
Implementation and validation of the ROM SAF level2b product

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ROM SAF DMI

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Outline

ROM SAF 1D-Var overview.

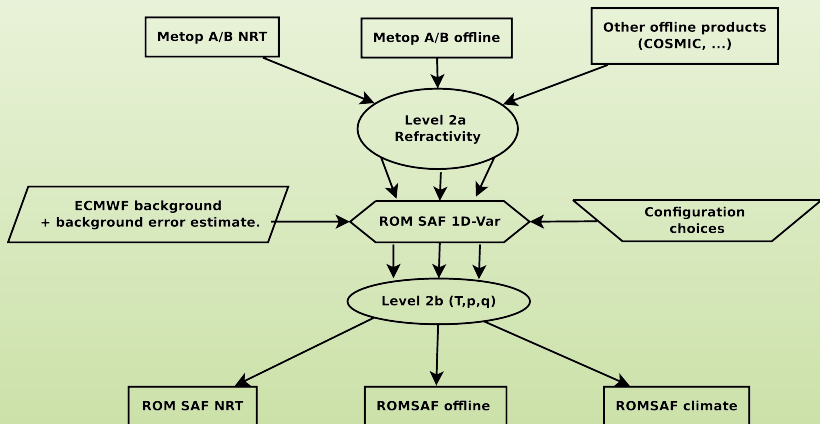
Configuration

B/O tuning

Where to go?

Summary

ROM SAF Level2b activities



ROM SAF Level2b current status

NRT

- ▶ 1D-Var version 2.5 running (stable) since January 2012.
- ▶ Version 2.6 running pre-operational.
- ▶ Version 2.6.2 (described on following slides) to go operational in Q4 2013.

Offline

- ▶ In pipeline

CLIMATE

- ▶ COSMIC data currently processed operationally and disseminated through gridded (level3) climate products.

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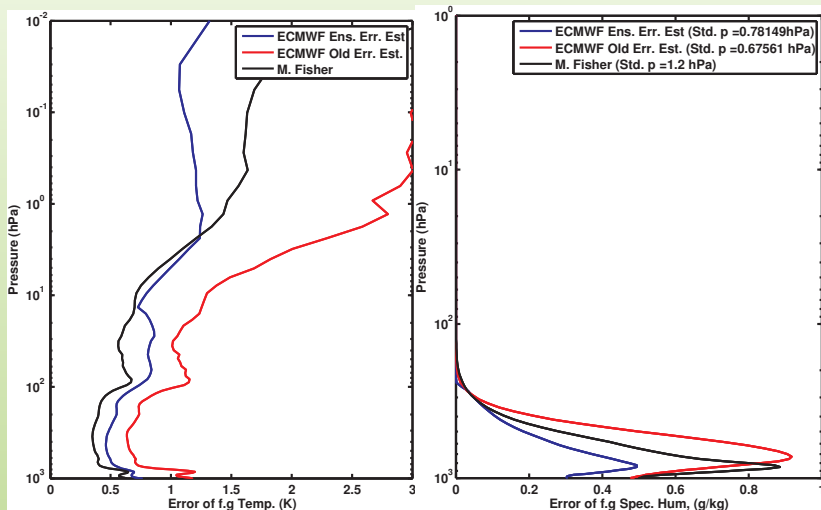
1D-Var configuration

$$J(\mathbf{x}) = \frac{1}{2}(\mathbf{x} - \mathbf{x}^b)^T \mathbf{B}^{-1}(\mathbf{x} - \mathbf{x}^b) + \frac{1}{2}(\mathbf{y}^o - \mathbf{H}(\mathbf{x}))^T \mathbf{O}^{-1}(\mathbf{y}^o - \mathbf{H}(\mathbf{x}))$$

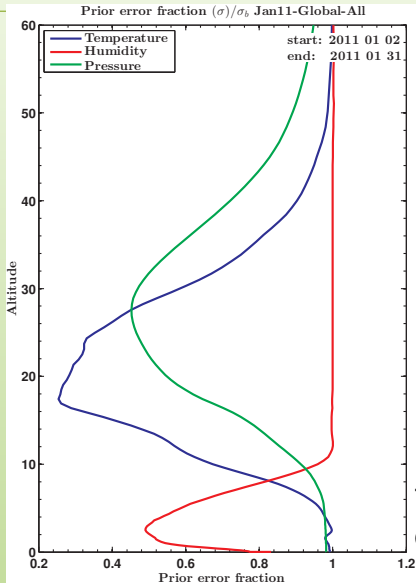
where $x = (\mathbf{T}; \mathbf{q}; p)$

- ▶ Observation covariance \mathbf{O} (or \mathbf{R} if you wish). Stdv. 2% enhanced below background tropopause. Correlation $1/e$ -length 3 km.
- ▶ Background covariance provided by ECMWF. Fixed temperature error and fixed relative humidity error.
- ▶ Currently 137 state vector labels.
- ▶ Logarithmic representation of q, p (also prevents $q \leq 0$)
- ▶ For current NRT: 8 km geo-potential height cut off, due to closed loop sampling and geometric optics. -To be upgraded in 2014.

Recent update of **B** for NRT



Error reduction



This example is from COSMIC data. 1D-Var version 2.5 before update of **B**

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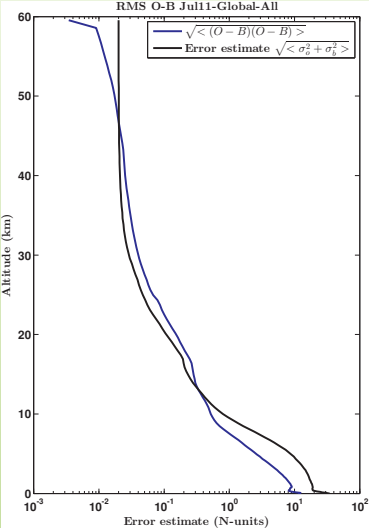
Desroziers relations

In refractivity space:

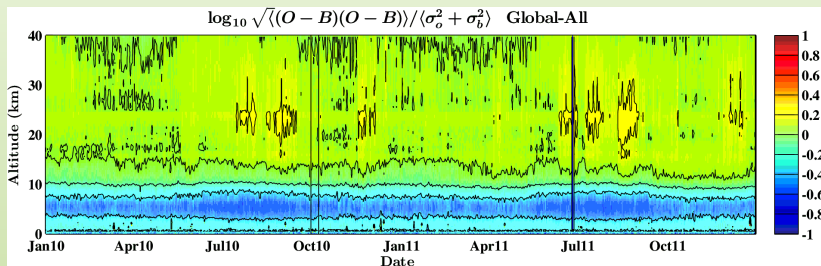
$$\langle (o - b)(o - b)^T \rangle = \mathbf{HBH}^T + \mathbf{O}$$

- plus 3 more.

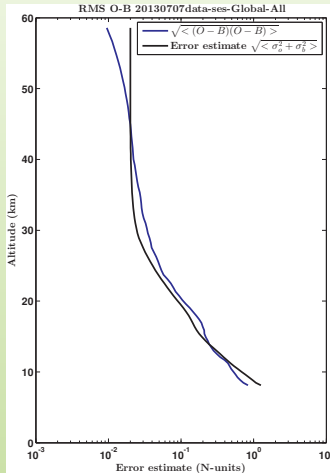
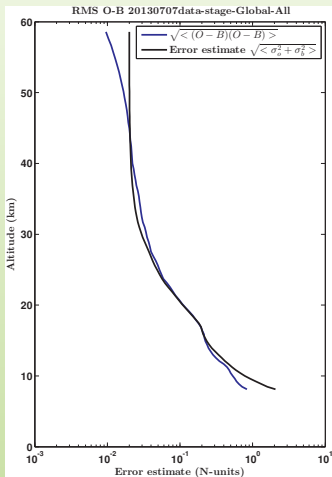
Desroziers et al. (2005)



Desroziers ratio



Desroziers relations before and after **B** update



-this is what we move on with in NRT for now. It is robust but too close to ECMWF.

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Purpose of NRT 1D-Var

1D-Var is needed to process Offline / Climate data, and suited to use as testbed, but what about NRT 1D-Var?

Originally the intention was to provide $T/q/p$ profiles for NWP, but few NWP's use $T/q/p$ assimilation. A few NRT/offline users are currently active, asking for pre-operational data.

Additional value:

- ▶ available before ECMWF analysis
- ▶ different information content than ECMWF
- ▶ good for QC and Monitoring
- ▶ possibly of interest for meteorologists

Probably best to keep the door open for new users.

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- ▶ NRT 1D-Var to go operational in Q4 2013.
- ▶ COSMIC data processed and validated for ROM SAF on-line climate products.
- ▶ 1D-Var is a framework. Configuration may be tweaked for various purposes.
- ▶ The background error correlations estimates from ECMWF are not necessary the right choice for all observations and all O-matrices, and it is certainly possible to design **O/B** for given purposes.