



ERA-Interim based analysis of persistent cold air pools over the Carpathian Basin

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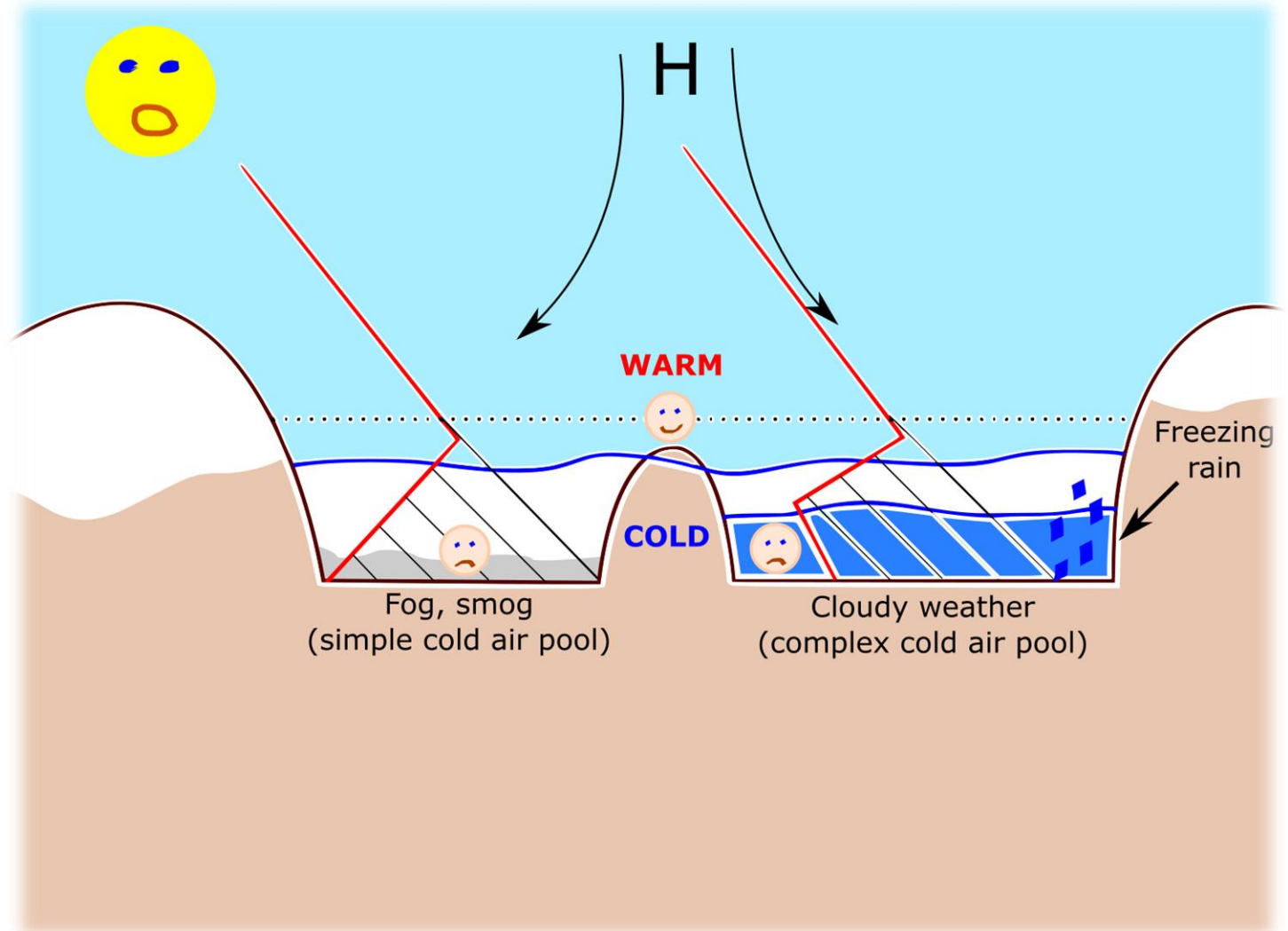
Overview

- Motivation, goals
- Persistent cold air pools
- Methodology
- Verification of ERA-Interim
- Case study
- Conclusions, plans

Motivation, goals

- Why do we examine cold air pools?
 - Environmental effects (e.g. fog, smog, freezing rain)
 - Difficulties of forecast
- Why ERA-Interim?
 - Better temporal and spatial resolution compared to measurements
 - Easier to compare with model data
- Goals:
 - Climatic examination
 - Cold air pool searching algorithm to make easier forecasting it

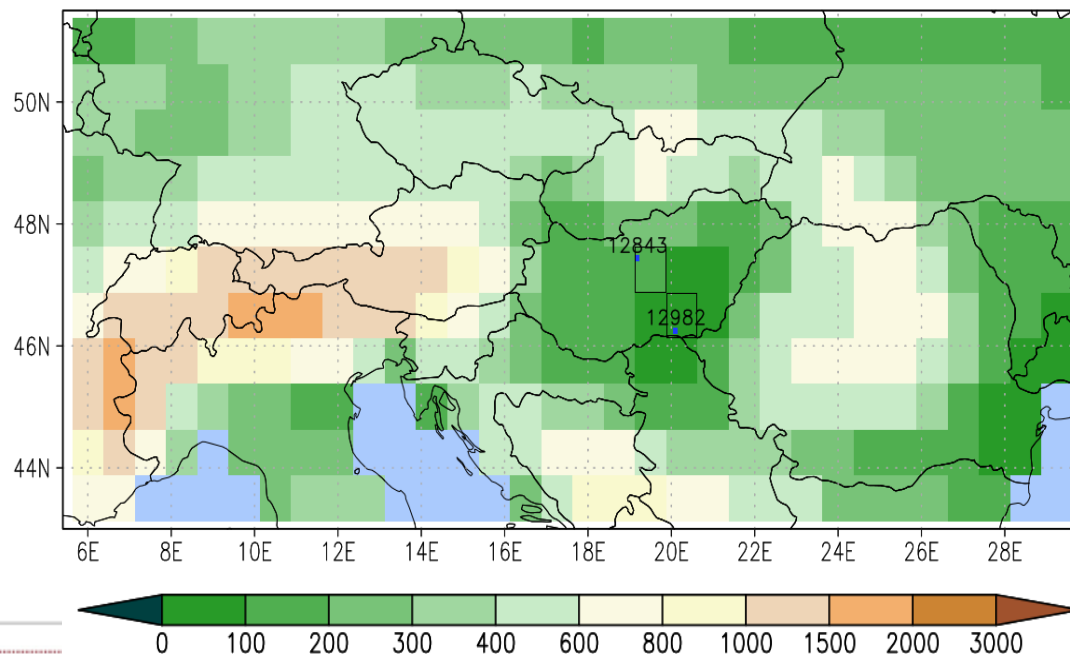
Persistent cold air pools



Methodology

- Data used:
 - ERA-Interim 0.75°
 - Integrated Global Radiosonde Archive (IGRA)
 - NCDC Integrated Surface Database (SYNOP codes)

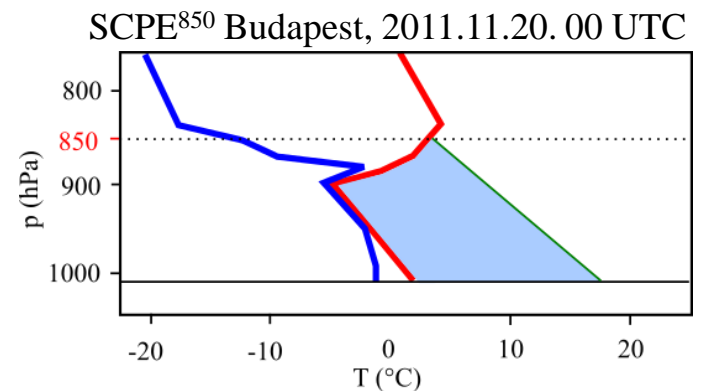
The topography of the examined domain (m) according to ERA-Interim. The examined stations (black marks) and the grid cells (blue squares)



Methodology

- Variables:
 - T_{2m} (°C): temperature at 2 m,
 - SCPE⁸⁵⁰ (J/kg): shallow convective potential energy,**
 - gradT (K/100m): vertical temperature gradient,
 - RH (%): relative humidity,
 - Wind (m/s)

$$SCPE^{850} = -R_d \int_{p_0}^{850 hPa} T(p) \frac{\Theta_{vp}(p) - \Theta_{ve}(p)}{\Theta_{ve}(p)} d(\ln p)$$





Verification of ERA-Interim

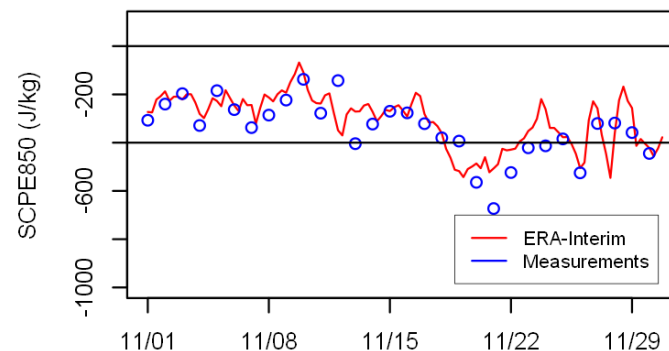
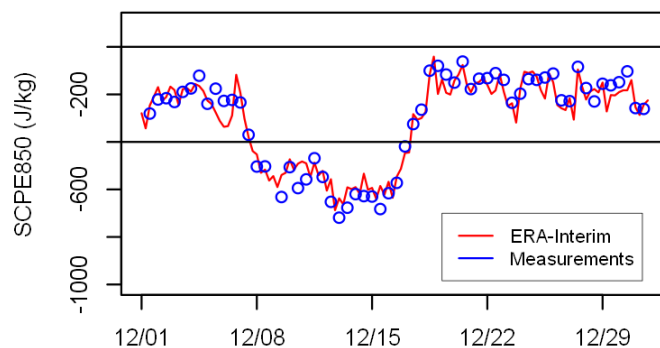
Budapest (ERA-Interim: 47.25N, 19.5E

real: 47.4N, 19.2E)

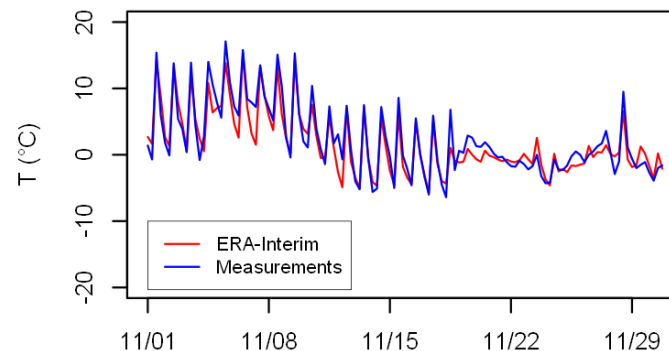
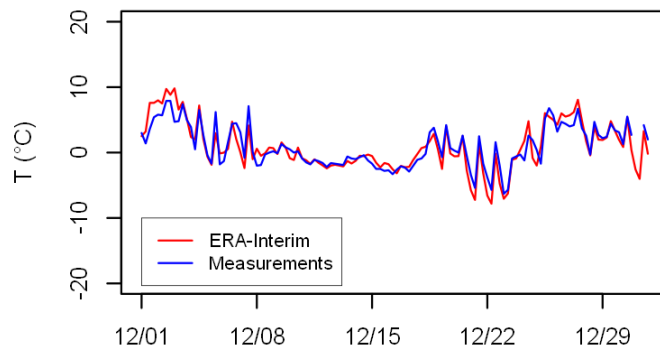
December 2004

November 2011

Shallow convective potential energy



Temperature at 2 m



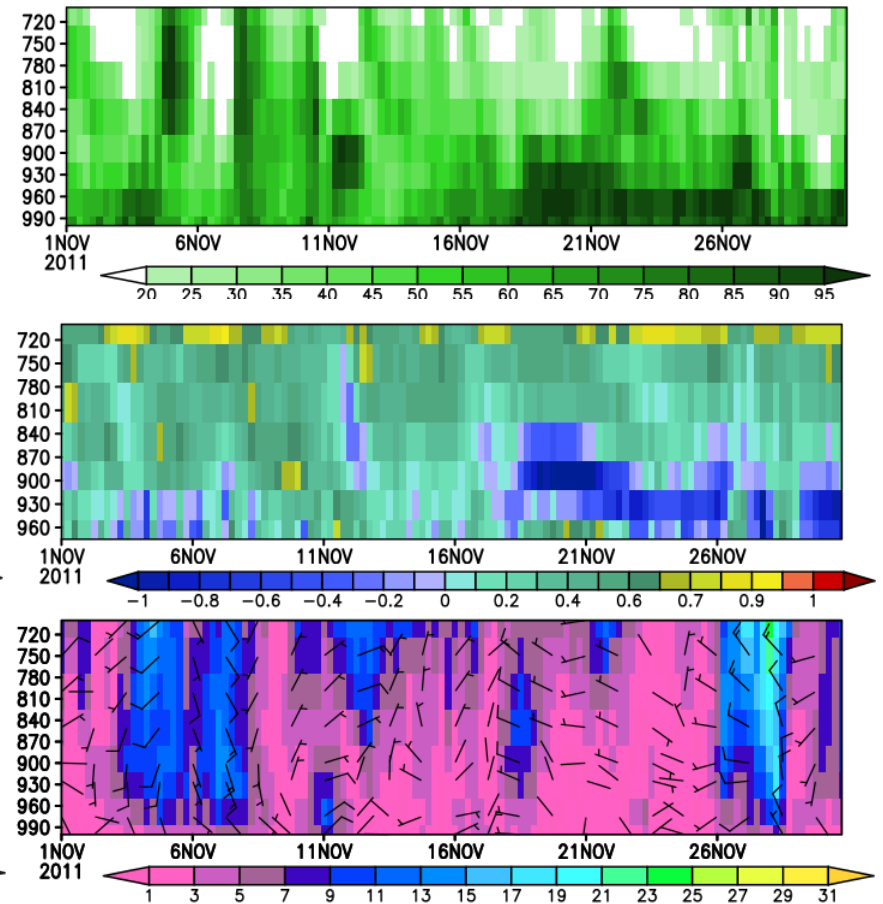
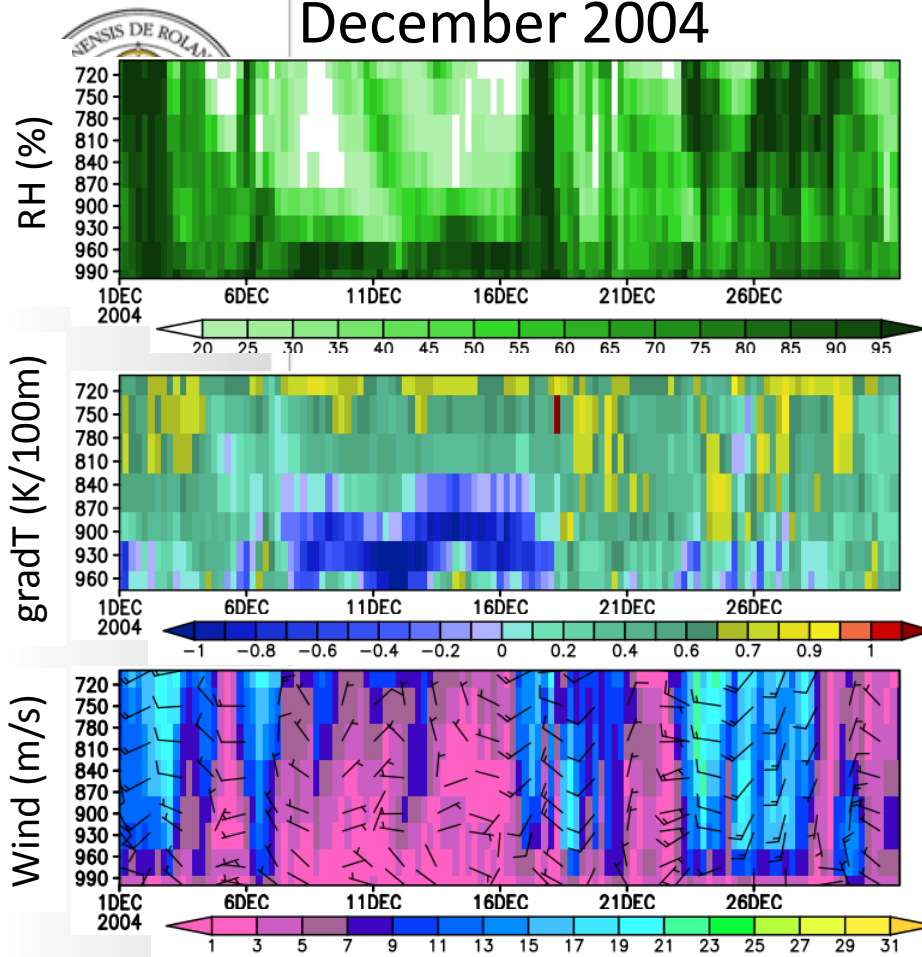
Case studies

2D meteograms

Budapest (47.25N, 19.5E)

December 2004

November 2011



Case studies

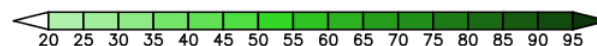
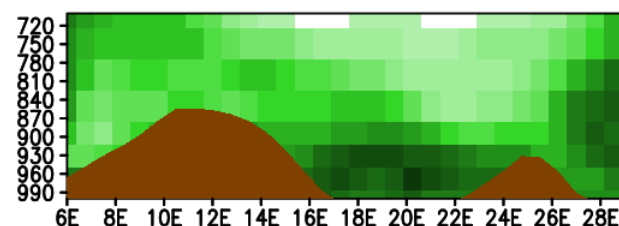
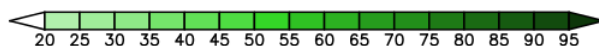
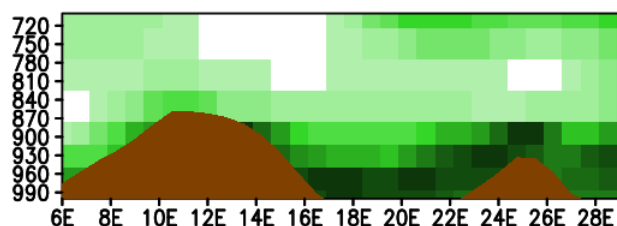
Vertical cross-sections

Latitude of Budapest (47.25N)

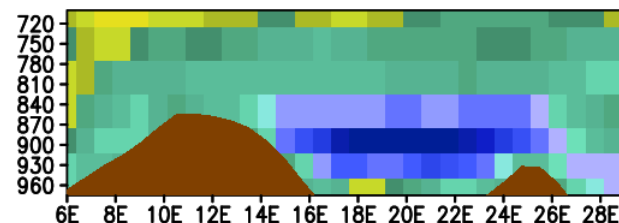
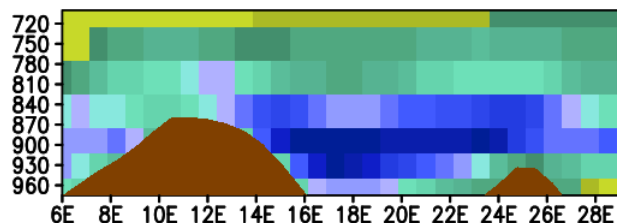
06 UTC 13 December 2004

18 UTC 20 November 2011

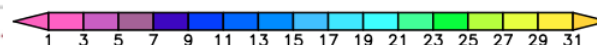
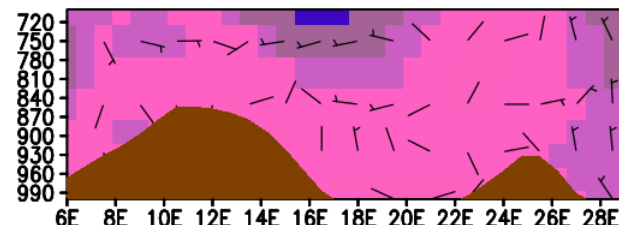
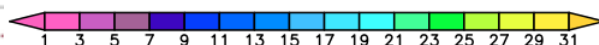
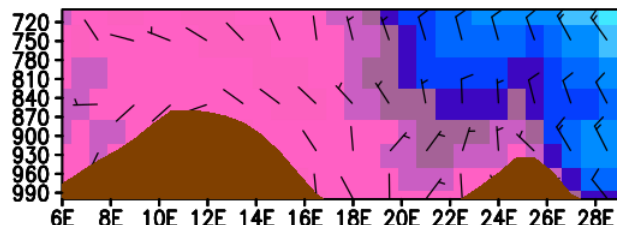
RH (%)



gradT (K/100m)



Wind (m/s)



06Z13DEC2004

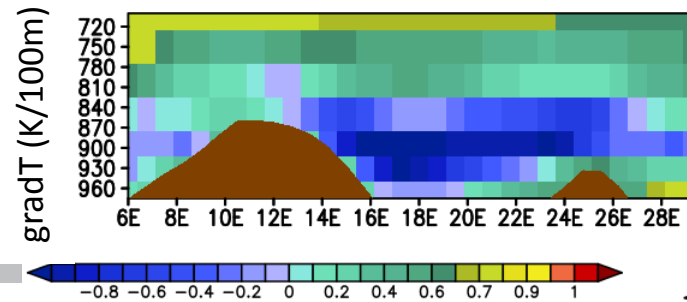
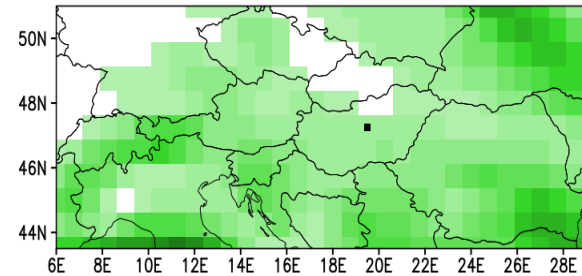
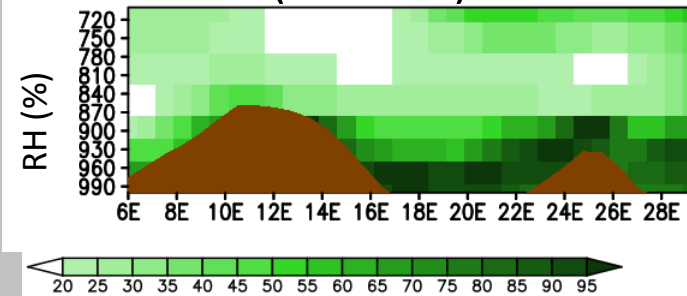
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Case study

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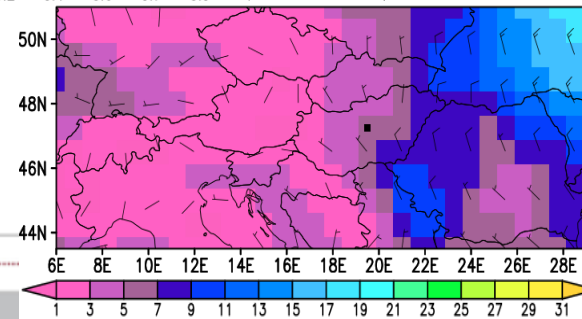
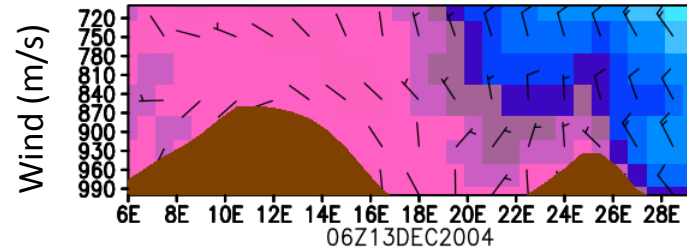
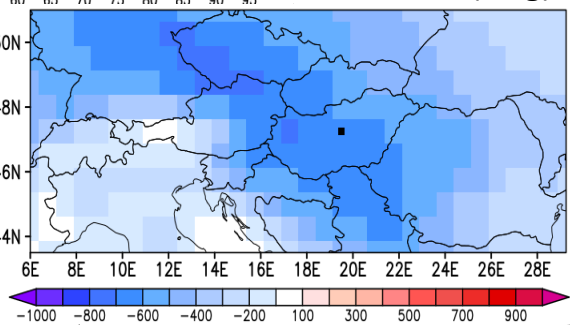
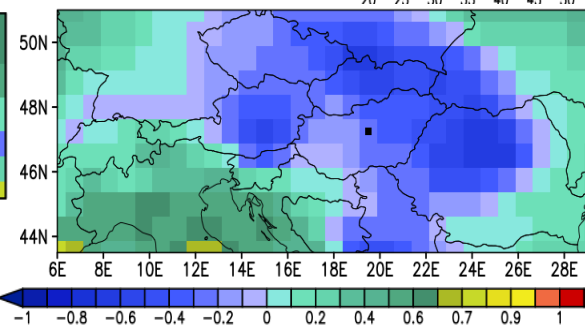
Vertical cross-sections
(47.25N)

Maps of 850 hPa
RH (%)



gradT (K/100m)

SCPE⁸⁵⁰ (J/kg)



Wind (m/s)

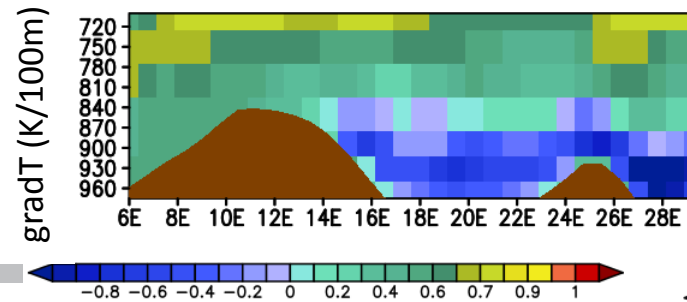
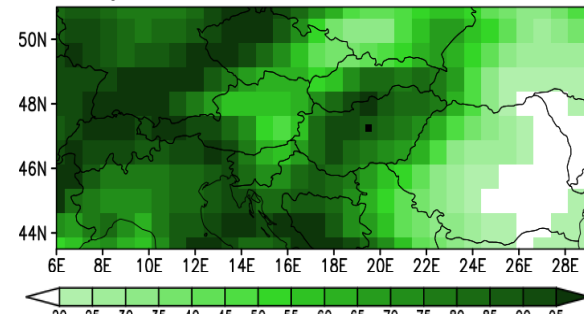
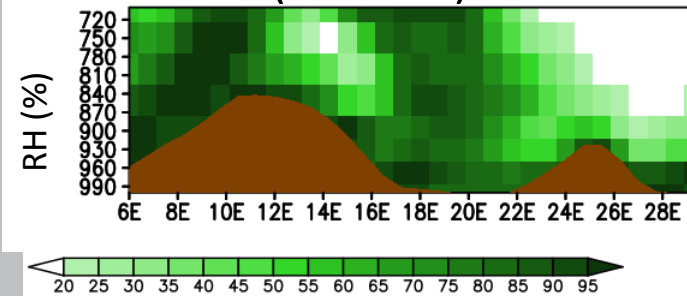
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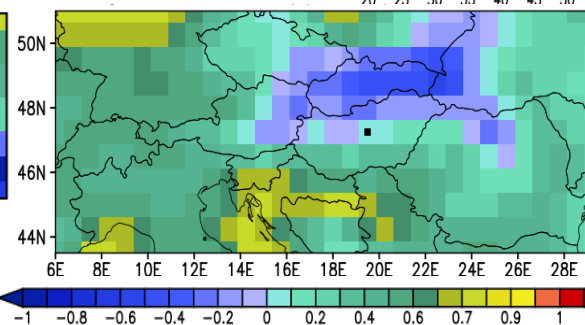
06 UTC 17 December 2004

Vertical cross-sections
(47.25N)

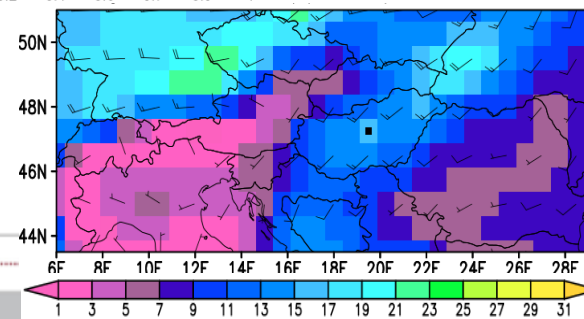
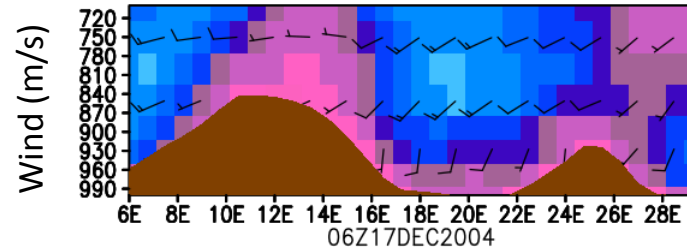
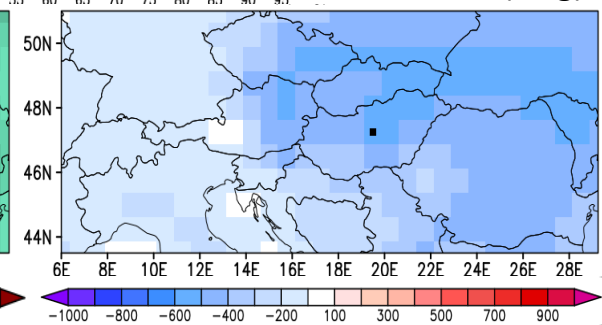
Maps of 850 hPa
RH (%)



gradT (K/100m)



SCPE⁸⁵⁰ (J/kg)



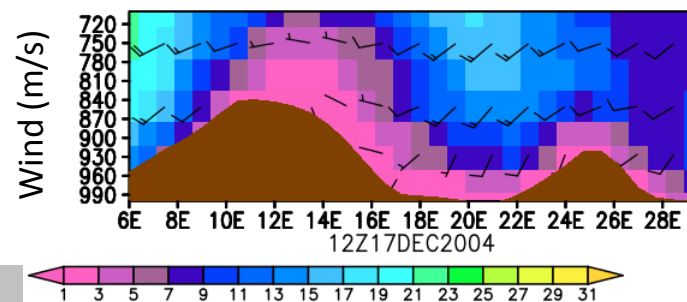
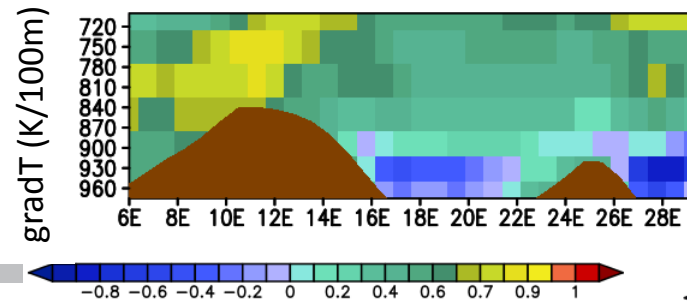
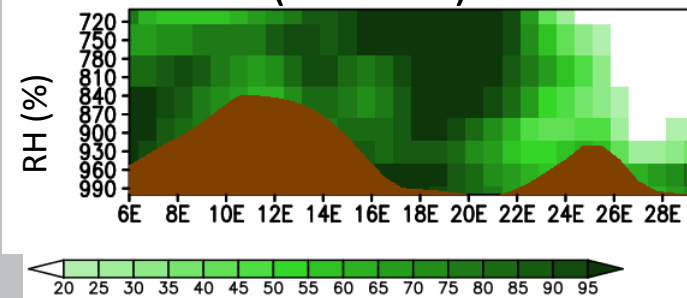
Wind (m/s)

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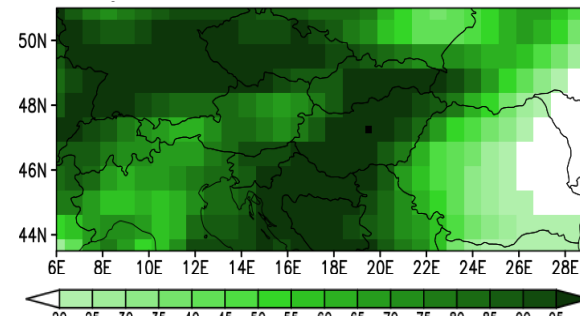
Case study

12 UTC 17 December 2004

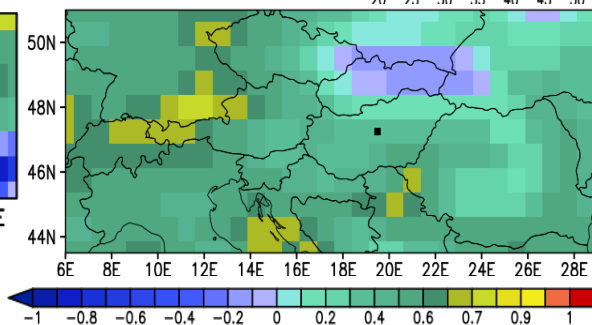
Vertical cross-sections (47.25N)



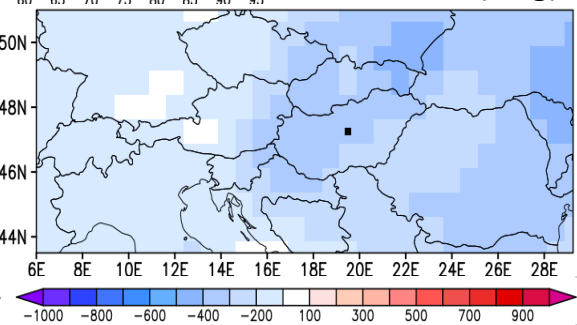
Maps of 850 hPa RH (%)



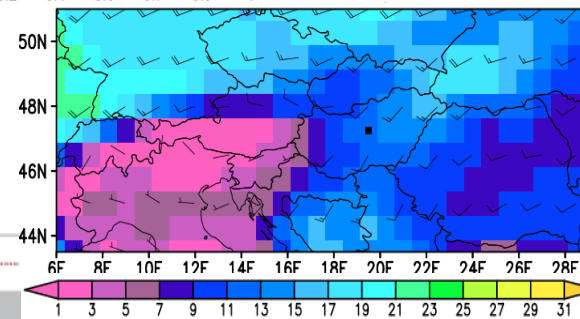
gradT (K/100m)



SCPE⁸⁵⁰ (J/kg)



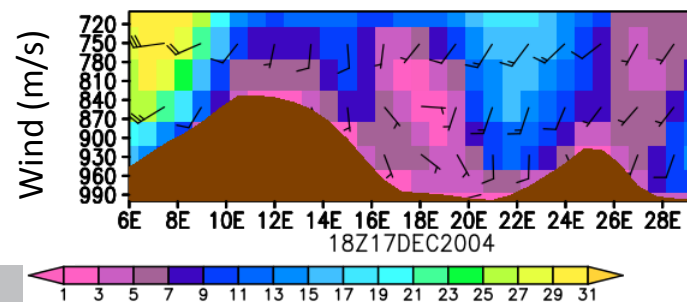
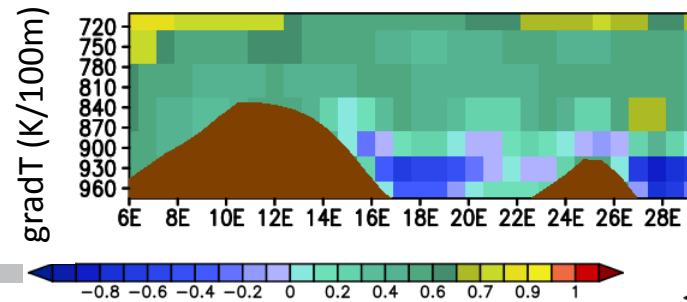
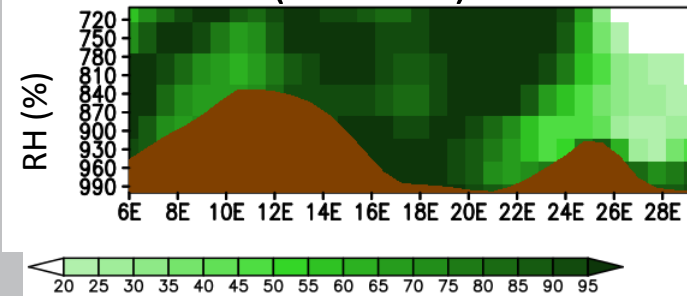
Wind (m/s)



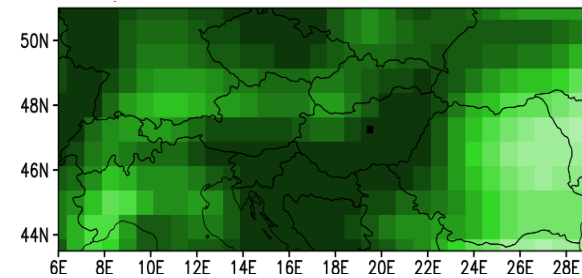
Case study

18 UTC 17 December 2004

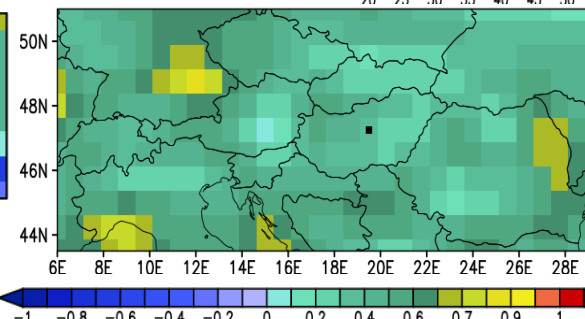
Vertical cross-sections (47.25N)



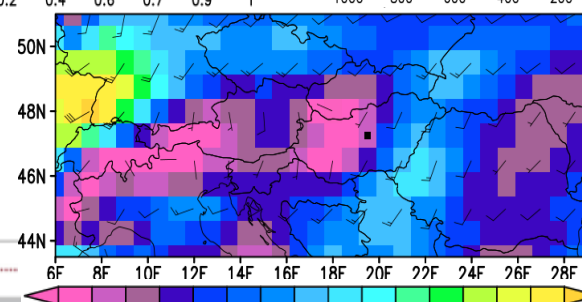
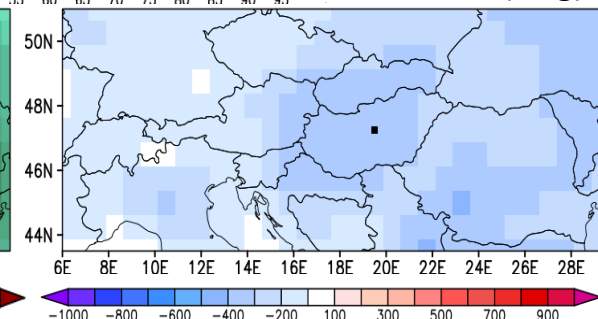
Maps of 850 hPa RH (%)



gradT (K/100m)



SCPE⁸⁵⁰ (J/kg)



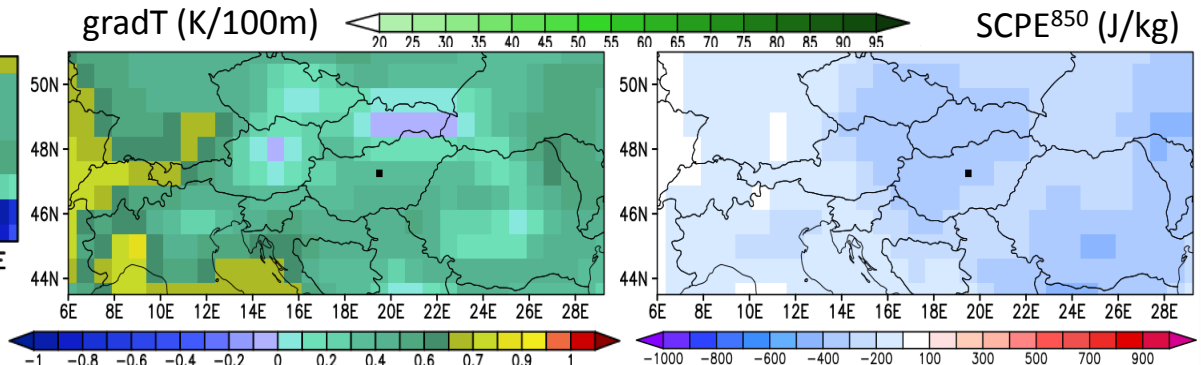
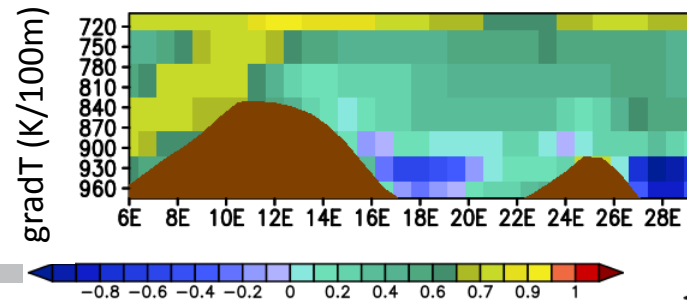
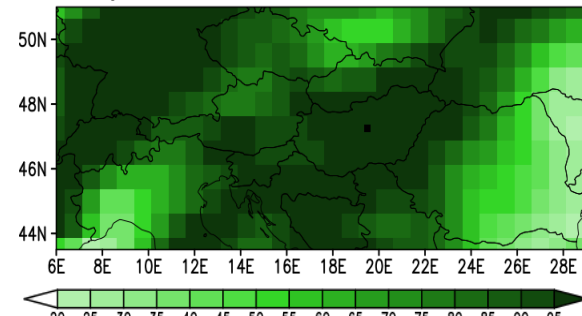
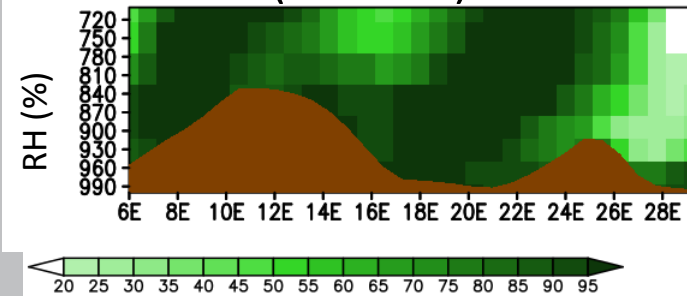
Wind (m/s)

Case study

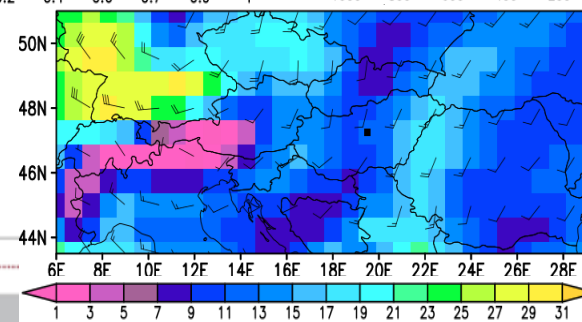
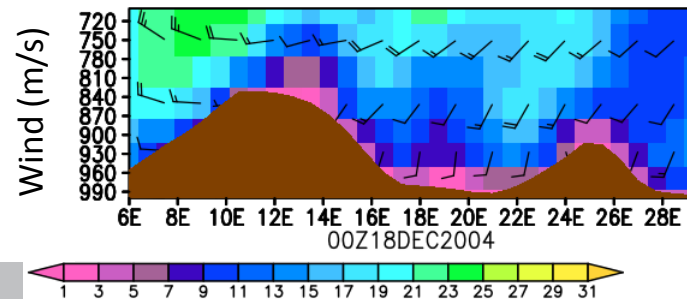
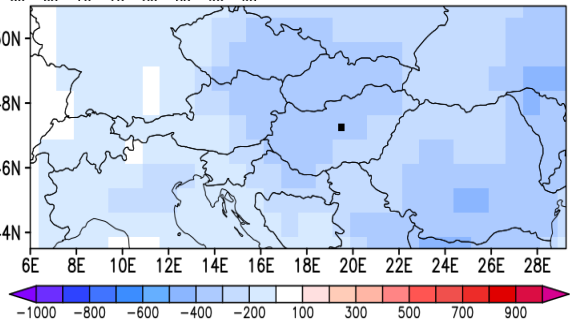
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Vertical cross-sections
(47.25N)

Maps of 850 hPa
RH (%)



SCPE⁸⁵⁰ (J/kg)



Wind (m/s)

Conclusions, plans

- The ERA-Interim reanalysis is suitable to examine persistent cold air pools
- Gridded database → validate regional climate models
- Cold air pool searching algorithm



Thank you your attention!