

Session 6: National and regional reports on ozone research and monitoring

Region 2: Asia

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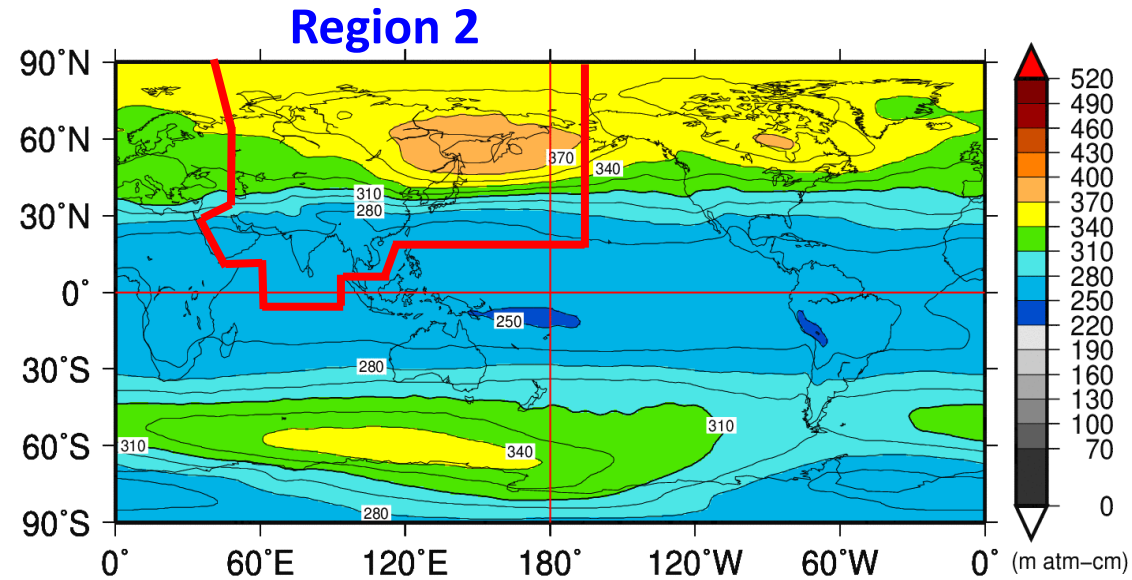
Japan Meteorological Agency (JMA)

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1. Background

Region 2: Asia



Annual mean total ozone amount (2019)

The highest concentration of ozone is found in the Region.

-> Systematic ozone observations at many stations are necessary to know details of ozone distribution.

2. Observational Activities

Status of observation activities from national reports

- Roughly one third of the countries (10 countries) submitted the national report for the 11th ORM.

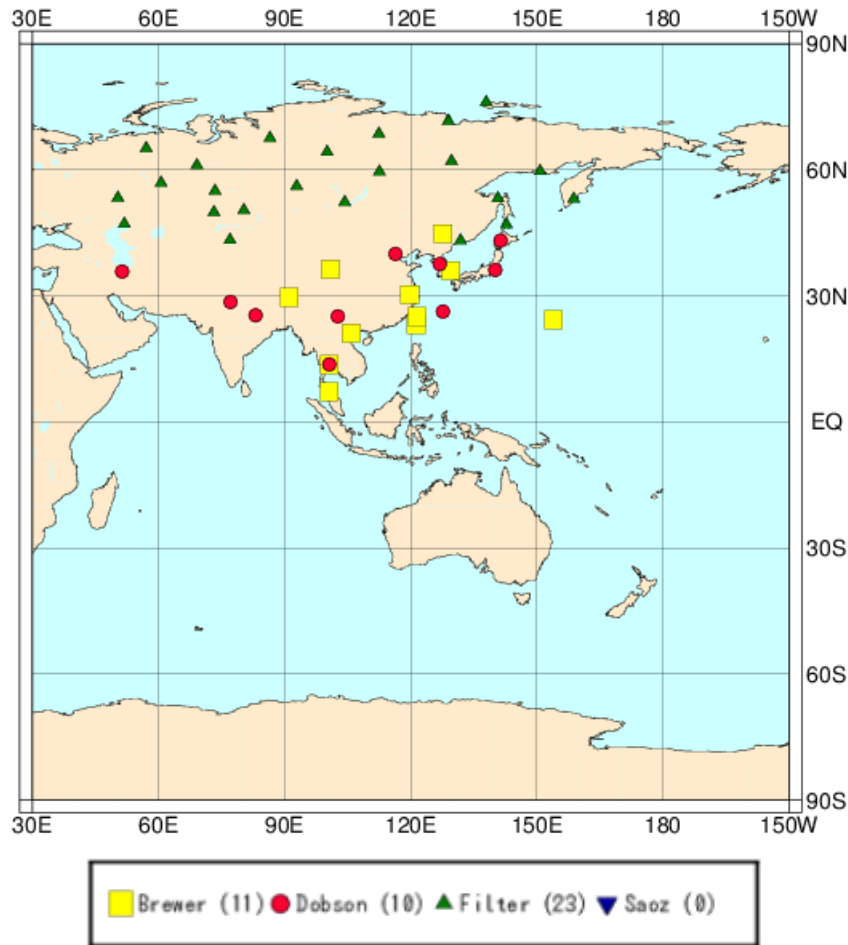
- Ozone
- UV
- Intercomparison activities

Countries that have submitted national reports

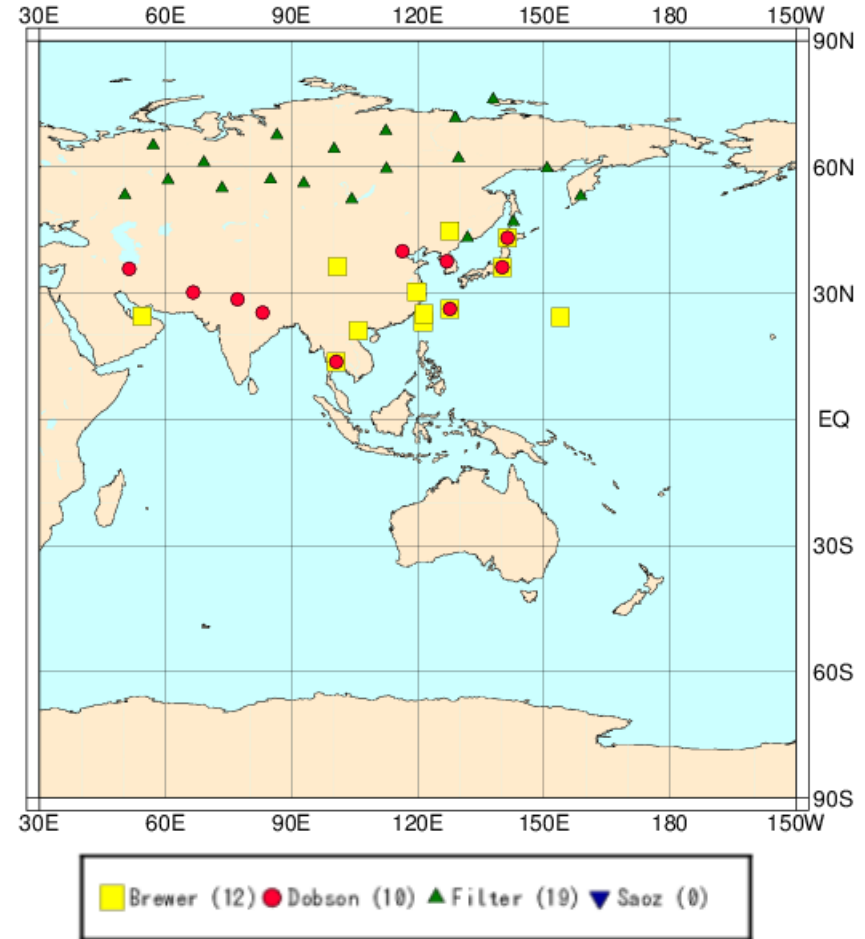
| |
|--------------------|
| Cambodia |
| India |
| Iraq |
| Japan |
| Kyrgyzstan |
| Myanmar |
| Russian Federation |
| Sri Lanka |
| Thailand |
| Turkmenistan |

Status of total ozone data archived in WOUDC

2014-2016



2017-2019



Data from about 40 stations are available in Region 2 (Asia) on WOUDC.

Ozone observations

Based on National Reports to ORM11

| | Active Observational Stations/Instruments |
|--------------|--|
| Cambodia | - |
| India | 3 Dobson (3 not working), 0 Brewer (4 not working), 1 ozonesonde stations |
| Iraq | - |
| Japan | 3 Brewer*, 1 ozonesonde stations |
| Kyrgyzstan | 1 Spectrophotometric Scanning Set (SPS) station (1 Brewer delivered by technical support project) |
| Myanmar | - |
| Russia | 30 filter ozonometers M-124, 6 Mini-SAOZ, 2 Brewer, 10 ozonesonde stations |
| Sri Lanka | -** |
| Thailand | 2 Brewer |
| Turkmenistan | 1 M-124 |

No routine observational work is done in several countries.
Some instruments needs maintenance.

*JMA replaced Dobson with Brewer spectrophotometers in February 2018

**Grant planned at ORM 9 was cancelled.

Observation over Antarctica is not included in this table

UV observations

Based on National Reports to ORM11

| | Active Observational Stations |
|--------------|---|
| Cambodia | - |
| India | 45 (India Meteol. Dep.), 1 (filter photometer at New Delhi) |
| Iraq | - |
| Japan | 5 (broadband radiometers), 1 (Brewer) |
| Kyrgyzstan | 1 (automatic 501 model UV Biometer) |
| Myanmar | - |
| Russia | 15 (M-124), 1 (UVB-1 YES pyranometer) |
| Sri Lanka | (planned at 5-6 stations) |
| Thailand | 2 (Brewer), 4 (Silpakorn Univ.) |
| Turkmenistan | - |

No routine observational work is done in several countries.

Observation over Antarctica is not included in this table

Intercomparison activities

Based on National Reports to ORM11

- India joined Dobson intercomparison campaign at Irene, South Africa in 2019.
- Japan joined Dobson intercomparison at Melbourne, Australia in 2017, Brewer intercomparison at Toronto, Canada in 2018, and Huelva, Spain in 2019.
- Russia joined Brewer intercomparison at Arosa, Switzerland in 2018, Dobson intercomparison at Hohenpeissenberg, Germany in 2019, UV Filter Radiometer Calibration Campaign UVC-II at Davos, Switzerland in 2017.

Some intercomparisons planned in 2020 and 2021 have been canceled or delayed due to COVID-19 concerns.

3. Research Activities

Status of research activities from national reports

- Monitoring: ODS*, surface ozone, and related compositions
- Analysis: Seasonal changes, Trends in total column ozone and others (by in-situ/satellite/lidar/...)
- Satellite:INSAT-3D, INSAT-3DR (India), SMILES (Japan)

* CFC-11 measurements are used to estimate emissions in east Asia.

* JMA started HFC measurements at Minamitorishima in April 2020.

- Modeling

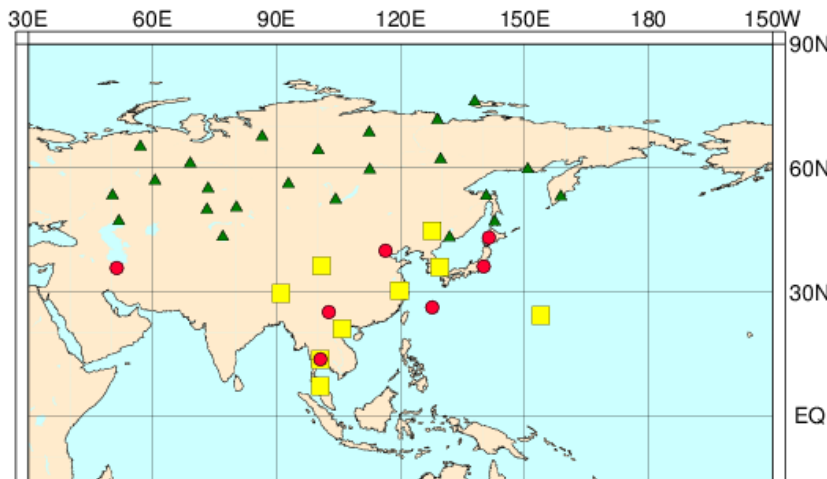
| | |
|----------|--|
| India | Air Quality Early Warning System (AQ-EWS), IITM-ESMv2 |
| Japan | CCSRNIES-MIROC5, MRI-CCM2, MRI-ESM2.0, CHASER |
| Russia | Chemico-climatic model of the ozonosphere SOCOL |
| Thailand | UV Index potential |

Several ESMs joined CCMI, CMIP6 and other intercomparisons.

4. Implementation of the recommendations of the 10th ORM

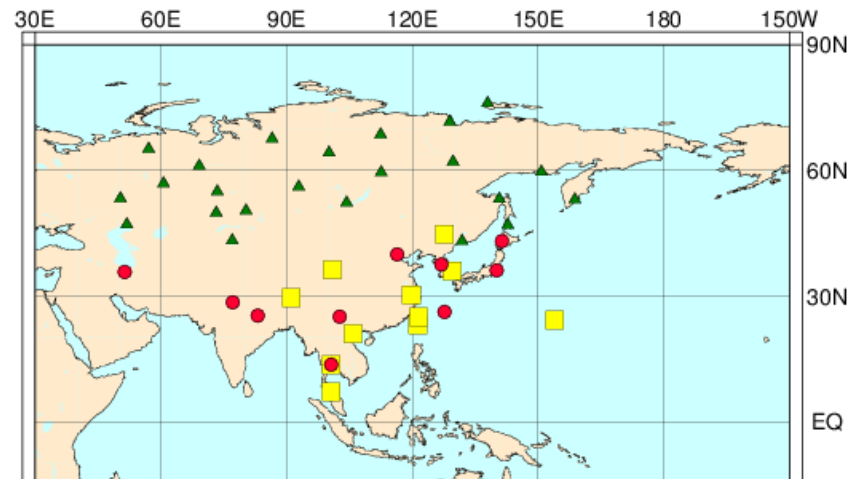
- Data availability at the world data center
 - Several reports were added to WOUDC since ORM10

2014-2016 @ ORM10



● Dobson(7) ■ Brewer(9) ▲ Filter(23)
 ▼ Saoz(0)

2014-2016 @ ORM11



■ Brewer (11) ● Dobson (10) ▲ Filter (23) ▼ Saoz (0)

| | | |
|--------------|--|--|
| India | WOUDC | Data availability Based on National Reports to ORM11 |
| Japan | WOUDC, CREX, NDACC | |
| Kyrgyzstan | WOUDC, WDCGG, NDACC | |
| Russia | WOUDC, NDACC | |
| Thailand | WOUDC | |
| Turkmenistan | To the coordinated international network by data exchange of WMO | |

Implementation of the recommendations of the 10th ORM

- Capacity Building Activities

Examples in National Reports to ORM11

| | |
|------------|--|
| India | On-site Dobson, Ozonesonde training, Cooperation with PMOD/WRC for radiation, send to WMO-GAWTEC |
| Japan | Science and Technology Research Partnership for Sustainable Development (SATREPS9 by Nagoya Univ. & NIES) with Argentina and Chile |
| Kyrgyzstan | Technical support for equipping Issyk-Kul OMD station, Kyrgyzstan, with modern measuring equipment for monitoring the ozone layer in the atmosphere of the mountainous region of Central Asia (2019-2020) |
| Russia | Guide Total Ozone measurements at 5 stations in Kazakhstan, UV measurement at Tashkent in Uzbekistan |

Capacity building is still required to increase capabilities
for research/monitoring on status of ozone over Asia

5. Future plans, needs, and recommendations

- Systematic observations to evaluate the changing state of the ozone layer, including detection of ozone layer recovery, should be continued in cooperation with international monitoring networks, such as NDACC and the WMO/GAW programme.
- Systematic calibration program and well-coordinated monitoring network should be established to detect variations and long-term trends in ground-level UV radiation.
- CCMs need to be developed to predict future changes in the ozone layer and improve our understanding of chemistry-climate interactions.
- Several countries need financial/technical support to increase capabilities for research/monitoring on status of ozone.
 - Maintenance/calibration of instruments
 - Set up monitoring stations