

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

In the Matter of)
)
Facilitating More Intensive)
Use of Upper) SB Docket No. 25-305
Microwave Spectrum)
)

**COMMENTS OF THE
NATIONAL WEATHER ASSOCIATION,
AMERICAN METEOROLOGICAL SOCIETY,
AMERICAN GEOPHYSICAL UNION and
UNIVERSITY CORPORATION FOR ATMOSPHERIC RESEARCH**

January 20, 2026

The National Weather Association (NWA), American Meteorological Society (AMS), American Geophysical Union (AGU) and University Corporation for Atmospheric Research (UCAR) appreciate the opportunity to provide comments on this Notice of Proposed Rulemaking (NPRM) seeking to facilitate more intensive use of upper microwave spectrum, specifically upper microwave spectrum bands above 24 GHz that are shared between the terrestrial Upper Microwave Flexible Use Service (UMFUS) and Fixed Satellite Service (FSS). The UMFUS framework includes an array of spectrum above 24 GHz, but this comment will specifically address UMFUS spectrum in the 37.7-38.6 GHz (upper 37 GHz band), and the 50.4-51.4 GHz (50 GHz band) and the proposed changes to Section 25.136 rules, such as the implementation of alternate licensing procedures like “light licensing.”

The membership of NWA, AMS, AGU and UCAR include the world’s leading Earth scientists and meteorologists, oceanographers and hydrologists, including operational forecasters, emergency managers and broadcasters who work to keep U.S. communities safe. These skilled professionals depend heavily on technology that is reliant on specific passive observations only available in or closely adjacent to the above noted bands for their forecasts and models to better understand the Earth’s atmosphere, oceans and land to predict natural hazards that impact lives, property and economies in the U.S. and across the world.

Passive Microwave Observations Improve Weather Forecasts—and the Broader Economy and Public Safety

Passive microwave observations from environmental satellites collected adjacent to the upper 37 GHz and 50 GHz UMFUS bands have contributed significantly to more accurate and timely weather forecasts over the past 40 years.

As discussed in comments from our organizations in response to past FCC proceedings,¹ this section includes some key characteristics of data from Earth Exploration-Satellite Service (EESS) passive bands that are used to provide crucial atmospheric information for weather forecasts.

It is important to emphasize that these passive observations are not communications signals and are orders of magnitude weaker than typical communications links. Passive microwave instruments do not emit or transmit in passive bands, nor are they conventional radio receivers. These instruments measure power, but do not detect and demodulate information content.

The properties of the atmosphere are defined by the laws of physics and chemistry (quantifiable mechanical properties of matter) and cannot be changed to optimize spectrum allocation.

Passive measurements of the atmosphere are especially vulnerable to harmful interference as even faint out-of-band emissions can, in aggregate, contaminate the natural transmission of the atmosphere to the space-based microwave sensor.² Forecasters rely on such radiometric sensors on satellites that measure the weak thermal emissions of the atmosphere – essentially the vibration of water molecules and oxygen due to temperature – and what most communications engineers call fluctuations in the “thermal noise floor.” By measuring these incredibly quiet emissions, scientists can compute a 4-D map of temperature and humidity worldwide over time, as well as surface characteristics such as ocean-surface windspeed. The data are also the backbone of supercomputer models that allow forecasters to predict weather hazards, such as hurricanes.

The most impactful U.S. data informing weather models and their improvement over the past 20 years has been from passive microwave sounding instruments on polar orbiting satellites operated by the National Oceanic and Atmospheric Administration (NOAA).³ While this proceeding mostly impacts passive microwave sensors from NOAA and the Department of Defense (DoD), there are now commercially owned/operated satellites with passive microwave sensors, in addition to European and Japanese satellites that the U.S. relies on, which all contribute to improving weather forecasts.

While these passive NOAA and DoD instruments are within Federal spectrum allocations, they directly inform weather forecasts across the U.S., which provides extensive value significantly beyond the Federal government, including the American public and many weather-dependent industries, such as aviation, stadium event management and maritime shipping. In addition, these observations are also used extensively by the weather industry and related industries like insurance to develop and populate their own models, which contribute to public safety and disaster response. The academic community uses the observations directly to conduct applied research in partnership with the public and private sectors, as well to educate future weather forecasters, emergency managers and other professionals in an increasingly weather-dependent world.

American lives and livelihoods depend upon reliable access to weather forecasts derived from appropriately calibrated Earth observations, which require access to spectrum without harmful

¹ See *AGU et al* comment in WT Docket No. 24-243 (22 Nov 2024) <https://www.fcc.gov/ecfs/document/11221965712018/1> and *AGU et al* comment in SB 25-80/GN 14-177 (28 Jul 2025) <https://www.fcc.gov/ecfs/document/10728088696934/1>

² *AGU et al* comment in SB 25-80/GN 14-177 at 1.

³ Kalluri, Satya (editor). June 2021. Satellite Microwave Sounding Measurements in Weather Prediction: A Report of The Virtual NOAA Workshop on Microwave Sounders. <https://doi.org/10.25923/wkgd-pw75>

interference. A study estimated weather had a 3.4% annual effect on the nation's economy.⁴ If that 3.4% is applied to the U.S. Bureau of Economic Analysis (BEA) 2024 GDP of 29.19 trillion, and nominal GDP estimates for 2025 will likely be about \$30 trillion,⁵ then weather currently has an annual direct effect of approximately \$1 trillion on the nation's economy, while indirect impacts on weather-impacted industries are far greater. That number has only increased as the incidence of weather disasters has increased over the past two decades and is expected to continue to do so in the coming years. Policymakers must recognize that the radio spectrum is used for many applications besides telecommunications, and these uses serve important functions in support of the economy, national security and public safety.⁶

The Threat of Adjacent Band Interference to Passive Microwave Observations Adjacent to the 37 GHz and 50 GHz UMFUS bands

The operation of passive systems differs substantially from those of communications receivers, such as smartphones, communications satellites or ground stations. While traditional communications devices are designed to detect and maximize the signal content while discarding noise, passive devices, specifically radiometers, are designed to detect small changes in that noise level caused by properties in the atmosphere.⁷

As described by the Geoscience and Remote Sensing Society of the Institute of Electrical and Electronics Engineers (IEEE GRSS) submission in response to a past proceeding on passive sensing, “*There are three levels of contamination to passive measurements ... **Obvious, Insidious, and Undetectable.***” **Undetectable** is below the measurement threshold of passive sensors, while **Obvious** is high enough to indicate a non-natural source and is discarded, leaving that location as unmeasured. The real problem is in the middle range with **Insidious** contamination.⁸

Insidious contamination refers to when the corrupting signal is small enough to realistically look like desired natural emissions, but large enough to affect the data. We are concerned that quality checks of data staged for computer-based model forecasts would not reject this data as invalid, as would happen with obvious contamination, which would mean the data may be used in numerical weather predictions, corrupting the accuracy of them.

Given the considerable increase in radio traffic that could result from this and related proceedings, it is particularly important to monitor such interference. The satellite communications uplinks proposed in these areas are expected to include Earth stations tracking spatially distributed non-geostationary orbiting (NGSO) satellites in motion. The sheer number of potential ground stations communicating with NGSO satellites, pointing all over the sky, can disrupt the measurement

⁴ Lazo et al. U.S. economic sensitivity to weather variability. *Bull. Amer. Meteor. Soc.*, 92, 709-720.
https://journals.ametsoc.org/view/journals/bams/92/6/2011bams2928_1.xml

⁵ BEA News Release Gross Domestic Product, 1st Quarter 2025 (Third Estimate), GDP by Industry, and Corporate Profits (Revised), <https://www.bea.gov/news/2025/gross-domestic-product-1st-quarter-2025-third-estimate-gdp-industry-and-corporate-profits>

⁶ *AGU et al* comment in SB 25-80/GN 14-177 at 2.

⁷ See *AGU et al* comment in 21-186 at 9. (27 July 2021). <https://www.fcc.gov/ecfs/document/1072681501910/1>

⁸ See *IEEE-GRSS-FARS* comment in GN 14-177/ET 21-186 (27 June 2021) at 3.
<https://www.fcc.gov/ecfs/document/1062804433840/1>

integrity and calibration uniformity of space-based instruments conducting operational passive measurements.

Current Passive Technologies Reliant on Adjacent Bands to 50 GHz UMFUS Bands

The current operational passive microwave radiometer on U.S. weather satellites, the Advanced Technology Microwave Sounder, or ATMS, hosted on NOAA's Joint Polar Satellite System (JPSS), senses atmospheric characteristics across multiple passive absorption bands to measure different atmospheric characteristics. Relevant to this proceeding, the sensor relies on information from a band directly adjacent to the 50 GHz UMFUS band. With two JPSS satellites in orbit and two more to be launched by 2031, the sensors are expected to continue to operate through the 2030s or longer.

NOAA's next generation operational microwave radiometry sensor, Sounder for Microwave-Based Applications (SMBA), is currently planned for the Near-Earth Orbit Network (NEON) series of low Earth orbiting (LEO) satellites and is expected to be under procurement in the next few months. Relevant to this proceeding, SMBA expects to operate adjacent to the 50 GHz UMFUS band. The NEON satellites with this sensor are expected to operate through at least 2055. In addition, NOAA also plans to launch a commercially operated satellite called QuickSounder through its NEON series, which is anticipated to launch another ATMS sensor into orbit in 2026.⁹

Impacts of Proposed Changes to 50 GHz UMFUS Bands to Passive Microwave Sensors Supporting Weather Forecasting

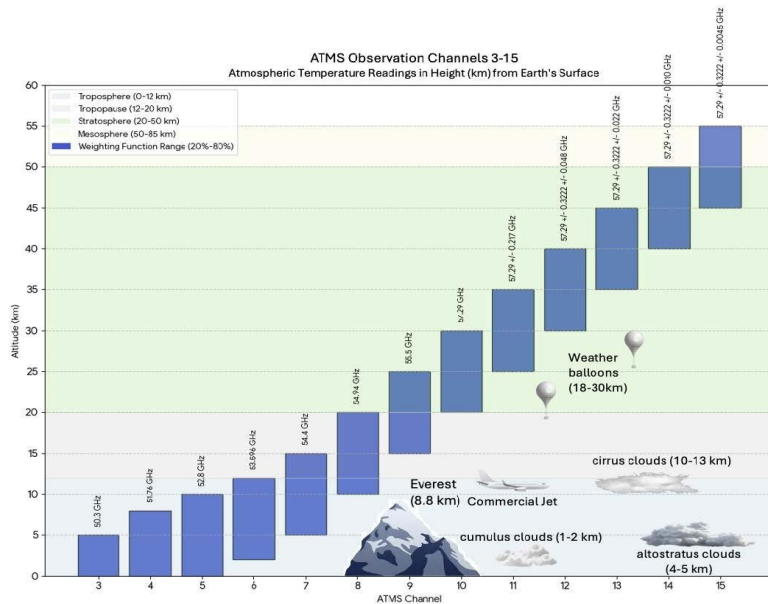


Figure 1 - ATMS Channels 3-15, with atmospheric temperature heights for each unique center frequency/channel. © IEEE/GRSS FARS TC

The NWA, AMS, AGU and UCAR are significantly concerned about this proceedings' proposals to dramatically increase the use of the 50 GHz UMFUS band (50.4-51.4 GHz). Of greatest concern is the continued reliability of information from the ATMS sensor's channel 3, centered in the EESS (passive) allocation at 50.3 GHz (figure 1),¹⁰ immediately adjacent to the 50 GHz UMFUS band, which measures temperature in the lower atmosphere (less than 10km from the ground) and is crucial for many weather forecasts and specific weather-dependent industries such as aviation and agriculture.

⁹ World Meteorological Organization's Observing Systems Capability Analysis and Review Tool (WMO-OSCAR). <https://space.oscar.wmo.int/satellites/view/quicksounder>. Accessed 14 Jan 2026.

¹⁰ See IEEE Geoscience and Remote Sensing Society (GRSS) reply comment in SB 25-80/GN 14-177 at 6. (27 Aug 2025) <https://www.fcc.gov/ecfs/document/108271434717592/1>

Similar to our response to the Satellite Spectrum Abundance proceeding,¹¹ we are also concerned about the reliability of the information from ATMS sensor channel 4, centered at 51.76 GHz (figure 1). The threat of increased radio activity in both the 50 GHz UMFUS band and the 51.4-52.4 GHz band proposed in the Satellite Spectrum Abundance proceeding could be detrimental to the other ATMS channels in the 50 GHz range that share front end electronics with adjacent/shared ATMS channels 3 and 4. (figure 1)

We support the positions expressed related to agenda items 1.1 and 1.3 in the “Views of the U.S. National Academies of Sciences, Engineering, and Medicine (NASEM) on Agenda Items at Issue at the World Radiocommunication Conference 2027” published in 2025. The 50.4–51.4 GHz band is proximate to the 50.2–50.4 GHz oxygen absorption band that is critical for atmospheric temperature profiling and measuring emissions from the surface of the Earth and their impacts on the atmosphere. The 50.2–50.4 GHz band also provides crucial information about precipitation intensity at the surface (liquid or solid).¹²

Current Passive Technologies Reliant on Adjacent Bands to 37 GHz UMFUS Bands and Impacts of Changes to the Bands

The natural emissions produced adjacent to the 37 GHz UMFUS band are measured using microwave radiometer sensors on the Defense Meteorological Satellite Program (DMSP)-17 and -18, launched in 2006 and 2009, and the Weather System Follow-on Microwave 1 and 2 (WSF-M1; WSF-M2) launched in April 2024 and planned for launch in 2028. The primary payload on the WSF-M mission is a Microwave Imager (MWI) sensor that takes calibrated passive radiometric measurements centered at 37.3 GHz to measure Ocean Surface Vector Winds (OSVW) and Tropical Cyclone Intensity (TCI), both of which are important to hurricane forecasting.

As our organizations noted in a reply comment to the Sharing in the Lower 37 GHz band proceeding (WT Docket No. 24-243),¹³ passive measurements near 36-37 GHz are unique from other passive bands in that they are best at pinpointing a tropical cyclone's center. Forecasters can use 36-37 GHz imagery in tandem with 85-91 GHz imagery, as measured by NOAA's operational Joint Polar Satellite System (JPSS), to assess the vertical structure of hurricanes.

The data from these DoD satellites are used more broadly than for national defense purposes. Other satellites operated by Europe and Japan¹⁴ also conduct passive measurements near 37 GHz, and similarly, those missions are also relied upon by U.S. civil agencies such as NOAA and the National Aeronautics and Space Administration (NASA), as well as DoD, the private sector and academic partners. To be useful for weather forecasting, remote sensing observations must be made over the entire Earth and with the highest practicable temporal resolution. For this reason, data from these instruments in different orbits that are operated by various international agencies are not seen as

¹¹ See *AGU et al* comment in SB 25-80/GN 14-177 at 7. (28 Jul 2025)

¹² National Academies of Sciences, Engineering, and Medicine. 2025. Views of the U.S. National Academies of Sciences, Engineering, and Medicine on Agenda Items at Issue at the World Radiocommunication Conference 2027. Washington, DC: The National Academies Press. <https://doi.org/10.17226/28596>. P 20, 28.

¹³ See *AGU et al* comment in WT 24-243 (22 Nov 2024) at 2. <https://www.fcc.gov/ecfs/document/11221965712018/1>

¹⁴ 27 Sept 2024. CORF. At 4.

duplicative and are customarily shared with U.S. agencies in near real time to enable such benefits to forecasting.¹⁵

Given the broad use of passive measurements near 37 GHz for weather forecasting, which supports the protection of life, property and economies both here and abroad, it is crucial to protect these measurements from harmful interference.

Comments Regarding Modifications to Section 25.13 and Potential Future Alternate Licensing Procedures

NWA, AMS, AGU and UCAR have considerable concerns about the proposal to change Section 25.136 criteria with a "light-licensing" approach. Without major changes, such an approach threatens to introduce unmanaged aggregate interference that could potentially disable the passive microwave sensors discussed in this comment so far, negatively impacting weather forecasting across the U.S.¹⁶

Legacy regulatory mechanisms, and specifically the "light-licensing" models imported from terrestrial fixed services, are mathematically and physically insufficient to protect passive spaceborne sensors from the aggregate interference of modern satellite networks. Traditional coordination for such licensing regimes focuses on preventing "harmful interference" between two active systems. For example, ensuring that a specific earth station does not jam a specific microwave backhaul link.

Passive sensors, however, operate differently. As noted earlier in this comment, they function as ultra-sensitive radiometers that integrate energy over wide fields of view and broad bandwidths to detect natural thermal emissions that are often indistinguishable from the noise floor. They do not suffer from "jamming" in the traditional sense; rather, they suffer from data corruption. A slight rise in the noise floor caused by the accumulated sidelobe energy of ~15,000 earth stations appears to the sensor not as interference, but as a false temperature reading (converted from received power). A 1 Kelvin error in brightness temperature (the minute power level measured by these passive sensors) can translate into a forecast error, potentially shifting the predicted path of a hurricane by hundreds of miles.

Current "light-licensing" proposals lack the mechanisms to calculate or control for these important, yet faint power levels in such a noisy environment. Such a licensing regime would operate on a first-come, first-served basis for transmitter-to-receiver protection, ignoring the third-party passive instrument orbiting overhead. This regulatory blind spot creates a scenario where individual operators may be fully compliant with their license terms while collectively diminishing the utility of the government funded environmental satellites taking passive measurements, which support accurate weather forecasts that broadly save lives and boost the economy (as noted earlier in this comment).

Interference into passive bands occurs through adjacent band or out-of-band emissions (OOBE). Ideally, a transmitter would emit energy only within its assigned bandwidth (e.g., 50.4–51.4 GHz), but in reality, there is spill over into adjacent frequencies.

¹⁵ 27 Sept 2024. CORF. At 3.

¹⁶ Backus, B; de Mattheais, P; Lubar, D; and Leduc, R. "Protecting Passive Microwave Bands for Weather Forecasting." Presented at the National Radio Science Meeting (NRSM). Jan 2026.
https://nrsmboulder.org/view_paper.php?PaperNum=1352

The regulatory decisions in play in this and related proceedings could be similar to the disputes related to OOB E near 24 GHz in 2019. Despite warnings from NOAA and the NASA that OOB E would degrade water vapor sensing in the adjacent 23.6–24 GHz band, the FCC auctioned 24 GHz spectrum.¹⁷ Through the auction, the FCC adopted limits (-20 dBW) that were significantly looser than the -50 dBW recommended by the science agencies. At the World Radiocommunication Conference 2019 (WRC-19) later that year, slightly stricter stepped limits were established for the 24 GHz band, but the scientific community widely criticized them (-20 to -28 dBW) as being too lenient, driven by the telecommunications industry rather than scientific consensus. The full extent of anticipated OOB E near 24 GHz did not fully materialize because terrestrial wireless did not deploy as broadly as expected. But this proceeding sets up an environment in the lower 50 GHz band that could create a much noisier environment that will more quickly degrade critical passive measurements for weather forecasting. Also, in contrast to the 24 GHz proceeding, this proceeding involves FSS and signals that would be directed into space. In addition, the 50-60 GHz range provides a collection of dependent bands for weather applications.

The ITU-R RS.2017 recommendation¹⁸ sets performance and interference criteria for satellite passive remote sensing and is the scientific "gold standard" for ensuring the coexistence of spectrum users without passive data corruption. It requires that interference not exceed the threshold for more than 0.01% to 0.1% of the time. But FCC regulations in the past, such as 24 GHz, have adopted emission limits that fail to meet this requirement in aggregate scenarios.

The expansion of satellite broadband and the preservation of weather forecasting are both vital societal goals. But given the points above, they cannot coexist under the current "light-licensing" trajectory. For the same reasons, the market-based approach will not be sufficient either. A new, robust spectrum management paradigm is required. Good faith coordination can only happen if RFI due to OOB E is recognized near bands that are currently used for passive operations.

Summary

The use of passive microwave spectrum allocations for Earth exploration-satellite services is an essential component to the development of weather forecasts. Characteristics of Earth-to-space emissions, such as power levels, deployment schedule, and direction of emissions, will determine if contamination of adjacent passive bands alters the accuracy of weather forecasts that are an output from complex numerical weather prediction models. Improvements in numerical weather prediction performance over the past 20 years can be attributed to passive microwave satellite observations,¹⁹ and it is important we do not backtrack on those forecasting advances.

Given such interdependence, our organizations call for studies to determine what are acceptable levels of OOB E, aligned with ITU-R RS.2017, that do not harm accessibility to key atmospheric parameters for forecasting, especially for the lower 50 GHz band. These studies should be conducted before any further regulatory actions are taken and should be funded using Spectrum

¹⁷ See *AGU et al* comment in ET Docket No. 21-186 (28 Feb 2024) at 2.

¹⁸ Recommendation ITU-R RS.2017-0. Performance and interference criteria for satellite passive remote sensing https://www.itu.int/dms_pubrec/itu-r/rec/rs/R-REC-RS.2017-0-201208-I!!PDF-E.pdf

¹⁹ Geer, A. J., F. Baordo, N. Bormann, P. Chambon, S. J. English, M. Kazumori, H. Lawrence, P. Lean, K. Lonitz, and C. Lupu. "The Growing Impact of Satellite Observations Sensitive to Humidity, Cloud and Precipitation." *Quarterly Journal of the Royal Meteorological Society* 143, no. 709 (October 2017): 3189–3206. <https://doi.org/10.1002/qj.3172>.

Pipeline Act funds to ensure they are completed thoroughly and are not limited given significant budgetary constraints at many Federal science agencies. The studies should be conducted together with atmospheric scientists and weather modeling experts to ensure the examinations are realistic in how the spectrum is used in a variety of weather conditions and terrain to best represent the needs of forecasters.

We appreciate the opportunity to provide input into this proceeding.

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