Review of verification activities and developments

Clive Wilson – for Expert Team on diagnostics, validation & verification

30th EWGLAM/15th SRNWP meetings – Madrid 6-9 Oct 2008

Contents

- EUMETNET programme proposal
- Joint workshop with 4th workshop of WWRP/WGNE working group on verification

  Helsinki, 8-11 June 2009
- Consortia activities
- Plans

Expert Team on diagnostics, validation & verification

- Members
  - Clive Wilson (chair), Joel Stein, Carl Fortelius, Francis Schubiger , Dijana Klaric
- Additional members
  - Marek Jerczynski, Alexander Kann , Andrea Raspanti, Ulf Andre
  - (Nigel Roberts, Marion Mittermaier)

Deliverables of EUMETNET/SRNWP proposal

- **D1: Operational verification comparison of one version of each of the 4 regional models of Europe (available for all the participating members).**
- **D2: Additional intercomparison of other versions of the consortia models including high resolution models**
- **D3: Inventory and recommendations of “new” scale-selective verification methods.**
- **D4: Catalogue of sources of non-GTS data.**

Deliverables D2, D3 , D4

- D2. Add more models/configurations including higher resolution forecasts to intercomparison
- D3. Methods/code for high resolution forecasts
  - Collaborate on investigation of new methods
  - Provide/exchange code for new methods
  - Enable access to radar composites (OPERA)
- D4. Non-GTS data
  - Catalogue sources
  - Publicise verification studies

Responsible member duties

- Model Intercomparison
  - organise the exchange of forecasts from the 4 reference models
  - coordinate the participating verification centres
  - verify the reference models using its verification package
  - produce the graphics and compute the consensus verification scores
  - maintain up-to-date the model intercomparison pages on its web site
  - store on its computer system all the verification results
- Use of the non-GTS observing data in verification
  - Establish a catalogue of data sources
  - Publicise verification studies and routine use of such data
  - motivate the NMS to provide their non-GTS observation data for verification use

Dates & Cost (per year)

- Start 1 November 2008 (delayed)
- End 31 October 2010 (2 years after start)
- Costs of the Responsible Member
  - 0.3 Full time equivalent scientist: € 30,000.-
  - Travel expenses of the 0.3 full time equivalent scientist: € 2,000.-
- **Total cost per year: € 32,000.-**

Joint workshop with WWRP/WGNE verification group

- Helsinki, 8-11 June 2009
- Pertti Nurmi (FMI) local organiser
- Focus on extremes & severe weather
- Ensembles/probabilistic verification
- Uncertainty & Value
- High resolution forecast verification
- Promote more focused user-oriented verification

Aladin verification activities

- Common verification package operational (Slovenia)
- Fuzzy, pattern recognition tests (Poland)
- Quasi-operational fuzzy methods (MeteoFrance)
  - $P_{neigbourhood}$, Brier skill
    - BSS_SO, BSS_NO (single o b or neighbourhood)
  - Used for prototype 2.5km AROME
- Radar + high res. Forecasts
  - Refelectivity – using AROME obs operator
  - Antilope project- 1km , 1h radar+ gauges

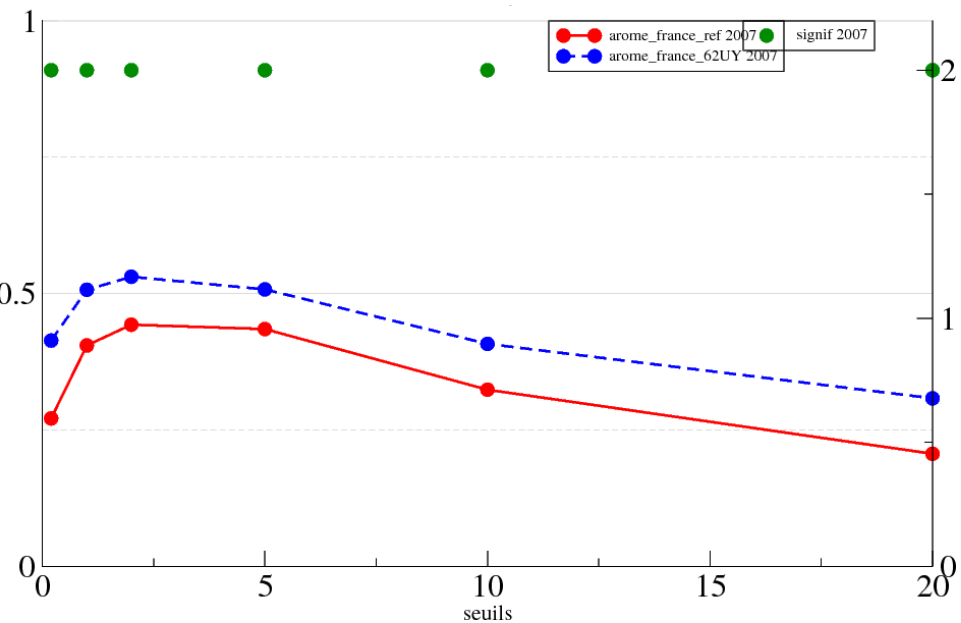
QPF verification during June 2007

(Joel Stein – Claude Fischer talk tomorrow)

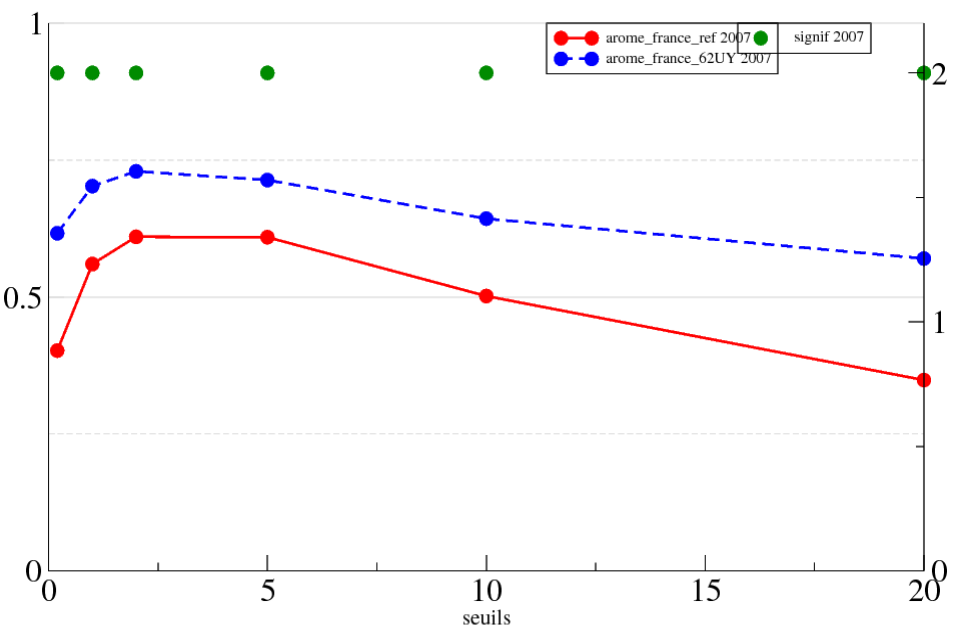
OLD AROME VERSION

NEW AROME VERSION

Brier skill score (SO) against persistence



Brier skill score (NO) against persistence



The size of the neighbourhood is 130 km

COSMO verification activities

- Common verification package VERSUS (see Adriano Raspanti's talk)
- Conditional verification in development
  - eg T_{2m} only for grid points with no cloud in obs and model
- Fuzzy verification -Ebert (13 methods) at DWD MeteoSwiss
  - MAP D-PHASE COSMO-7 v COSMO-2 (Marco Arpagaus)
  - Recommend Fractional Skill Score and Upscaling
  - DWD verification v radar (nearly) operational
- Collaboration with NCAR (Development test bed) & Australian Bureau of Meteorology

COSMO verification (contd)

- Common “global” score for COSMO models
  - Cf Met Office UK index
- Development of probabilistic forecasts & ensemble verification
  - Common scores
  - Include in common package

Hirlam verification activities

- Web portal for Hirlam-A
  - Verification scores, observation usage, diagnostics
  - Hirlam v Harmonie forecasts suites
  - Harmonised production & display
    - Meteograms
    - Field verification stats
    - Departure stats (Data assimilation)
    - Localised profiles & flux measurements
- HARMONIE ver package
  - Includes SAL - see talk by Carl Fortelius

SAL features

- ✓ **QPF in pre-specified area ⇔ [redacted]**
- ✓ **Three independent components addressing the quality**
  - **Structure - S -**
  - **Amplitude - A -**
  - **Location - L -**
- ✓ **For a perfect forecast: S = A = L = 0**
- ✓ More details of the method in

  Wernli, Paulat, Hagen, Frei, 2008 (MWR)

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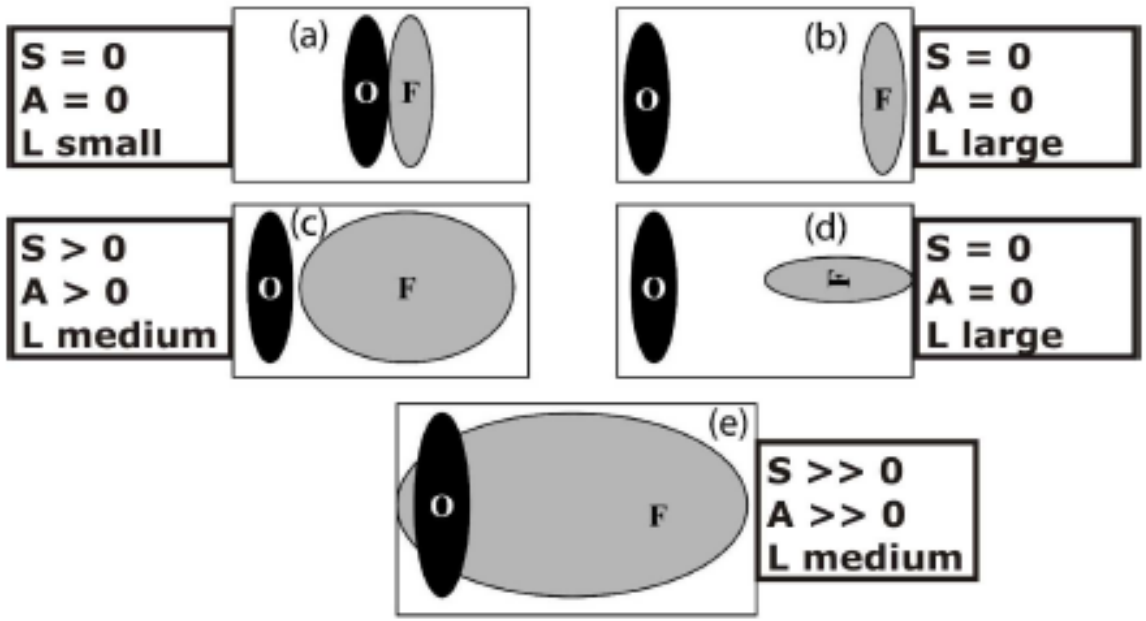
Structure,S, Amplitude, A, Location , L (=L_1+L_2)

Wernli, Paulat, Hagen, Frei, 2008 (MWR)



SAL features

S:	**Structure**	**-2**	**…**	**0**	**…**	**+2**
		objects too small or too peaked		Perfect		objects too large or too flat
A:	**Amplitude**	**-2**	**…**	**0**	**…**	**+2**
		averaged QPF under-estimated		Perfect		averaged QPF over-estimated
L:	**Location**			**0**	**…**	**+2**
				Perfect		wrong location of Total Center of Mass (TCM) and / or of objects relative to TCM

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http://fminwp.fmi.fi/WebgraF/RADAR/index.html?choice_ind=dBZ

PV doc | www-nwp/~meso/mes... | Mesoscale Model Dev... | Clive Wilson's home p... | LaTeX Documentation | Operational & Trial At... | @fcodes | Chambers Online Refe...

http://www-nwp/...xVerifProj.html | FC03TR - Severe weather verif... | Marion's World | Radar reflectivity Fig: Observ... | http://fminwp.fmi.fi/mastverifnew/

../ RADAR

dBZ

Variable

Simulated dBZ

Observed dBZ

Histograms

SAL scatter

Cycle

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12

Help

Resize

Send

Radar reflectivity

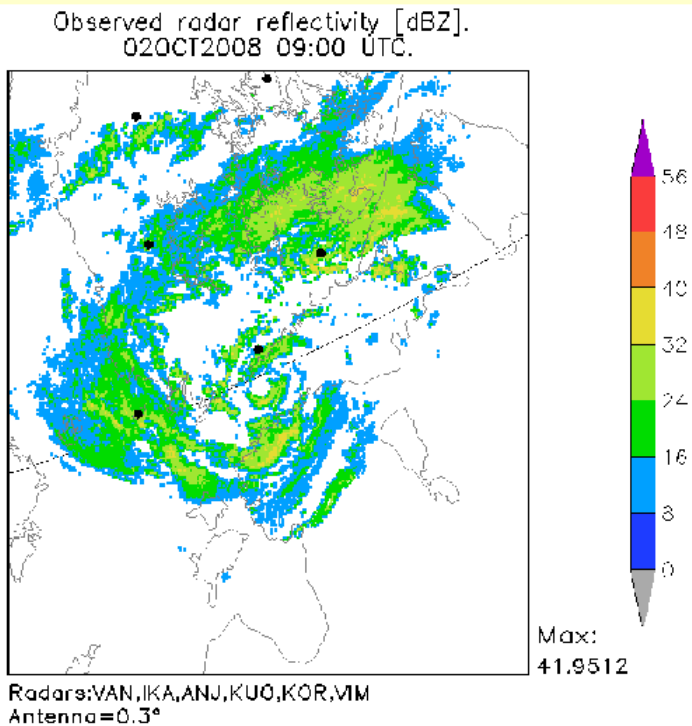
Hour 009

All Save Clear DEL

Observed dBZ;00;009

Radar reflectivity

AROME : 2.5km, 40 levels (cy32h2)



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SAL_monthly

Cycle

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12

Help

Resize

Send

SAL monthly verification

Period

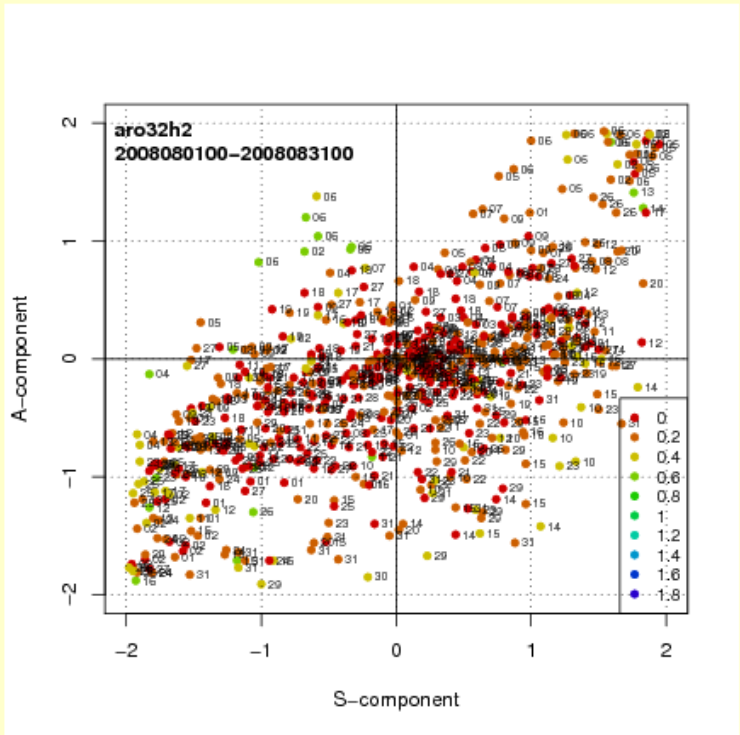
Aug 2008

All Save Clear DEL

Aug 2008;00

Radar reflectivity SAL verification

AROME : 2.5km, 40 levels (cy32h2)



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Hirlam verification (contd)

- GLAMEPS verification at AEMET
  - Multi-model
  - Rank histograms, PIT histograms, spread-skill, Brier SS, ROC, reliability, sharpness, RV
- FMI- Finnish radar reflectivity compared to high res forecasts using radar simulation model
  - SAL
  - RSM in HARMONIE soon
- Fuzzy – MOS, traditional scores (Kok)

Met Office verification activities

- Operational verification package extended for ensembles- MOGREPS
  - Reliability, rank histograms, ROC, Brier, value
  - Multimodel ensembles
- Fractional skill score (FSS) and intensity/scale (Casati) NAE & UK4
- Evaluation of new 1.5km
- Assessing OPERA European composite quality
  - Comparison against UK composite, DA test, continuity with NAE
- Moderate severe weather index for high impact events
- Review of warnings (Exeter University, Stephenson & Joliffe)

ET plans

- SRNWP EUMETNET comparison
  - Need Responsible member
  - Commitment to provide results from centres
- Helsinki workshop
- Agree on best (better ?) methods for high resolution forecast verification
- Link to operations – best methods of presenting forecasts