WIGOS Data Quality Monitoring System (WDQMS)

Performance targets of surface land stations

WEATHER CLIMATE WATER
TEMPS CLIMAT EAU

WMO OMM

World Meteorological Organization
Organisation météorologique mondiale

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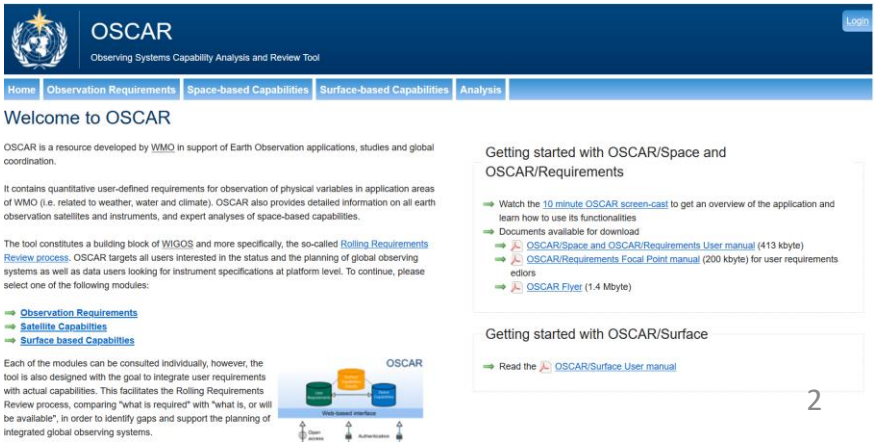
- The Observing Systems Capability Analysis and Review **(OSCAR) tool** (https://www.wmo-sat.info/oscar/) and the **Manual on the Global Observing System, Volume II – Regional Aspects** (WMO, 2011b) define requirements for observation cycles.
- According to the Manual, a **minimum** of three observations at main hours in Universal Time Coordinated (UTC) and five observations at main and intermediate hours (3 h) are required. The target is four observations at main hours in UTC and eight obs.
  at main and intermediate hours (3 h) required.

➢ Provisional GBON: hourly observations



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Performance targets of RA VI

- Examples for the WMO Integrated Global Observing System (WIGOS) Data Quality Monitoring System (WDQMS) of Regional Association (RA) VI.
- It is up to individual RAs to define their own performance targets.
- Data availability = 95%
- Timeliness HH+50 = 90%, HH+100 = 95%

Parameter	*Target*	*Comment*
Data availability: percentage of observations received from the network	95% *Manual on the Global Observing System* (WMO, 2011*b*) MRQ: 50% TRQ: 95–100% (depending on the RA)	Percentage of monthly data available from the surface land station network according to the schedule outlined in OSCAR/Surface (number of observations received per month compared to number of observations expected per month)
Timeliness: percentage received by HH+100 HH+50	 95% 90%	Percentage of data received by target times (HH+100 or HH+50) calculated on a monthly basis Targets relate to percentage of data received, not expected Threshold requirement Breakthrough requirement

Bias, trueness and precision

- The **bias** is used as a measure of trueness and is calculated as the average of O-B results over a certain period.
- The targets regarding **trueness** are stated such that the bias should be close to zero for all measured variables.
- The standard deviation is the quantitative measure of **precision**. The targets for precision are applied to the standard deviation of O-B results over a certain period for each of the observed variables.
- All three measures – bias, trueness and precision - are assessed daily and monthly. Also, the 5-day moving average of daily calculated standard deviation of O-B will be calculated for all variables and compared to the respective prescribed threshold.

Gross errors

- The number of gross errors in a month (number of single observations whose O-B results exceed the prescribed threshold) will be computed for each variable at each station.
- The station will be flagged as an issue when the percentage of gross error per variable is **larger than 15% of the total observations of that variable in the month**.
- For different variables different thresholds are defined. The thresholds proposed for land surface observations as outlined in *WMO-No. 1224* are:
  - 10hPa for surface pressure or 100 m for geopotential height
  - 10 K for 2-metre temperature
  - 15 m/s for wind vector
  - 30% for relative humidity.

Performance targets of RA VI - pressure

- Target for bias (trueness) = 0.5 hPa
- Target for standard deviation (precision) = 1.5 hPa
- Threshold for gross errors = 10 hPa

Parameter	*Trueness – target for bias*	*Precision – target for standard deviation*	*Threshold for gross errors*	*Comment*
Pressure (hPa)	0.5 hPa	1.5 hPa	10 hPa <15% of all single observations	Bias as a measure of trueness: on average (several days), the absolute value of the daily calculated bias of pressure observations (P BIAS) should not exceed the given target Standard deviation as a measure of precision: on average (several days), the daily calculated standard deviation of pressure (P STDDEV) should not exceed the given target Gross errors: the number of gross errors during 1 month should not exceed a percentage of all single observations of that particular station Threshold requirement

Performance targets of RA VI – geopotential h.

- Target for bias (trueness) = 30 m
- Target for standard deviation (precision) = 40 m
- Threshold for gross errors = 100 m

Parameter	*Trueness – target for bias/ mean vector difference (MVD)*	*Precision – target for standard deviation/ root mean square vector difference (RMSVD)*	*Threshold for gross errors*	*Comment*
Geopotential height (m)	30 m	40 m	100 m <15% of all single observations	For surface land stations in mountainous areas only where no pressure observations are provided but geopotential heights (gpm) are Bias as a measure of trueness: on average (5 d), the absolute value of the daily calculated bias of gpm observations (gpm BIAS) should not exceed the given target Standard deviation as a measure of precision: on average (several days), the daily calculated standard deviation of gpm (gpm STDDEV) should not exceed the given target Gross errors: the number of gross errors during 1 month should not exceed a percentage of all single observations of that particular station Threshold requirement

Performance targets of RA VI - temperature

- Target for bias (trueness) = 0.5 K
- Target for standard deviation (precision) = NA
- Threshold for gross errors = 10 K

Parameter	*Trueness – target for bias/ mean vector difference (MVD)*	*Precision – target for standard deviation/ root mean square vector difference (RMSVD)*	*Threshold for gross errors*	*Comment*
Temperature (K)	0.5 K	Not currently specified: numerical weather prediction (NWP) 2 m temperature forecasts are not yet reliable to serve as reference	10 K <15% of all single observations	Bias as a measure of trueness: on average (5 d), the absolute value of the daily calculated bias of temperature observations (T BIAS) should not exceed the given target Standard deviation as a measure of precision: on average (several days), the daily calculated standard deviation of temperature (T STDDEV) should not exceed the given target Gross errors: the number of gross errors during 1 month should not exceed a percentage of all single observations of that particular station Threshold requirement

Performance targets of RA VI - wind

- Target for bias (trueness) = 3.0 m/s
- Target for standard deviation (precision) = 5.0 m/s
- Threshold for gross errors = 15 m/s

Parameter	*Trueness – target for bias/ mean vector difference (MVD)*	*Precision – target for standard deviation/ root mean square vector difference (RMSVD)*	*Threshold for gross errors*	*Comment*
Wind vector ($m\ s^{-1}$)	3.0 $m\ s^{-1}$	5.0 $m\ s^{-1}$	15 $m\ s^{-1}$ <15% of all single observations	MVD as a measure of trueness: on average (several days), the absolute value of the daily calculated MVD of wind observations (WIND MVD) should not exceed the given target RMSVD as a measure of precision: on average (several days), the daily calculated RMSVD of wind should not exceed the given target Gross errors: the number of gross errors during 1 month should not exceed a percentage of all single observations of that particular station Threshold requirement

Performance targets of RA VI – relative humidity

- Target for bias (trueness) = 10%
- Target for standard deviation (precision) = NA
- Threshold for gross errors = 30%

Parameter	*Trueness – target for bias/ mean vector difference (MVD)*	*Precision – target for standard deviation/ root mean square vector difference (RMSVD)*	*Threshold for gross errors*	*Comment*
Relative humidity (%)	10%		30% <15% of all single observations	Bias as a measure of trueness: on average (several days), the absolute value of the daily calculated bias of relative humidity observations (RH BIAS) should not exceed the given target Standard deviation as a measure of precision: on average (several days), the daily calculated standard deviation of relative humidity (RH STDDEV) should not exceed the given target Gross errors: the number of gross errors during 1 month should not exceed a percentage of all single observations of that particular station Threshold requirement

Baseline OSCAR/Requirements

Table 2. Links to requirements for global NWP, for surface variables, in OSCAR/Requirements

Air pressure (at surface)	*Air temperature (at surface)*	*Wind vector over the surface (horizontal)*	*Specific humidity*
ID 250	ID 253	ID 320	ID LT 303
http://www.wmo-sat.info/oscar/variables/view/10	http://www.wmo-sat.info/oscar/variables/view/12	http://www.wmo-sat.info/oscar/variables/view/183	http://www.wmo-sat.info/oscar/variables/view/161

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Thank you

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https://community.wmo.int/activity-areas/wigos

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