Verification of hourly precipitation using OPERA dataset

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Spanish Met Service - AEMET
Hirlam/Aladin All Staff Meeting
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Introduction

The objectives of OPERA are:

- to provide a European platform wherein expertise on operationally-oriented weather radar issues is exchanged;
- to develop, generate and distribute high-quality pan-European weather radar composite products on an operational basis.

Odyssey, the OPERA Data Centre, generates and archives composite products from raw single site radar data using common pre-processing and compositing algorithms.

Odyssey creates 3 composite products:
- Instantaneous Surface Rain Rate
- Instantaneous Max Reflectivity
- 1 Hour Rainfall Accumulation
Using OPERA as pseudo observations to verify NWP deterministic models:

- **ECWMF**
  - 00, 06, 12 & 18 UTC runs
  - 12, 24, 36 & 48 h fcst – 3 h accumulated precipitation
  - Verification domain – Europe

- **AEMET – Harmonie operational model**
  - 00, 06, 12 & 18 UTC runs
  - 12, 24, 36 & 48 h fcst – 1 h accumulated precipitation
  - Verification domain – Iberian Peninsula

- **AEMET – gSREPS individual members**
  - 00 & 12 UTC runs
  - 36 h fcst – 3 h accumulated precipitation
  - Verification domain – Iberian Peninsula

- **Period 2016120100 - 2017013123**
\( S = 0 \)
\( A = 0 \)
L small

\( S > 0 \)
\( A = 0 \)
L medium

\( S = 0 \)
\( A = 0 \)
L large

\( S = 0 \)
\( A = 0 \)
L large

\( S >> 0 \)
\( A = 0 \)
L medium

Davis et al. 2006
AEMET Harmonie Det - OPERA

H+12   H+24

Acc. Precip. 1h
00,06,12 & 18 UTC

Iberian Pen.

H+36   H+48

Hirlam/Aladin All Staff Meeting
HYDROP is a pseudo precipitation product from AEMET radar network calibrated with AEMET precipitation observations in real time.


Using HYDROP as pseudo model validated using observations from the AEMET automatic station network

Obs: 1, 3, 6, 12 and 24 hours accumulated precipitation

Period 2016120100 – 2017013123

Converting hdf5 format to grib

More observations than OPERA
Example - HYDROP

Acumulación horaria 1HR_SRIM –07:00 Z

Acumulación horaria 1HR_SRIM_PLU –07:00 Z

Credits: Jose Miguel Gutierrez - AEMET
Validation – OPERA / HYDROP

- Using OPERA/HYDROP data as pseudo model validated using observations from the AEMET automatic station network

- Obs: 1, 3, 6, 12, and 24 hours accumulated precipitation

- Period 2016120100 – 2017013123

- Converting hdf5 format to grib
• AEMET automatic station network.

• Acc. Precip. 1 h, 3 h, 6 h, 12 h and 24 h.

• A lot of no-data.

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<tr>
<th>OPERA</th>
<th>2016120100</th>
<th>2017013123</th>
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<td>E3</td>
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OPERA – Obs – Acc Precip 1 h

OPERA 2016120100 2017013123 --> E1 --> # = 678425 -- bias = -0,05 -- rmse = 1,02
OPERA 2016120300 2016120600 --> E1 --> # = 678425 -- bias = -0,05 -- rmse = 1,02
Precip mm/10’ – Obs 6069X
## OPERA_ZMAX – Obs - Monitoring

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OPERA_ZMAX – Obs – Acc Precip 1 h

OPERA_ZMAX 2016120100 2017013123 --> E1 --> # = 690018 -- bias = 0,10 -- rmse = 2,38
99500 36,5°N 5,0°W 78,00
OPERATION – Obs – E1 - 2016120409

Operazione 1Hr PRECIP: DATA: 20161204 HOUR: 0900

Obs 99500 36,5 N 5,0 W 78,00
Obs. AEMET+IPMA - 2016120409 - zoom

99500 36,5 N 5,0 W 78,00
Conclusions

- Precipitation from Radar Reflectivities are smaller than observations.
- Precipitation based in Z_MAX also improves maximum amounts but scores are further worse on average (double penalty).
- Still too early to use in NWP and EPS verifications.
- But spatial (~2 Km) and temporal (1 hour acc. Precip. Every 15 minutes) resolutions, and domain (whole Europe) make this product very useful (when improves) for Mesoscale Models validation.
- Having precipitation data in spatial structures is more convenient for mesoscale verification methods (SAL) than having pointwise observations.