VERIFICATION OF METEOROLOGICAL WARNINGS AFFECTNG BUENOS AIRES CITY

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1. INTRODUCTION

Constant monitoring and surveillance of meteorological systems is what allows the National Weather Service (NWS) of Argentina to elaborate and issue Meteorological Warnings (MW) when the possibility of severe weather is foreseen. Once a warning is issued, it is updated in general every 6 hours or less depending on the evolution of the weather system. This work shows the current status of Warnings through the study of those issued for Buenos Aires City (BA) and surroundings in two years, from 1-DEC-2009 to 29-FEB-2012. Buenos Aires is located in Argentina, South America, 34.5°S 57°W, and on the east faces La Plata River. It has subtropical weather, with the four seasons clearly differentiated.

2. METHODOLOGY AND RESULTS

The period considered includes 3 summers and 2 winters/springs/autumns. The MW that includes Buenos Aires are discriminated in two types: I) the MW is issued for the first time for a region not surrounding BA but later is included in the MW, and II) MW that have their origin in BA itself (MW-BA). The number of MW issued in the period where in total 185, while those MW-BA account to 29. The later is particularly explored in this paper because they are usually the ones with less prewarning time and were usually little or no severe warning signature is visualize timely in weather maps (Table 1), and in consequence they constitute a challenge to any forecaster. The same applies to any severe weather occurring in any part of the country. On the other hand cases were intense precipitation was observed in BA, defined here as more than 40mm/6hours, MW are studied as well.

Table 1: Pre warning time of MW initiated in BA (only hits are considered)

Pre-warning hours	N° of Warnings
0	**9**
3	**4**
6	**5**
9	1
12	3
18	1
21	2

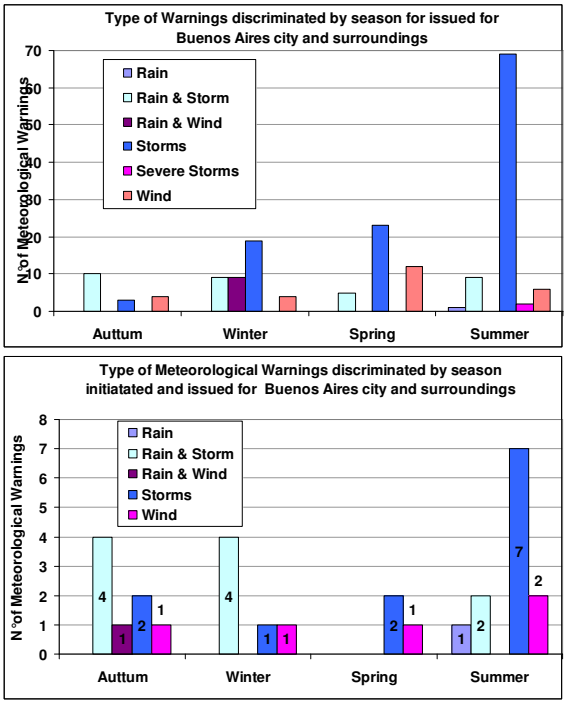

Figure 1: Distribution of Meteorological Warnings by season (top) affecting Buenos Aires City in the two years period of study, 185 total. The bottom panel shows the MW initiated in Buenos Aires, 29 from the total MW.

The distribution of MW by type and season are shown in Figure 1. It is evident from the figure that those MW related to Storms (and severe weather associated to convection) is the most common feature all year with a maximum in summer, while Wind and

Rain&Storms follow. Overall those related to convection are the ones that predominate in BA.

From these 29 cases describe above, only 4 (14%) cases where verified as false alarms. But those cases shown in Table 1 that presented less than 3 hour of pre warning time could be considered surprises. So in total the effectiveness of the warning is reduced considerably. It's worth mentioning here that the NWS of Argentina issues Nowcasting warnings based on radar and satellite monitoring and that they complement the MW system. This type of warnings are not explore in this paper.

Station / Date	St 1	St 2	St 3	St 4	St 5	St 6	St 7	Met. Warning
30/01/2010	41							NO
03/02/2010				41				YES
06/02/2010	54	46				57		YES
16/02/2010		92						YES
20/02/2010	69	75	97	91	55	50	59	YES
22/02/2010				40				YES
23/02/2010						47		NO
24/05/2010	62	58	78	100		65	49	YES
30/07/2010						40		NO
23/11/2010			45					NO
12/12/2010	50							NO
19/01/2011	47	48			55	57		YES
18/02/2011			60					NO
20/02/2011	77	68	40					NO
16/06/2011						47		NO
23/06/2011	41	43						NO
12/08/2011				55				YES
02/02/2012	84	65						YES
03/02/2012	60							YES
08/02/2012		49						YES

Table 2: Observed precipitation greater than 40mm/6hs in the area of study (includes 7 weather stations) and in the period defined in this paper. The last column indicates were a MW was issued or not

The City of Buenos Aires is highly susceptible to intense precipitation events. Over the last two years several events of this type occurred. If those days are considered, as shown in Table 2, it's possible to evaluate the performance of the MW system. Intense rain is defined here as greater than 40mm accumulated in 6 hour. The last column of Table 2 indicates were a MW was issued or not. 9 of the total 20 cases where not included in any MW. Most of them involve only 1 station (of 7 in an area of near 100km^2) giving indication of the extreme localization of the convection. From the 11 cases that were effectively under a MW, 7 of such MW were initiated in BA, which is a desirable result of the forecast system. The most important case missed by the forecast system is that of 20/02/2011 were the convection was more organized and intense rain was observed in 3 stations. This case in particular took part of a nowcasting warning.

3. CONCLUTIONS

The City of Buenos Aires is highly affected by intense or strong weather that is reflected on the high number of MW issued for the area. Most of the MW occurred in summer and are related to storms (associated with hail, or wind gusts, or intense rain, or lighting, or all the above). The verification of MW-BA resulted in a low number of false alarms, 14%, but if cases where pre warning time was less than 6 hours this number a high rate of "misses" is found. To complete this last statement, dates with intense observation observed during the period of study were considered, and from this point of view the number of significant misses resulted only in 1/20, 5%.

For a better and effective Warning System it's desirable to achieve longer pre warning times and reduce significantly the "misses". The Nowcasting Warning System is a necessary tool that helps isolate and discriminate specific severe weather and localization of such. Alerting the public is a very difficult task given the little time between a warning and the episode. In this sense a MW should be available in advance.

4. BIBLIOGRAPHY

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