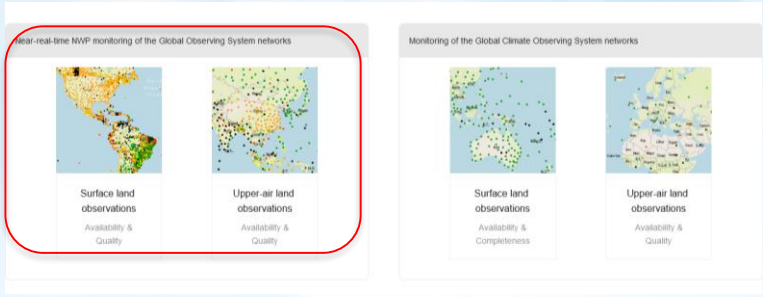
Online training for Regional WIGOS Centres (RWC) in Regional Association (RA) V

22 September 2021

How to evaluate data availability and data accuracy

WEATHER CLIMATE WATER
TEMPS CLIMAT EAU

FOCUS ON
GOS NRT NWP surface land stations monitoring/pressure
Results of 15th September 2021



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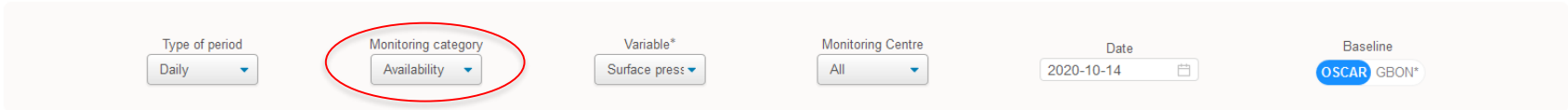
World Meteorological Organization
Organisation météorologique mondiale

Category ‘Availability’

- RWC may select the **Monitoring category ‘Availability’** in the web tool to evaluate the performance related to data availability



- The monitoring of data availability is based on performance figures of WIGOS Monitoring Centres (MC) obtained from comparing the observations received to those expected to be ingested to the WMO Information System (WIS) according to the schedule of international exchange determined from OSCAR/Surface metadata.
- **If at least one WIGOS Monitoring Centre shows ‘Normal’ (green) and others show different results, e.g. ‘Availability issues’ (orange or red) no action is required by the RWC.**

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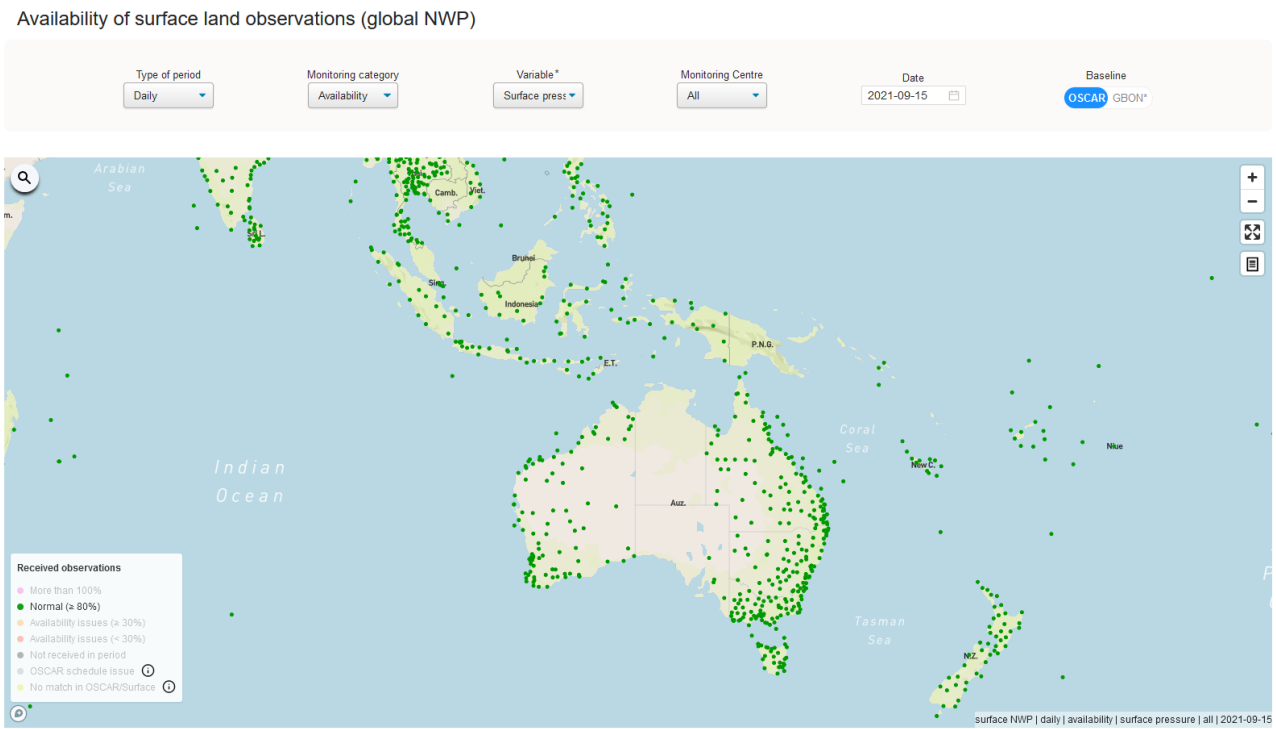
Normal (≥ 80%)

- Stations shown as green dots
- S: Normal (≥ 80%)

  ➔ station is performing well, no action required ☺



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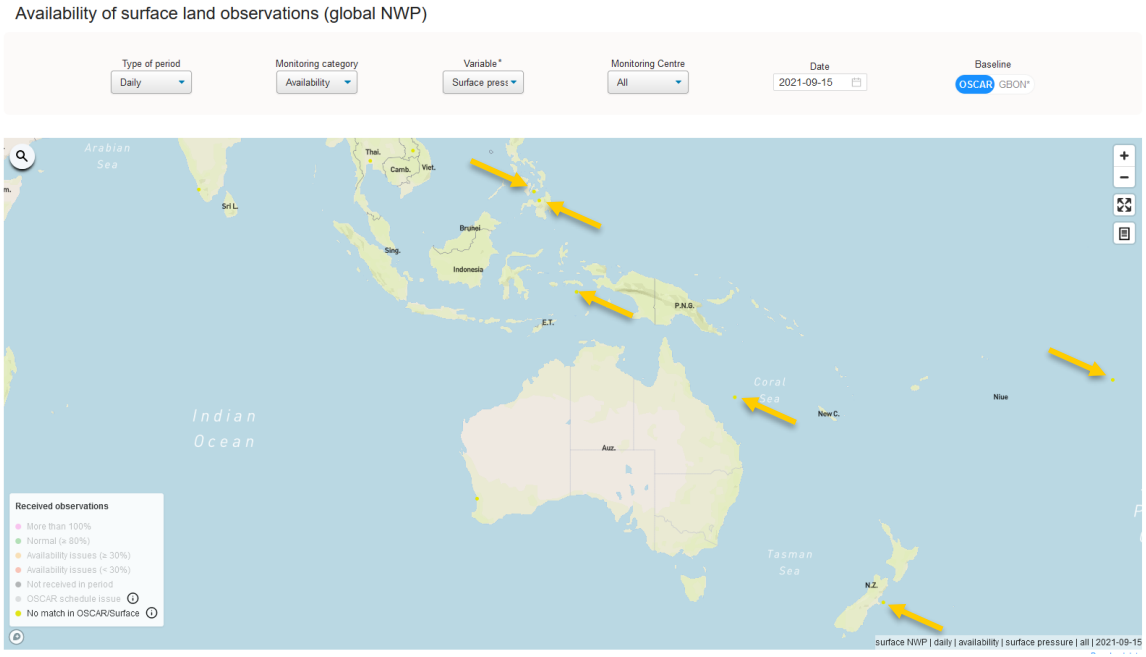
No match in OSCAR/Surface

- No match in OSCAR/Surface – although data available on WIS!
- Stations shown as yellow dots are reporting but haven´t been registered in OSCAR/Surface so far, or at least there is no match of the station ID (potential reason: NMHS might not have sufficient number of WMO IDs but did not migrate to WSI yet).

➢ RWC to initiate an incident management process asking WDQMS NFP to contact OSCAR/ Surface NFP

Only a few stations in RA V



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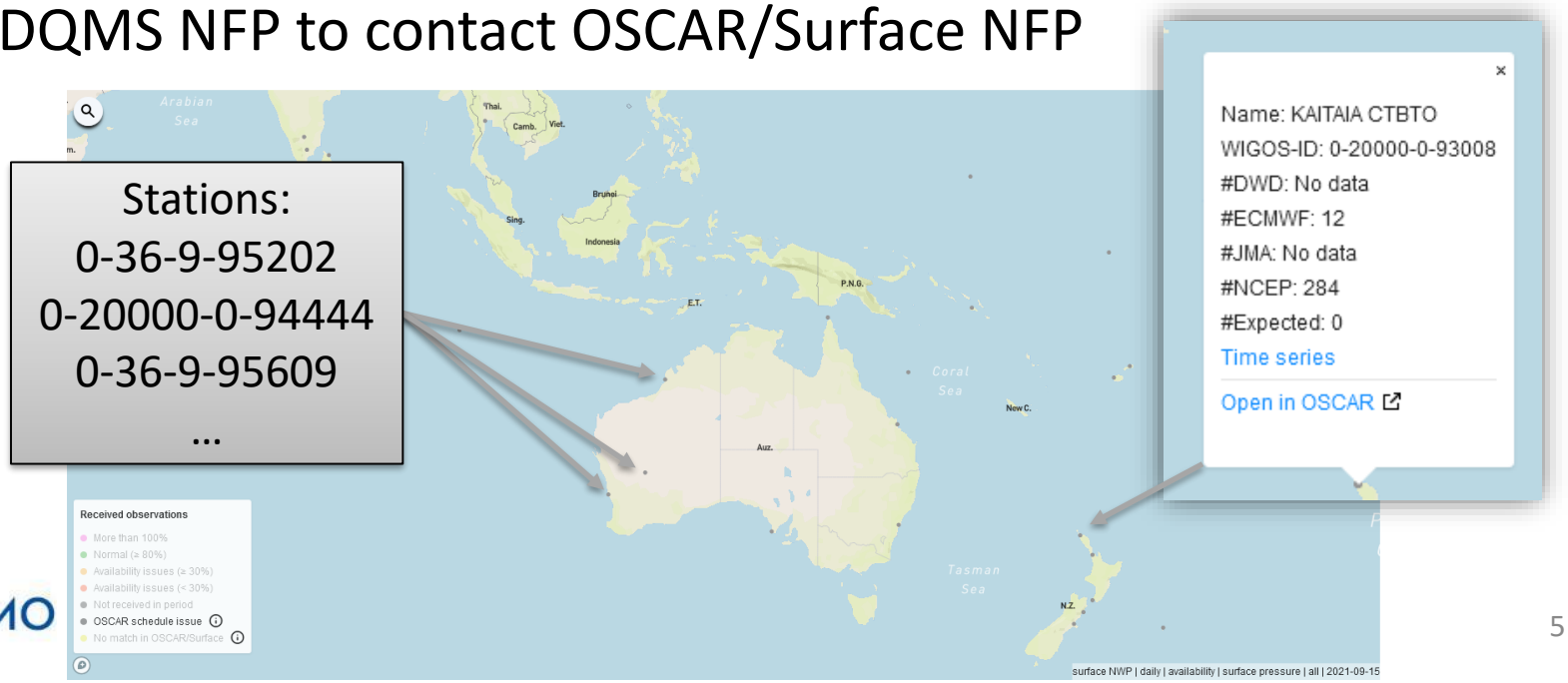
OSCAR schedule issue

- ***Only in surface land stations monitoring!***
- Stations shown as grey dots are reporting but there seem to be issues in the OSCAR schedule (potential reason: NMHS might report higher temporal resolution but didn´t set the field ‘international exchange’ correctly → ‘#Expected’ = 0).

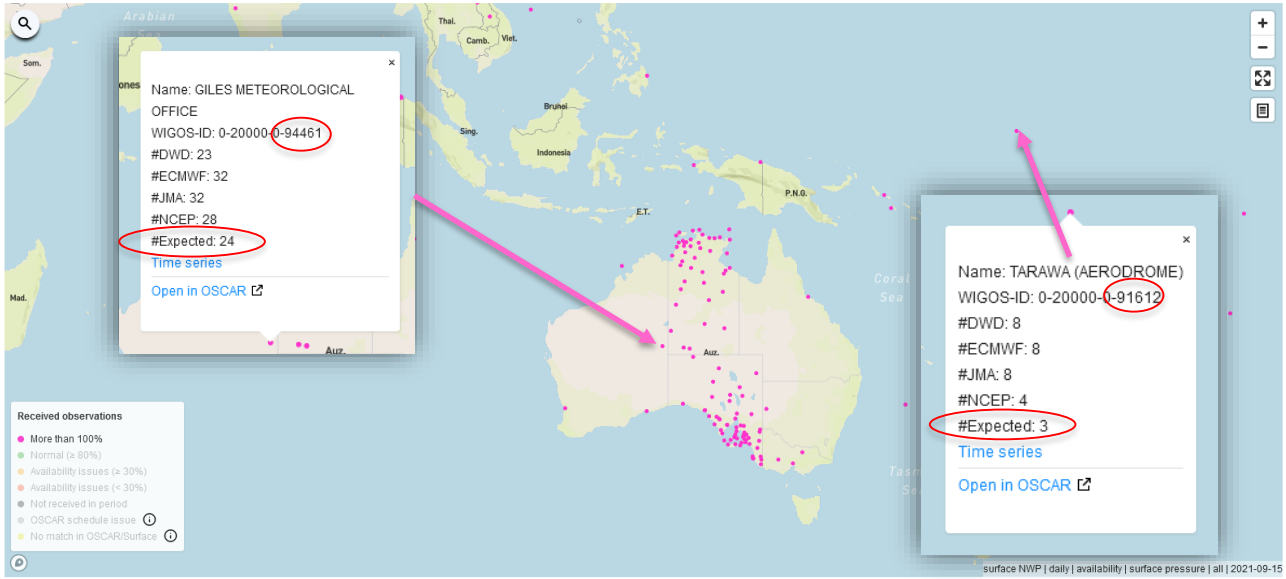
➢ RWC to initiate an incident management process asking WDQMS NFP to contact OSCAR/Surface NFP



More than 100%

- Stations shown as pink dots
- More data available - actually a ‘happy problem’ because more data are shared internationally than indicated in OSCAR/Surface
- Most likely there is an issue with the expected number of measurements in the metadata field **‘Reporting interval’** in OSCAR/Surface for this particular variable (→ see ‘#Expected’)

➢ RWC to initiate an incident management process asking WDQMS NFP to contact OSCAR/Surface NFP to make corresponding changes in OSCAR/Surface metadata



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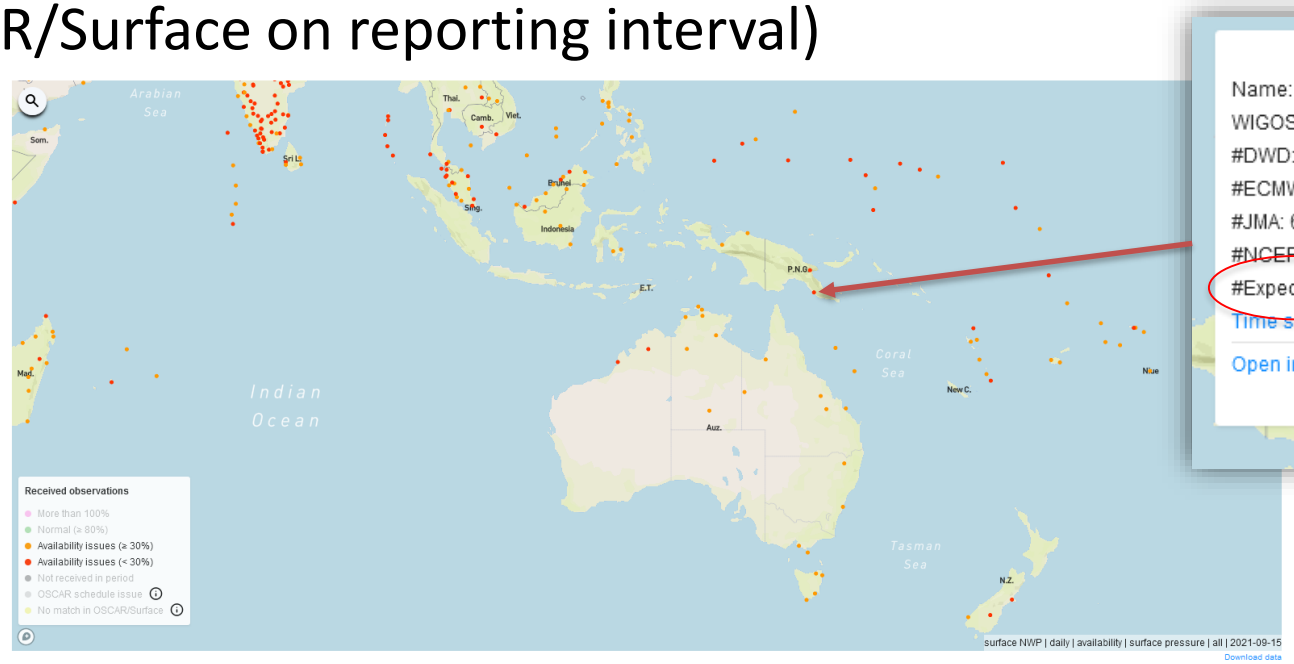
Availability issues ● (≥30%) and ● (<30%)

- Stations showing orange or red dots have availability issues
- If they continue to appear having **‘Availability issues‘** especially when selecting **‘All’ Centers** and the **‘Daily’** display

➢ RWC to initiate an incident management process asking WDQMS NFP to take actions to investigate the cause of the incident and to find a solution (issues often related to incorrect entries in OSCAR/Surface on reporting interval)

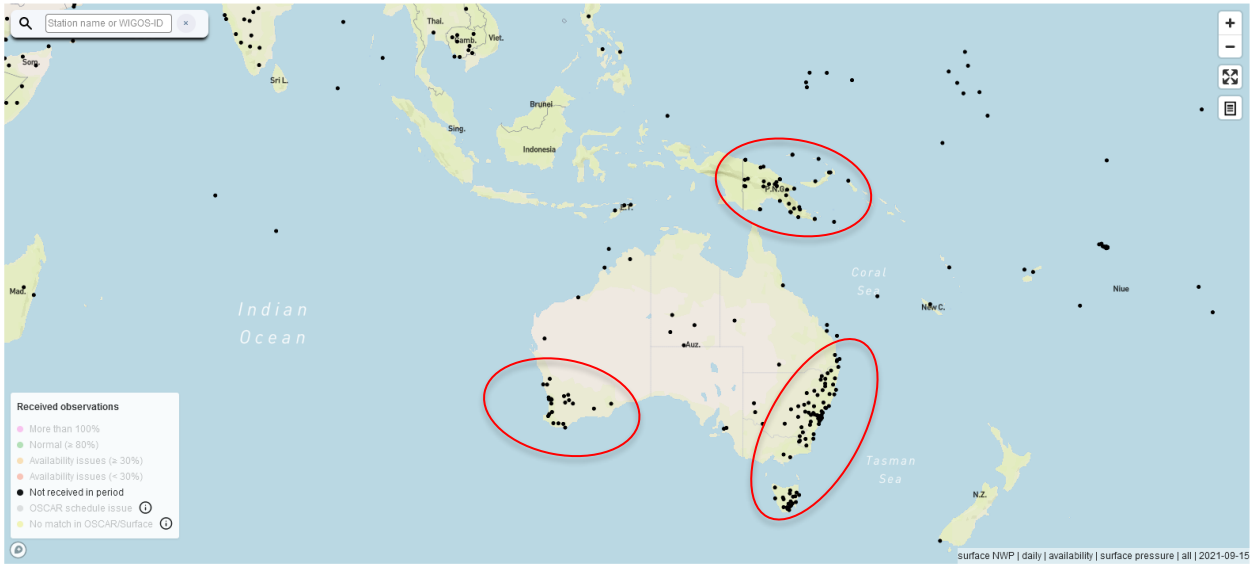


Not received in period

- Data from stations shown as black dots were **‘Not received in period ‘** – this is shown especially when selecting **‘All’ Centers** and the **‘Daily’** display
- If data of these stations were not received since a longer period of time it is a ‘silent station’

➢ RWC to initiate an incident management process asking WDQMS NFP to take actions to investigate the cause of the incident and to find a solution

e.g. Western and South-eastern Australia, Tasmania



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Reasons for 'no data received'

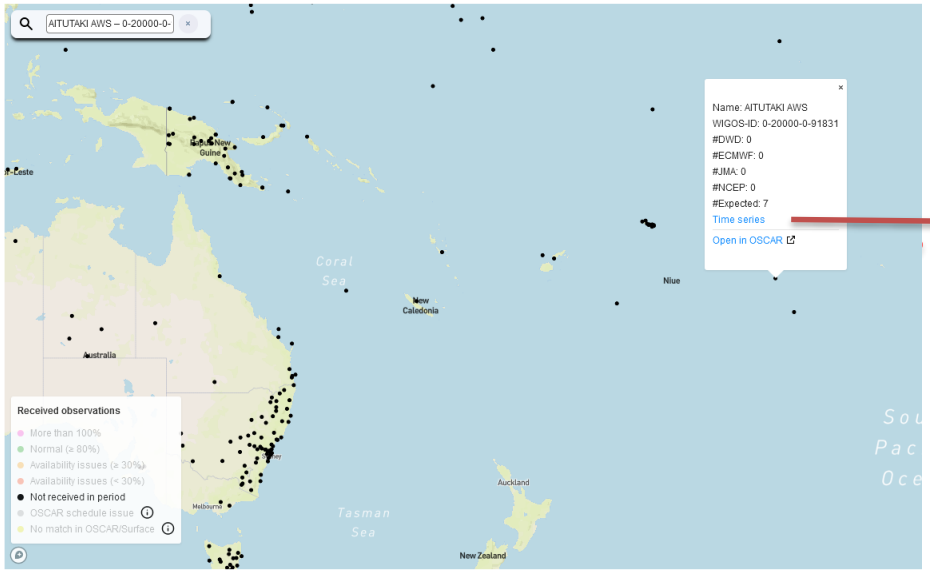
There are several reasons for no data being received by the WIGOS Monitoring Centres. The causes for these issues have to be clarified by the country concerned; these could be for example:

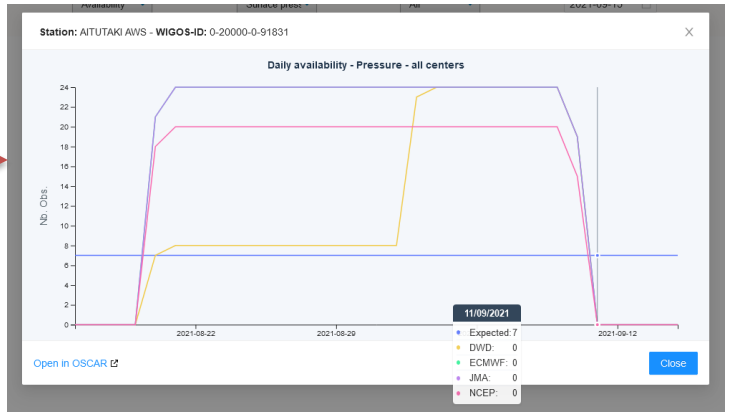
1. Station is not intended to report to WIS (only national use of the data intended) ➔ WDQMS NFP together with OSCAR/Surface NFP to check GOS affiliation in OSCAR/Surface
2. No data received due to technical issue at site (issues related to data transmission or sensor malfunctioning) ➔ WDQMS NFP to work with WIS NFP and/or maintenance technician to check data transfer from site or sensors at site
3. Station data is expected in the WIS but no data available ➔ WDQMS NFP to work with WIS NFP to check WIS dissemination

Example - data outage of a particular station

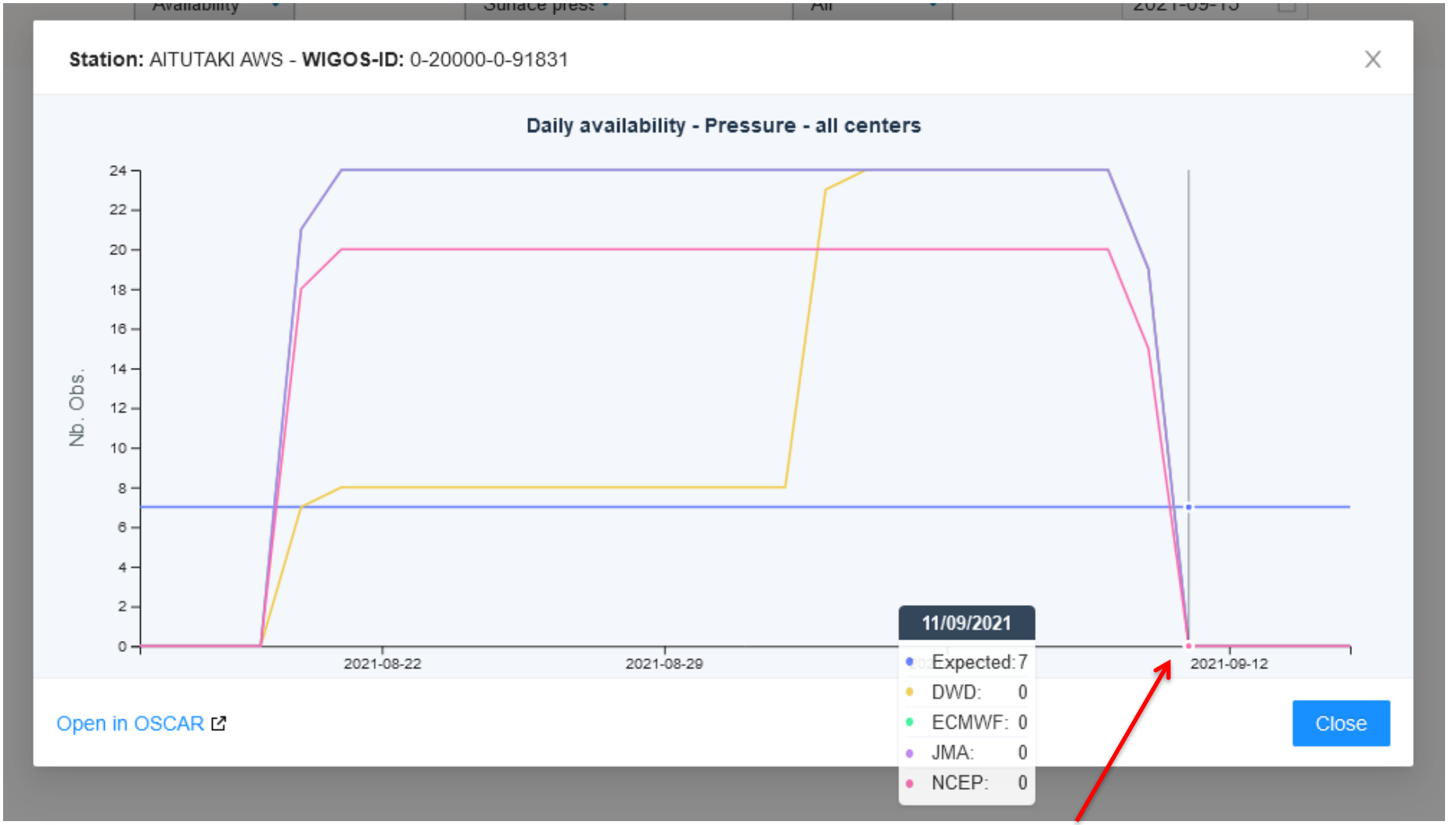
- Surface land station 91831 AITUTAKI AWS, Cook Islands usually reports hourly messages per day to WIS
- However, since 11th September 2021 no data were available on WIS (No. of obs. received by each of the WIGOS MC = 0), shown as ● dot in availability map

➢ RWC would have to raise an incident ticket concerning this data outage after 5 days the latest, i.e. on 16th September 2021





Example - data outage of a particular station (cont.)

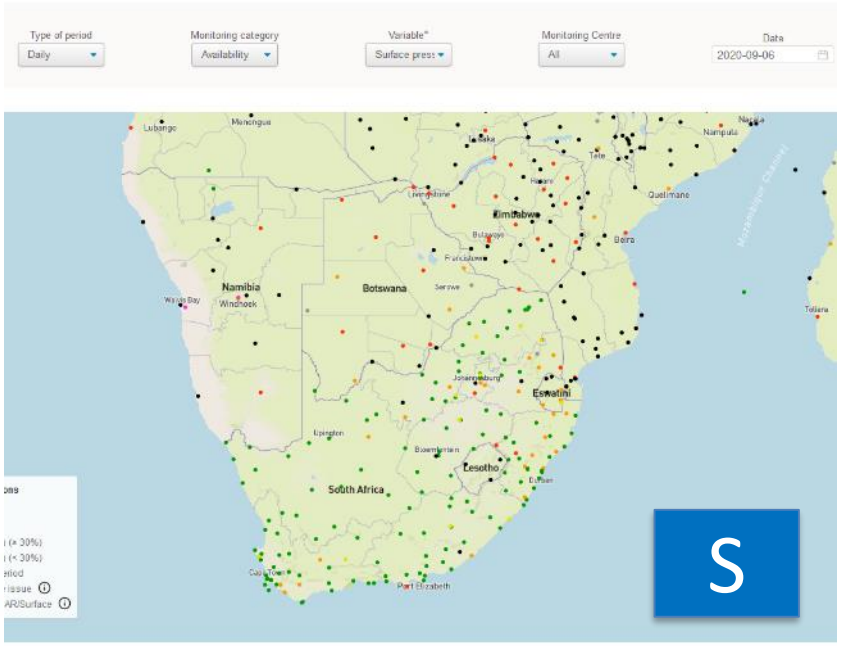


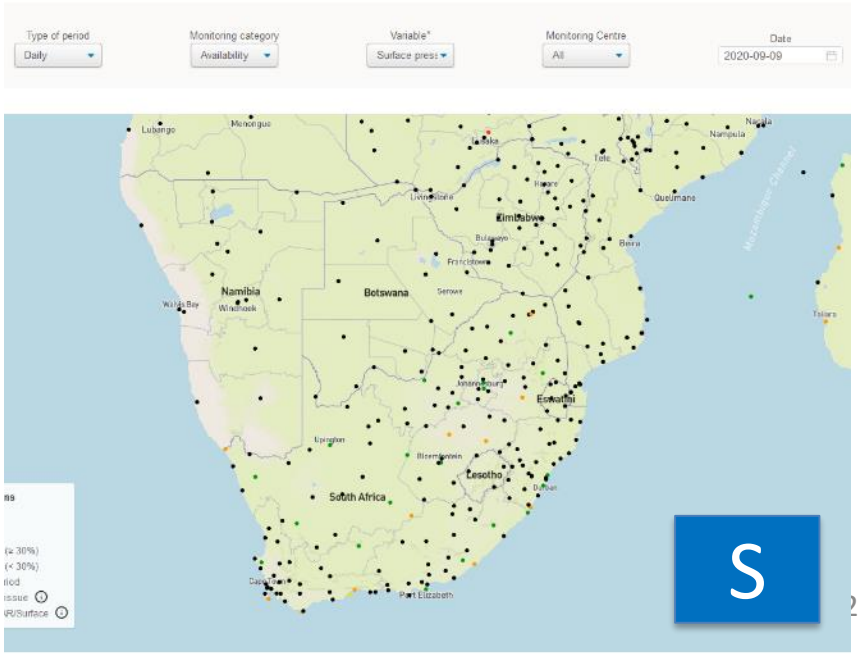
Data outage

Example - data outage of entire country/ies

- Most of the observations for countries in Southern Africa were not received during the period 8 to 10 September 2020.
- This happened due to technical challenges at the RTH because the stations in South Africa were operational.

➢ In such a case RWC shall raise an incident ticket as soon as possible after recognizing this incident to rectify this incident!

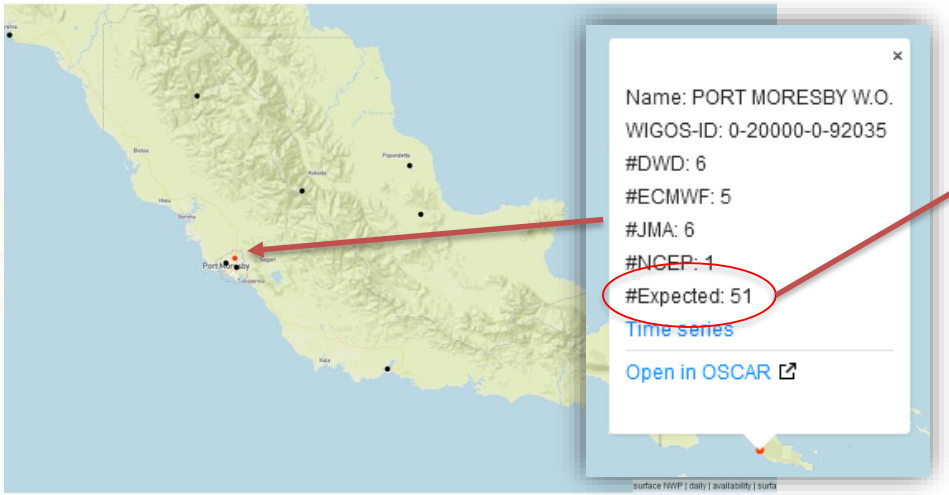


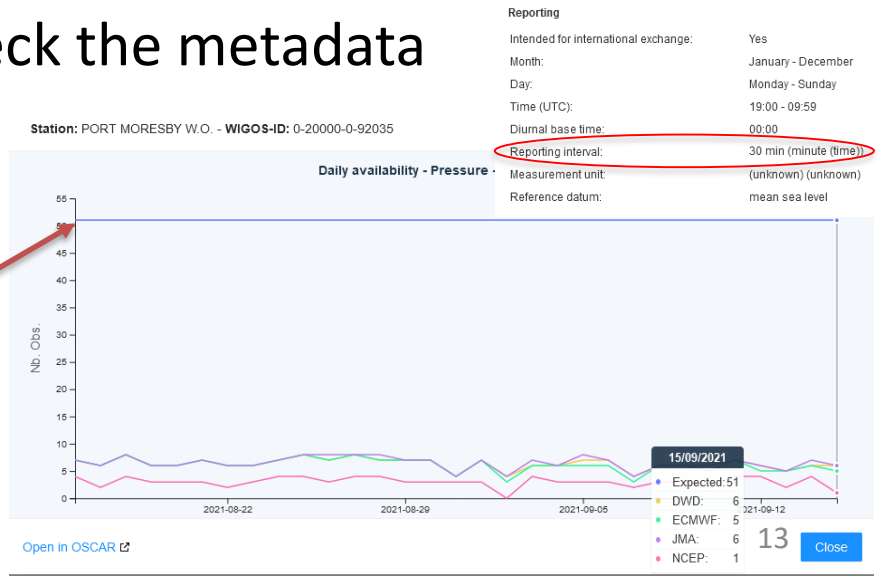


Example – incorrect OSCAR/Surface metadata

- Surface land station 92035 PORT MORESBY W.O. (Papua New Guinea) reports 6 messages per day to WIS
- However, the expected number of observations according to OSCAR/Surface are 51 per day, ● dot in availability map
- According to OSCAR/Surface the station reports pressure on an half-hourly basis (Reporting interval: 30 min)

➢ RWC should raise an incident ticket asking WDQMS NFP together with OSCAR/Surface NFP to check the metadata





Category ‘Quality’

- RWC may select the **Monitoring category ‘Quality’** in the web tool to evaluate the performance related to accuracy

- The WDQMS web tool provides ‘Quality’ performances as Observation against Background (O-B) values averaged over a selected period (6-hourly or daily) of a particular variable
  e.g. 2m temperature, 10m zonal wind component, 10m meridional wind component, 2m relative humidity
  surface land stations only: surface pressure/geopotential height
- **If at least one WIGOS Monitoring Centre (MC) shows low (good) O-B results (green dots) most likely the issue is related to the corresponding WIGOS MC which shows larger O-B results → no action required by RWC**

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Constraints of O-B results

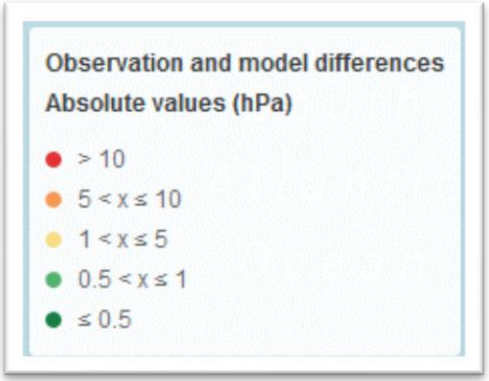
- NWP models base on observations from the respective regions and the observations are interpolated to the model layers
- **O-B results of pressure observations are quite reliable** because the pressure can be interpolated to the relevant levels quite well
- However, large O-B results of temperature and relative humidity are often caused by model biases. Especially in winter times and in areas with steep orography models cannot always resolve strong temperature inversions and thereby might lead to wrong 2m temperature or 2m relative humidity forecasts.
- Therefore O-B results of the variables 2m temperature and 2m relative humidity have to be considered with care.

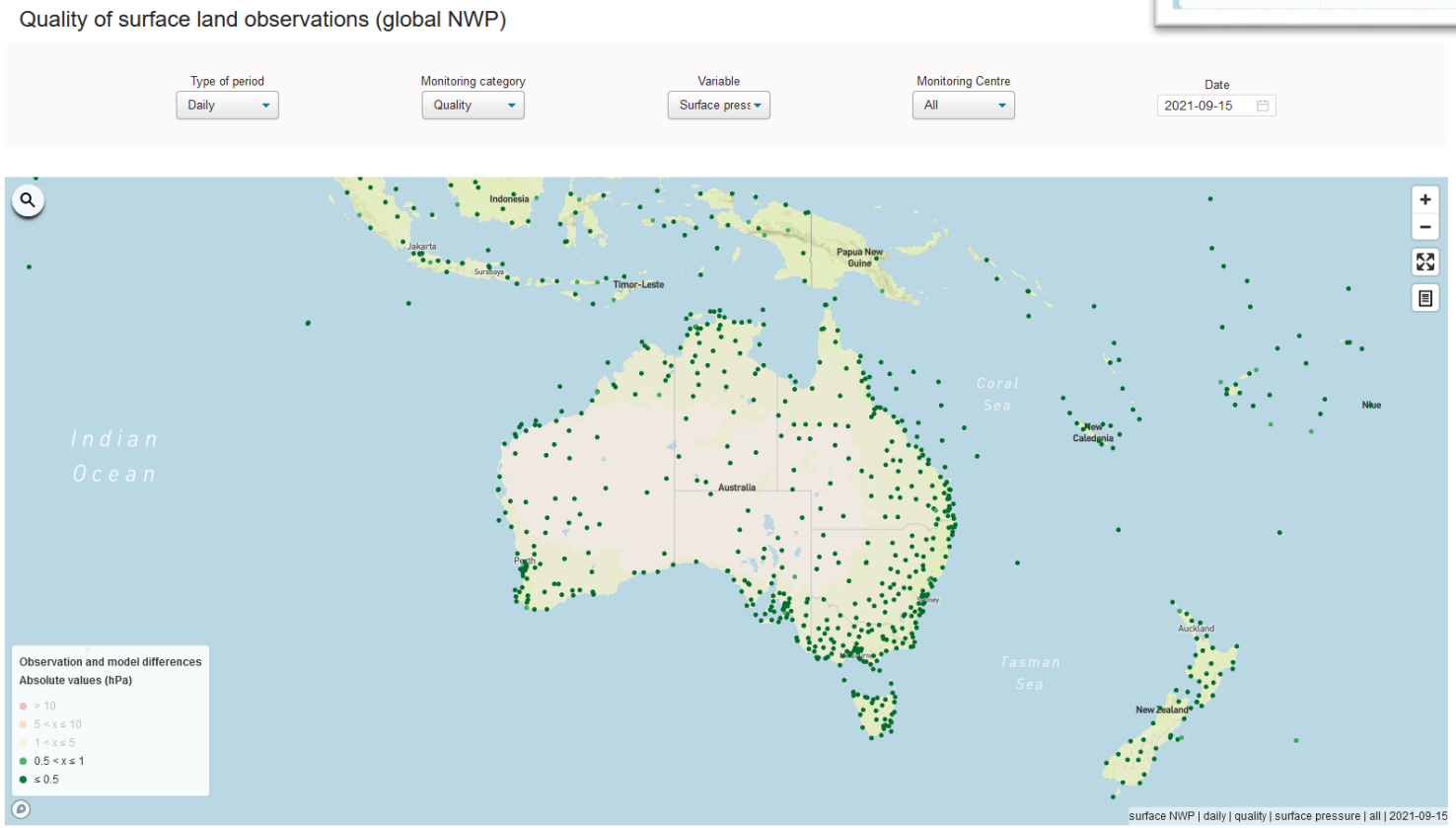
➢ **Hence, incident tickets should only be raised in case of ongoing large errors in O-B results with an increasing trend → stations showing ● or ● dots**

Absolute pressure obs values ≤ 1 hPa

- Stations shown as green dots
- The quality of pressure observations is good, the station is performing well

➔ no action required ☺

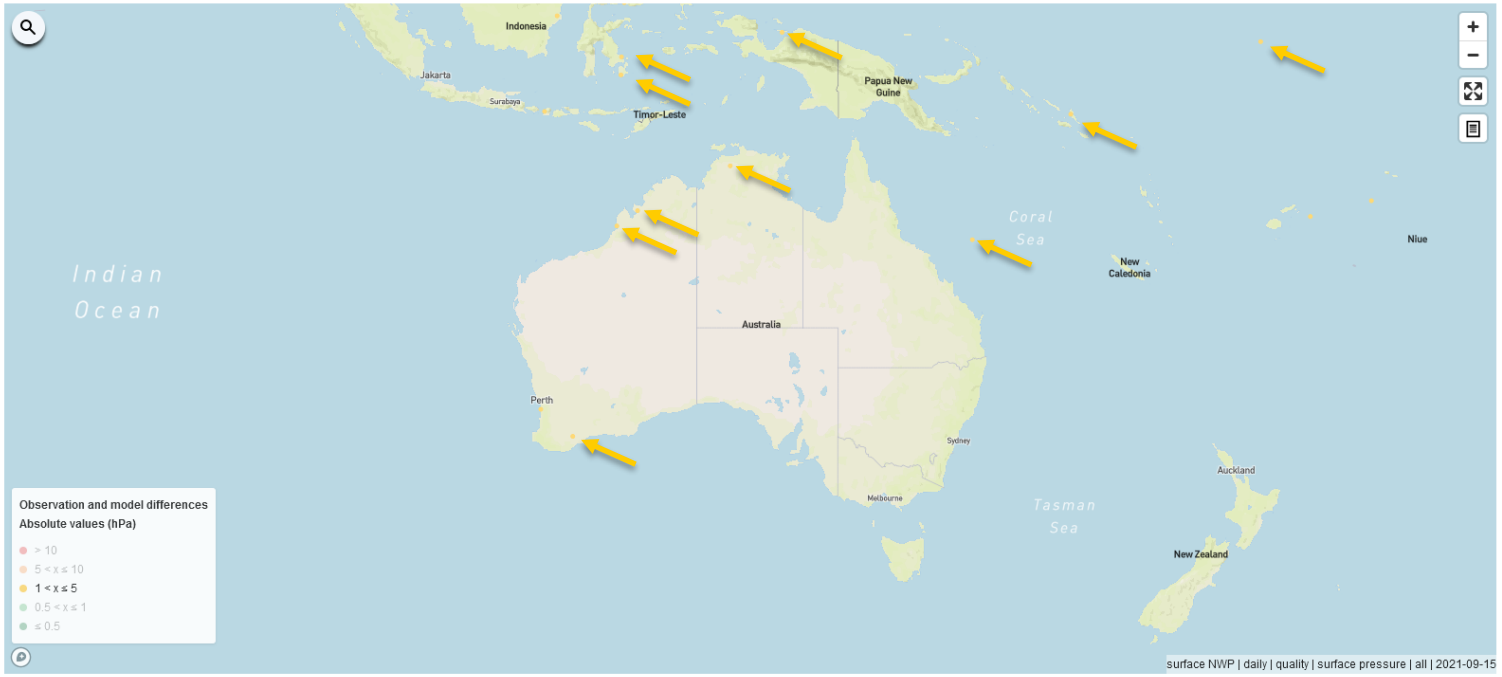




Absolute pressure obs values 1 - 5 hPa

- Stations showing yellow dots have quality issues
- If they continue to appear having quality issues especially when selecting **'All' Centers** and the **'Daily'** or **'Alert'** display

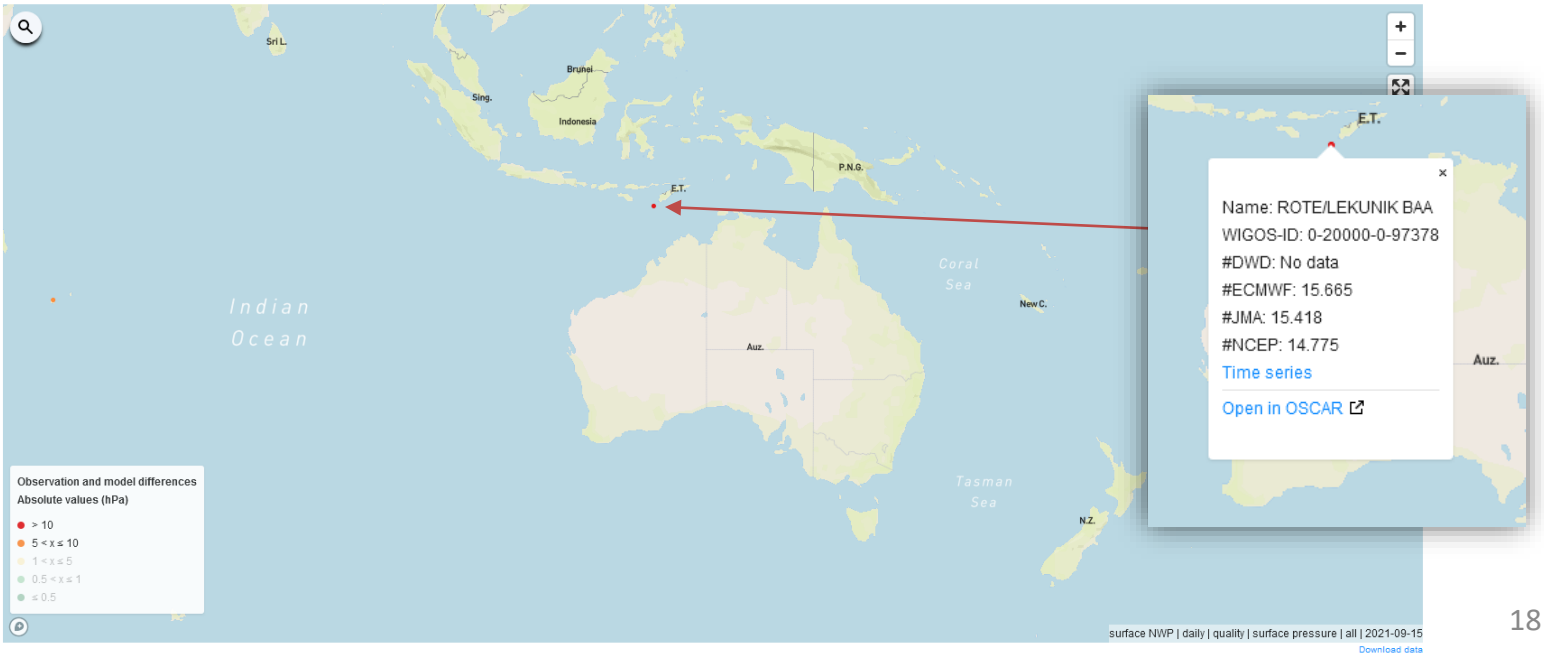
➢ RWC to initiate an incident management process with medium priority (●) asking WDQMS NFP to take actions to investigate the cause of the incident and to find a solution



Absolute pressure obs values > 5 hPa

- Stations showing orange or red dots have large quality issues
- If they continue to appear having quality issues especially when selecting **'All' Centers** and the **'Daily'** or **'Alert'** display

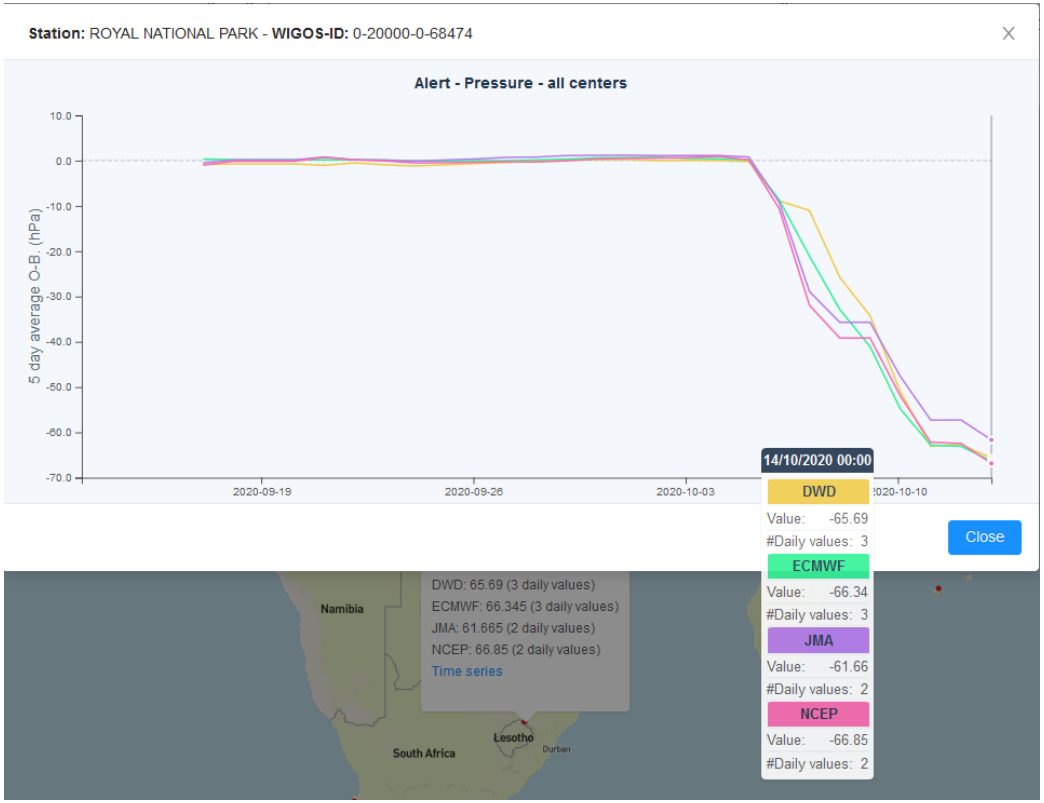
➢ RWC to initiate an incident management process with high (●) or very high priority (●) asking WDQMS NFP to take actions to investigate the cause of the incident and to find a solution



Example No. 1a – worsening pressure O-B results

- Station 68474 ROYAL NATIONAL PARK showed low pressure O-B results (≤ 1 hPa) but since 06th October 2020 the O-B results dropped significantly (≥ - 60 hPa) for all monitoring centres
- Potentially sensor drift leading to increasing wrong measurements at site

➢ RWC to raise a ticket related to this incident after 5 days the latest, i.e. on 11th October 2020



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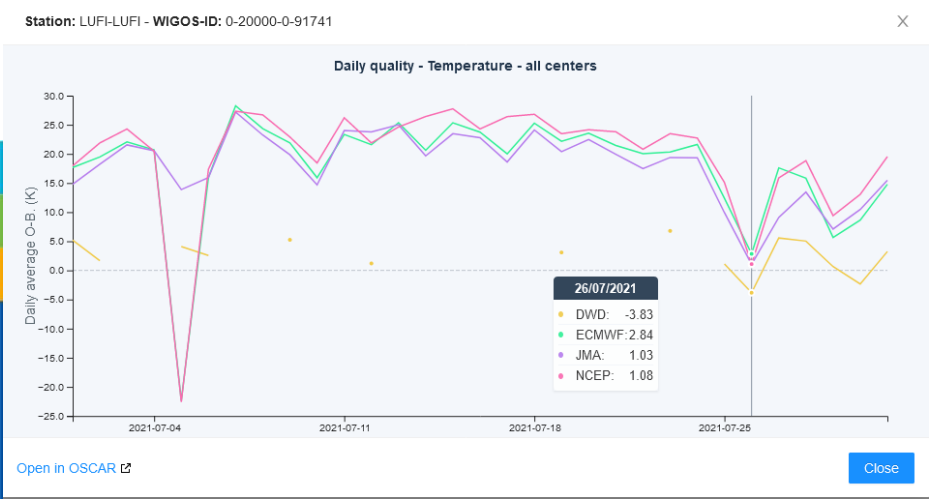
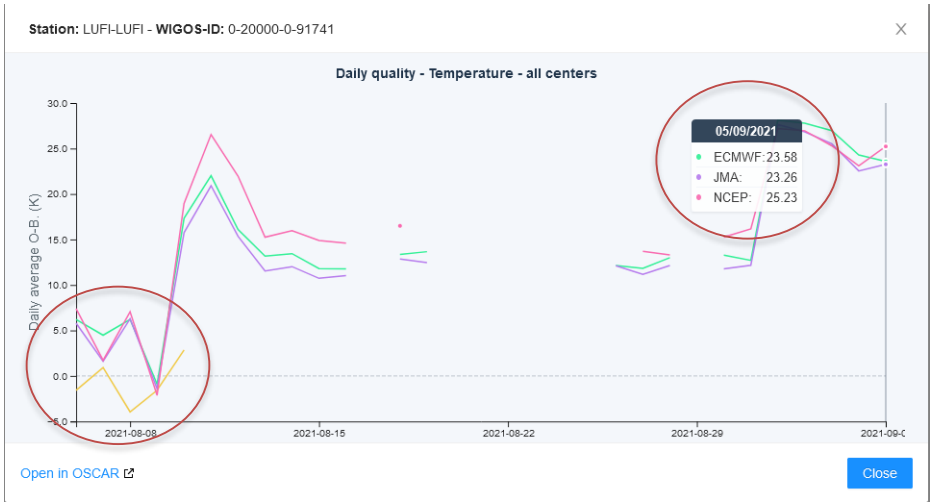
Example No. 1b – worsening temp. O-B results

- Station 91741 LUFI-LUFI, Samoa showed low temperature O-B results (≤ 5 K) beginning of August
- the O-B results worsened significantly (≥ appr. 25 K) for all monitoring centres (as it has been the case in July already)
- Potentially wrong measurements/readings at site (station reported 51.7°C on 05th Sept 2021, 10 UTC)

➢ RWC to raise a ticket related to this incident after 5 days

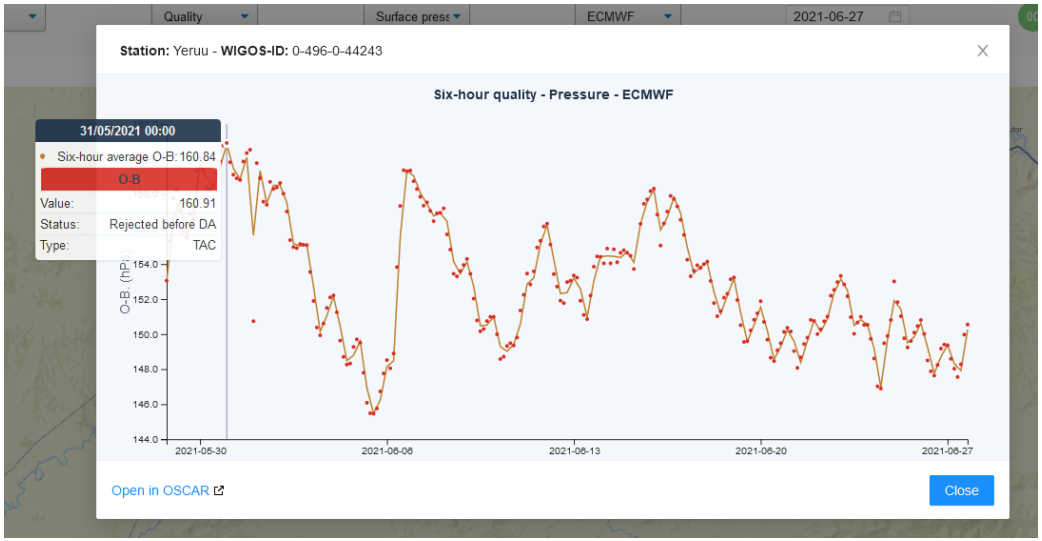




Example No. 2 – continuous large pressure O-B results

- Station 44243 Yeruu, Mongolia shows constant large pressure O-B results (≥ 150 hPa)
- Most likely related to incorrect metadata being used as background for data assimilation by WIGOS MCs (either from OSCAR/Surface or BUFR messages)
- OSCAR/Surface: station height 674.5m, barometer height 2181m

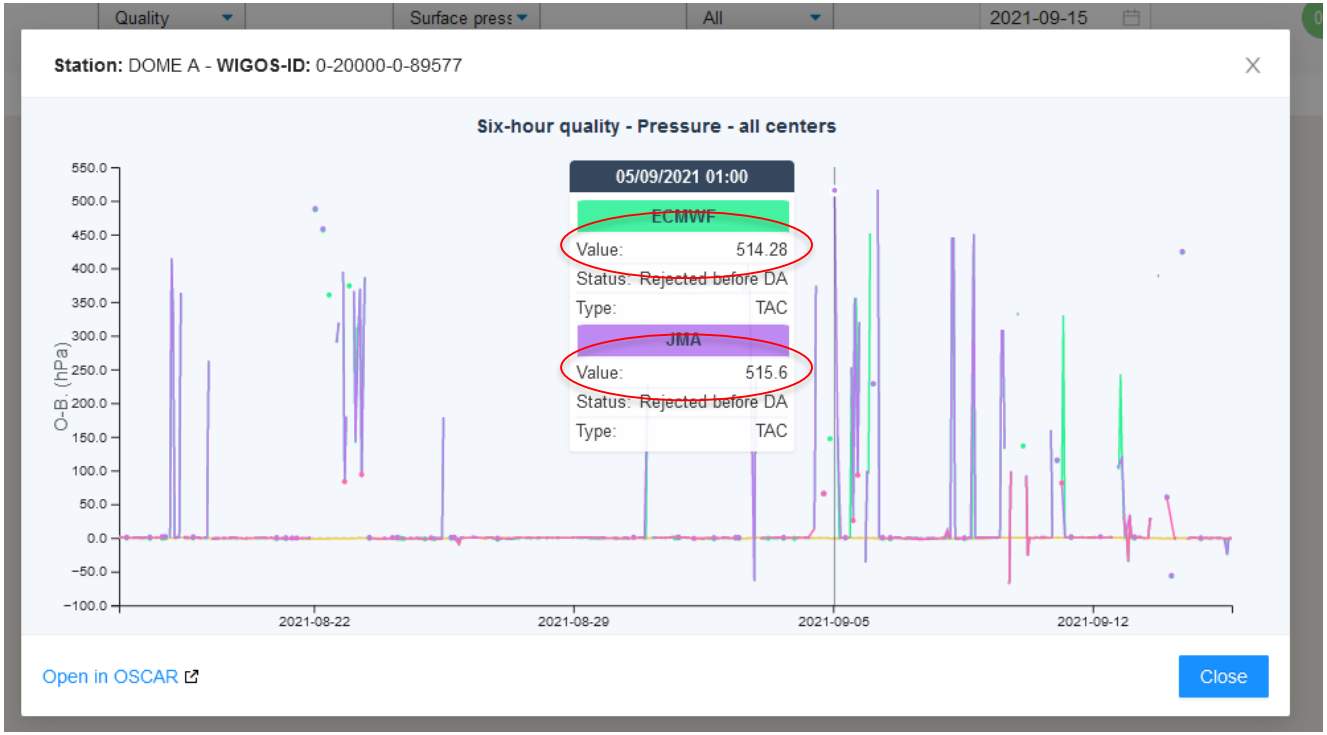
➢ RWC to raise a ticket related to this incident to check with NFP the barometer height and station height in OSCAR/ Surface and/or BUFR metadata as well as with MC FP



Example No. 3 – sporadic dips in pressure O-B results

- Station 89577 DOME A, Australia (Antarctica) shows sporadic very large dips in pressure O-B results (between 0.5 and 515 hPa)
- Most likely related to sporadic incorrect measurements or readings at site

➢ RWC would have to raise a ticket related to this incident if the issue is frequently reoccurring



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Example No. 4 – differences in pressure O-B results depending on barometer heights being considered by MCs

- DWD O-B results differ from the other Monitoring Centres for pressure values of 97378 ROTE/LEKUNIK BAA
- DWD used a internally corrected barometer height 175 m ECMWF, JMA, NCEP used the OSCAR/Surface information 1 m

➢ RWC would have to raise a ticket related to this incident to ask the NMHS and the monitoring centres to check the barometer height

Electronic pressure transducer (silicon diaphragm)

Latitude	Longitude	Elevation
10.73333333 33°S	123.0666666 667°E	1m

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RWC starting to operationalize…

- When starting its WDQMS operations RWC should initiate incident management processes for long-term ongoing issues of the following types of issues before getting into detail with special incidents of particular stations:
- **Monitoring category 'Data availability'**
  - No match in OSCAR/Surface
  - Stations which didn´t report for a longer period of time (i.e. so-called 'silent stations')
  - Stations reporting more than expected according to OSCAR
- **Monitoring category 'Quality'**
  - Ongoing, constant large surface pressure O-B results (most likely related to incorrect OSCAR/Surface metadata)

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Thank you

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www.wmo.int/wigos

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