Automatic data checking system

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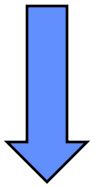
Objectives

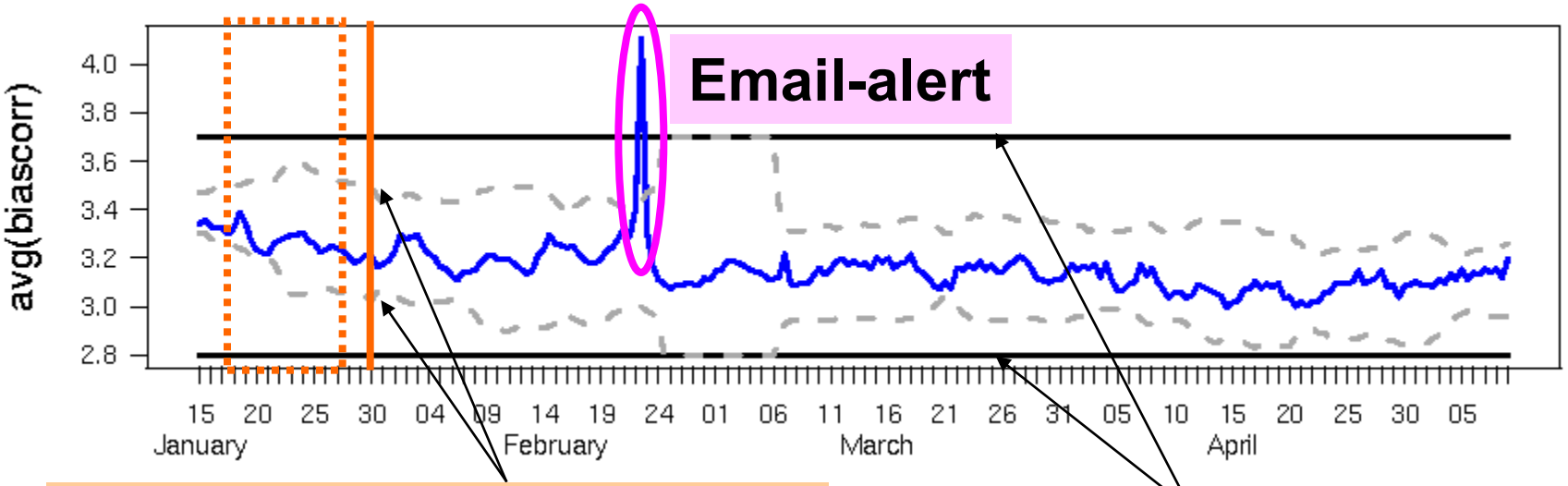
- Detect **sudden** changes in the quality and the availability of observations
- Detect **slow drift** of the quality and the availability of observations
- Detect atmospheric situations with **large model errors**



Actions

Automated data checking

Selected **observation quantities** are checked against an expected range
E.g., global mean bias correction for GOES-12 (in blue):



Soft limits (mean ± 5 stdev of statistic to be checked, calculated from past statistics over a period of 10 days, ending 2 days earlier)

Hard limits (fixed)

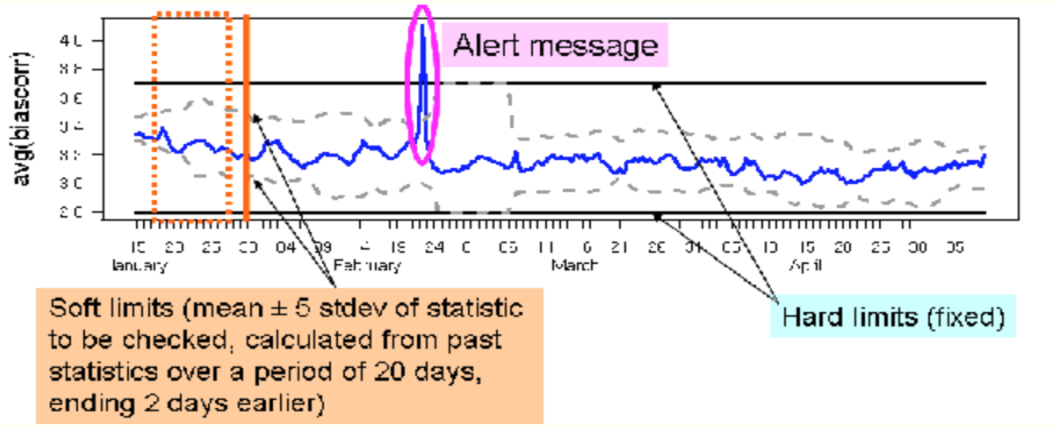
Satellite Data Automatic Checking

Products

- Forecasts
- Data and Software Ordering
- Catalogue
- GTS Products
- Operational Upgrades

An experimental automatic satellite data checking system has been implemented recently at ECMWF. It triggers the production of alarm messages if an anomaly is detected in the quality or the availability of the satellite data assimilated by the model.

Selected statistical parameters (number of observations, bias correction, and mean bias-corrected background and analysis departures) are checked against an expected range. An appropriate alert message (including a time series plot) is generated if statistics are outside the specified ranges. A severity level (slight, considerable, severe) is assigned to each message depending on how far statistics are from the expected values. Two kinds of ranges are used by the automatic checking: Soft and Hard limits. Soft limits are updated automatically using statistics from the last twenty days (extremes are excluded during this process). Hard limits are adjusted manually when required.



Currently, the automatic checking is limited to data passing through the minimisation process (including VarBC passive data). It's being applied, twice a day, to the long cut-off 4D-VAR cycles (DCDA).

- Operational Satellite Data Checking for 2013061012 DCDA
- Operational Satellite Data Checking for 2013061000 DCDA

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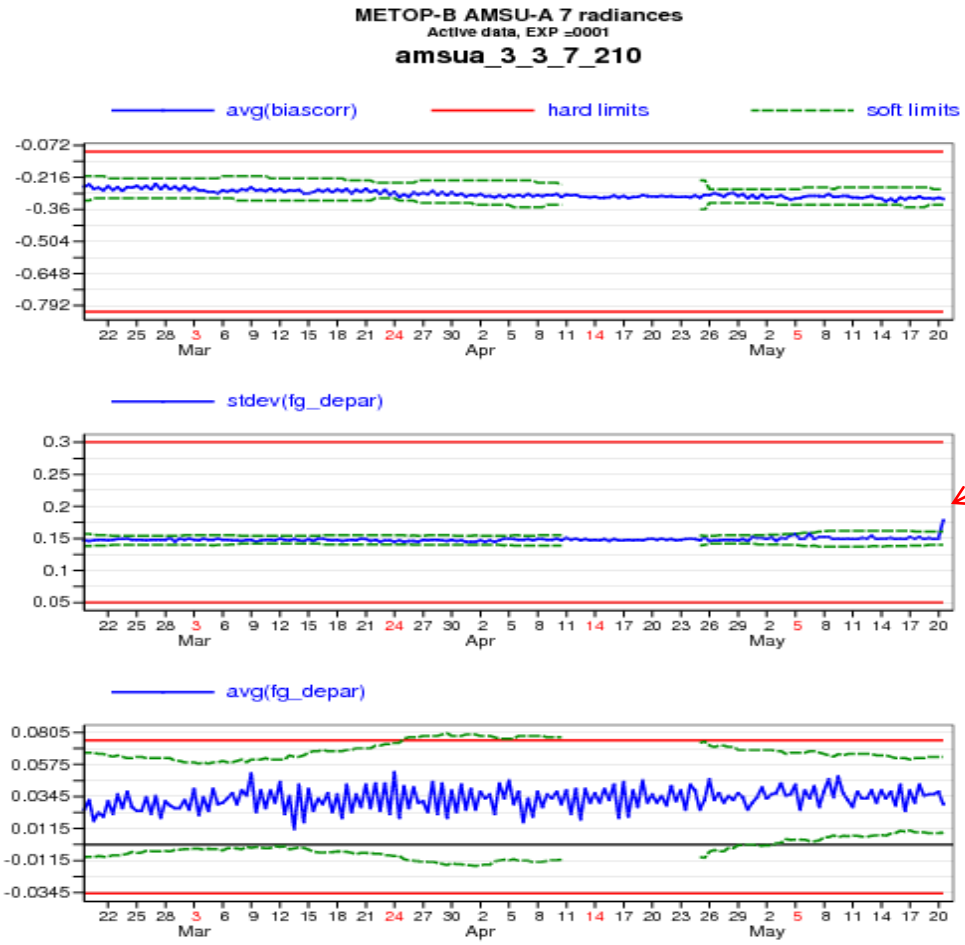
Sudden changes

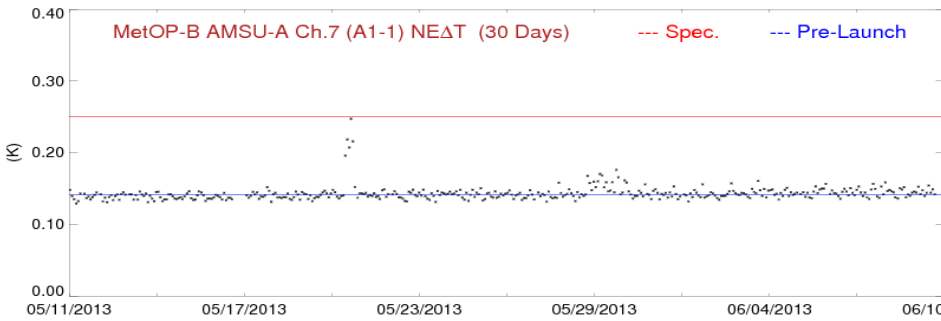


AMSUA

METOP-B AMSU-A 7 radiances : out of range:

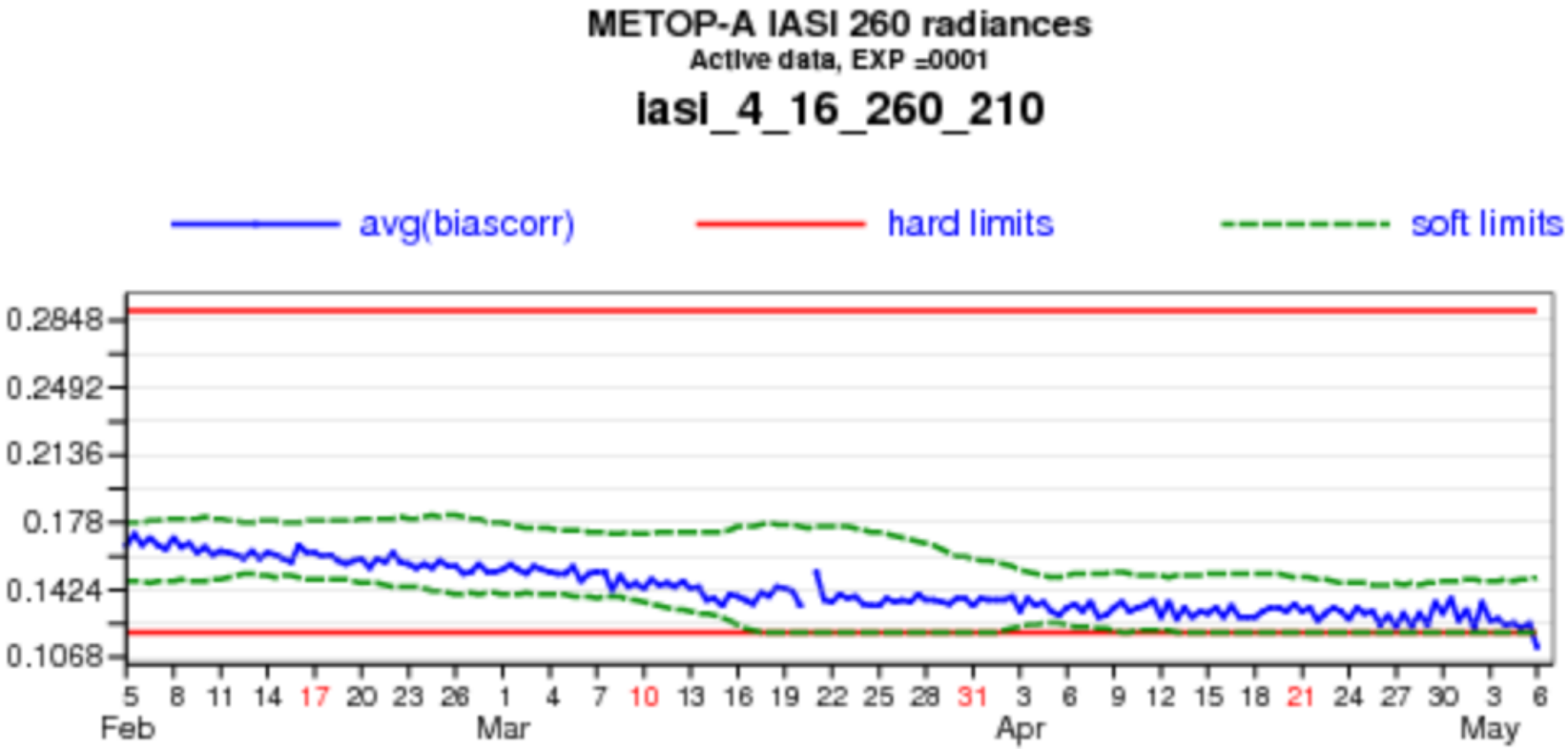
amsua_3_3_7_210.png

Severely: stdev(fg_depar)=0.178, expected range: 0.14 0.161



http://www.star.nesdis.noaa.gov/icvs/M1/ipm_telemetry_m1_amax.php

Detection of drifts



Model errors

Checking 0001 DCDA 2013010212

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AQUA AIRS 56 radiances : out of range:

(3 times in last 10 days for at least one item)

http://www.ecmwf.int/products/forecasts/satellite_check//do/get/satcheck/3215/110485?showfile=true

Severely: stdev(fg_depar)=0.777, expected range: 0.57 0.68

Slightly: avg(biascorr)=-0.02000005, expected range: -0.37 -0.05(H)

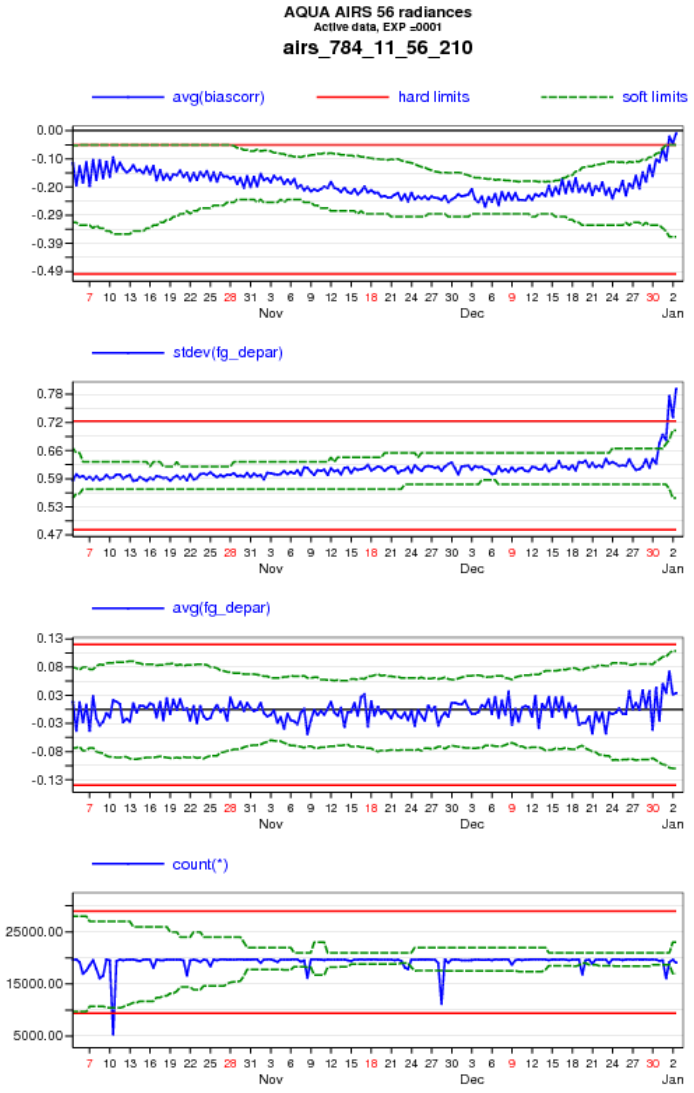
METOP-A IASI 89 radiances : out of range:

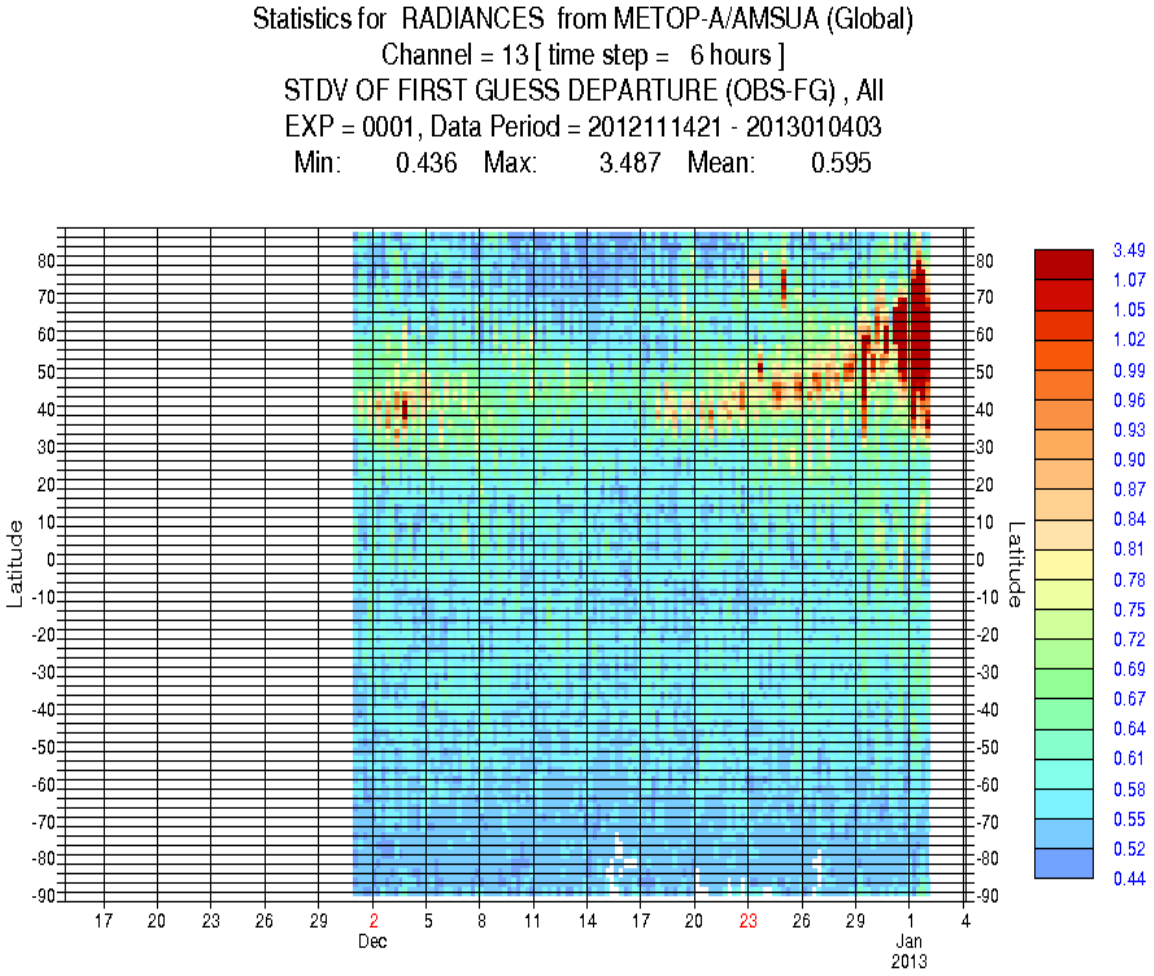
(6 times in last 10 days for at least one item)

http://www.ecmwf.int/products/forecasts/satellite_check//do/get/satcheck/3217/111259?showfile=true

Severely: stdev(fg_depar)=0.459, expected range: 0.33 0.41

Model errors





Features

- The detection method is robust: miss rate is very small and detection rate is high
- Flexibility to add instruments and observation quantities
- “Ignore” facility for instruments/channels with known problems
- Facility to dispatch/publish warnings by data type and severity level
- Detailed time series associated to each warning
- Possibility to define other checking criteria other than hard/soft limits