JULY 26TH 2007 SEVERE STORM IN BUENOS AIRES CITY: LESSONS LEARNED

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I. INTRODUCTION

In July 26th 2006 a severe storm accompany by heavy precipitation and hail of considerable size was observed in Buenos Aires city, Argentina. Regarding the size of the hail observed (from 5 to 8 cm of diameter) and the degree of property damage that result from it, this episode was the first of its kind ever registered in the city. This event presented the need to make a revision of stability index in this particular location to account for the possibility of large hail precipitation as well as a climatology of hail storms ever observed in the city.

Some of the hail stones observed in the 26th July storm that affected Buenos Aires city

II. DATA AND RESULTS

In Fig.1 the vertical profile of the pre storm environment for the hail storm that impacted in Buenos Aires city is shown. This kind of text book sounding wasn't found in other events where storm and hail, although of smaller dimensions, occurred in the city in the period of study 1995-2006.

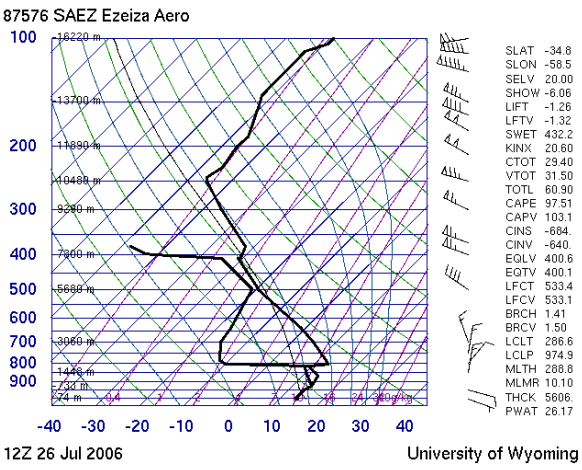

Fig.1: Vertical sounding for the hail storm in Buenos Aires City on July 26th 9 am (7 hours prior to the event).

The striking characteristics of this sounding were, among others, the Sweat Index value (570.7, estimated for the South Hemisphere), the Total Total Index value (60.9) and the dry layer in middle to lower levels. Finally what was so peculiar about it on first sight was the time of the year that it happened, winter. Looking into the last 30 years of data where hail was reported in the city produced the annual cycle that is shown in Fig. 2. From October to February there is maximum while a very marked minimum is observed during April to June. This correspond well with circulation patterns that favours the formation of organized convections, for example the penetration of the Low Level Jet in the months of spring and summer along with the migration to the south of the South Atlantic semi stationary High. The case discussed above which occurred in winter was not characterized by a very unstable air mass (θ_e of 325K) but for a build up in the previous days of humidity in the middle and lower layers. This case was also characterized by a cold advection in low levels prior to a cold front passage and the deepening of the thermal low north west Argentina which increased the advection of humidity to the region. Figure 3 shows in the upper panel the 850 hPa geopotential and temperatures fields for the night before the storm. The lower panel shows the 850 hPa humidity and wind fields.

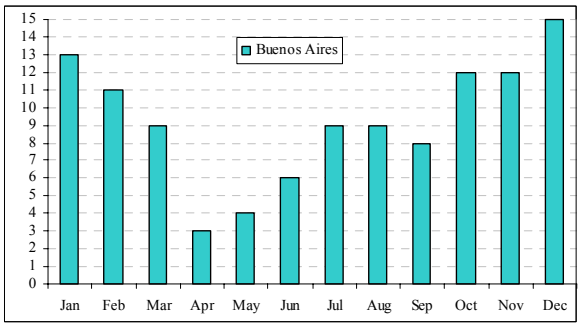

Fig. 2: Number of cases of hail producing storms that were observed in the period 1976-2006 in Buenos Aires city.

A retrospective study was made to quantify the association of stability indexes with storm occurrence in Buenos Aires during the period 1989-2006. Sweat Index case is shown in Table 2 while the Total Total Index case is shown in Table 3. The number of cases with the highest values of Sweat and TT indexes are very low, 11 and 16 respectively. The statistics show that they are associated with storms in most of the cases. Because radar and satellite images, as well as high resolution NWP are usually available there is a tendency to overlook these parameters. When storm initiation is detected by remote sense instruments or in situ observations the study of the soundings and their parameters should give hints in advance of the potential severity of the storms. Nevertheless these indexes are not

bullet proof as the lower end of the tables indicates. Many storms don't show their potential of severity on the indexes.

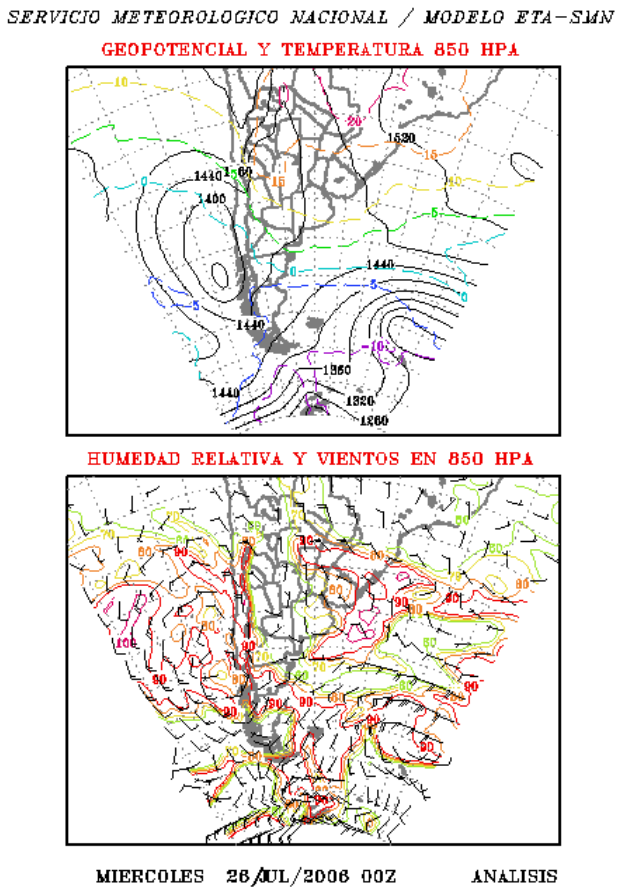

Fig.3: 850 hpa Analysed fields 15 hours prior the storm. Upper panel: Geopotential and Temperature. Bottom panel: Relative Humidity and Wind

III. CONCLUSIONS

When a unique event for a particular location occurred they are not generally forecasted in their full extent. The cost of giving a false alarm is very high and unjustified when revising the statistics for the region.

But once they occurred we have the chance to look back and learn. In this paper I make a revision of the hail storm that was registered in Buenos Aires City which was the first of kind ever observed in this location. In this case radar images were available in real time and warnings were issued. Nevertheless what happened later that day was unthinkable. The sounding and the calculation of the stability indexes were key players in the forecast of the event.

TABLE 2: Number of storm cases according the Sweat Index value

Storm occurrence	Number of cases	Sweat Index	Porcentage
10	11	>400	90,9
89	143	250-400	62,2
108	202	200-250	53,5
179	392	150-200	45,7
216	816	100-150	26,5
169	1293	50-100	13,1
73	688	< 50	10,6

TABLE 3: Number of storm cases according the Total Total Index value

Storm occurrence	Number of cases	Total Total Index	Porcentage
14	16	> 55	87,5
25	39	50 a 53	64,1
83	144	47 a 50	57,6
156	291	44 a 47	53,6
314	994	41 a 44	31,6
252	2060	< 44	12,2

IV. AKNOWLEDGMENTS

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