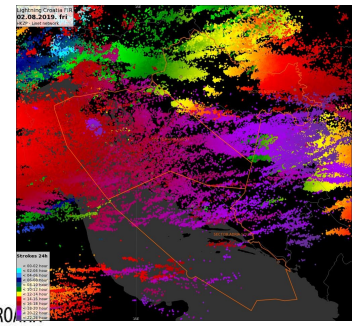
CROATIA CONTROL

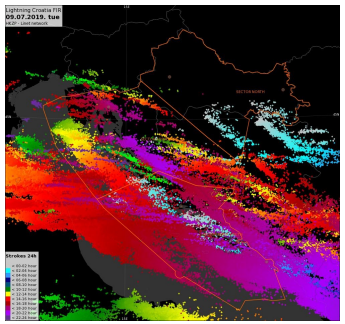
Primjeri grmljavine (LINET)

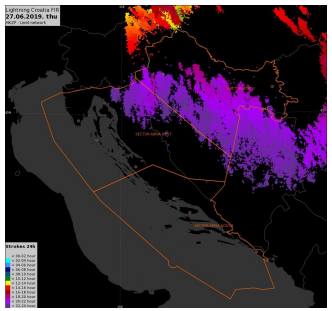


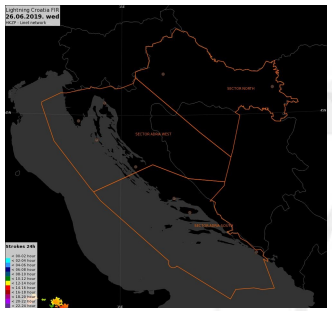


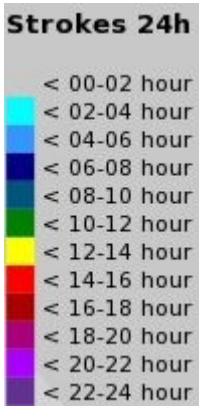




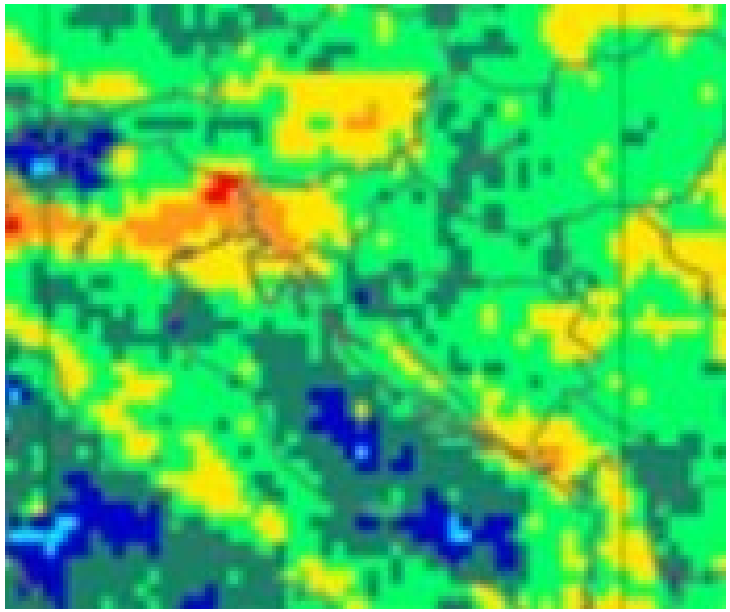


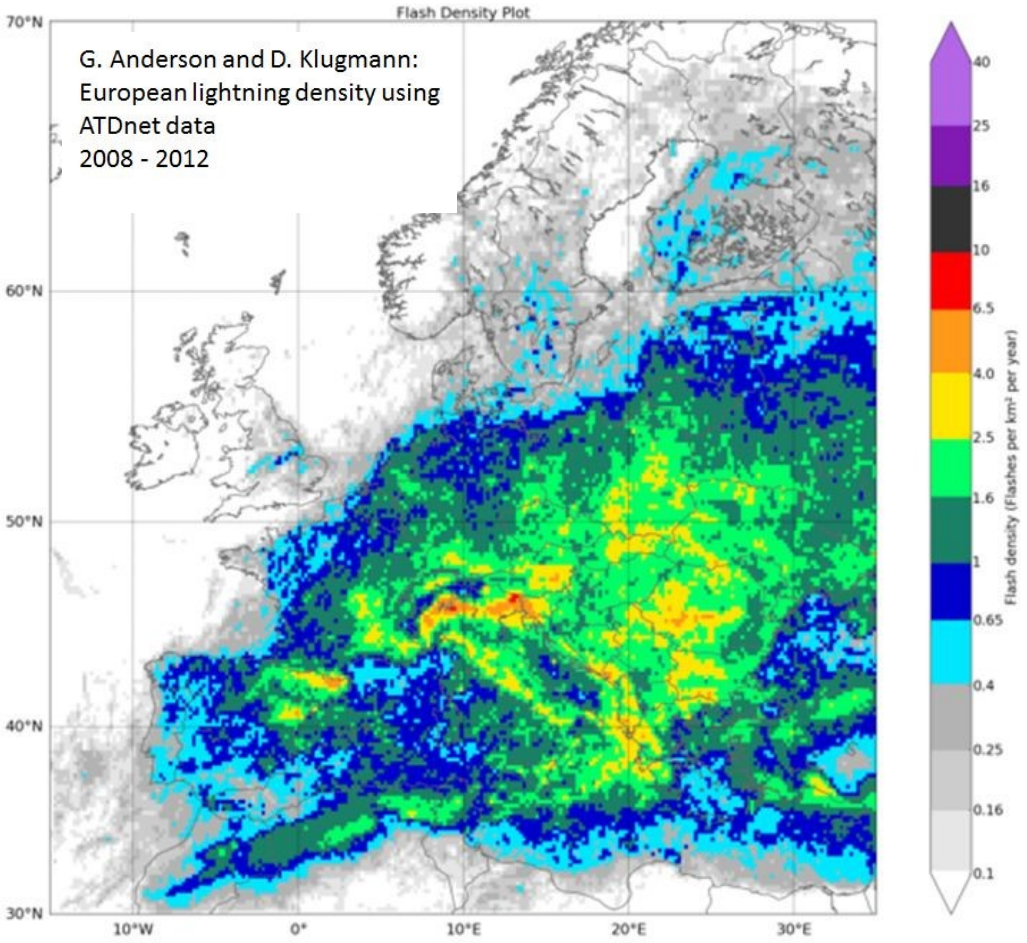






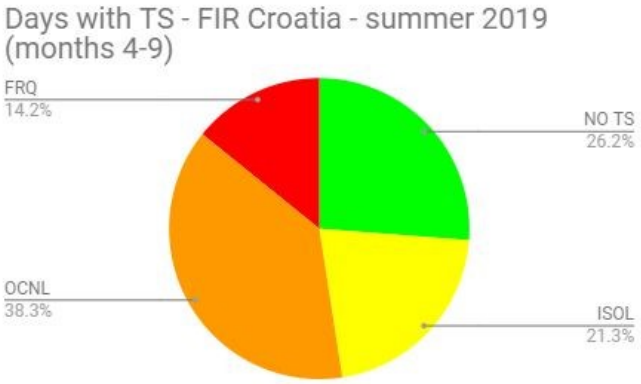
Klimatologija





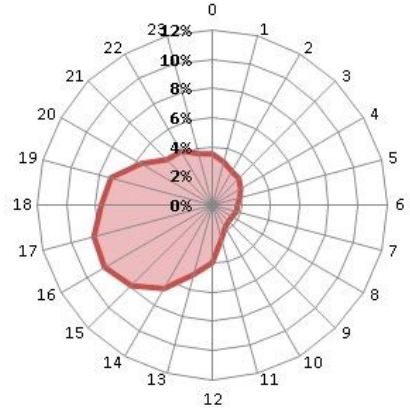
CROATIA CONTROL

Klimatologija grmljavine

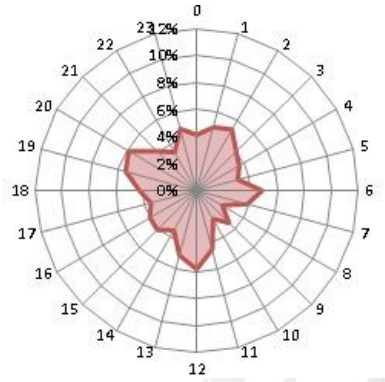


Day distribution

Zagreb airport



Dubrovnik airport



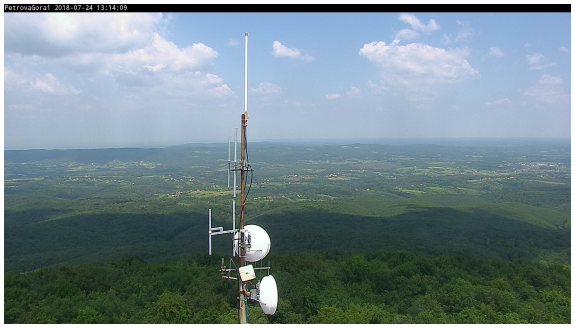
CROATIA CONTROL

Konvekcija primjer

Web kamera

Plitka

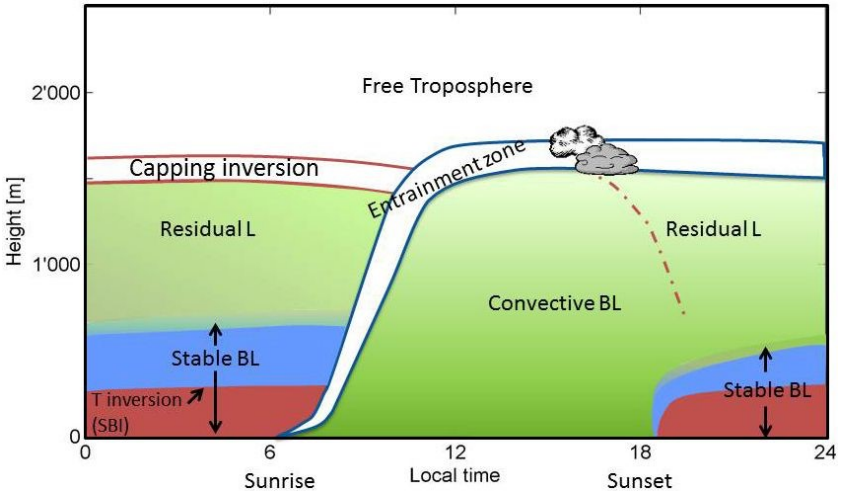
-ravni vrhovi



Duboka ili uvjeti za nju

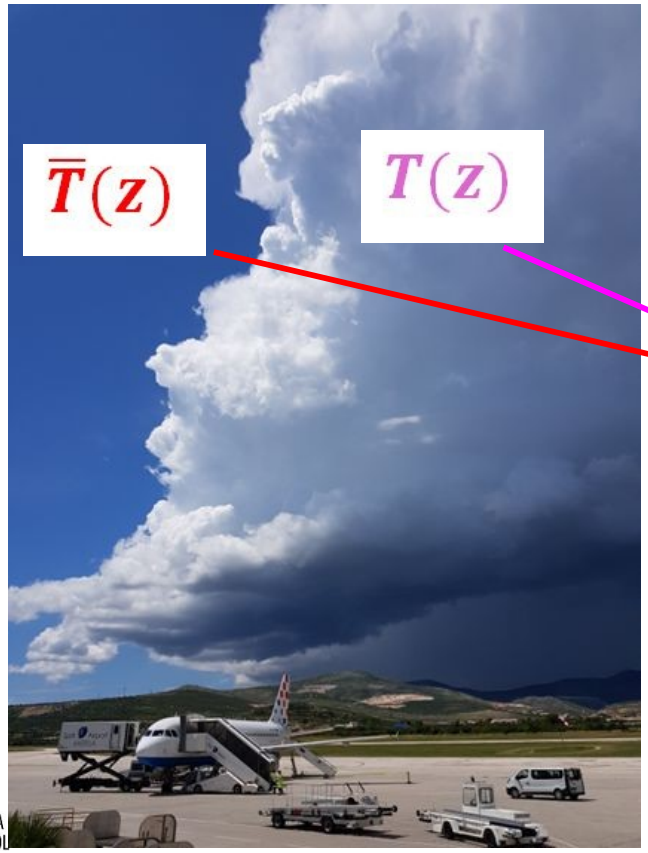
-različite visine vrhova

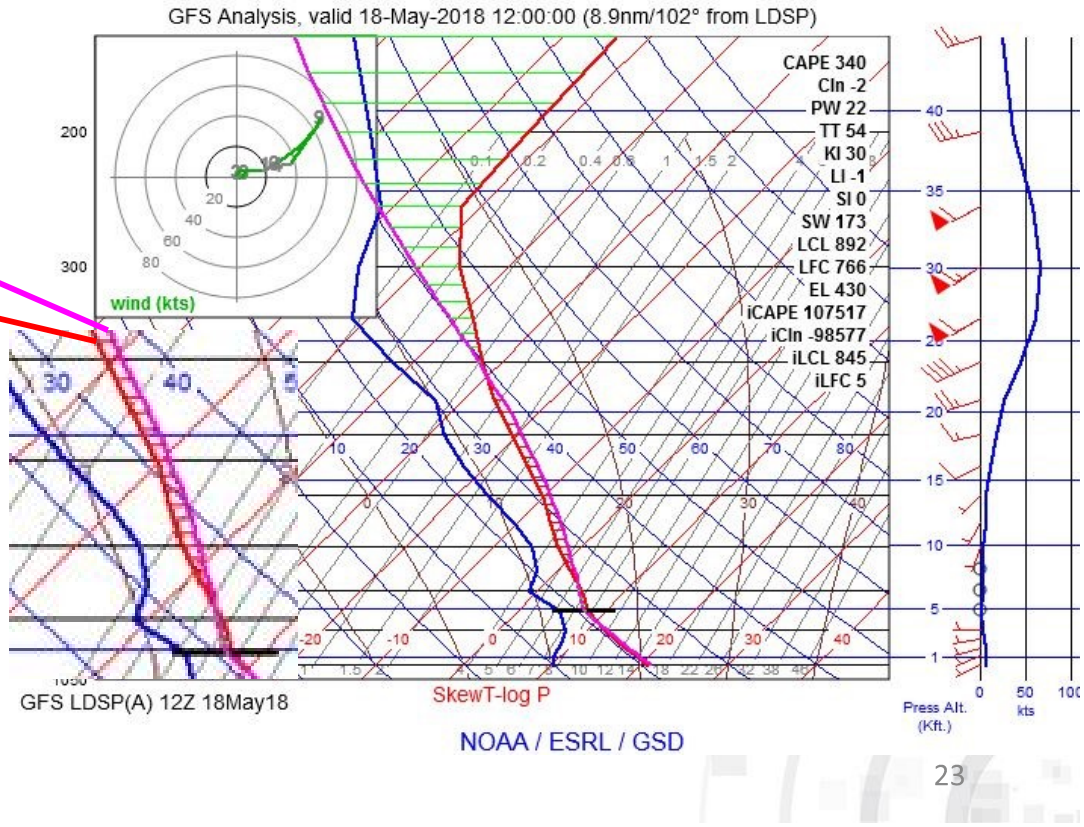
Konvekcija primjer

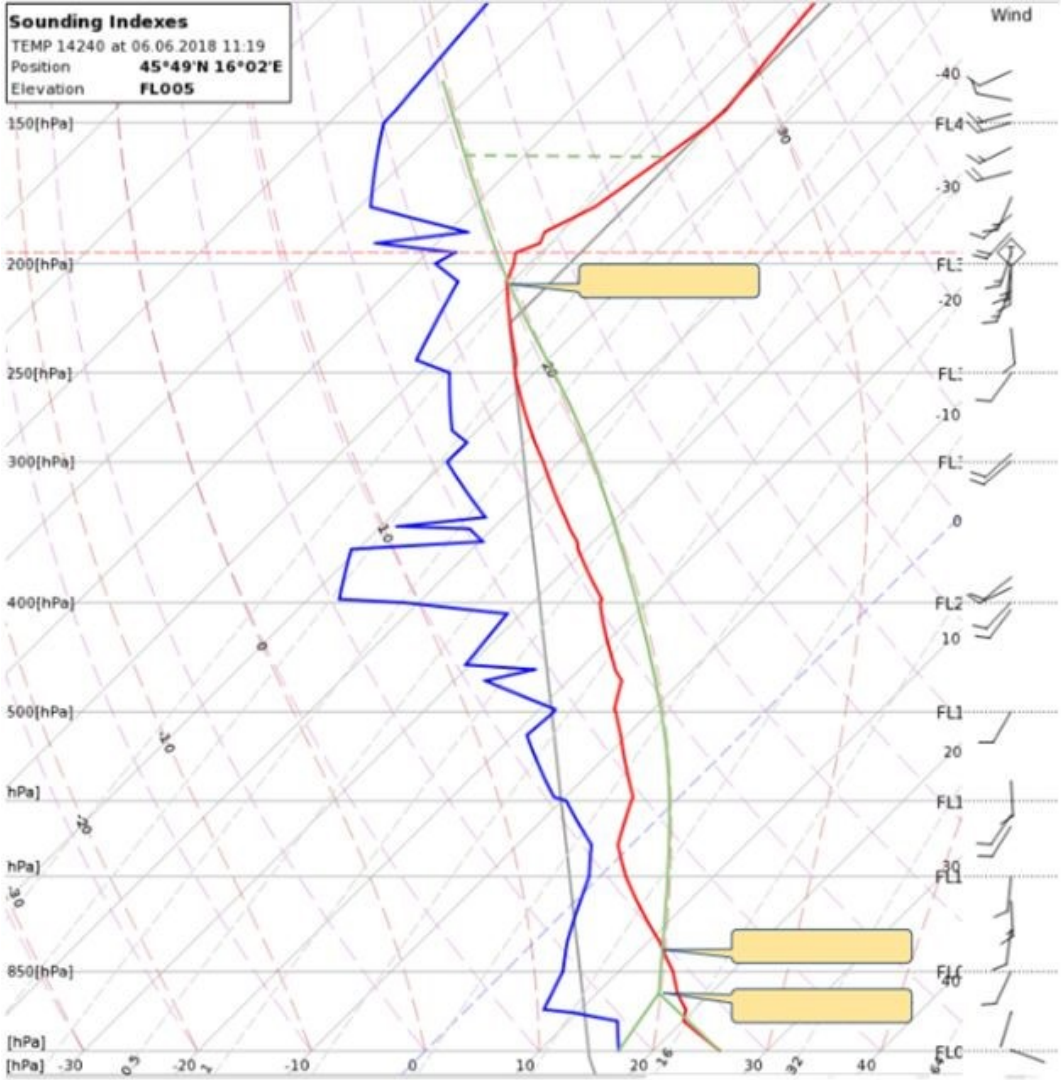


Konvekcija

$$B \equiv g\frac{T-\bar{T}}{\bar{T}}$$






Sounding Indexes
TEMP 14240 at 06.06.2018 11:19
Position 45°49'N 16°02'E
Elevation FL005
Wind
150[hPa]
200[hPa]
250[hPa]
300[hPa]
400[hPa]
500[hPa]
850[hPa]
[hPa]
-30
-20
-10
0
10
20
30
40
-40
-30
-20
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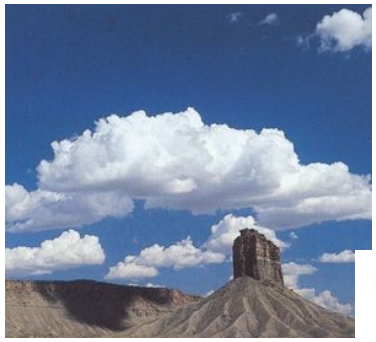
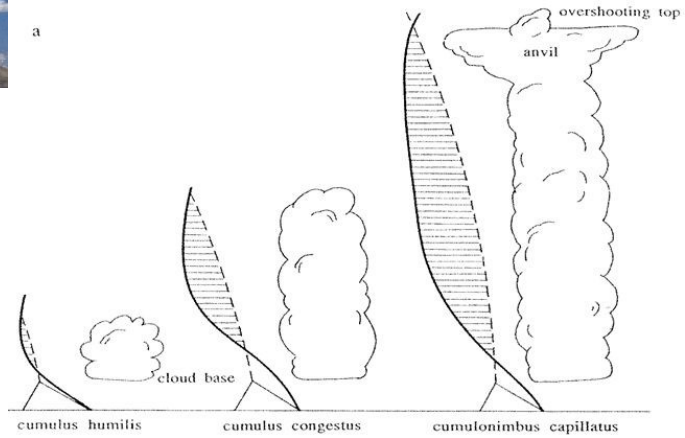
0
10
20
30
40



a

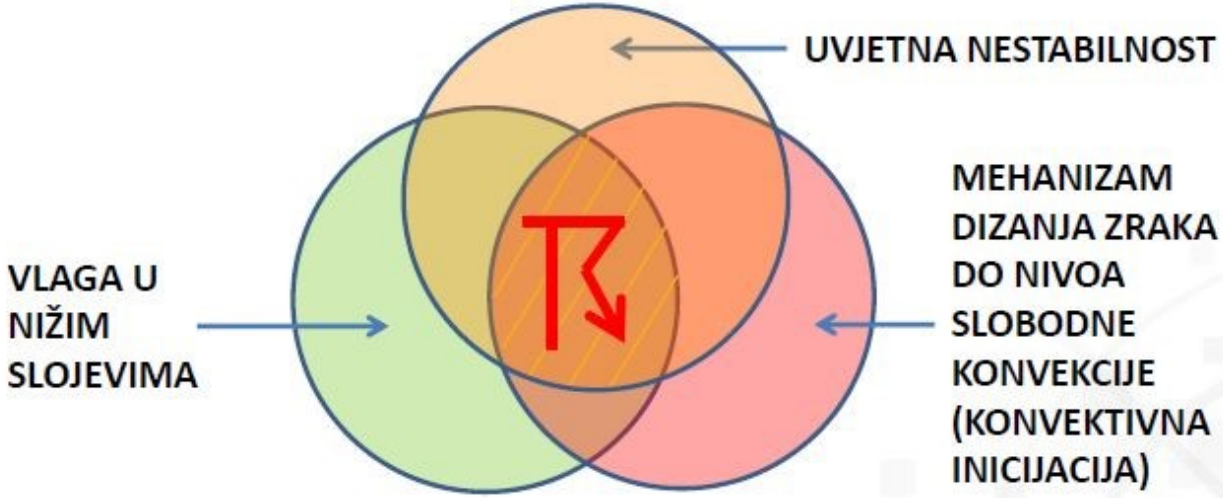


CROATIA CONTROL

Konvekcija sastojci za duboku konvekciju

1. Uvjetna nestabilnost
2. Vlaga u nižim slojevima
3. Mehanizam dizanja zraka (do LFC-a)

} CAPE >> 0



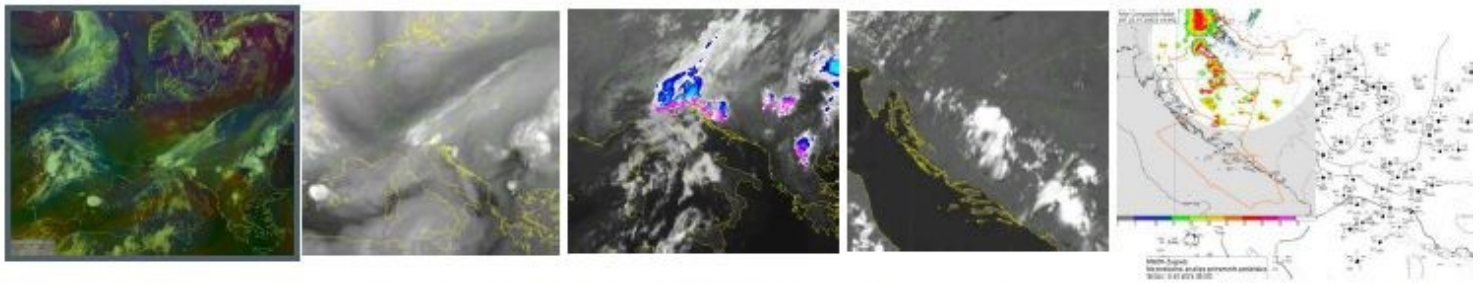
bitno

- povezivanje prostornih i vremenskih skala

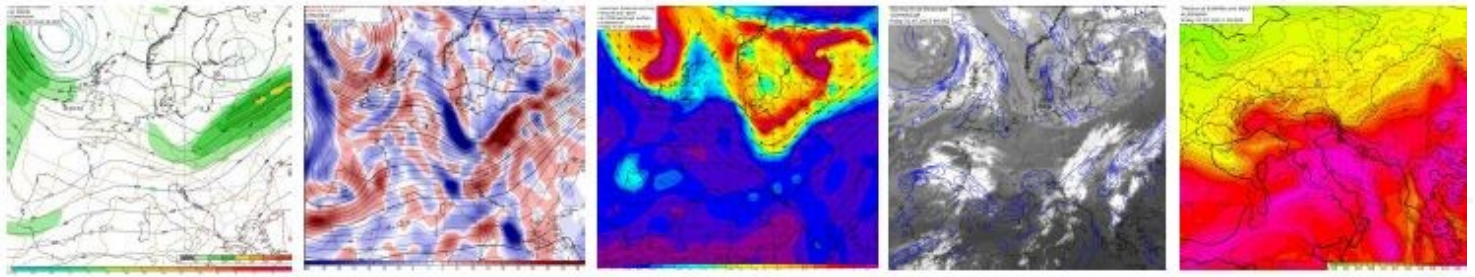
-mjerenja i modela

Osnovne prognostičke podloge

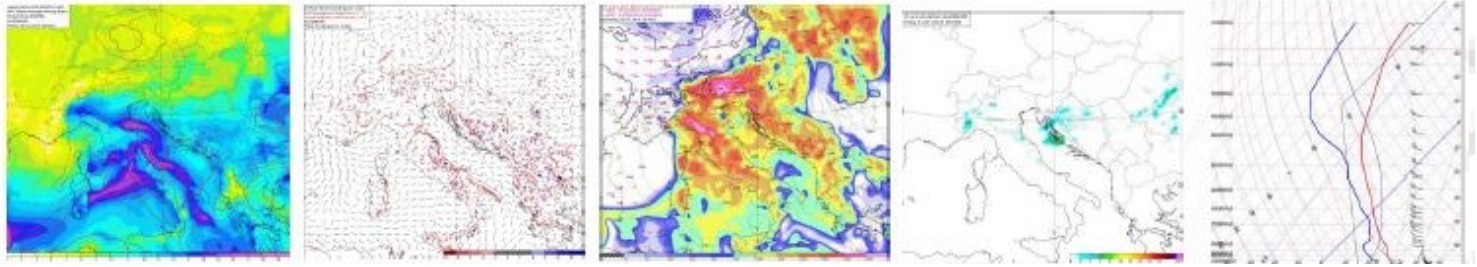
MOTRENJA sat airmass, Water vapor, IR, visible; radar; prizemna mjerenja



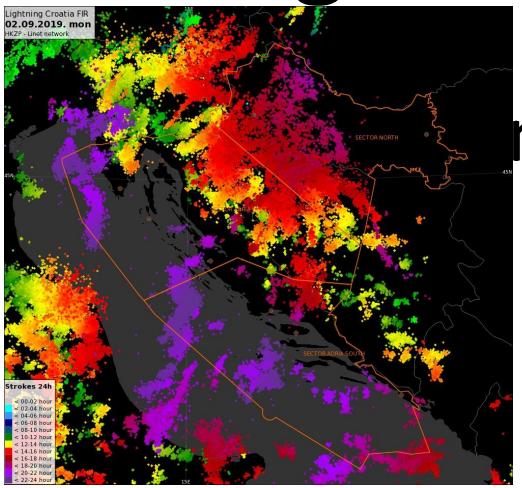
MODEL (H+wspd)300hPa, (H+vrtložnost) 500Hpa, Potencijalna vrtložnost, Frontalni parametar hPa, Θe 850+tlak

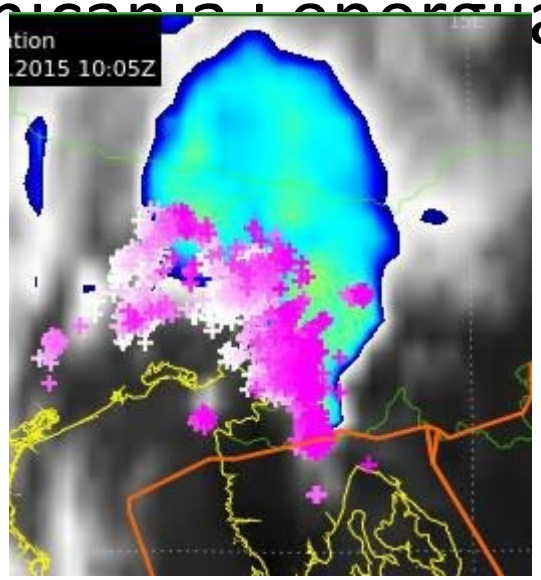


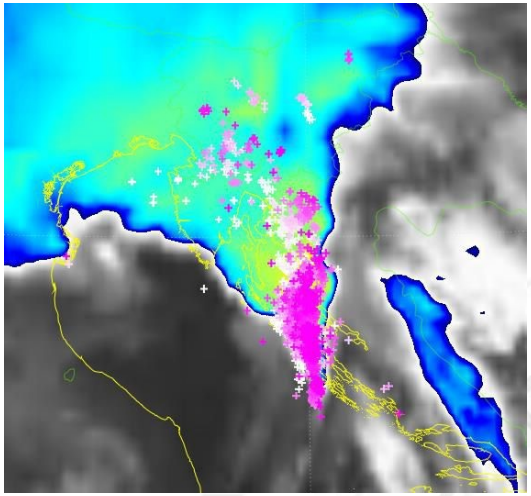
vlaga u niskim slojevima+lapse rate 900-600hPa; konvergencija, CAPE+ smicanje; oborina, termodijagram



Organizacija konvektivnih ćelija

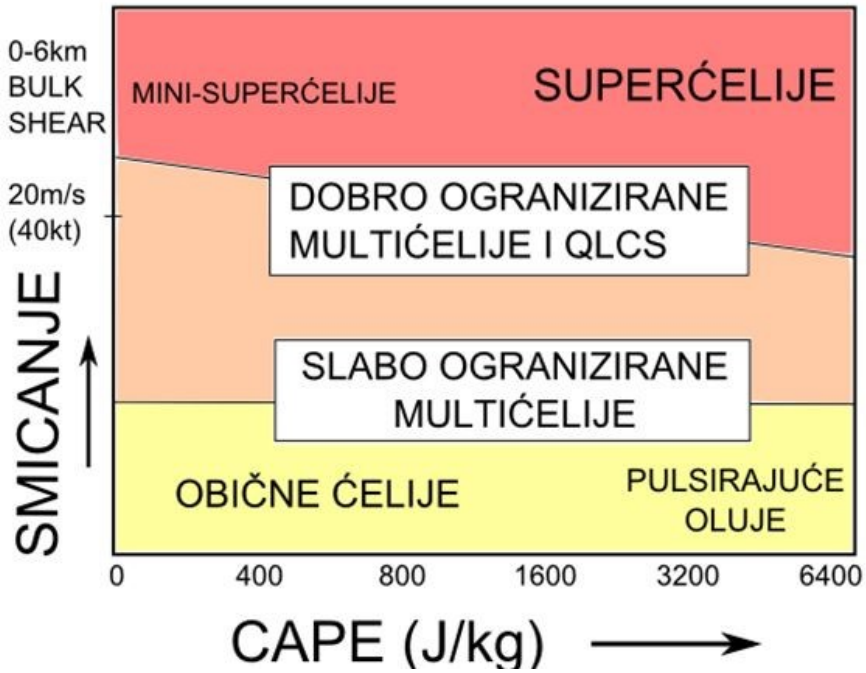




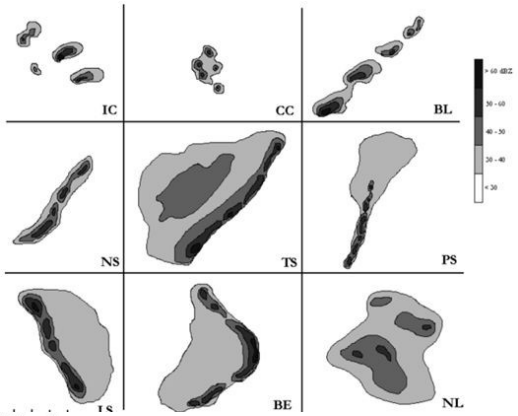


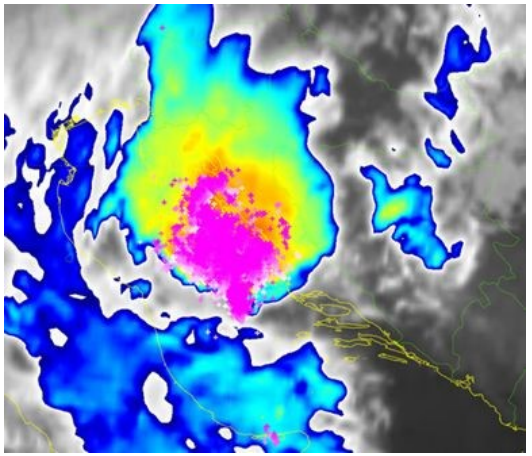
Organizacija konvektivnih ćelija

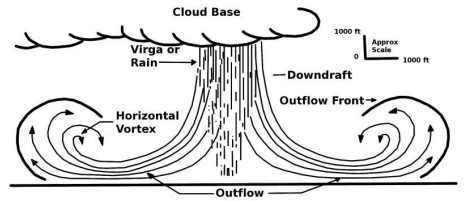
Kombinacija smicanja i energija

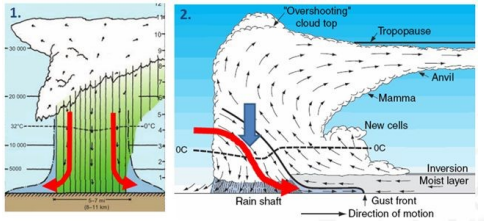


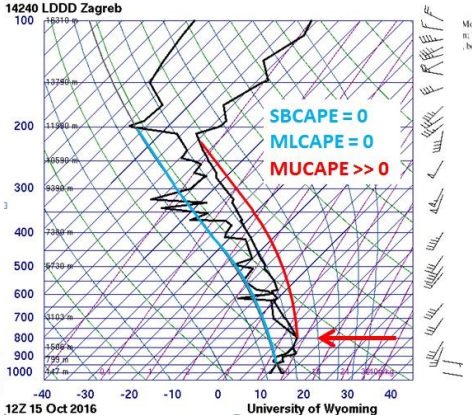
Partikularne teme ...

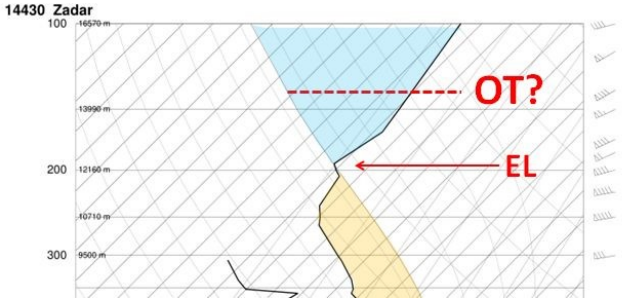


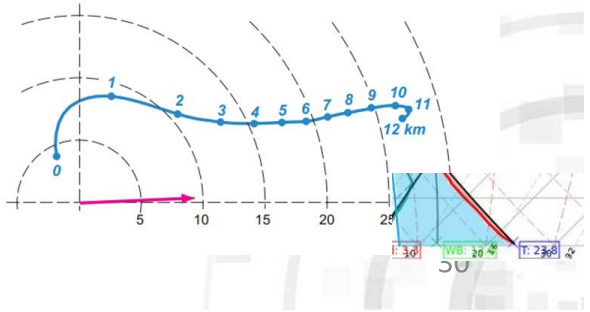












Poveznice

Utjecaj vjetra

Slijetanje na bočni vjetar

MET&Aviation