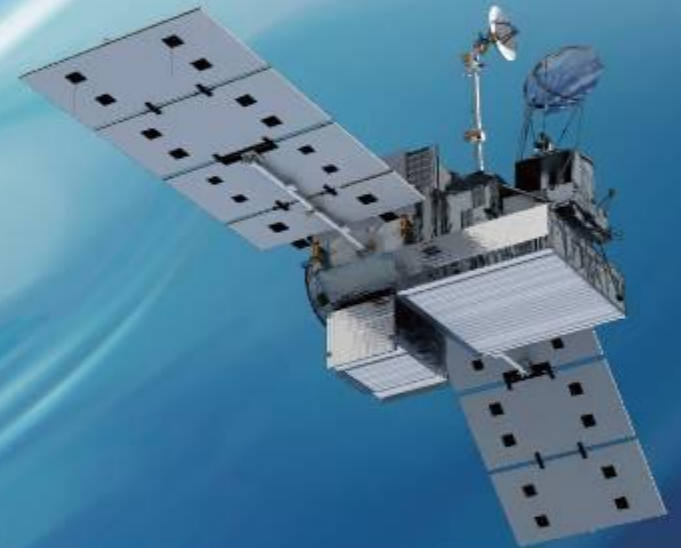




JAXA GPM Update

Takuji Kubota (JAXA/EORC)



Dual-frequency Precipitation Radar (DPR) Sensor Status

- * DPR anomaly events that occurred between April and May 2020 are summarized below.
 - * 22 April 2020
 - * 2 May 2020
 - * 20 May 2020
- * JAXA judged these occurred due to transient events such as **single event upset (SEU)**, which caused some temporal problems of a memory in the DPR instruments.
- * Since 20 May 2020, there have been **no similar events**. JAXA continues to monitor the DPR status.

All data collection is now nominal and instruments are in good condition.

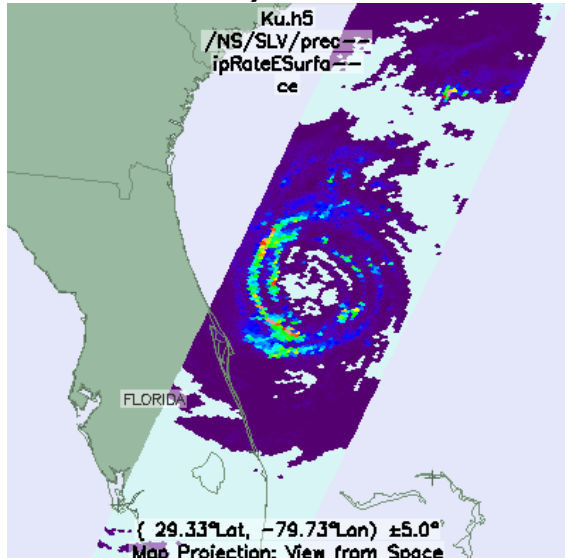


In June 2020, JAXA and NASA started to **release the DPR-L2/L3 V06X**, corresponding to the KaPR scan pattern change.

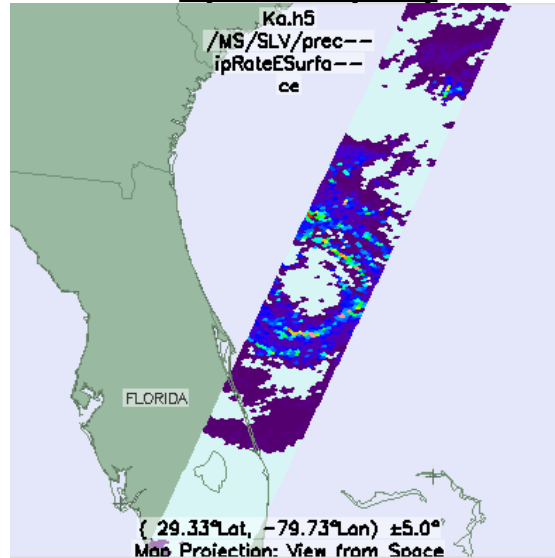


Color in Figures: DPR L2 surface precipitation rate

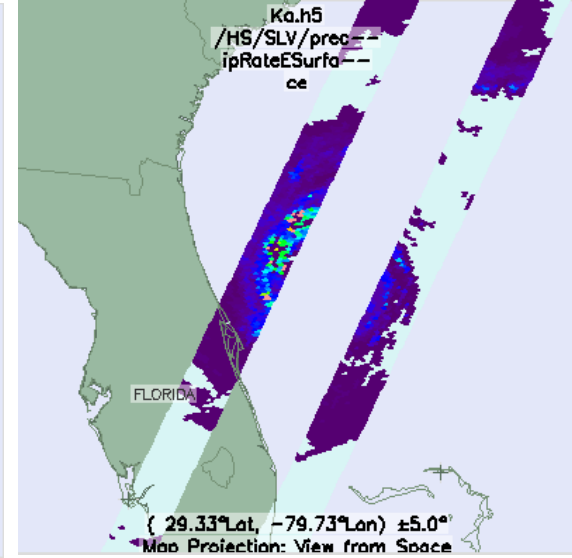
a) KuPR



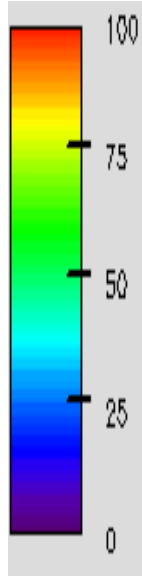
b) KaPR(MS)



c) KaPR(HS)



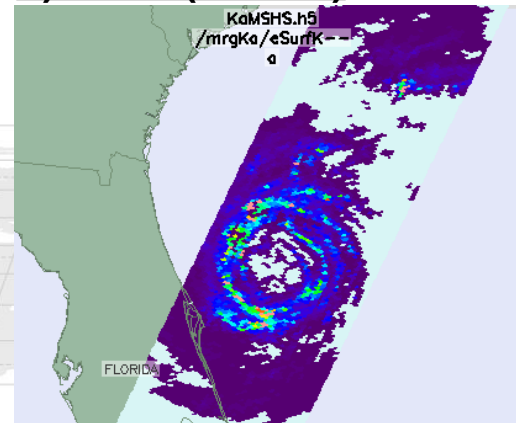
[mm/h]



Hurricane Dorian
2019/09/04 10:35(UTC)



d) KaPR(MS/HS)



Dual-frequency technique can be applied in a full swath, which can enable us more accurate estimates in the full swath since May 2018.

<https://www.eorc.jaxa.jp/en/news/2020/nw200604.html>

JAXA 3D RAINFALL WATCH using GPM/DPR observations



* DPR monitoring website around Japan

- * 3D movie of the DPR observations are produced automatically with heavy rainfall thresholds and visitors can download it from the website.
- * Overlay the DPR orbital rainfall information, GSMaP rainfall distribution (1h, 24h, 24h and 72h) and IR cloud information.

JAXA 3D RAINFALL WATCH
宇宙から見た日本周辺の三次元降水量

表示データの日付(日本時間)
2020 / 7 / 24 指定日検索
前日 最新観測日 翌日
(最終更新日:2021年01月14日 18時00分01秒(日本時間))

3Dで観測された雨事例一覧

- 2020年07月24日 07時 東シナ海
- 2020年07月24日 07時 日本海

表示データの切り替え(重ね合わせ可能)

- 1時間降水量 (雨量スキャンレーダが通った範囲)
- 1時間降水量 (領域全体の降水分布)
- 前12時間 積算降水量 (領域全体の降水分布)
- 前24時間 積算降水量 (領域全体の降水分布)
- 前72時間 積算降水量 (領域全体の降水分布)

降水量のマップ画像

降水量の3D動画

この事例をシェアする(URL)

透過率: https://www.eorc.jaxa.jp/GPM/3DRAIN/index_j.html#200723_2210

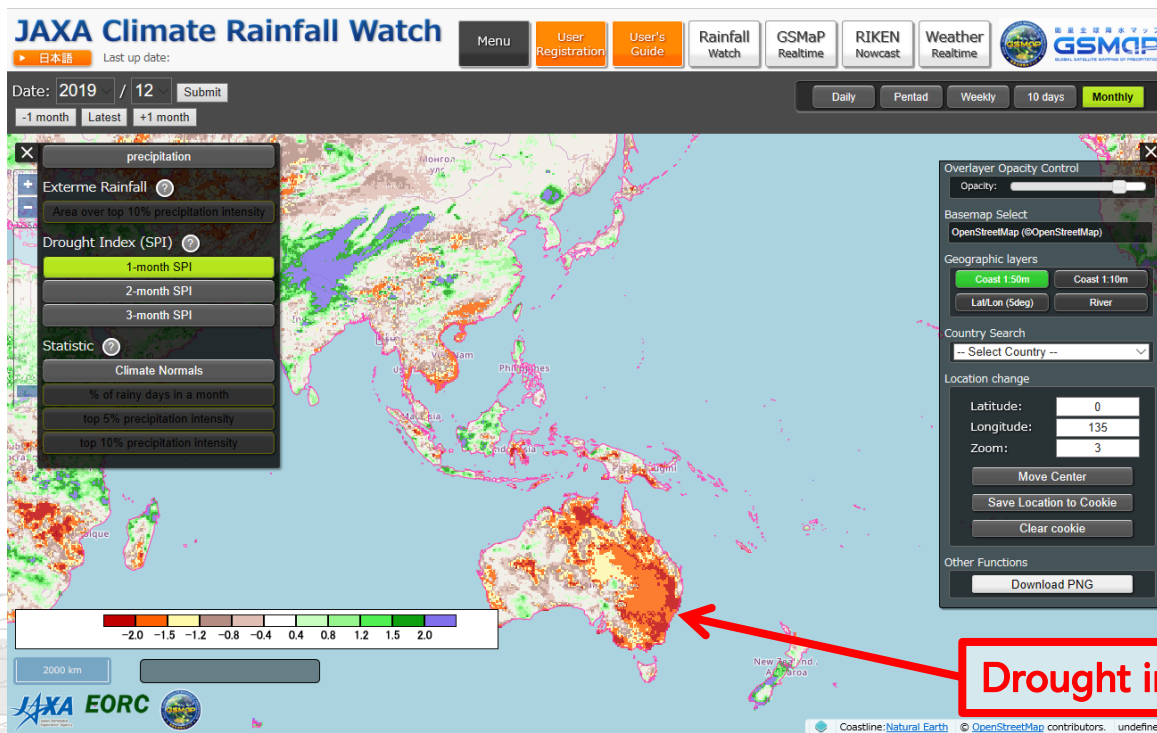
https://www.eorc.jaxa.jp/GPM/3DRAIN/index_j.html

3D structure of the localized heavy rainfall that occurred in the Kyushu region in July 2020

JAXA Climate Rainfall Watch using Global Satellite Mapping of Precipitation (GSMaP)



- In Mar. 2020, we started to operate a homepage “**JAXA Climate Rainfall Watch**”, which provides information about extreme heavy rainfall and drought over the world using the 20-yr GSMaP data.



Displaying accumulated rainfall in some temporal scale (**daily, pentad, weekly, 10-days and monthly**), indices related to extreme heavy rainfall and drought.

Detection of heavy rainfall and drought is based upon Tashima et al. (2020, *JSTARS*).
<https://doi.org/10.1109/JSTAR.S.2020.3014881>

Drought in Australia (December 2019)

Graphical User Interface of the "JAXA Climate Rainfall Watch" website (https://sharaku.eorc.jaxa.jp/GSMaP_CLM/)

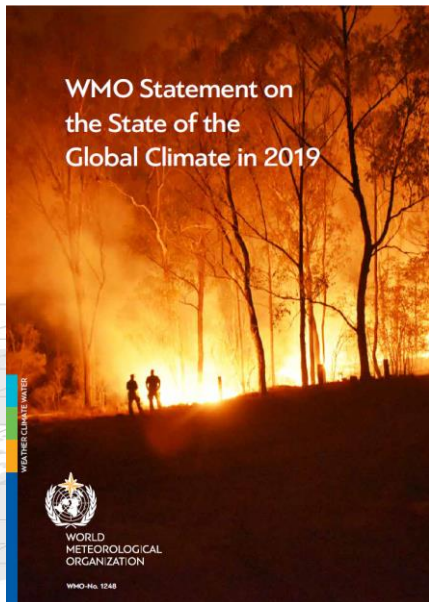
World Meteorological Organization (WMO) project using the GSMaP 20yr-data



- JAXA attends **WMO Space-based Weather and Climate Extremes Monitoring (SWCEM) Demonstration Project (SEMDP)**, East Asia and Western Pacific Regional Subproject with the GSMaP 20 year-data.
- Based upon results of this project, results from JAXA GSMaP and NOAA CMORPH were described in the Australia drought article of the **WMO Statement on the State of the Global Climate 2019** and the **WMO Bulletin** (the official journal of the WMO).

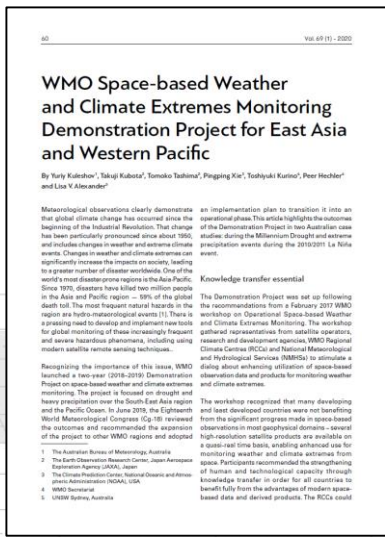
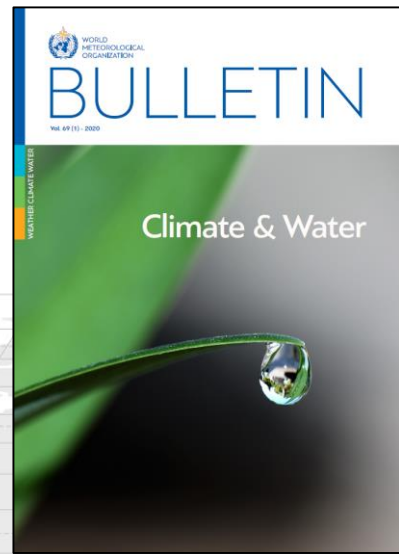
WMO Statement on the State of the Global Climate 2019

WMO Bulletin



DROUGHT MONITORING IN AUSTRALIA UTILIZING PRODUCTS FROM THE WMO SPACE-BASED WEATHER AND CLIMATE EXTREMES MONITORING DEMONSTRATION PROJECT

Yuriy Kuleshov, Lynette Bettio, Takuji Kubota, Tomoko Tashima, Pingping Xie, Toshiyuki Kurino and Peer Hechler

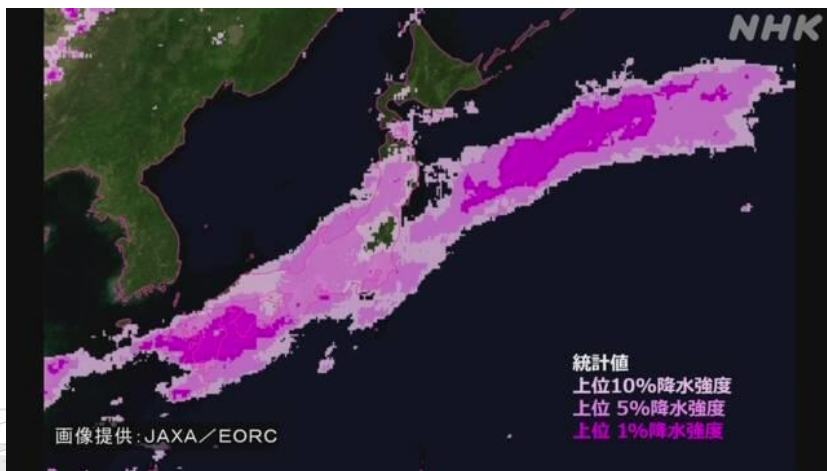


<https://public.wmo.int/en/our-mandate/climate/wmo-statement-state-of-global-climate>
https://library.wmo.int/doc_num.php?explnum_id=10211

<https://public.wmo.int/en/resources/bulletin/wmo-space-based-weather-and-climate-extremes-monitoring-demonstration-project>

Utilization of the GSMaP in Japanese TV News

- * Japan experienced heavy rainfall in July 2020, causing serious damages.
- * Our GSMaP result to detect heavy rainfall in July 2020 was **reported in Japanese TV (NHK) News.**
 - * NHK (Japan Broadcasting Corporation) is Japan's only public broadcaster.



Extreme heavy rainfall area above 90th percentile for weekly precipitation (July 1-7, 2020), used in the NHK TV News



Moeka Yamaji (JAXA/EORC) remotely explained this in the NHK TV News.

GSMaP assimilation in JAXA supercomputer system (NEXRA)



- * NICAM-LETKF at JAXA Research Analysis (NEXRA) using the GSMaP was installed in JAXA supercomputer system (JSS) and has been experimentally operated it in near-real time (Kotsuki et al. 2019, SOLA).



NICAM-LETKF at JAXA
Research Analysis=NEXRA

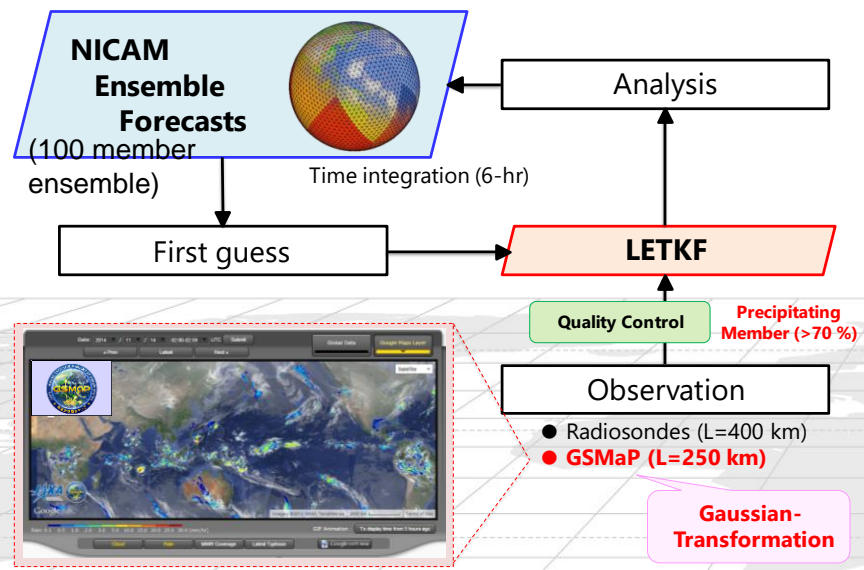


Monitoring home page of the NEXRA is now available as “JAXA realtime weather watch”.

<https://www.eorc.jaxa.jp/theme/NEXRA/>
<https://sharaku.eorc.jaxa.jp/GSMaPxNEXRA/>

Joint press release with RIKEN, Chiba Univ., Univ. Tokyo, and JAXA
(https://www.jaxa.jp/press/2020/08/20200820-1_j.html)
GSMaPxNEXRA based upon Kotsuki et al. (2019, WAF) started in Aug. 2020.

Assimilating GSMaP with NICAM-LETKF



Kotsuki et al., 2019, SOLA, 15A, 1-7. doi:10.2151/sola.15A-001

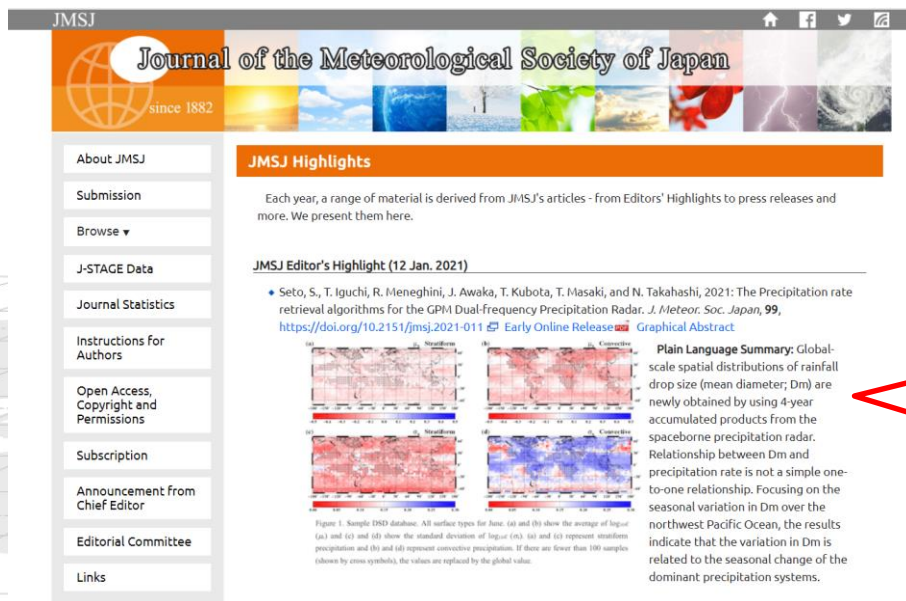
* 34 papers were submitted to the GPM Special Edition in Journal of the Meteorological Society of Japan (JMSJ).

* The submission was closed at the end of Sep. 2020.

* You can see the papers from the following URL.

* http://jmsj.metsoc.jp/special_issues_editions/GPM.html

* 18 papers are already listed.



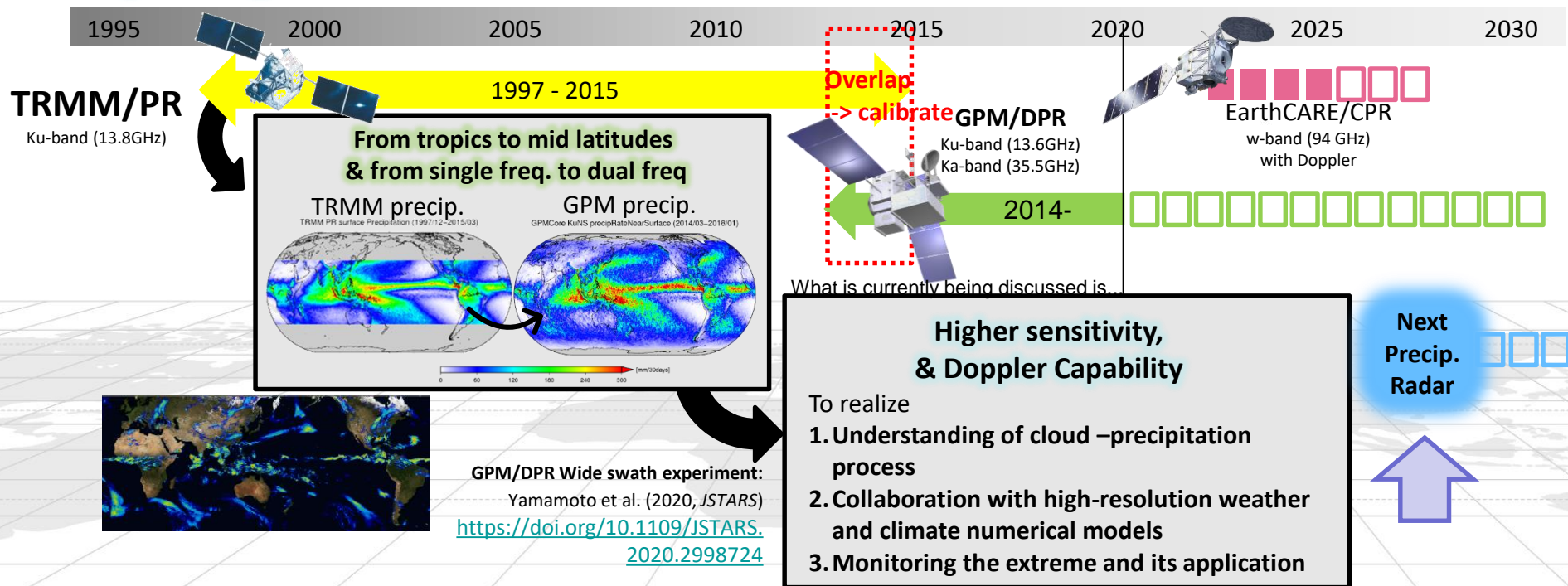
The screenshot shows the JMSJ website homepage. The header includes the JMSJ logo and the text "Journal of the Meteorological Society of Japan since 1882". A navigation menu on the left lists: About JMSJ, Submission, Browse, J-STAGE Data, Journal Statistics, Instructions for Authors, Open Access, Copyright and Permissions, Subscription, Announcement from Chief Editor, Editorial Committee, and Links. The main content area features a "JMSJ Highlights" section with a sub-section for "JMSJ Editor's Highlight (12 Jan. 2021)". This highlight features a paper by Seto, S., T. Iguchi, R. Meneghini, J. Awaka, T. Kubota, T. Masaki, and N. Takahashi (2021) titled "The Precipitation rate retrieval algorithms for the GPM Dual-frequency Precipitation Radar". It includes a "Plain Language Summary" and a figure with four panels (a, b, c, d) showing global maps of rainfall drop size and convective precipitation.

Seto et al. (2021) for precipitation rate retrieval algorithms of the GPM/DPR got **JMSJ Editor's Highlight.**

Next Generation Precipitation Radar discussed in JAXA



- The JAXA has studied a feasibility of a next generation precipitation radar with Japanese science team and user community.
 - ✓ The JAXA has discussed with NASA in the Aerosol and Cloud, Convection and Precipitation (ACCP) study.
- Our targets for the next generation precipitation radar will be **Doppler Observations, Higher sensitivity measurements with scanning capability.**



Summary

- * **GPM/DPR instrument is now working well**, although it experiences anomalies in April-May 2020.
- * DPR products V06X were released in June 2020.
- * **GSMaP Applications status**
 - * JAXA Climate Rainfall Watch
 - * WMO Statement on the State of the Global Climate 2019
 - * The Article in WMO Bulletin
- * **GSMaP assimilation in JAXA supercomputer system (NEXRA)**
 - * Joint press release with RIKEN, Chiba Univ., Univ. Tokyo, and JAXA
- * **GPM 5th Anniversary special edition in JMSJ**
- * **Next Generation Precipitation Radar discussed in JAXA**