"ICELANDIC CYCLONES AND THE WEATHER IN ROMANIA"

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Résumé: *Les cyclones d'Islande et le climat de la Roumanie.* L'aspect du temps en Roumanie est déterminé par la disposition des formes barriques caractéristiques des latitudes tempérées d'hémisphère nordique : l'Anticyclone des Açores, des Cyclones d'Islande, des Cyclones Méditerranéens et l'Anticyclone d'Europe d'Est. L'extension vers le centre de l'Europe des dorsales des Açores, des cyclones originaires d'Islande et, partiellement, des dépressions méditerranéennes qui entraînent la réduction des influences continentales excessives du sud et de l'est du pays – tous jouent un rôle important pour le climat d'ouest.

Mots-clés: circulation atmosphérique, champ de pression atmosphérique, paramètres météo

The Icelandic cyclones (improperly called Icelandic, since they are born in eastern Canada, an area with a high cyclogenetic potential, delimited by the cold Labrador stream and the warm Gulfstream) dominate the configuration of the atmospheric relief in the euroatlantic geographic space of the temperate latitude from the northern hemisphere and they also determine the general tropospheric air circulation. Sometimes, the surface that they cover includes most of the Northern Atlantic Ocean, Northern and Western Europe, with minimum value of atmospheric pressure of 950-970 hPa and speed average about 40 Km per hour. Above Western Europe there are almost 60-70 series or "families" of Icelandic cyclones that cross this region every year, coming from Northern Atlantic. A typical case is that from the 5th of July 2007. The synoptic situation at the

A typical case is that from the 5th of July 2007. The synoptic situation at the ground (figure number 1) was dominated by the extention towards south of a trough of an Icelandic cyclone from the Scandinavian Peninsula till above the Adriatic Sea, with several "cut-off" nucleus, from which one was exactly above Romania. Along this trough developed a cold atmospheric front, which descended towards the central basin of the Mediteranean Sea, determining into its' posterior side above the west, center and north part of the continent the advent of a polar, cold and wet, thermodynamic unstable air mass. Only in the extreme western Europe there was an azoric anticyclonic high pressure system. The weather phenomenas at European scale are represented in figures number 2 and 3.

On the altitude charts (figures number 4 - 5) are marked out the extention of the depresionary trough until the upper-tropospheric, but also some very high values of the thermal gradient above the Balcanic Peninsula, including Romania. The tilt of the vertical axis of the minimum pressure values at ground and in altitude, and also the existence of the closed izohipse at 500h Pa level, indicate the transition from the young cyclone period to the maximum stage of development of the cyclone. The cold advection from the posterior sector of the depression amplified the frontogenesis and also the weather phenomena associated with it.

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The atmospheric sounding in pictures number 6 from Szeged (Hungary) confirm the active atmospheric circulation from south-west towards the whole troposphere, even the presence of JETstream very low above Romania (close to tropopause level the wind speed was over 300km/hour), but also the advection of a very wet air mass



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Fig. 5 Geopotential Surface 500 hPa 5th of July 2007 00UTC USAFE - OWS



2007 00UTC Wetterzentrale

In our country, the rainfall associated with the cold atmospheric front, mostly as a rainshowers and thunderstorms, has started little after midnight and until 5 o'clock in the morning affected the Western Hills and Plain, the Occidental Carpathians and the northern parts of Moldavia and Transilvania (figure number 7).

The spatial distribution of the cloudy system above Europe is represented in picture number 8, and the radar echotop image from picture number 9 emphasizes the vertical development of the convection clouds called Cumulonimbus, which had their upper limit in altitude over 6 km and even 9 km in the northern of Moldavia.

The cold air mass which moved along with the atmospheric front, but also the presence of clouds and of rain, determined in the western regions of Romania mild temperatures, with minimum values between 13-14°C, while the southern regions had a clear sky and a tropical night, with a minimum temperature of 20°C, even 25°C in Danube Valley.

After a very quick displacement towards east, at local hour 9.00, the area of rainfalls and the electric phenomenas extended to all Transilvania and the western of Oltenia, while in Muntenia and Dobrogea the wind intensifed until it reached 8-10 m/s and even 12-15 m/s in the mountain area.

The center of gravity of the cloudy system moved towards north-east (figure number 11), but it was still above our country, very compact and vertically well developed, having the upper limit of the clouds up to 7-8 km in altitude.

In the afternoon, at local hour 15.00, the cloudy system of the cold atmospheric front moved to the extreme north part of the country and dissipated a little bit, but there were still rainfalls and thunderstorms in the Apuseni Mountains, northern and eastern Transilvania and in the north part of Moldavia, while in the south and south-east of the country the wind was blowing in blust, with over 8-10 m/s, even 12 m/s in the mountain area and at seashore.

The cold air mass extended above most of the regions, therefore, the maximum temperature was quite modest: 17-18°C in Crisana and Maramures, 20-22°C in Banat; these values are up to 6-7°C under the normal values of the multiannual-climate media values. In the north of Moldavia there weren't more than 14-15°C; also, in Oltenia and Muntenia only isolated the temperature reached 25°C.

All these, excepting the Danube Delta and the seashore, where the cold air mass got only in the evening. Under these circumstances, here were registered temperatures even over 30° C at noon.

In the echotop radar image taken at the that hour it was seeing a decreasing of the upper limit of clouds, which no longer surpassed 4-5 km in hight, while the most active and intense part of the cloudy system was still developing and had some very strong nucleus, which grew in altitude up to 11-12 km at the eastern border with The Republic of Moldavia.

In the evening, at local hour 21.00 (18.00 UTC), in the satellite image from picture number 14, the atmospheric front had already crossed over our country and moved towards the eastern basin of the Black Sea. There was only one cloudy system above Maramures, with the upper limit at about 5 km altitude.



Fig. 7 Synoptic chart Romania 5th of July 2007 02 UTC N.A.M



Fig. 9 Radar echotop 5th of July 2007 02 UTC N.A.M.



Fig. 8 Infrared clouds coverage 5th of July 2007 02UTC METEOSAT 8



Fig. 10 Synoptic chart Romania 5th of July 2007 06 UTC N.A.M.



Fig. 11 Infrared clouds coverage 5th of July 2007 06UTC METEOSAT 8



Fig. 12 Radar echotop 5th of July 2007 06 UTC N.A.M.

The map in picture number 13 shows a good weather in almost all over the country, with more clouds only at the mountains and in the extreme north, where was registered a rainfall at the Sighetu Marmatiei meteo station. The wind was still powerful at the mountains and in the extracarpathian regions due to the dynamic increase of the atmospheric pressure into the cold air mass which moved along at the back of the atmospheric front.



Fig. 13 Synoptic chart Romania 5th of July 2007 18 UTC N.A.M.

Fig. 14 Infrared clouds coverage 5th of July 2007 18 UTC METEOSAT 8

In pictures number 15 and 16 are represented the maps containing the quantities of precipitations registered every 12 hours on 5th of July 2007. These values show lavish rainfall in the Western Plain and Hills, also in the Occidental Carpathians, with values of 57 l/m² in Satu Mare, 43 l/m² in Oradea and Chisineu Cris, 40 l/m² at Supuru de Jos, 104 l/m² at Stâna de Vale, 29 l/m² at Siria. The foehn effect is also obvious: in the east of Apuseni Mountains there were only 7 l/m² at Baisoara and 5 l/m² at Alba Iulia.



Fig. 15 last 12 hours precipitationquantities 5th of July 2007 06 UTC N.A.M.



Fig. 16 Last 12 hours precipitation quantities 5th of July 2007 18 UTC N.A.M.

The presence, the orientation and the masivity of the Carpathian chain determine an orographic barrier effect, especially for the advection of the air from west and north; the consequence is that the West Plain and Hills and also the west slopes of the Apuseni Mountains have a more wet climate than the south and east parts of Romania, where the continental climate is prevalent.

In west of Romania, the heavy rainfalls are determined by the very active western or north-western air circulation, often the Jetstream, which quickly brings along the polar masses above these regions, without being affected by the continentalization process. Most of these situations are being determined by the extension towards the center of the continent of the anticyclonic ridge of Azoric origine (almost 40%), but also by the evolution of the Islandic atmospheric depression or of their troughs towards south-east Europe (almost 25%), while the mediteranean cyclones have a lower value (20%) because of the orographic barrier represented by the Meridional Carpathians.

The orographic conditions have a great influence over the atmospheric fronts, especially when it comes to the cold fronts, so, the biggest amount of rainfall is registered in the central area of the Apuseni Mountains.

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