Introduction of JMA’s satellite-based nowcasting products

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Contents

〜JMA’s satellite-based nowcasting products〜

• For aviation safety and effective air control
  • Convective cloud information (CCI) product
  • Fog detection product
  • Volcanic ash product
• 2D extension of pointed ground observation
  • Sunshine duration product
• To monitor aeolian dust event
  • Aerosol product
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Convective cloud information (CCI) product

- JMA provides aviation operators with CCI, including data on cumulonimbus areas (CBAs), rapidly developing cumulus areas (RDCAs) and mid-/low-cloud unknown areas (MLUAs).
Convective cloud information (CCI) product

Japan Area (every 5 minutes)

Asia and Western Pacific Area (every 10 minutes)
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JMA provides Fog Detection product based on Himawari-8 observation data and numerical weather prediction (NWP) data for the Japan to help domestic aviation operators.

The product is also used by JMA to monitor fog in sea areas and other places where surface observation sites are scarce.

The spatial resolution is 0.02-degrees in latitude/longitude, and the time resolution is 5 minutes.
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Volcanic ash products

JMA utilizes **GEOCAT/VOLCAT program** to retrieve volcanic ash **by special courtesy of NOAA/NESDIS**.

Mt. Sheveluch, Kamchatka (10th Jan. 2018)
Volcanic ash products

JMA utilize **GEOCAT/VOLCAT program** to retrieve volcanic ash **by special courtesy of NOAA/NESDIS.**

VA product is produced automatically.

Volcanic Cloud Monitoring – NOAA/CIMSS

[https://volcano.ssec.wisc.edu/imagery/view/](https://volcano.ssec.wisc.edu/imagery/view/)
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Sunshine duration product

JMA operates surface meteorological observation network "the Automated Meteorological Data Acquisition System (AMeDAS)"

- about 1300 stations
- average intervals is 17 km

To meet user demands for 2-D meteorological information, gridded weather analysis called **Weather Analysis Map (WAM)** was developed.

WAM shows meteorological information in areas distant from AMeDAS stations as well as other region!

One hour sunshine duration in Tokyo area.
Sunshine duration product

WAM is 2-D information of **surface latest meteorological conditions** estimated from **in-situ and remote sensing observation** data, and NWP-based data.

- **Frequency:** hourly
- **Region:** Japan's land area (except for a part of islands)
- **Resolution:** 1 x 1 km^2 size mesh
- **Provide:** Images on JMA's website [https://www.data.jma.go.jp/obd/bunpu/index_en.html]
  Binary data (GRIB2) dissemination (via the Japan Meteorological Business Support Center)

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**Weather** (2016.3-)

**Surface temperature** (2016.3-)

**One-hour sunshine duration** (2020.9-)
Sunshine durations are defined as period "direct solar radiation intensity is at least 120 W/m²". (This value corresponds to an interception less than around 91% relating to cloud, atmosphere, and terrain.)

**Estimate sunshine probability** in every 2.5-minute Himawari-8 observation scene, **determine whether there is sunshine or not** at each scene and **integrate number of sunshine scenes** to be sunshine duration.
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Aerosol product is retrieved from Himawari-8/9 visible and near-infrared channel.

- Band 1 to 6
- The product is not only used to monitor aeolian dust events, called as “Kosa” in Japanese but also used to data assimilation to aerosol forecast.
- Every 10 minutes, 0.05deg horizontal resolution
- We use a retrieval algorithm developed by JAXA (Yoshida et al. 2018)
The Himawari-8 VIS-NIR Aerosol Product detected a dust storm moving across the Yellow Sea on 7 May 2017. (left figure)

- There is an area with large AOD in the red circle on the left image that shows some aerosols are there.
- That day, the dust was recorded at the observatories of Japan.
JMA applied an updated version of the algorithm in 2020 developed by JAXA for operation in January 2022 (Yoshida et al., 2021).

- The Outliers (corresponding to high values but low aerosol loading) observed with the original algorithm are mitigated with the new version.
- Aerosol parameters retrieved using the new algorithm are also more coincident with in-situ data.
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Sea Surface Temperature (SST) Product

- Himawari-8 SST product is derived from infrared data of Himawari-8.
  - Band 07, 11, 13, 14 and 15
- Every 10 minutes, 0.02deg horizontal resolution
- We use a retrieval algorithm developed by JAXA, based on a quasi-physical algorithm (Kurihara et al. 2016)
• High resolution: Thanks to the high-resolution sensor of Himawari-8/9, we can obtain SST which has unprecedentedly high resolution as a geostationary satellite.

• High frequency: Every 10 minutes this product is being distributed. The high frequent observation gives us much data that is not affected with cloud.
Thank you for your attention!