

Practical use of standard meteorological instruments in domestic meteorological observation networks



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Outline of presentation

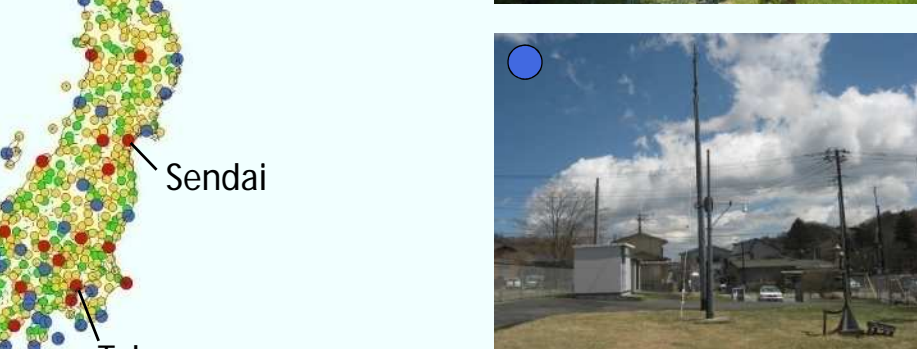
- Observation network of JMA “AMeDAS”
- Traceability of meteorological instruments in Japan
- Maintenance of field instruments
 - Overhaul and inspection / calibration of field instruments at Meteorological Instrument Center (MIC)
 - Site inspection / calibration of field instruments



Observation network of JMA “AMeDAS” (Automated Meteorological Data Acquisition System)

| | | |
|---|-----|------------------------------|
| ● Manned Meteorological Observatory | 61 | } About 1,300 Stations |
| ● Special Automatic Weather Station | 95 | |
| ● Automatic Weather Station | 773 | |
| ● Automatic Precipitation Gauge Station | 361 | |

Stations are located at average intervals of 17km.



<Observation element>

- Precipitation (All stations)
- Air temperature, Wind direction/speed and Sunshine duration (about 840 stations)
- Snow depth (about 320 stations)

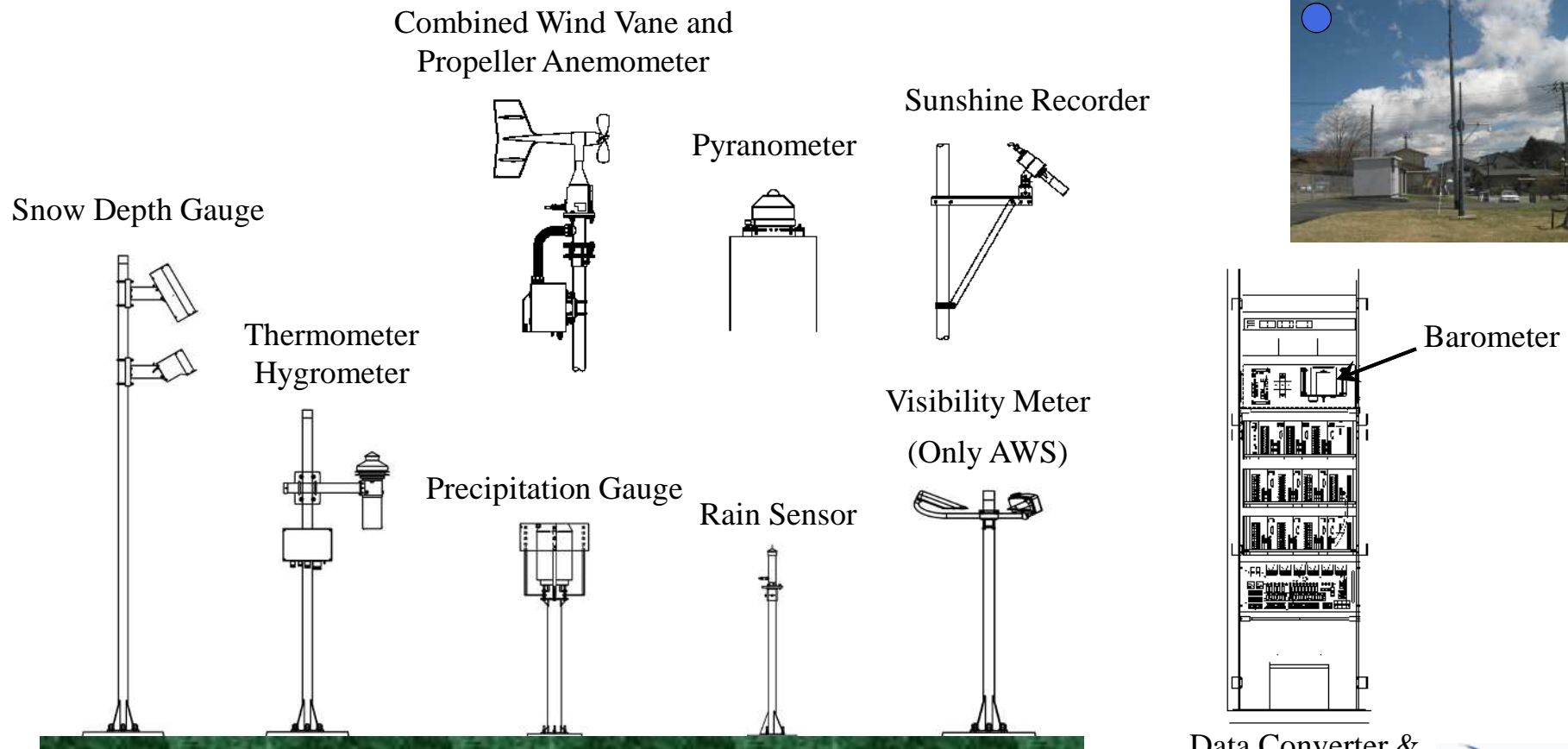
Naha ● Minamidaito Jima

Minamitori Shima ●

Observation network of JMA “AMeDAS”

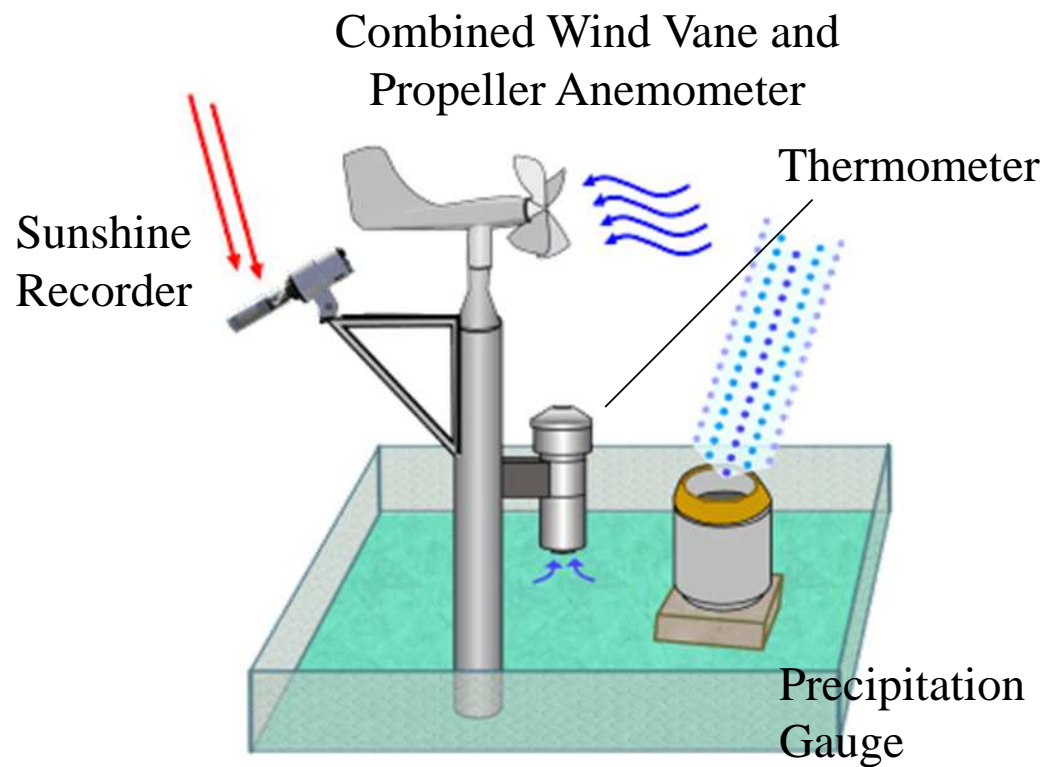
Manned Observatory &
Special Automatic Weather Station

Surface Weather Observation System (JMA-10 type)



Observation network of JMA “AMeDAS”

Automatic Weather Station / Automatic Precipitation Gauge Station



Automatic Weather Station

Traceability of Meteorological Instruments in Japan

BIPM

International Standard
(SI unit)

NMIJ

National Primary Standard
(National Metrology Institute of
Japan)

National meteorological standard
(JMA standard)

JMA

Working standards
(JMA sub-standard)

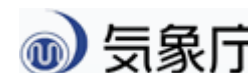
Working instruments
(Observation sites)



JMA is accredited to ISO/IEC17025

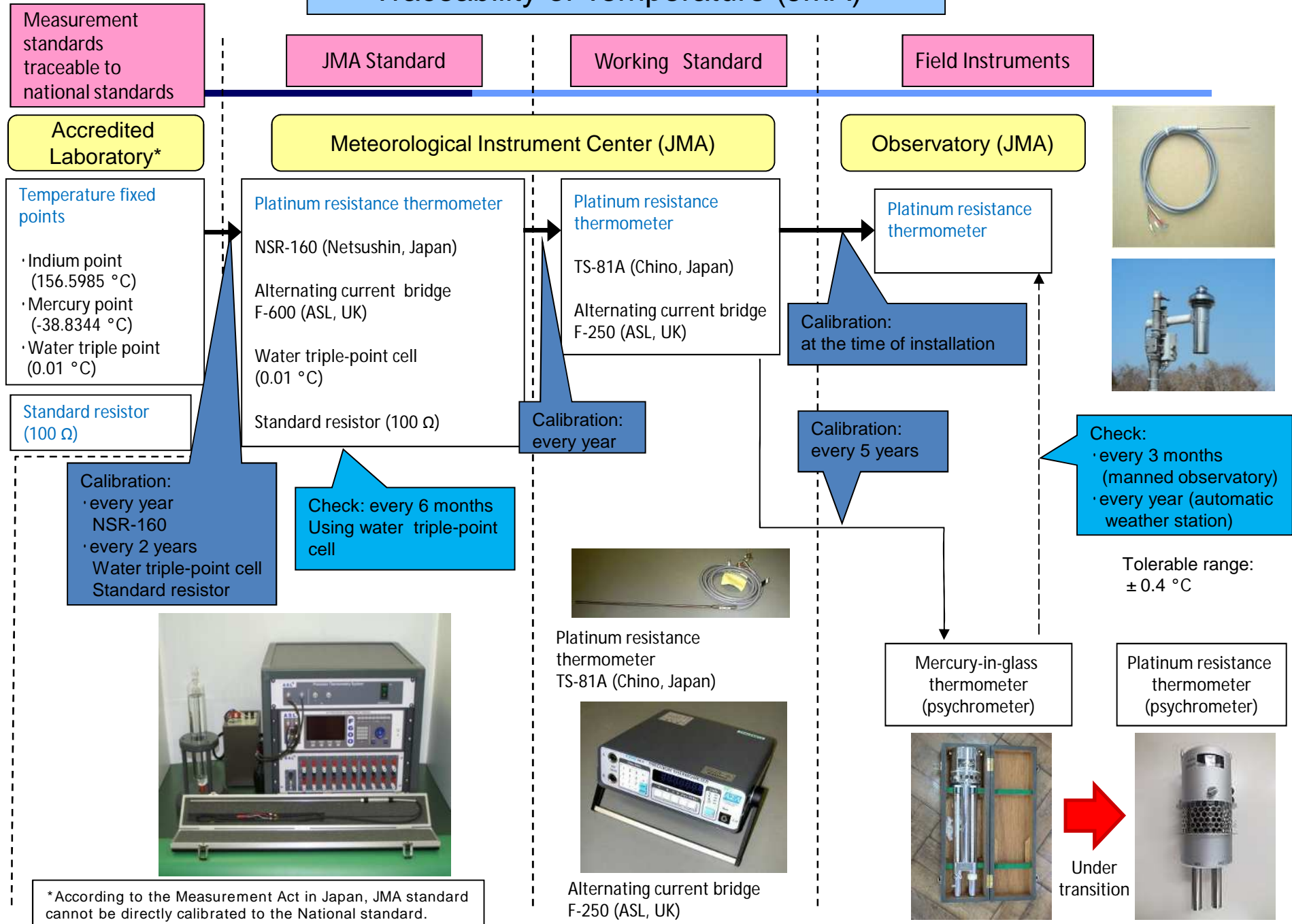
- Temperature
- Humidity
- Pressure

In Japan, the Meteorological Service Act requires all meteorological instruments used for public to meet certain technical and performance standards.



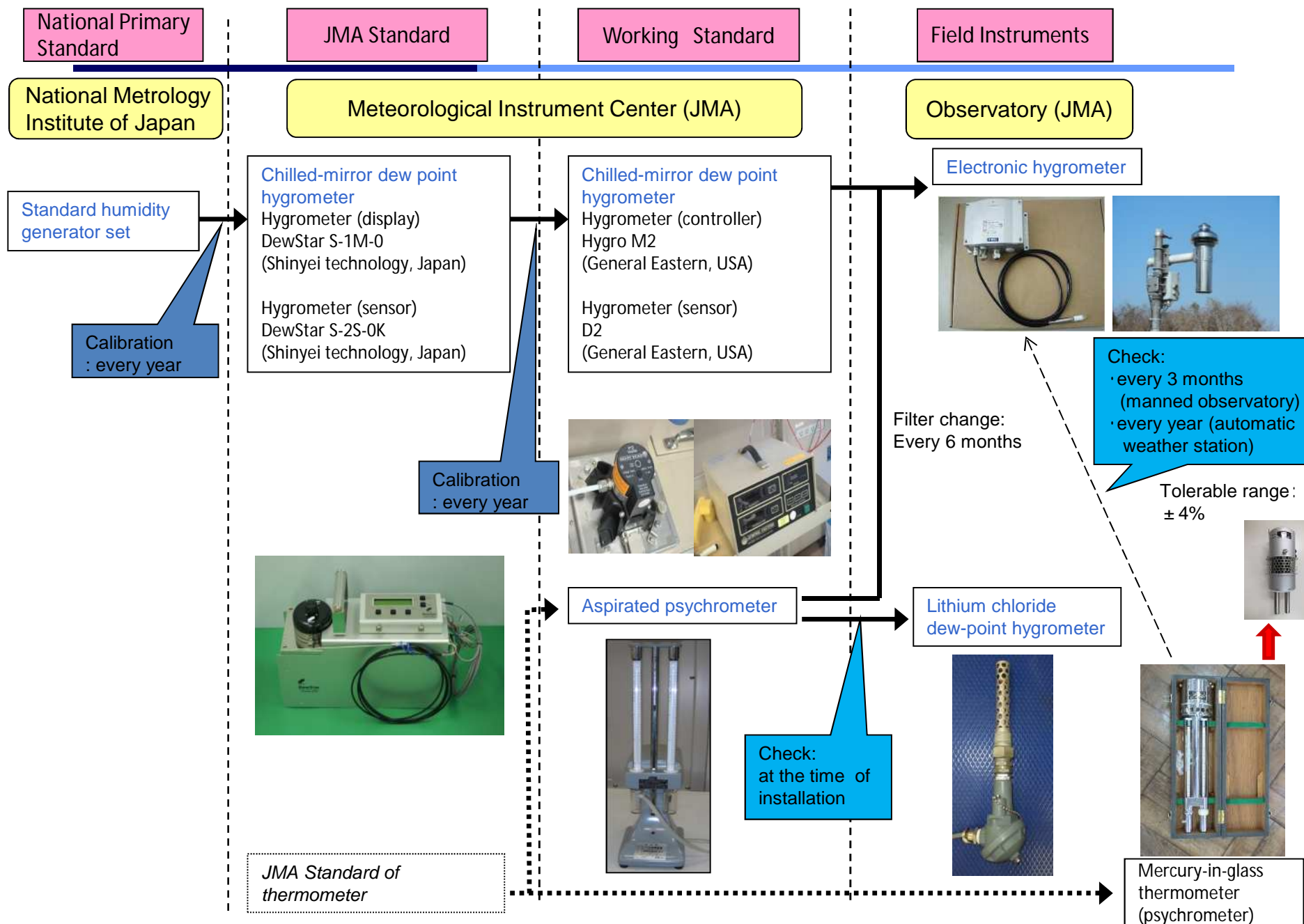
Traceability of Temperature (JMA)

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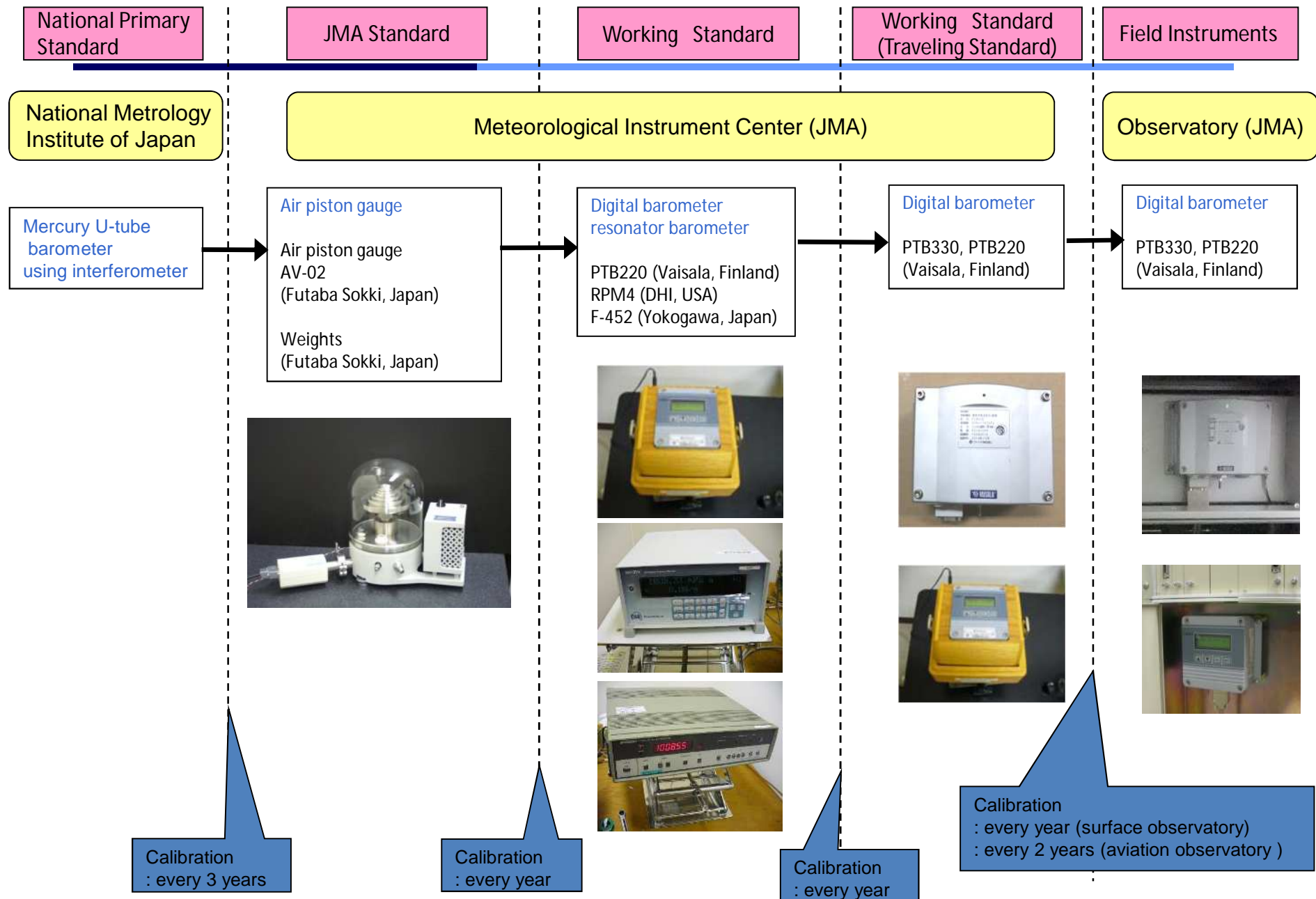
Traceability of Humidity (JMA)

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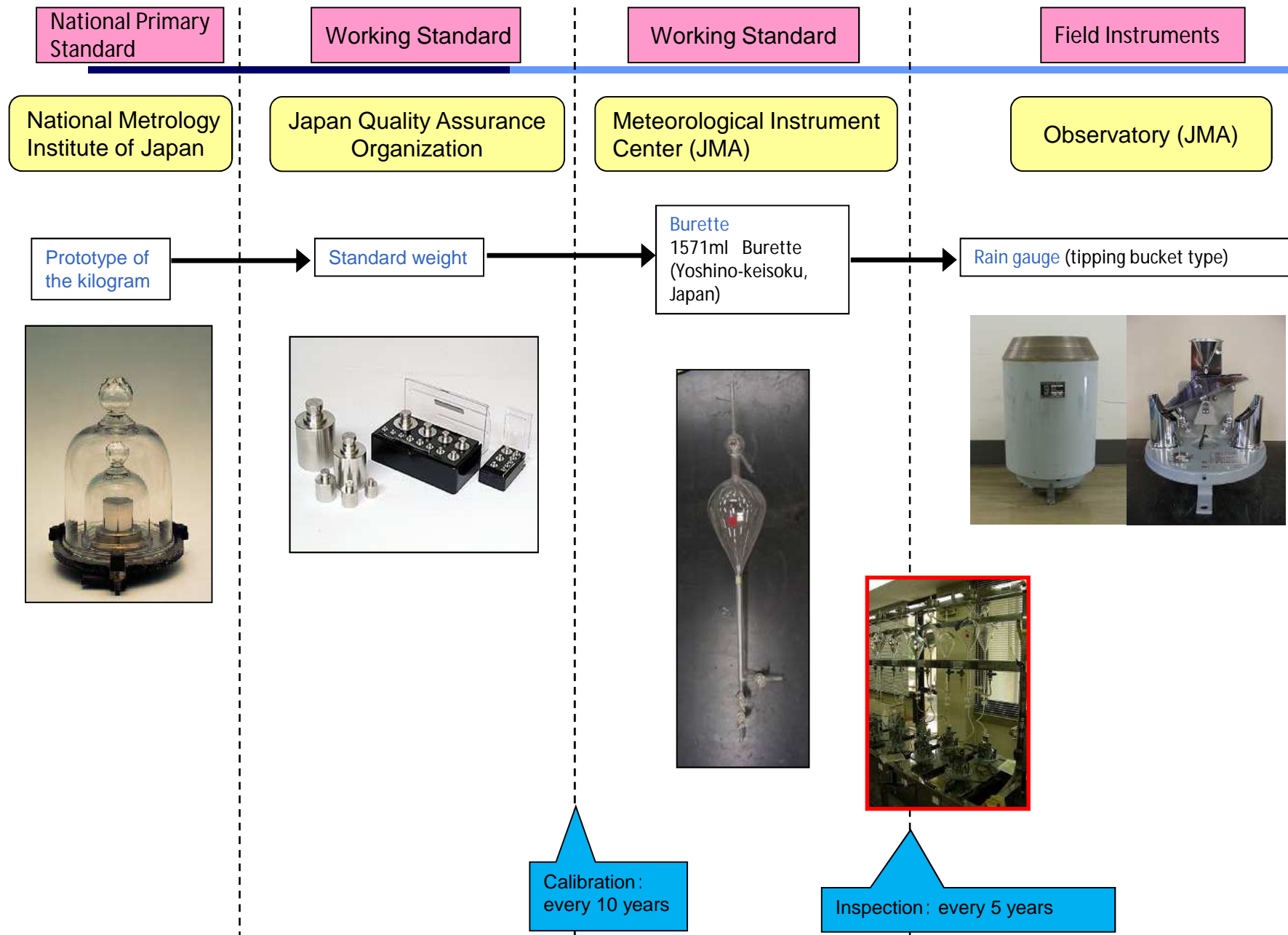
Traceability of Pressure (JMA)

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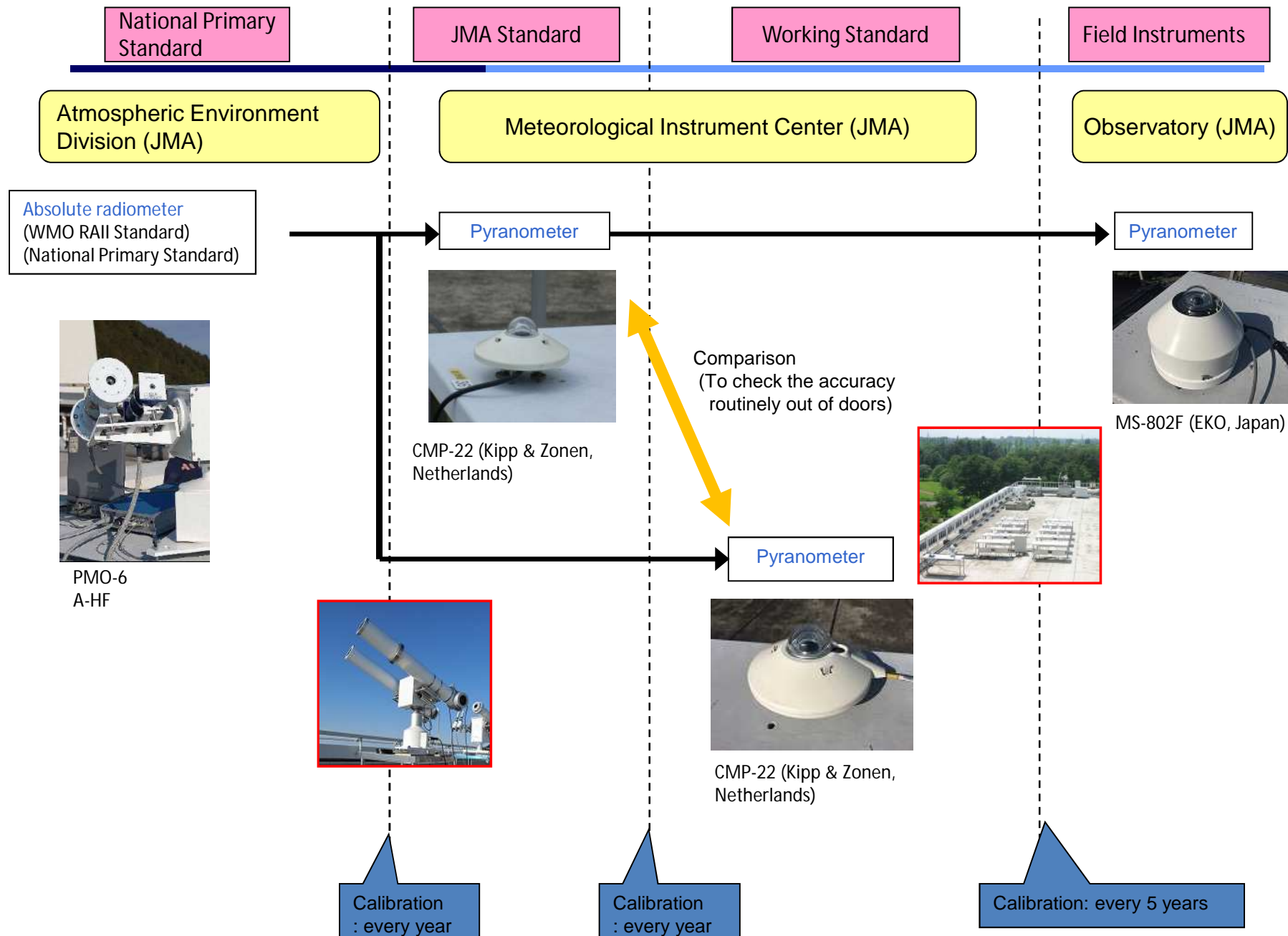
Traceability of Precipitation (JMA)

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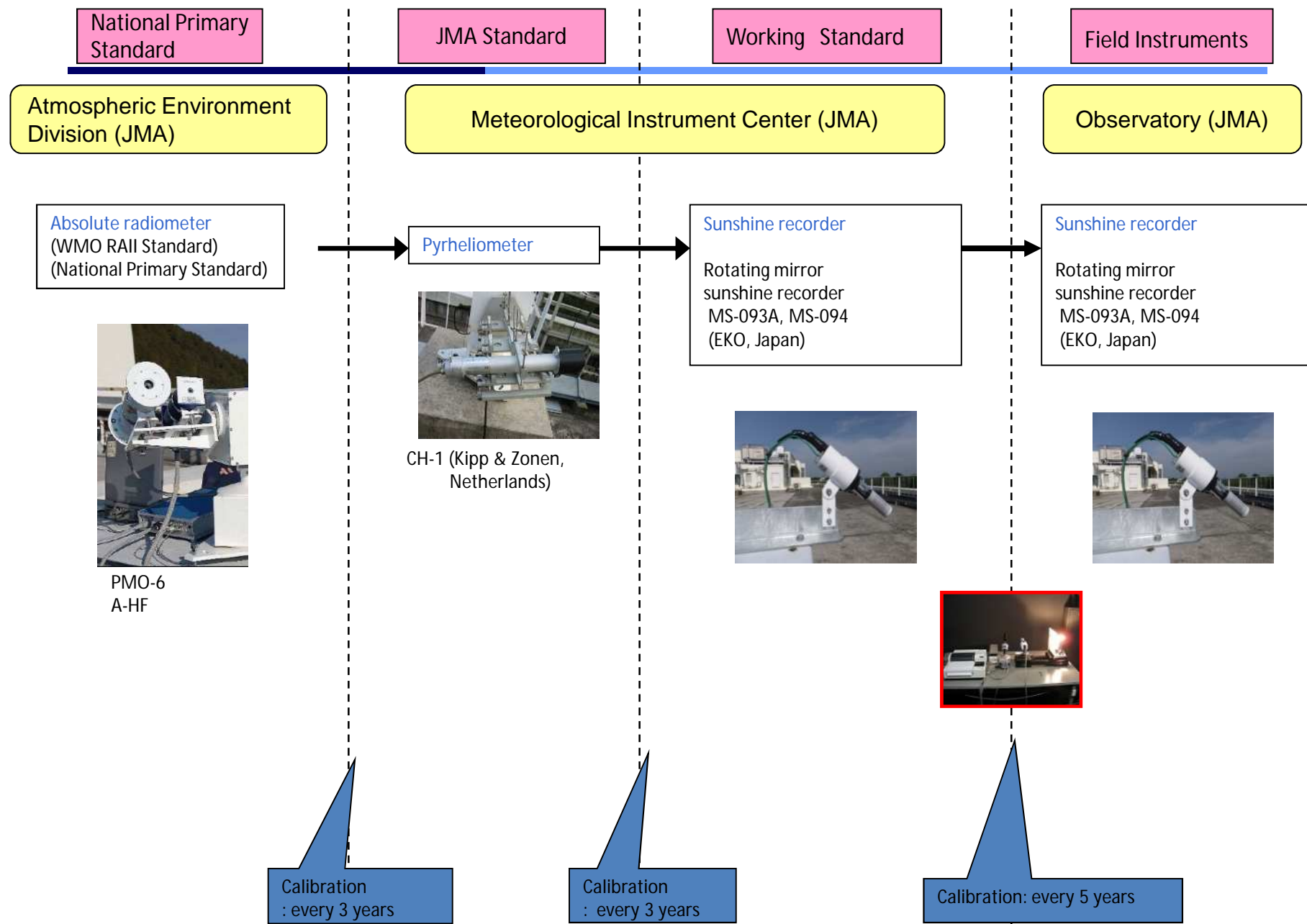
Traceability of Solar Radiation (JMA)

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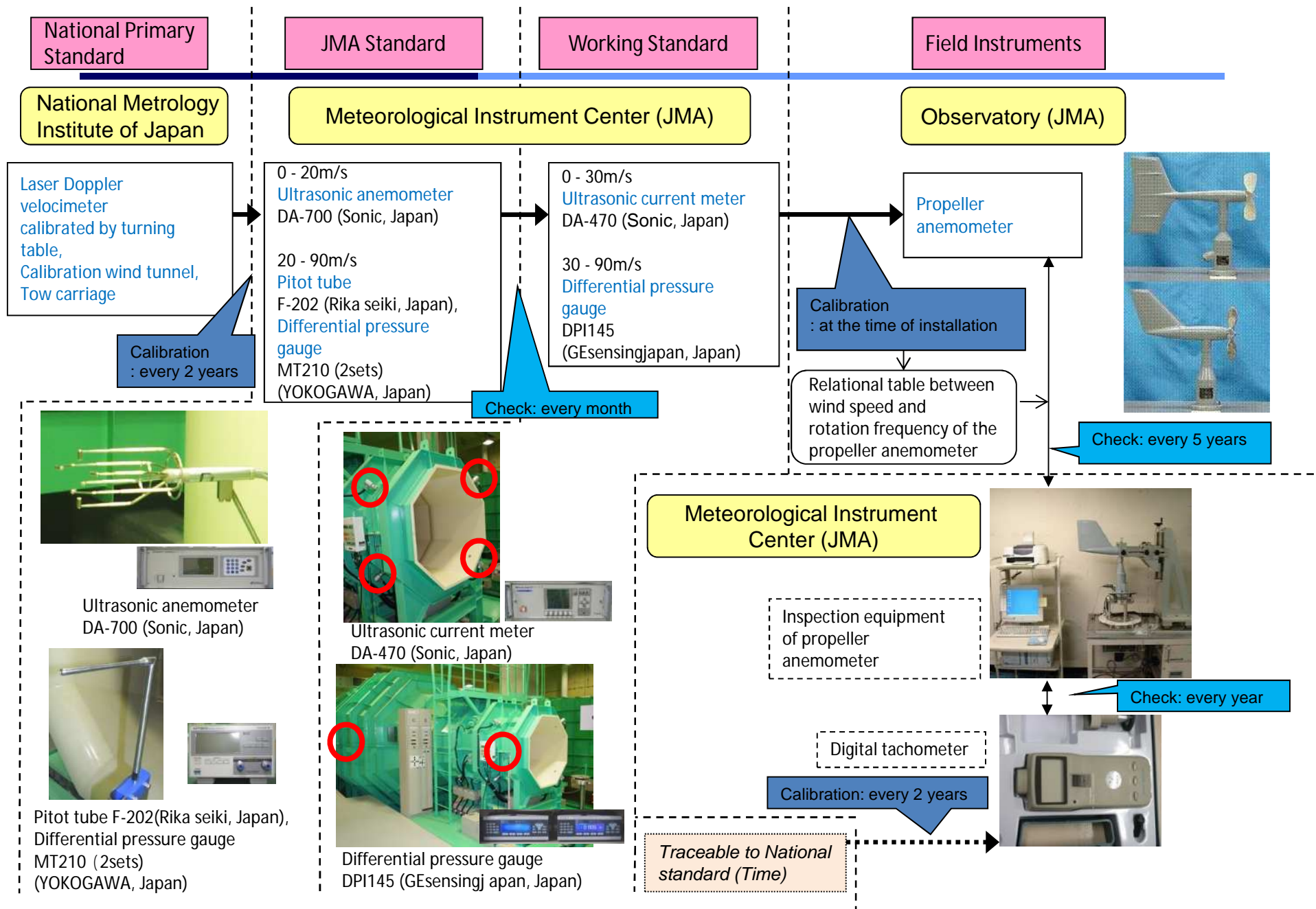
Traceability of Sunshine Duration (JMA)

20 Mar. 2018



Traceability of Wind Speed (JMA)

20 Mar. 2018



Maintenance of field instruments

Manned Observatory
Special AWS



Automatic Weather Station
Automatic Precipitation
Gauge Station



MIC inspects about 1,600 units
of instrument per year.

Overhaul and
Inspection/calibration
at MIC:
Every 5 years.

Instruments

Anemometers
Rain gauges
Pyranometers
Sunshine recorders



Meteorological Instrument
Center (Tsukuba)

Maintenance at field site

Manned Observatory, Special AWS : Every 3 months
AWS : Once or twice in a year

Maintenance of field instruments

■ Overhaul and inspection / calibration of field instruments at MIC

■ Overhaul

- Replacement of deteriorated / damaged parts
- Adjustment



Inspection/calibration:
every 5 years

Anemometers
Rain gauges
Pyranometers
Sunshine recorders



■ Inspection / calibration

- Checking :
whether the instrumental error concerned
is within a specified range or not
in comparison with standard instruments.



Standard instruments for rain gauges

Maintenance of field instruments

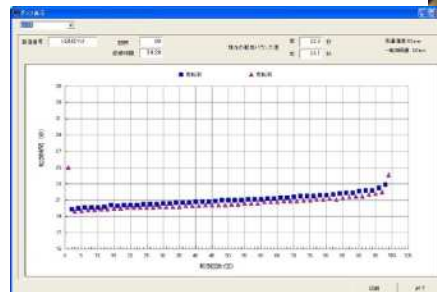
■ Overhaul and inspection / calibration of field instruments at MIC

Overhaul and inspection for rain gauge

- Replacement of deteriorated / damaged parts
- Adjustment



- Inspection



Maintenance of field instruments

■ Site inspection / calibration of field instruments

■ Maintenance and inspection at field site



Anemometer

Clean? Are there any spider webs?

Is the gauge installed horizontally?

Does the bucket tip properly?

Does the heater work properly?

Is there any damage?

Does the propeller respond properly to winds?

Is the fan working properly?

Is there any rust or dirt inside the shelter?

Is there any damage to the sensors?



Precipitation Gauge



Thermometer, hygrometer & Shelter

JMA regularly maintains AWS in order to keep the quality of observation data.

Maintenance of field instruments

■ Site inspection / calibration of field instruments

- Site inspection for thermometer / hygrometer
(Manned observatory & Special AWS)



Platinum
resistance
thermometer
/ Electronic
hygrometer



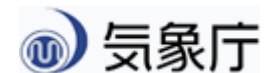
Check
(Every 3 months)



Aspirated psychrometer
Assmann type (JMA uses)



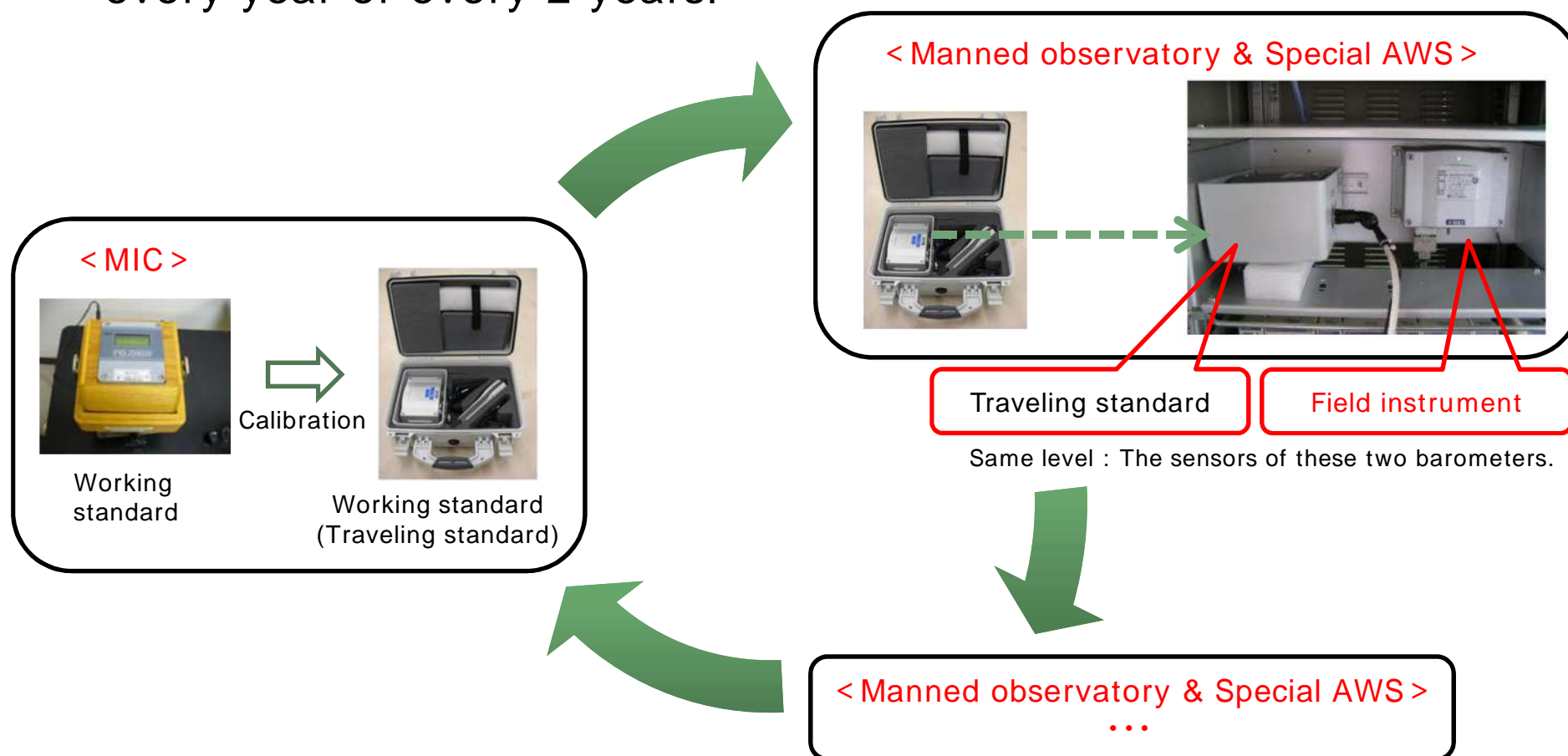
Platinum resistance
thermometer
(psychrometer)



Maintenance of field instruments

■ Site inspection / calibration of field instruments

- Site calibration for barometer (Manned observatory & Special AWS)
- Calibration by comparing with traveling standard at field site every year or every 2 years.



Summary

- JMA keeps the traceability of meteorological instruments.
 - Calibration of standards at MIC.
 - Calibration of field instruments at MIC (before installing).
- JMA maintains the field instruments.
 - Overhaul and calibration / inspection at MIC every 5 years.
 - Site inspection / calibration with traveling standard.
- It is important that NMHSs keep the traceability of meteorological instruments and maintain the field instruments to assure the quality of observation data.

Thank you for your attention !