PGE04-MSG
Precipitating Clouds Product

Presented during the NWCSAF Product Assessment Review Workshop

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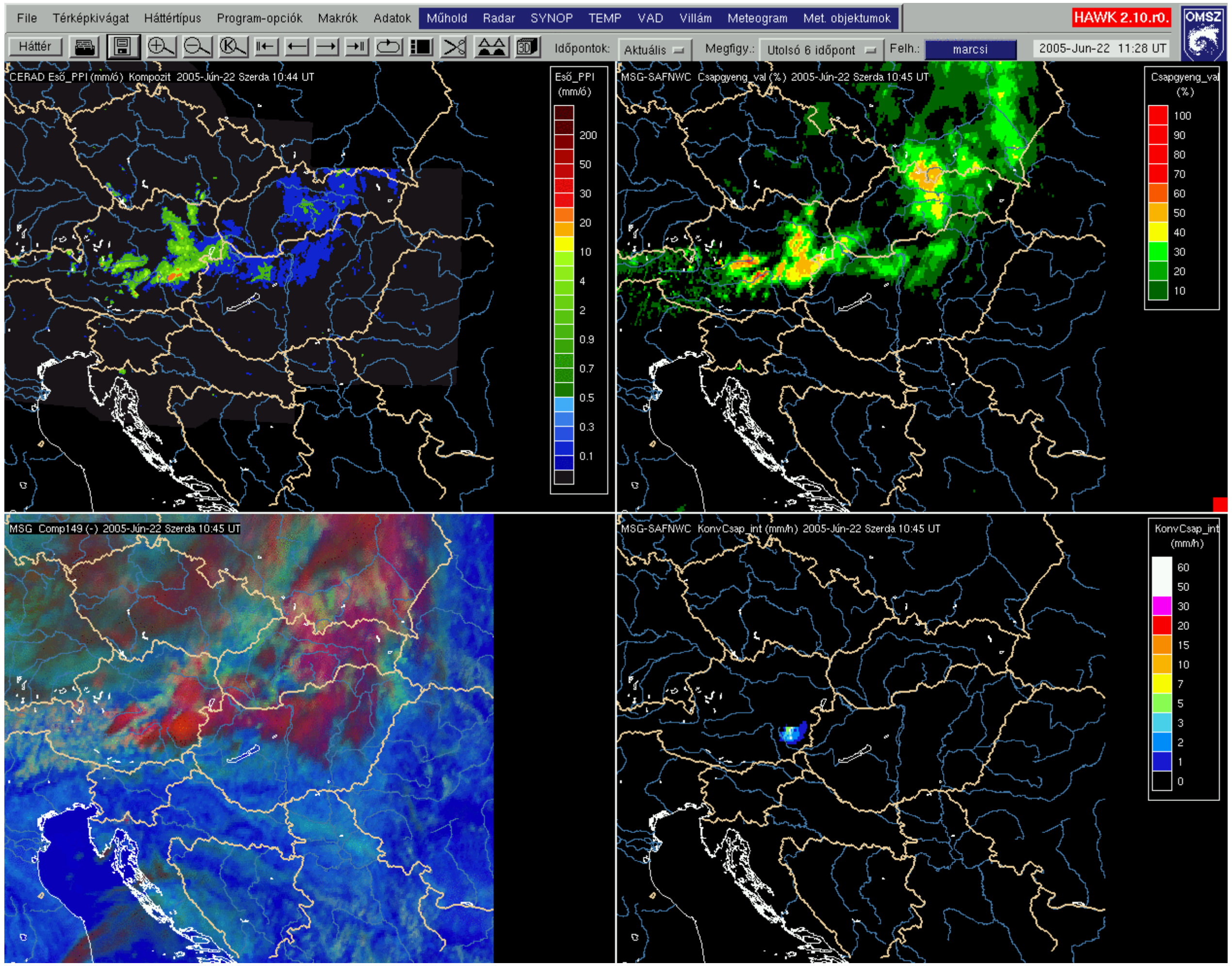
Example of Precipitating Cloud Product



PC output: Likelihood of precipitation

10%

20%

30%

40%

50%

60-100%

22 June 2005 10:45UTC

SAFNWC/MSG v1.2
Radar composite (upper left)
PC day algorithm (upper right)
RGB14r9 (lower left)
CRR (lower right)

(Courtesy of HMS, M. Putsay)

Product and verification history

- V1.0/1.1: algorithm derived from AVHRR algorithm coefficients tuned on BALTRAD radar, 2 intensity classes, but obvious that 2 classes could not be resolved
- V1.2: tuned with MSG data on European SYNOP current weather report (WW), only total precipitation likelihood.

  verified against 1 year French and one year Hungarian rain gauge data
- V1.2F: different tuning of 1.2 algorithm coefficients on french gauge data, verified against one year of Hungarian gauge data.

Performance v1.2 – subjective -

- Extend of precipitation generally overestimated
- Day and night algorithm still discontinuous
- Day algorithm outperforms night algorithm
- Problems at low sun: underestimation of precipitation
- Performance depends on synoptic situation:
  - isolated convection OK
  - weak fronts often usefull
  - strong fronts useless (fronts visible but precipitation quite uniform over all frontal cloud system)

Verification method

Classification into rain/norain performed at fixed likelihood thresholds:

	Satellite rain	Satellite no rain
Gauge rain	Hits	misses
Gauge no rain	False alarms	Correct negatives

Scores presented:

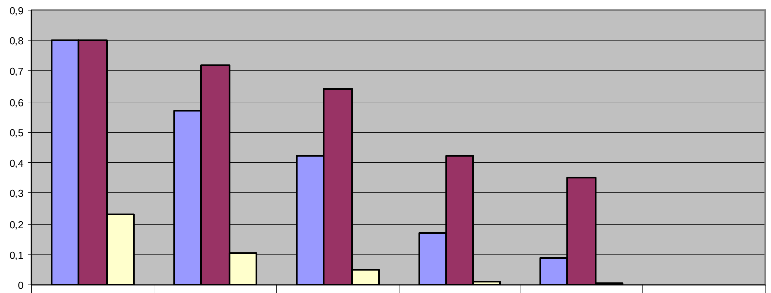
Probability of detection:
POD=hits / (hits+misses)

False alarm rate:
FAR=false alarms / (false alarms+hits)

Probability of false detection:
POFD=false alarms / (correct negatives + false alarms)

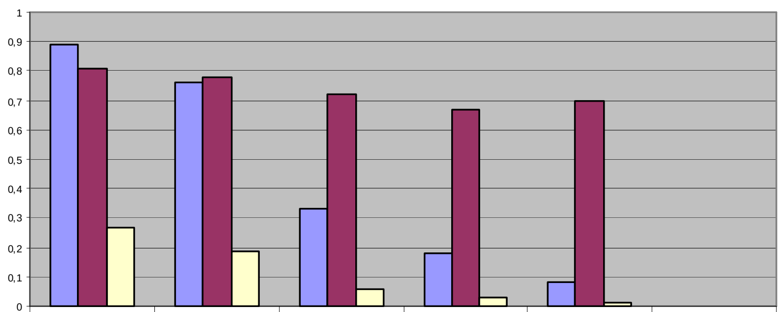
Algorithm performance v1.2 at different likelihood thresholds, reference: hungarian gauges 2004

DAY, v1.2



	10%	20%	30%	40%	50%	60%
POD	0,8	0,57	0,42	0,17	0,09	0
FAR	0,8	0,72	0,64	0,42	0,35	0
POFD	0,23	0,106	0,052	0,009	0,003	0

NIGHT, v1.2



	10%	20%	30%	40%	50%	60%
POD	0,89	0,76	0,33	0,18	0,08	0
FAR	0,81	0,78	0,72	0,67	0,7	0
POFD	0,27	0,187	0,06	0,027	0,012	0

Conclusions

Day algorithm: both POD and FAR decrease with more severe likelihood threshold for precipitation identification, but POD decreases more than FAR

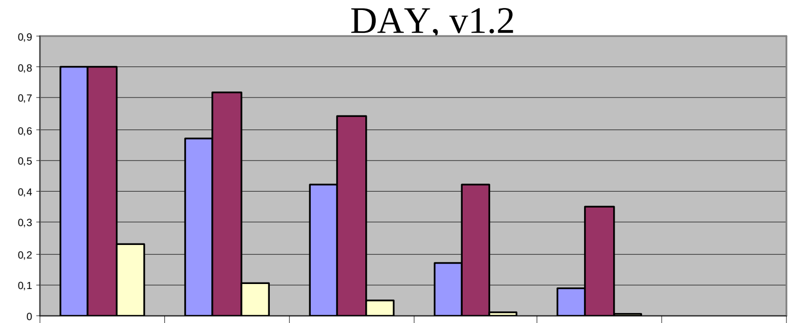
Night algorithm: both POD decreases similar as in day algorithm, but FAR remains almost Constantly high.

☹

Recommended threshold both day and night: **20%**

At this threshold the night algorithm outperforms the day algorithm!

Algorithm performance v1.2 day versus 1.2F day at different likelihood thresholds, reference: hungarian gauges 2004



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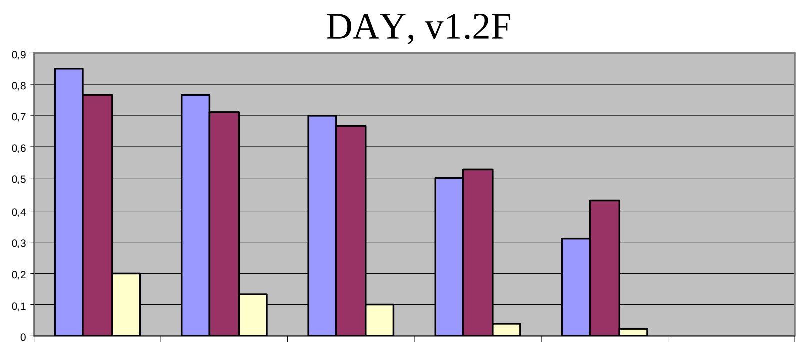
1.2F: tuned on French rain gauge data

Conclusions

As compared to v1.2 day, advantages of v1.2F are:

•Significantly higher POD at all thresholds ✪

•Up to 30% threshold is POD higher than FAR✪

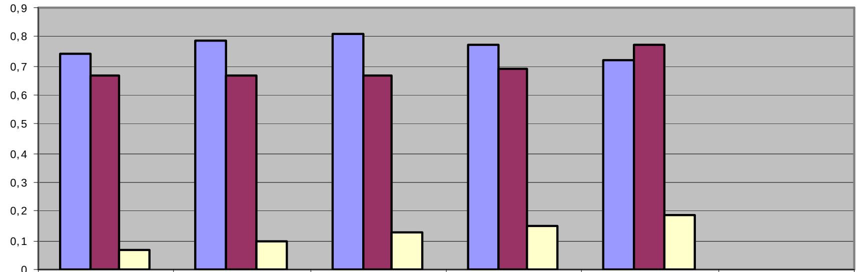


	10%	20%	30%	40%	50%	60%
POD	0,85	0,77	0,7	0,5	0,31	0
FAR	0,77	0,71	0,67	0,53	0,43	0
POFD	0,2	0,13	0,1	0,04	0,02	0

Recommended threshold for v1.2F day:
day algorithm better at 30%,
At 20% similar to night algorithm

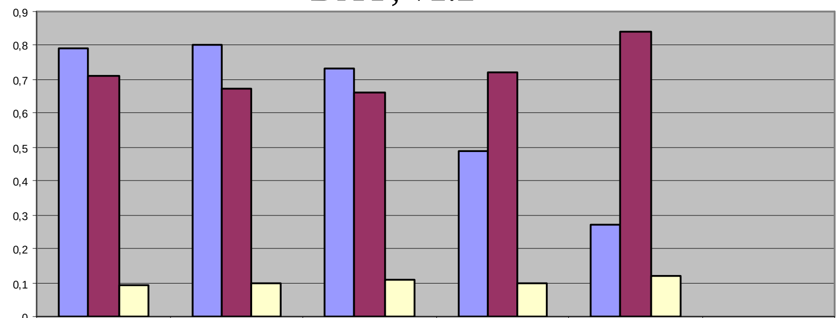
Algorithm performance at different sun zenith angles, reference: hungarian gauges 2004, likelihood threshold 20%

DAY, v1.2F, gauge tuned



	0-40	40-50	50-60	60-70	70-80
POD	0,74	0,79	0,81	0,77	0,72
FAR	0,67	0,67	0,67	0,69	0,77
POFD	0,07	0,1	0,13	0,15	0,19

DAY, v1.2



	0-40	40-50	50-60	60-70	70-80
POD	0,79	0,8	0,73	0,49	0,27
FAR	0,71	0,67	0,66	0,72	0,84
POFD	0,09	0,1	0,11	0,1	0,12

Conclusions

Day algorithm 1.2F gauge tuned:
No pronounced angular dependence ✪

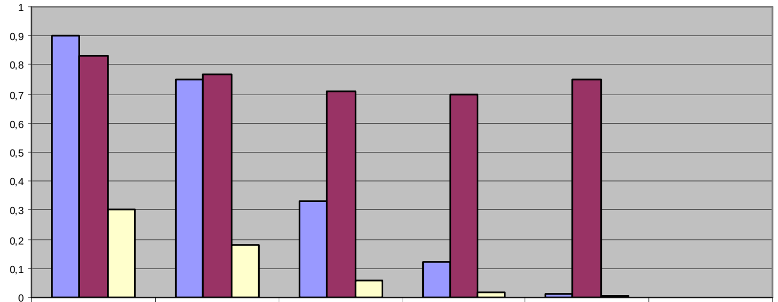
Day algorithm 1.2: pronounced angular dependence ☹

Gauge tuned day algorithm clearly outperfoms v1.2!

SAF NWC SMHI

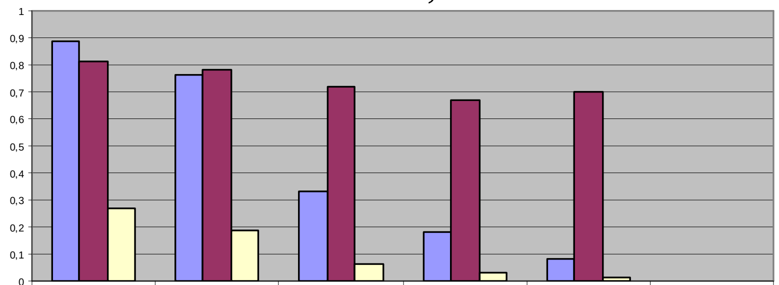
Algorithm performance v1.2 night versus 1.2F night at different likelihood thresholds, reference: hungarian gauges 2004

NIGHT, v1.2



	10%	20%	30%	40%	50%	60%
POD	0,9	0,75	0,33	0,12	0,01	0
FAR	0,83	0,77	0,71	0,7	0,75	0
POFD	0,305	0,18	0,056	0,02	0,003	0

NIGHT, v1.2F



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POFD	0,27	0,19	0,06	0,03	0,01	0

1.2F: tuned on French rain gauge data

Night algorithms v1.2 and v1.2F:

Comparable performance

Summary

- New gauge tuned coefficients give much better performance during day than current 1.2 algorithm.

Installation: replace current auxilary data directory for PGE04 with update (soon available on helpdesk)

- Problem with day-night discontinuity not solved, night algorithm inferior

- Product useless for strong fronts (no hope for improvement when considering spectral features only)

Outlook for 2.0

- Investigate how much the night algorithm can be improved by using 3.9μm channel
- In case of significant improvements for night, the scheme would have to be split in day/ twilight/ night
- It is however not likely that discontinuities between day/ twilight/ night would be less than in v1.2 between day and night.