

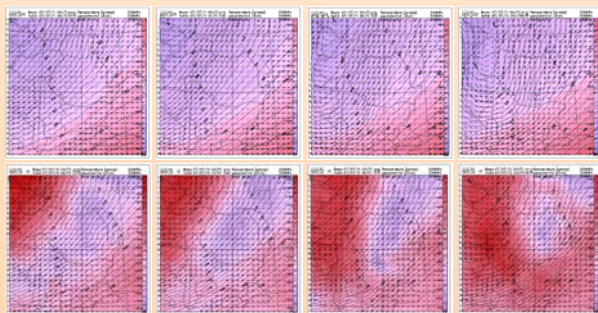
AN EPISODE OF TROPICAL AIR MASS INSTABILITY ANALYSED USING ALADIN AND ALARO MODELS

Florinela Georgescu, Simona Tascu, Gabriela Bancila, Doina Banciu
 National Administration of Meteorology, Bucharest, Romania,
 E-mail: doina.banciu@meteo.inmh.ro

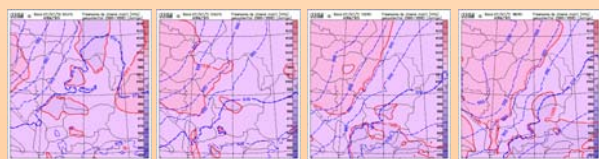
2007 summer in Romania:
 - unusual high frequency of tropical origin air mass advections
 ⇒ extremely high temperature periods.
 - short events of intense atmospheric instability.
10-12th of July,
 - atmospheric instability covered the entire Romanian area.
 - heavy rain, strong winds and flash floods affected especially the eastern Romania.
Aim of this case study
 - to analyse the tropical air mass invasion and some features of the tropical and frontal instability for the above mentioned episode, mainly using the outputs of ALADIN and ALARO.
 - to evaluate the model precipitation forecast.



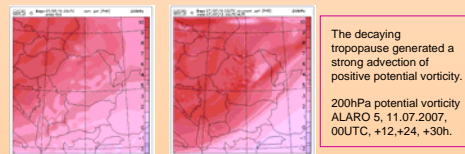
10 cm hail layer at Odorheiu Săcuiesc, 11 of July, 2007



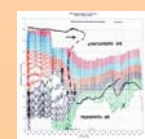
In the morning of 11 of July, a short wave trough generated in the mid and higher troposphere approached Romania, from Central Europe. The air circulation was strong and the trough became sharper during the day and the night after that. The jet stream, in front of the trough ascendant part is more visible at 200 hPa high.
 At 200 hPa high, the strong thermal gradient shows the tropopause decay (warmer air, from the lower stratosphere, over Central Europe and over the western part of Romania).
 300hPa (up) and 200hPa (down) geopotential and temperature ALARO model, 11.07.2007, 00 UTC, +6, +12, +18, +24h.



MSLP and 500-1000 geopotential at 10.07.2007 12UTC and at 11.07.2007: 00,12 and 18 UTC, behind the cold front, the pressure is increasing gradually



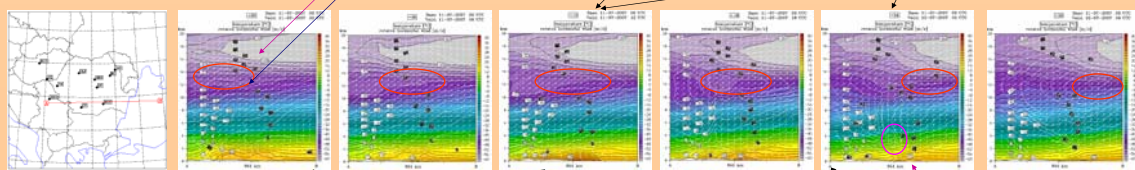
The decaying tropopause generated a strong advection of positive potential vorticity.
 200hPa potential vorticity ALARO 5, 11.07.2007, 00UTC, +12,+24,+30h.



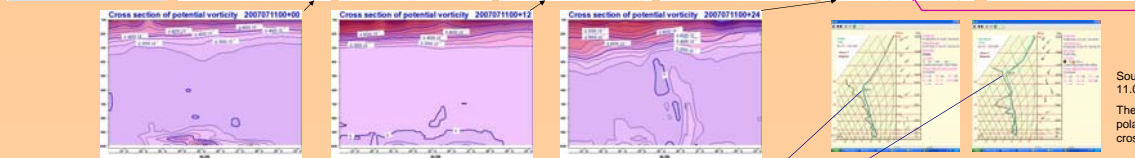
Conceptual model of doubled tropopause near the Subtropical jet stream
<http://reductionism.net.sasnic.net/bgary.mtp2dcd561211/x.htm>



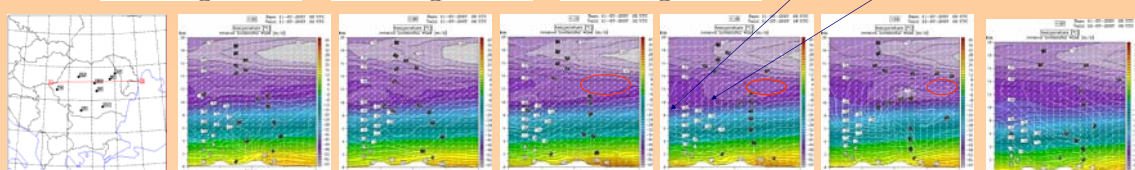
Soundings: Bucharest – 11.07.2007, 00 and 12 UTC, 12.07.2007, 00 UTC; Belgrade – 11.07.2007, 12 UTC



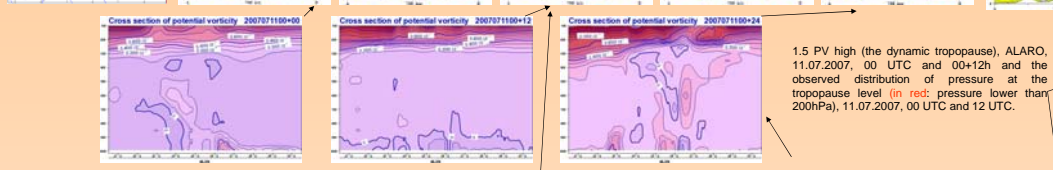
ALADIN VERTICAL CROSS SECTION (centered on Bucharest)
 Doubled tropopause is a typical tropical air mass characteristic, near the subtropical jet stream.
Red circle: the subtropical jet stream, (moving eastward and slowly descending, while the tropical air is mixed with the polar origin air).
Pink circle: the jet stream, associated with the cold front in lower troposphere.



Soundings: Szeget and Cluj Napoca – 11.07.2007, 12 UTC
 The tropopause level is descending westward (in polar air mass) and in the eastern part of the cross section the tropopause is still doubled.

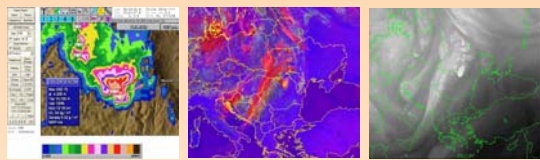


ALADIN VERTICAL CROSS SECTION (centered on Odorheiu Săcuiesc)



1.5 PV high (the dynamic tropopause), ALARO, 11.07.2007, 00 UTC and 00+12h and the observed distribution of pressure at the tropopause level (in red: pressure lower than 200hPa), 11.07.2007, 00 UTC and 12 UTC.

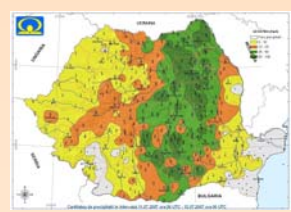
Cross section of potential vorticity and the map of 1.5 PV high illustrate the development of the trough at the tropopause level.



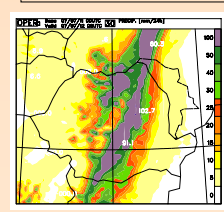
Radar reflectivity – Odorheiu Săcuiesc, 11.07.2007, 10.26 UTC
 METEOSAT 9, RGB (0.5-0.6, 0.4-0.9, 0.3-0.1), 10.45 UTC
 METEOSAT 9, WV 6.2, 10.45 UTC

→ Deep convection in the left exit region of the jet streak

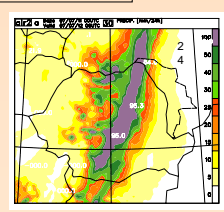
24 hrs cumulated precipitation: 11.07.2007, 06 UTC – 12.07.2007, 06 UTC



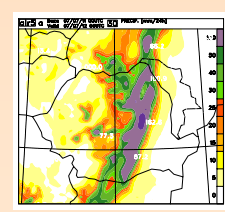
Observed precipitation



OPER: ALADIN cy2813 without prognostic variables for condensed water



ALR2: ALARO-o cy3211 without 3MT



ALR5: ALARO-o cy3211 with 3MT