ASSESSMENT OF SATELLITE PRECIPITATION ESTIMATES OVER THE SLOPES OF THE SUBTROPICAL ANDES

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MOTIVATION

Mountainous regions:
- Precipitation has a critical role in regulating the hydrological cycle.
- Low density of surface data.
- Snow detection problems.
- Major challenge for satellite products.

OBJECTIVE

Evaluate the performance of 24-hour accumulated precipitation estimates available on the subtropical Andes, analyzing the complexity of the area and differences between warm and cold season.

SATELLITE PRECIPITATION ESTIMATES

<table>
<thead>
<tr>
<th>Estimate</th>
<th>Resolution (UTC)</th>
<th>Type</th>
<th>Reference</th>
<th>Coverage-period</th>
</tr>
</thead>
<tbody>
<tr>
<td>3B42 RT (NASA)</td>
<td>0.25°-3 h</td>
<td>IR-PMW</td>
<td>Huffman et al. (2007)</td>
<td>Global/2000-2010</td>
</tr>
<tr>
<td>3B42 V7 (NASA)</td>
<td>0.25°-3 h</td>
<td>IR-PMW-PR OBS (monthly)</td>
<td>Huffman and Bolvin (2016)</td>
<td>Global/1998-2010</td>
</tr>
<tr>
<td>CHMORPH (NAAI)</td>
<td>0.25°-3h</td>
<td>IR-PMW</td>
<td>Joyce et al. (2004)</td>
<td>Global/2002-2010</td>
</tr>
<tr>
<td>HYDRO (CPTEC)</td>
<td>4 km-30 min</td>
<td>IR-PMW</td>
<td>Scofield and Kuligowski (2003)</td>
<td>South America/2003-2010</td>
</tr>
<tr>
<td>IMERG IR (NASA)</td>
<td>0.1°-30 min</td>
<td>IR-PMW-DPR</td>
<td>Huffman and Bolvin (2015)</td>
<td>Global/2015-2016</td>
</tr>
</tbody>
</table>

RESULTS FOR THE STUDY PERIOD OF 7 YEARS

- 3B42 V7 shows a better performance in the coldest and wettest season JJA.
- The analysis taking into account the terrain elevation shows an underestimation of the estimates to low land elevation and overestimation at higher altitudes. HYDRO estimates based on IR data, do not show a dependency of the errors with the topography and improves its performance in JJA, as 3B42 V7.
- A marked level of underestimation of the estimates is shown windward of the terrain, which could be associated with a development of precipitation from warmer clouds; a slight overestimation is shown at higher elevations for data estimates using microwave and could be linked to the limitations of these products in areas covered by snow; and the best results were found downwind of the terrain, where the nature of convective precipitation reduces errors in satellite estimates.
- In the future, it is necessary to generate correction factors considering areas of solid precipitation and cold brightness temperature thresholds appropriate to the nature of clouds in mountainous regions.
- The quality of the new IMERG products from GPM was evaluated for the matching period available and resulted in more optimal values in the statistical indices.

CONCLUSIONS

- 3B42 V7 gets better results in both seasons in comparison with the other estimates analyzed in the entire study period of 7 years.
- The results indicated a better performance of estimates in the coldest and wettest season JJA.
- The analysis taking into account the terrain elevation shows an underestimation of the estimates to low land elevation and overestimation at higher altitudes. HYDRO estimates based on IR data, do not show a dependency of the errors with the topography and improves its performance in JJA, as 3B42 V7.
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