RA VI Workshop on Regional WIGOS Centres Functions and Tools

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How to evaluate data availability and data accuracy

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WMO OMM

World Meteorological Organization

Organisation météorologique mondiale

WEATHER CLIMATE WATER

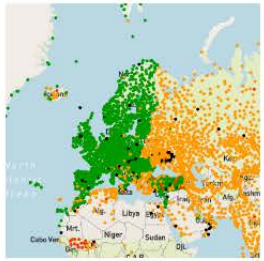
TEMPS CLIMAT EAU

How to evaluate data availability and data accuracy

- Use of the **WDQMS webtool**
- This is a **mandatory function** of the **Regional WIGOS Centres** (RWC), although important for NFPs-WDQMS to be familiar with
- The focus of these evaluation procedures are on the **near real time** stations exchanging data internationally and collected by the four WIGOS Monitoring Centres (global NWP centres)
- Examples in this presentation refer to the monitoring of **surface pressure** (also temperature in the evaluation of accuracy) from surface land stations

How to evaluate data availability and data accuracy

Global Basic Observing Network (GBON)



Surface land observations

Station Compliance

Upper-air land observations

Station Compliance

Near-real-time NWP monitoring of the Global Observing System networks

Surface land observations

Availability & Quality

Upper-air land observations

Availability & Quality

Monitoring of the Global Climate Observing System networks

Surface land observations

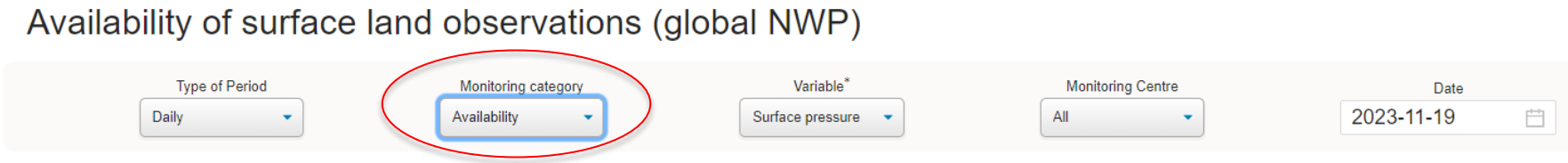
Availability & Completeness

Upper-air land observations

Availability & Quality

Category ‘Availability’

- Selecting the **Monitoring category ‘Availability’** in the webtool allows evaluating the performance related to data availability

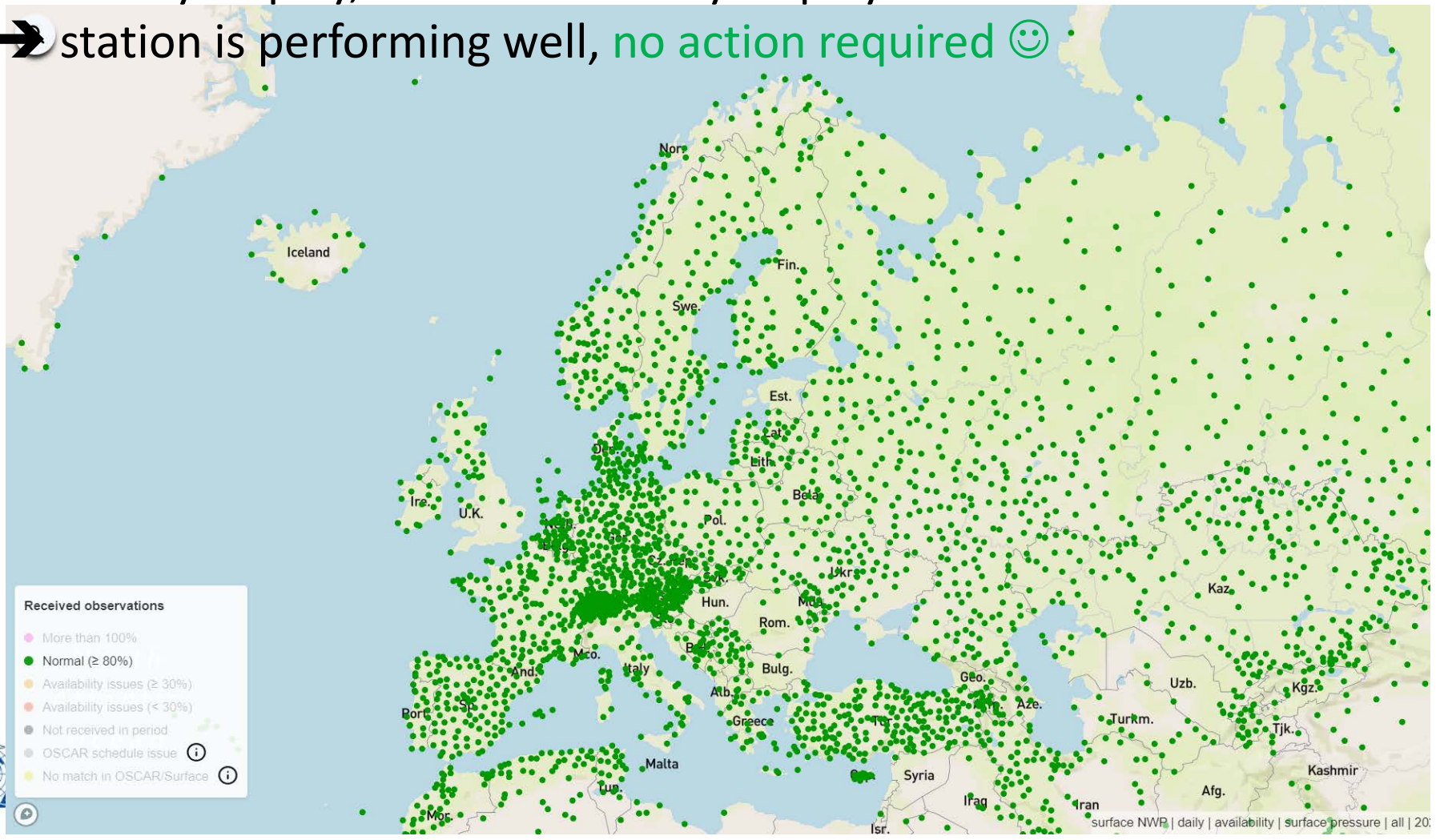


- The monitoring of data availability is **based on performance figures of WIGOS Monitoring Centres** (WMC) obtained from comparing the **observations received** to those expected to be ingested to the WMO Information System (WIS) according to the schedule of international exchange **declared in OSCAR/Surface**.
- **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 a RWC.

Normal (≥ 80%)

- Stations shown as green dots; S: Normal (≥ 80%)
- UA: ‘at least one complete launch (all variables and layers)’ in six-hourly display, ‘no issue’ in daily display

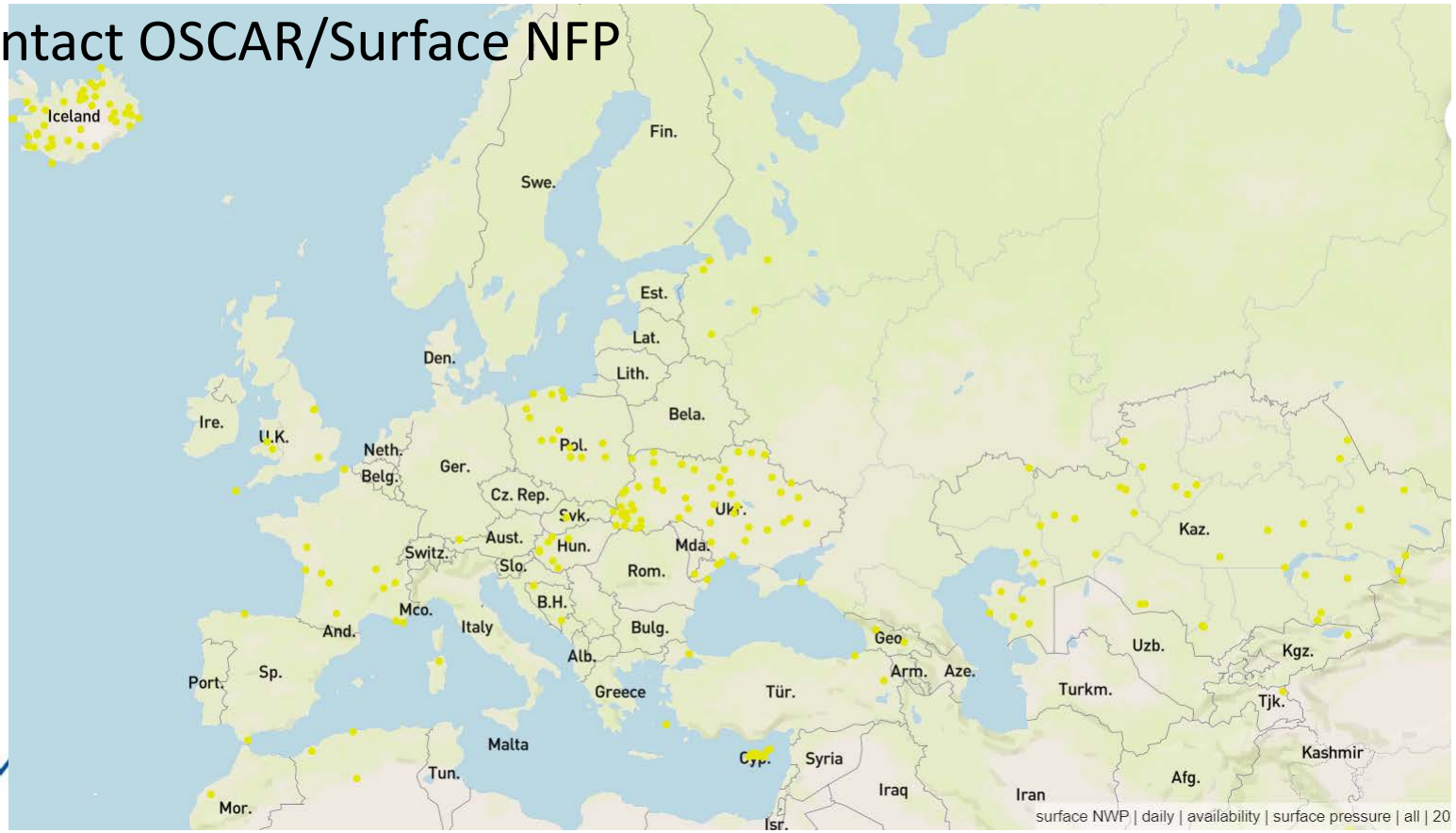
➔ station is performing well, no action required ☺



No match in OSCAR/Surface

- No match in OSCAR/Surface – although data available on WIS!
- Stations shown as yellow dots, are reporting but has not been registered in OSCAR/Surface so far, or there is no match of the station ID (potential reason: NMHS has not migrated to WSI yet).

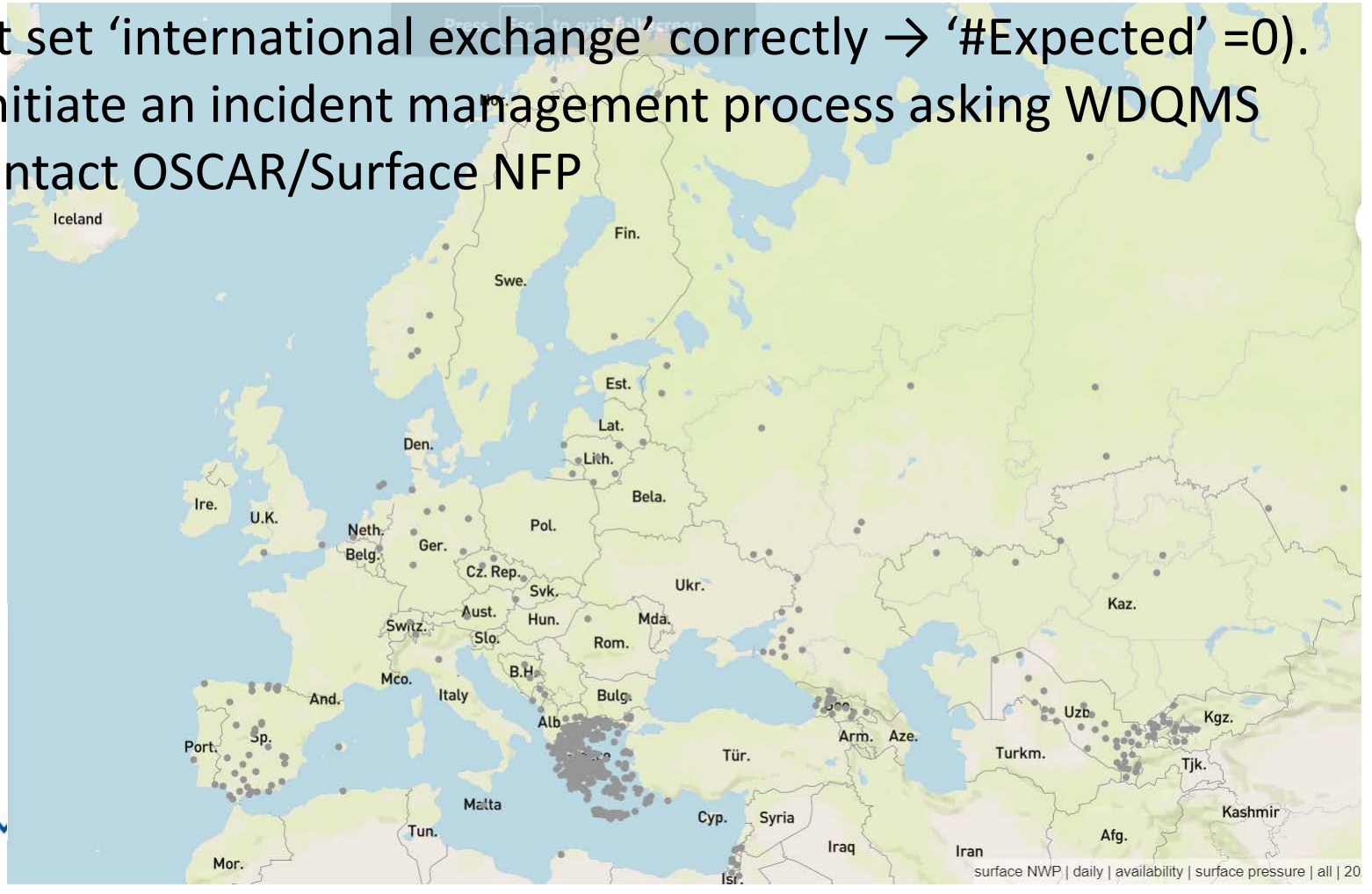
➢ RWC to initiate an incident management process asking WDQMS NFP to contact OSCAR/Surface NFP



OSCAR schedule issue

- ***Grey dots only in surface land stations monitoring!***
- Stations are reporting but there are issues in OSCAR schedule (potential reason: NMHS might report higher temporal resolution but didn´t set 'international exchange' correctly → '#Expected' =0).

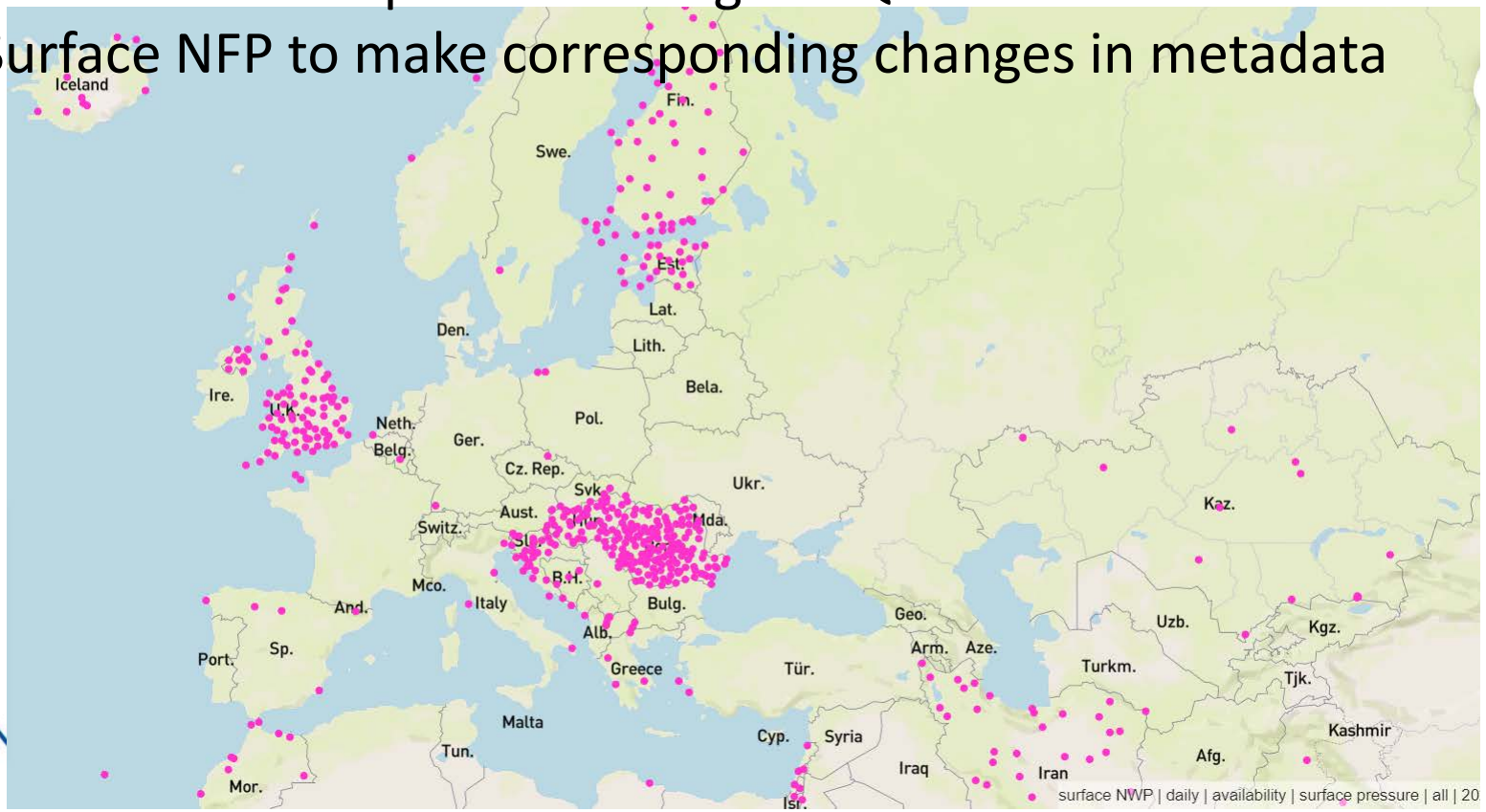
➢ RWC to initiate an incident management process asking WDQMS NFP to contact OSCAR/Surface NFP



More than 100%

- Stations shown as pink dots: More data available than indicated in OSCAR/Surface - actually a ‘happy problem’
- 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’)

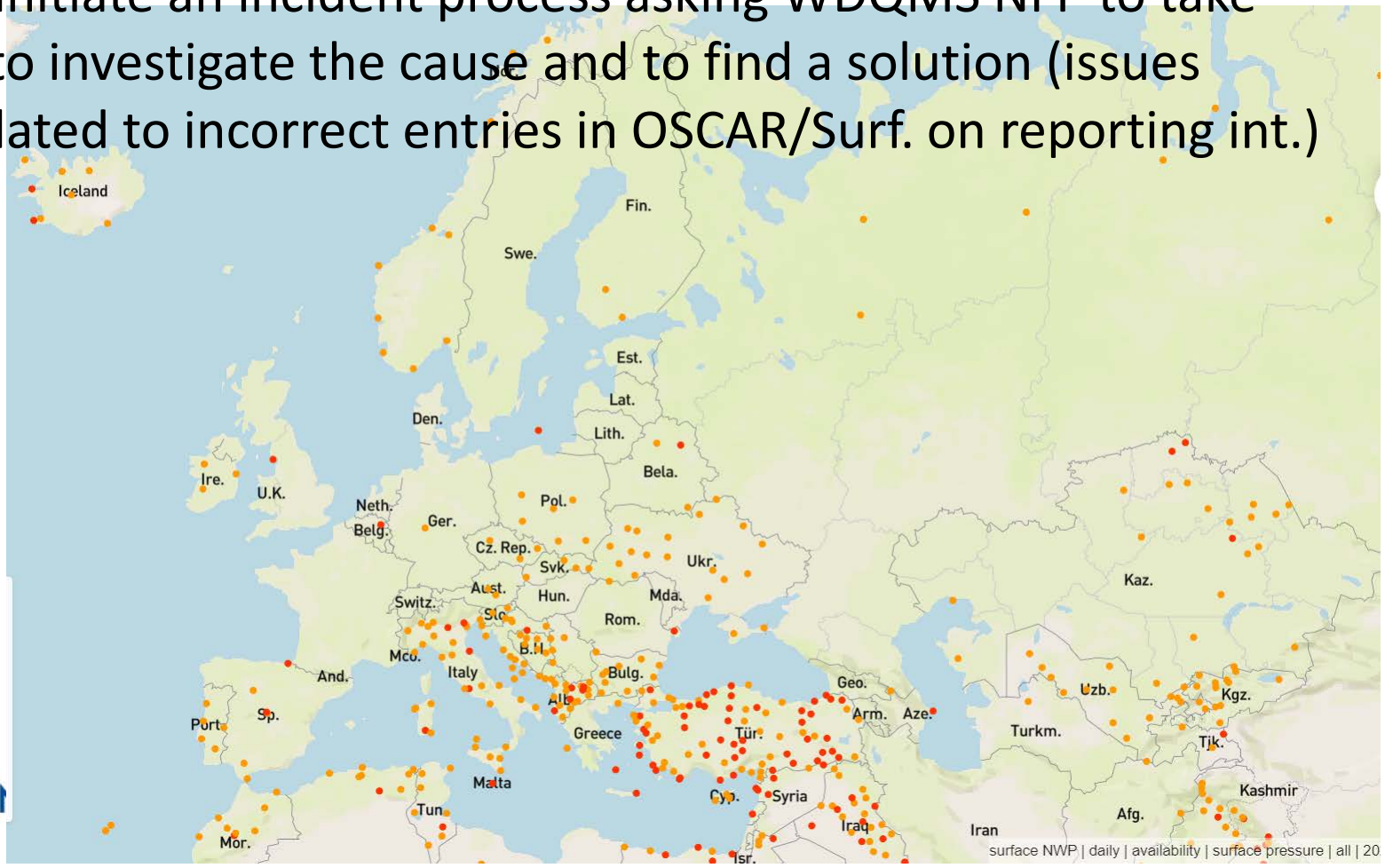
➢ RWC to initiate incident process asking WDQMS NFP to contact OSCAR/Surface NFP to make corresponding changes in metadata



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 process asking WDQMS NFP to take actions to investigate the cause and to find a solution (issues often related to incorrect entries in OSCAR/Surf. on reporting int.)



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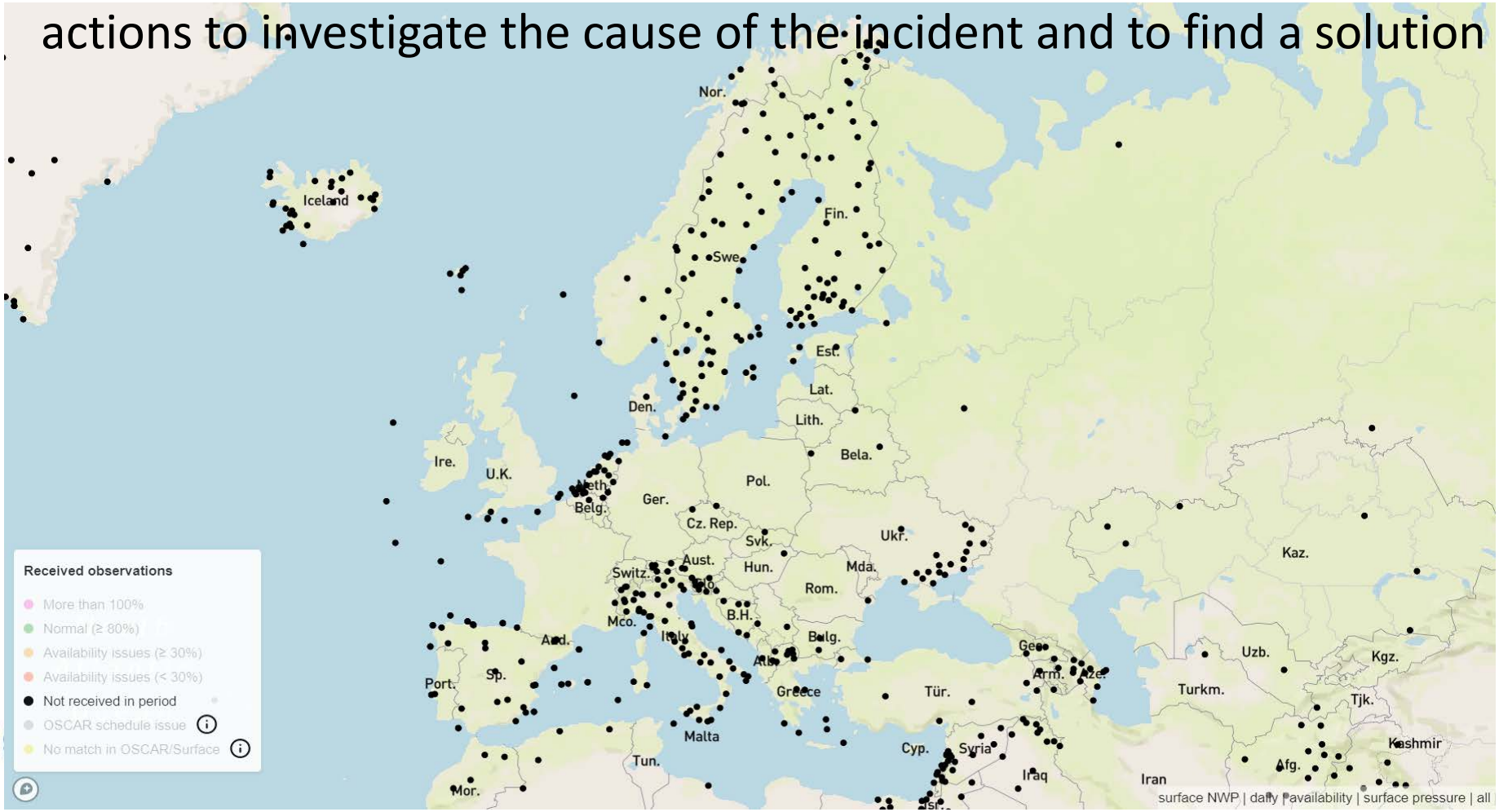
● Not received in period

- Data from stations with black dots were "**Not received in period**" – it is shown especially when selecting **'All' Centers** and **'Daily'** display
- If data were not received for more than 5 days it is a 'silent station'

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



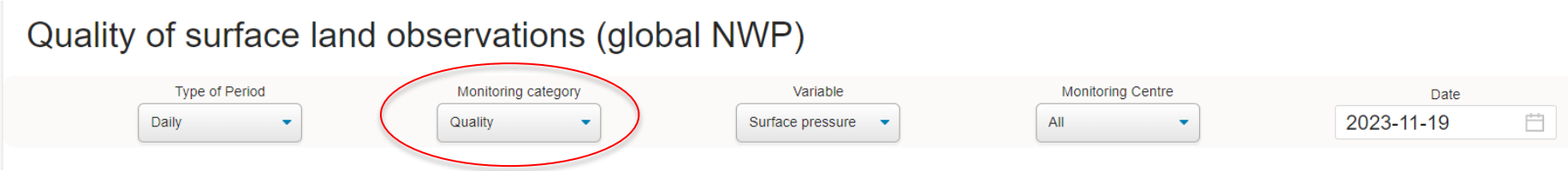
Reasons for 'no data received'

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

Category 'Quality'

- Selecting the **Monitoring category 'Quality'** in the webtool allows to evaluate the stations 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). If other MCs shows high O-B results, most likely the issue is related to the corresponding MC showing larger O-B results → no action required by RWC**

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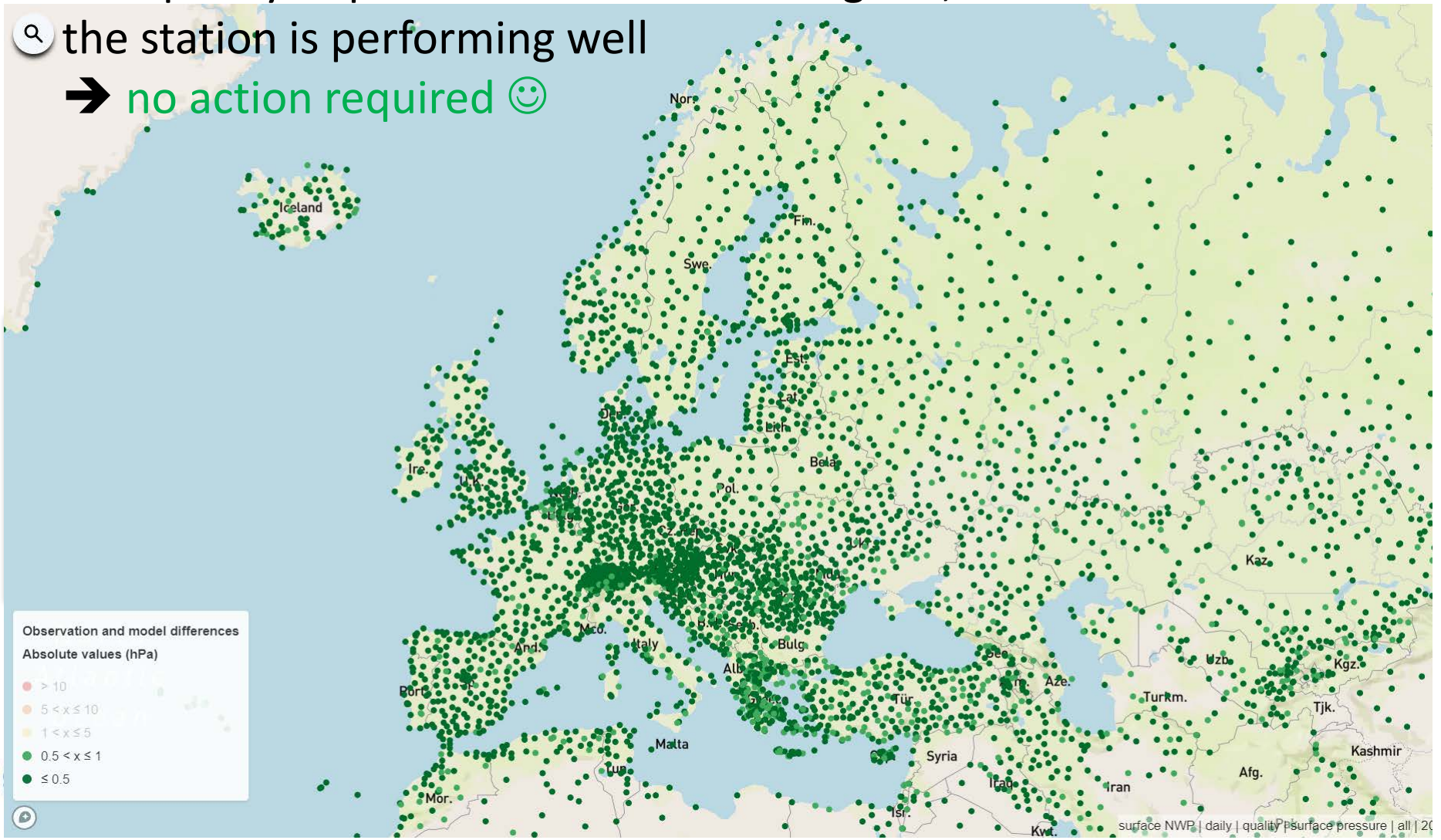
Constraints of O-B results

- NWP models assimilate 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 significantly higher than usual → stations showing ● or ● dots**

Absolute pressure O-B differences ≤ 1 hPa

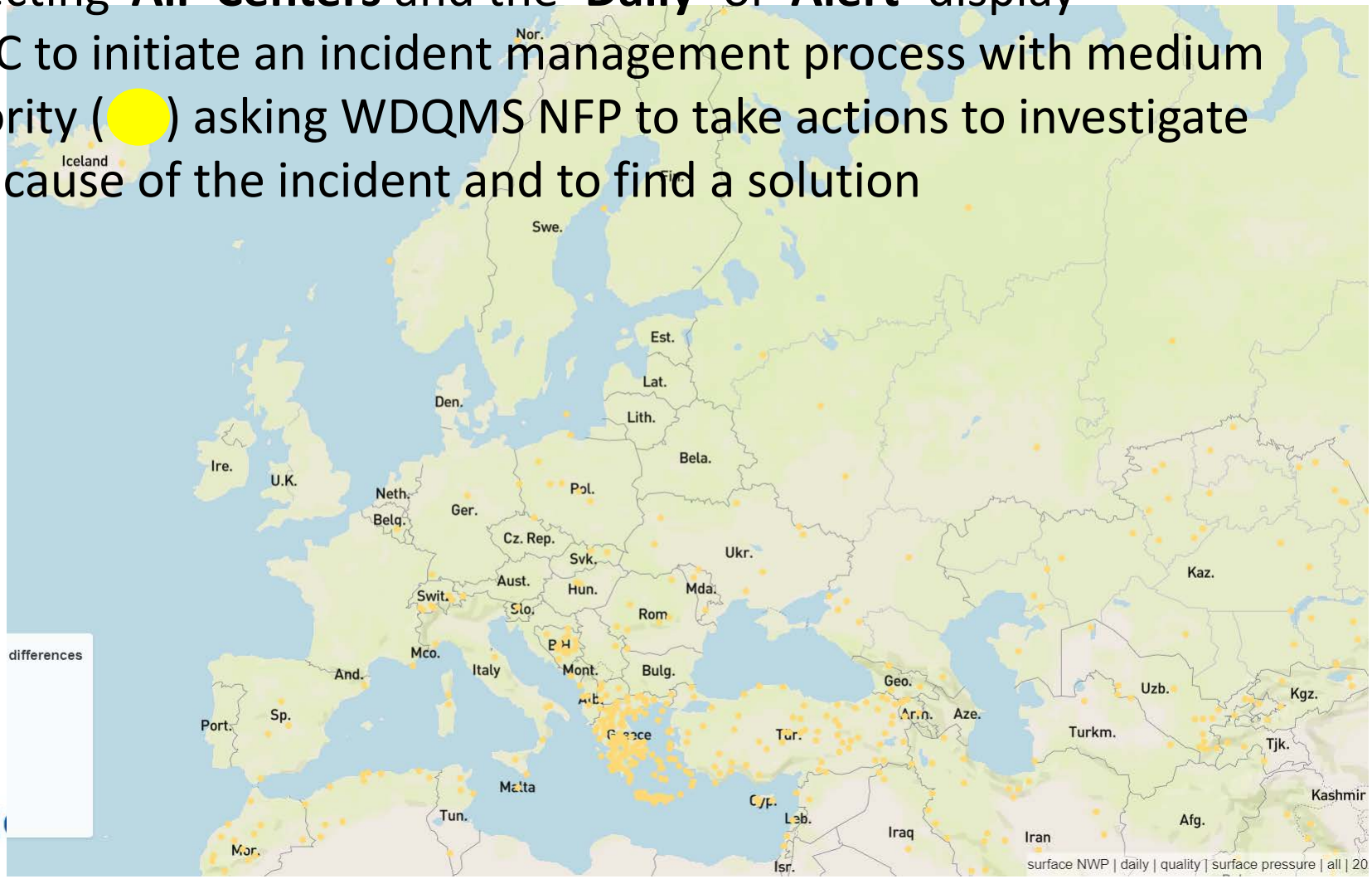
- Stations shown as green dots
- The quality of pressure observations is good,
- the station is performing well
  - ➔ no action required ☺



Absolute pressure O-B differences 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

Priorities for (RWC) raising incidents…

- When performing their WDQMS operations the RWCs, especially those initiating/pilot mode should raise incident tickets for long-term ongoing issues of the following types and follow up on them:
- **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/S.
- **Monitoring category 'Quality'**
  - – Ongoing, constant large surface pressure O-B results (most likely related to incorrect OSCAR/Surface metadata)

Thank you
Gracias

WIGOS Learning Portal
https://etrp.wmo.int/course/view.php?id=146
WIGOS Website
https://community.wmo.int/activity-areas/wigos

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