

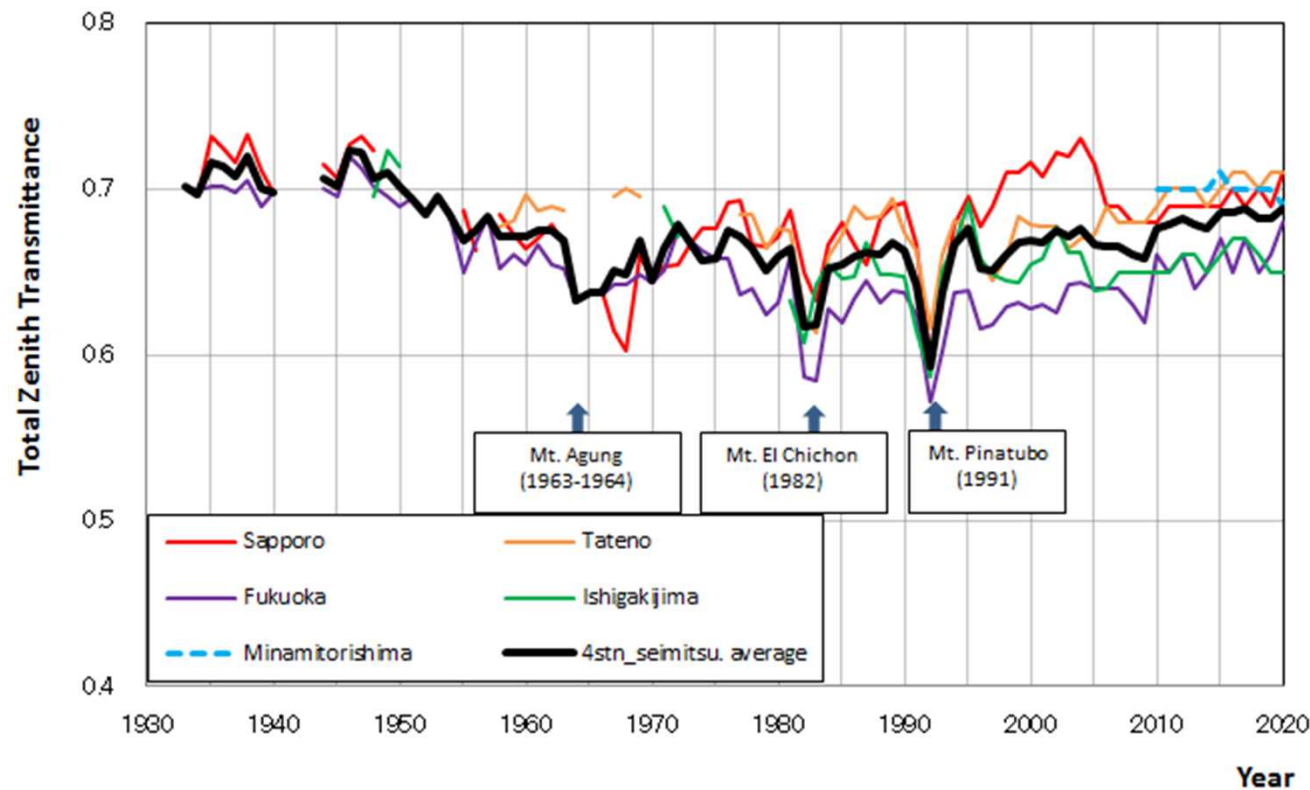
Key activities of Regional Radiation Center(RRC) Tokyo in the WMO RA-II

Japan Meteorological Agency (JMA)

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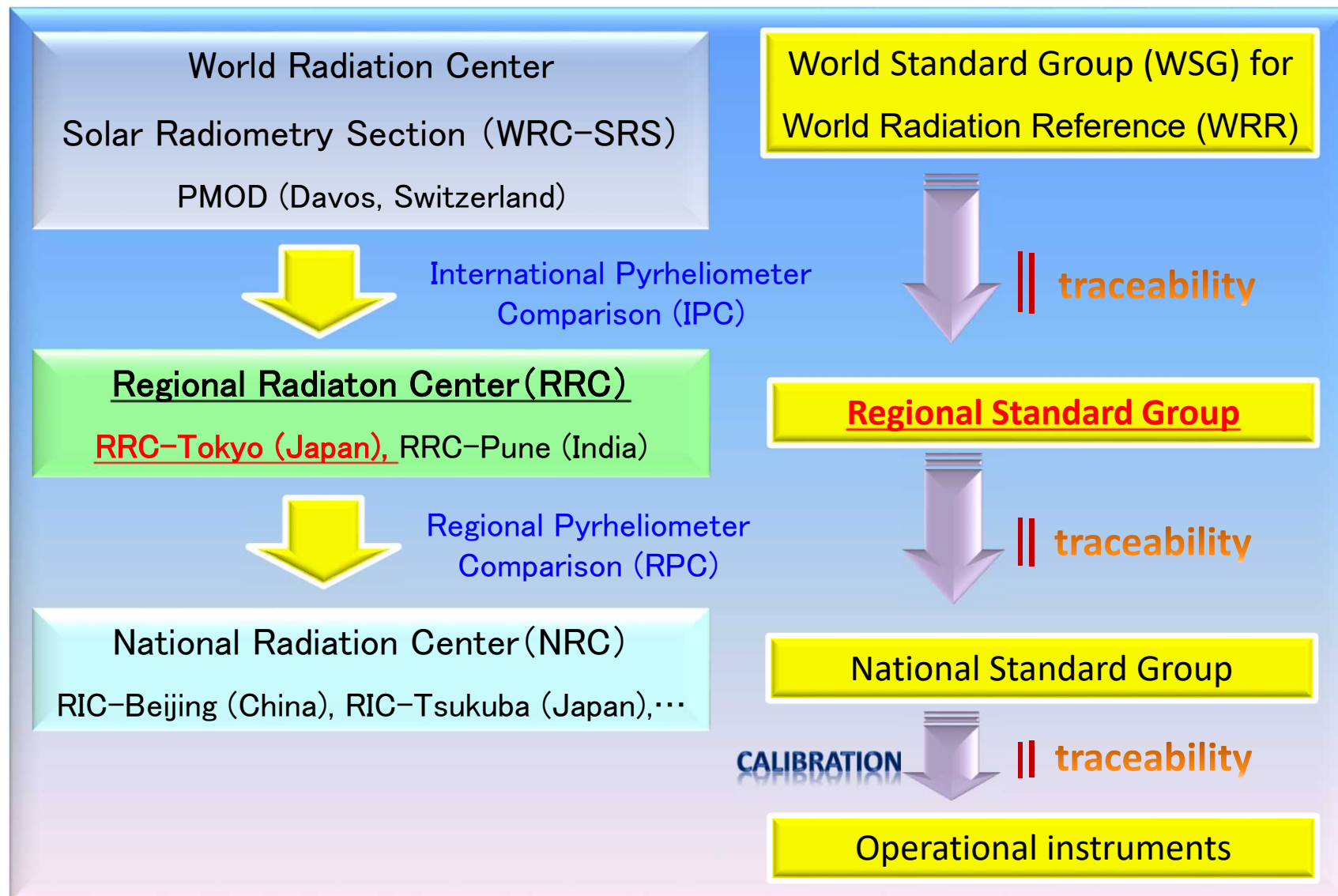
Background

- Japan Meteorological Agency (JMA) has been conducting solar radiation measurements traceable to the international standard scales since the 1930s .
- JMA was designated as a Regional Radiation Center (RRC) in Asia, and has been serving as one of RRCs in RA-II (RRC Tokyo) since 1965.



Long-term variations of annual mean transmittance calculated from direct solar irradiance at 4 (1933-2020) stations in Japan.

A framework of calibration of solar radiation instruments (ex. RA-II)



Conceptual diagram of calibration of solar radiation instruments within the framework of WMO

Activities of RRC Tokyo (1/3) - History and main activities -

1964	Pyrheliometer Intercomparison : India – Japan (Pune, India)
1965	Regional Radiation Center Establishment (RA II Res.20, CIMO IV Rec.1,3,9)
1968	Pyrheliometer Intercomparison : Thailand - Japan (Tsukuba, Japan)
1970	IPC-III (WRC/Davos, Switzerland)
1975	IPC-IV (WRC/Davos, Switzerland)
	Pyrheliometer Intercomparison : China - Japan (Tsukuba, Japan)
1980	IPC-V (WRC/Davos, Switzerland)
1983	Pyrheliometer Intercomparison : Hong Kong – Japan (Tsukuba, Japan)
1985	IPC-VI (WRC/Davos, Switzerland)

Activities of RRC Tokyo (2/3) - History and main activities -

1989	<u>RPC-I : Regional Pyrheliometer Comparison of RA II & RA V (Tsukuba, Japan)</u>
1990	IPC-VII (WRC/Davos, Switzerland)
1994	Reference Pyranometer Calibration : Thailand (Tsukuba, Japan)
1995	Pyrheliometer Intercomparison : China - Japan (Tsukuba, Japan)
	Reference Pyranometer Calibration : Korea (Tsukuba, Japan)
	IPC-VIII (WRC/Davos, Switzerland)
1996	Training for Calibration of Pyrheliometers : Korea (Tsukuba, Japan)
1997	Pyrheliometer Intercomparison : Hong Kong & Korea – Japan (Tsukuba, Japan)
	Training for Reference Pyranometer Calibration : Philippines (Tsukuba, Japan)

Activities of RRC Tokyo (cont. 3/3) - History and main activities -

2000	IPC-IX (WRC/Davos, Switzerland)
2002	Pyrheliometer Intercomparison : Hong Kong, China & Korea – Japan(Tsukuba, Japan)
2005	IPC-X (WRC/Davos, Switzerland)
2007	<u>RPC-II : Regional Pyrheliometer Comparison of RA II (Tsukuba, Japan)</u>
2010	IPC-XI (WRC/Davos, Switzerland)
2012	<u>RPC-III : Regional Pyrheliometer Comparison of RA II (Tsukuba, Japan)</u>
2015	Reference Pyranometer Calibration : Indonesia (Tsukuba, Japan)
	IPC-XII (WRC/Davos, Switzerland)
2017	<u>RPC-IV : Regional Pyrheliometer Comparison of RA II & RA V (Tsukuba, Japan)</u>
2021	IPC-XIII (WRC/Davos, Switzerland, only instruments)
2023	<u>RPC-V : Regional Pyrheliometer Comparison of RA II (Tsukuba, Japan)</u>

Activity for RRC Requirements

- To comply with requirements for RRC, RRC Tokyo holds a Regional Pyrheliometer Comparison (RPC) of RA-II once every 5 years, in the next fiscal year of IPC in principle.
- Furthermore, to maintain the regional standard pyrheliometers, RRC Tokyo holds a domestic solar radiometer intercomparison in cooperation with RIC Tsukuba.



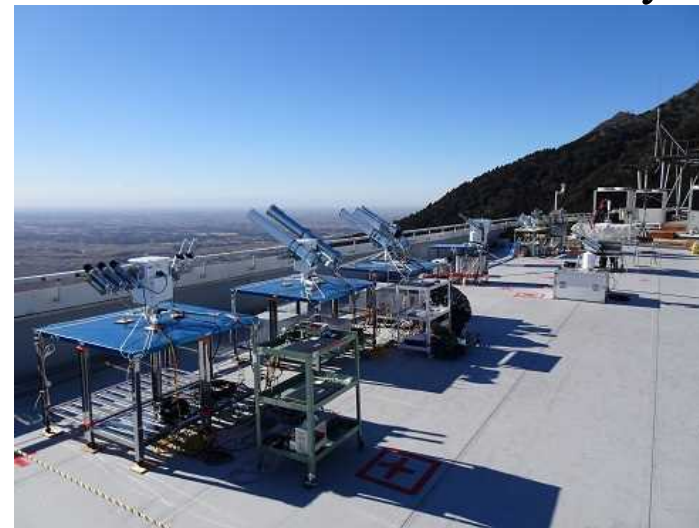
RPC of RA-II at Tsukuba

- The previous RPC (RPC-IV) was held in 2017 (17 Jan. - 5 Feb) at Tsukuba in Japan with participants from 3 NRCs in RA-II and WRC.
- RRC Melbourne and 2 NRCs in RA-V also participated in this RPC.



Domestic solar radiometer intercomparison

- A domestic intercomparison of solar radiometers is held once a year between the regional and national standard instruments to maintain their accuracy.



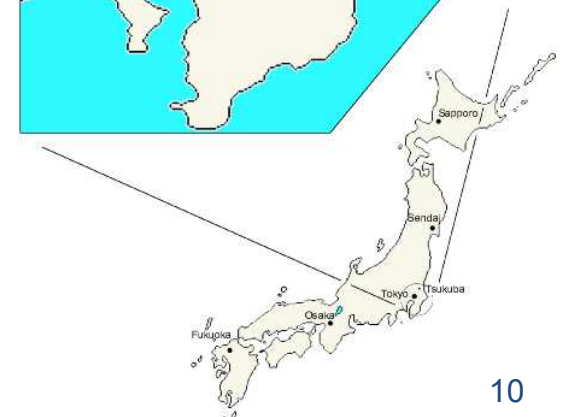
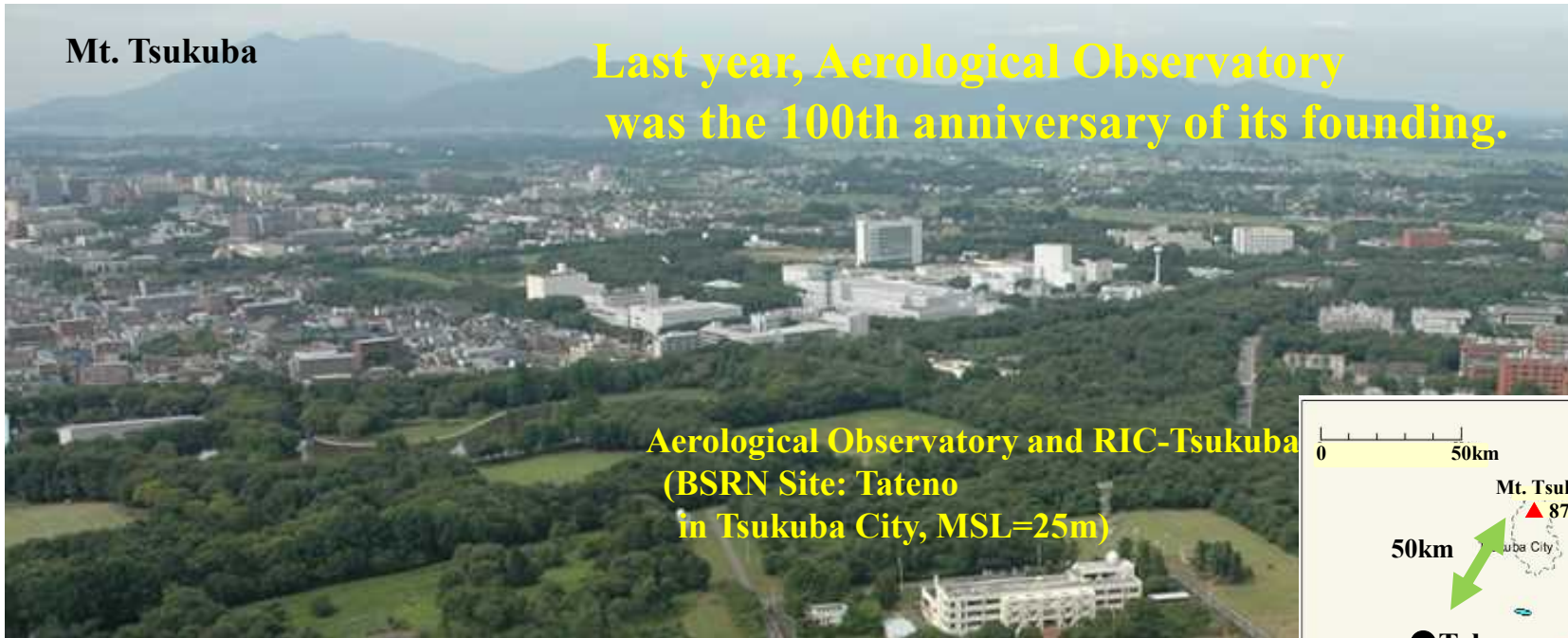
Annual internal pyrliometer comparison at Mt.Tsukuba in 2020

Left: Regional standard instruments (pyrheliometers)

Right: National standard instruments (pyranometers with collimation tubes)

Pyranometers are calibrated by Regional Instruments Center (RIC) Tsukuba.

RPC events and Domestic Intercomparison at Tsukuba



Summary

- JMA was designated as the Regional Radiation Center (RRC) in Asia, and has been serving as one of RRCs in RA-II (RRC Tokyo) since 1965.
- RRC Tokyo holds a Regional Pyrheliometer Comparison (RPC) of RA-II once every 5 years, in the next fiscal year of IPC in principle, which complies with the requirements for RRC.
- To maintain the regional/national standard pyrheliometers, RRC Tokyo holds a intercomparison once a year among the regional and national standard groups to maintain their accuracy , which complies with the requirements for RRC and NRC (National Radiation Center).
- RRC-Tokyo would like to cooperate with WMO in calibration of radiation instruments in the Asian region for the improvements of surface radiation measurements.
- The next RPC of RA-II is planned to be held in Jan. 2023. We would be grateful if many countries (NRCs) could participate in the intercomparison.

Thank you !!

