

Level 1 Test data needs of regional NWP and NWC users: Contribution to the discussion

Christina Köpken-Watts,
Data Assimilation, DWD

- Introductory remarks:
 - Relation of NWC and regional NWP
 - Satellite data in NWC and in (regional) NWP
- Test data
 - User groups
 - Test data types
 - Test data needs
- Summary

NWP

Established systems

NWC/VSRF

- Regional & convection resolving NWP
- Forecasts: 6 hours to 24-72h
- Resolution: ~5-7km to ~1.5–2.5 km
- Setup: ~3-6 hourly analysis updates
- Availability: 4-8 forecasts/day
at $\geq t_0 + 1-3h$

- Forecasts & warnings for 6-12h
- NWC focus: up to ~6h
- Input:
 - **Observations (conv./satellite) analysed & extrapolated**
 - NWP: last available run

Evolution

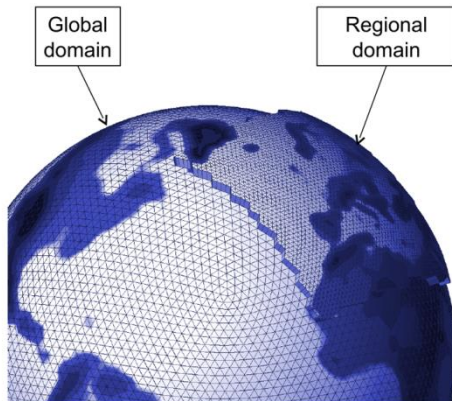
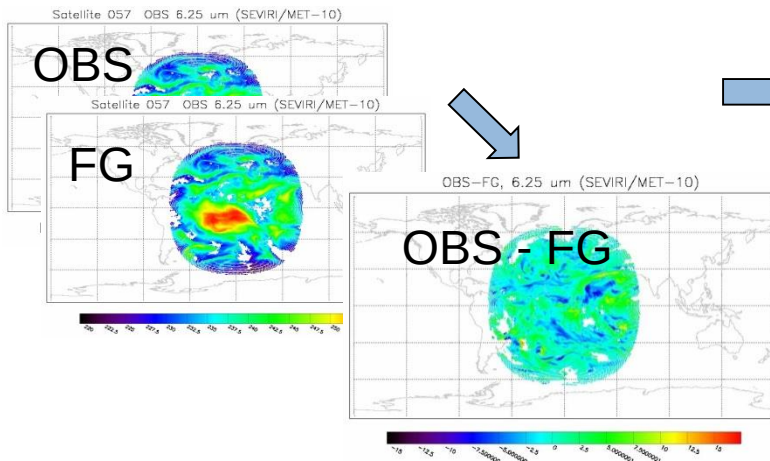
- Focus on **convection resolving NWP**
- Forecasts: 6 hours (to 48 h)
- Resolution: $\leq 1 - 1.5$ km
- RUC-setup: ≤ 1 hourly updates
- Availability: 24 forecasts/day
at $t_0 + 30$ min.
- Use of more remote sensing data
(radar/satellite/ground-based)

- Forecasts & warnings for 6-12h
- NWC focus: up to ~1-2h
- Input:
 - **Observations (conv./satellite) analysed & extrapolated**

NWP

Integrated
products





Successful assimilation of MTG-IRS data

→ will be key for both regional NWP
and NWC/VSFRF applications

→ needs (like global NWP):

- Fast forward model (RTTOV in practice)
- Stable SRF across detector array/in time
- Accurate calibration of data
- Understanding of biases
 - Analysis easier in global context

→ additionally requires:

- very high timeliness (similar to NWC)
- use of higher resolution data

Use of satellite data e.g. to:

- Complement radar data
- Analyze convective environment, e.g. stability
- Indication of local phenomena
- Early indicator for detection of inaccurate NWP forecasts

Mostly in the form of:

- Cloud fields
- Dedicated spectral composite
- Stability indices
- CI parameter
- ...

Development areas:

- More accurate L2 profiles to complement RS network (in space and time)
- Convective indicators, e.g. based on PC scores
- Low level humidity, improved fog detection (e.g. use of dedicated composites)
- Automated systems, e.g. neural networks, detection of objects

User groups

MTG – IRS
PC scores compressed data

(standard via EumetCAST)

MTG – IRS
Raw radiances

(via GEANT network)

- Need for PC scores test data
- Need for corresponding raw spectra to develop & check tools based on PCs
- Need for raw spectra test data

Similar requirements for availability of test data

Types of use for test data

Check of format and data contents

- No high physical realism needed

Technical tests of data processing and methods (applications)

- Realistic underlying profiles and RT
- Realistic range of atmospheric situations and observing conditions
- Realistically simulated instrument & noise characteristics

Scientific investigations of data characteristics or methods and applications

- Simulated data with fully controlled and understood atmospheric conditions and instrument characteristics
- or
- Data as realistic as possible, potentially based on very high resolution NWP
- Realistic observing conditions and use of full instrument and noise characteristics

Continuous pre-launch data stream
for final infrastructure and processing tests



Types of use for test data

Check of format and data contents

- No high physical realism needed
- Good documentation needed

YES

Technical tests

For data processing and methods (applications)

- Realistic underlying profiles and RT
- Realistic range of atmospheric situations and observing conditions
- Realistic simulated instrument noise characteristics

YES

Scientific investigations

of data characteristics or methods and applications

- Simulated data with fully controlled and understood atmospheric conditions and instrument characteristics or
- Data as realistic as possible, potentially based on very high resolution NWP
- Realistic atmospheric conditions and noise

NWP: No
NWC: (Yes)

Continuous pre-launch data stream
for final infrastructure and processing tests

YES



- For regional NWP and NWC
- Finalized data format
- Area: Dwells covering Europe (or LAC4) at nominal resolution
Full disk later
- Period: TBD, at least several consecutive hours - one day
- Based on:
 - Data covering realistic range of situations, e.g. coarse NWP fields
 - Expected instrument characteristics and noise
- Availability of used atmospheric input profiles/fields and assumptions
- Both full spectra and PC compressed data

- Interest for development of **NWC** applications
- Details of requirement for intended use need to be confirmed
- Finalized data format
- Area: Some dwells, LAC4/Europe (?) at nominal resolution
- Period: TBD, at least several consecutive slots
- Based on:
 - Realistic higher resolution NWP fields
 - Expected instrument characteristics and noise
- Availability of used atmospheric input profiles/fields
- Both full spectra and PC compressed data
- Such data may help to raise user awareness

- MTG-IRS data are expected to be very important data for regional NWP - and NWC (possibly mostly through use of RUC NWP)
- Test data are mostly needed for technical testing of data processing
- Data need to represent realistic range of atmospheric situations but not the full detail at IRS resolution
- Test data should be made available early on, after finalisation of format and data contents
- A period of continuous NRT pre-launch data for final infrastructure and processing tests is necessary

