Rainfall Short-Term Forecast in the Surveillance Area of São Paulo Weather Radar

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INTRODUCTION

The forecast of rain the very short term is very important especially in very populated areas, helping to reduce fatalities caused by tornadoes, storms and floods, and prevent major damage to different sectors of society as the private, industrial, transportation and agriculture.
OBJECTIVE

Evaluate of the rainfall nowcasting within the surveillance area of São Paulo weather radar for different types of precipitating systems, mainly the are associated to floods and landslides in Metropolitan Area of São Paulo, was carried out with an 2D wind advective scheme and rainfall rates estimated by radar. The third-order upstream numerical scheme was used with a uniform wind vector.
- Urbanization
- Soil cover
- Heat Island
- Deeper convection over MASP

Source: www.oesteinforma.com.br
Geographical location of the São Paulo weather radar.

- 240 Km
- 33 elevations every 5 minutes
- Horizontal resolution of 2 km x 2 km
- Band S (10 cm)
- Relation $Z=200R^{1.6}$ of Marshall & Palmer (1948)

The rainfall short-term forecast was made from the displacement vector of the precipitating system, obtained by the method SHARP (Short - Term Automated Radar Prediction) developed by the group of meteorology at McGill University and also used by the Sao Paulo Weather Radar.

Linear extrapolation of radar echoes for up to 3 hours of constant displacement vector prediction with keeping the same structure of precipitation.
# Precipitating Systems

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<th>Weather Systems</th>
<th>Ocurrence</th>
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<td>Cold Fronts</td>
<td>May to October</td>
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<td>November to December</td>
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<td>Squall lines</td>
<td>February, October and November</td>
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<td>Ordinary Convection</td>
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<td>Sea Breeze</td>
<td>December to March</td>
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Rainfall rate threshold 20 mm/h

Number of convective and stratiform events between 2004 - 2005.
Comparison between radar and advective scheme

Field of precipitation accumulated by the São Paulo weather radar (left) and predicted by the advective scheme (right) for 30 minutes, for an event Dispersed Bands of April 21, 2005 at 07:47 (UTC). Latitudes, longitudes, and geographic contours including the Sao Paulo Weather Radar and Metropolitan Region of São Paulo MRSP and municipalities are indicated. The color scales indicate the rate of precipitation (mm).
Field of precipitation accumulated by São Paulo weather radar (left) and predicted by advective scheme (right) for Squall lines of September 19, 2004 at 20:47 (UTC) for 30 minutes.
Radar Advective Scheme

60 minutes

90 minutes
CONCLUSIONS

- The advective scheme showed better performance of the lowest to the highest accumulations of precipitation. As for systems with more organized structure of precipitation (LI) or stratiform (FF);

- Systems with morphological structure more homogeneous and more organized precipitation can be advected for a period exceeding 90 minutes. And convective systems 60 and 90 minutes (in the case of convection organized).