Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

In the Matter of	)	
	)	
Satellite Spectrum Abundance	)	SB Docket No. 25-180
	)	
	)	
Use of Spectrum Bands Above 24 GHz For Mobile Radio Services	)	GN Docket No. 14-177
	)	

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

July 28, 2025

The American Geophysical Union (AGU), American Meteorological Society (AMS), National Weather Association (NWA) and University Corporation for Atmospheric Research (UCAR) appreciate the opportunity to provide comments on this Notice of Proposed Rulemaking (NPRM) seeking to make additional spectrum resources available for satellite communications in the two following areas: 1) 51.4-52.4 GHz band (52 GHz band); and 2) certain "W-band" frequencies (92.0-94.0 GHz, 94.1-100 GHz, 102.0-109.5 GHz, and 111.8-114.25 GHz).

The membership of AGU, AMS, NWA 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 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 from environmental satellites collected adjacent to the 52 GHz band, and in the W-Band, including 92 GHz and 115 GHz bands, have contributed significantly to more accurate and timely weather forecasts over the past 40 years.

It is important to emphasize that these passive observations are not communications signals and are orders of magnitude weaker than typical communications links. Passive 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. **Further, the properties of the atmosphere are defined by the laws of physics and chemistry and cannot be changed to optimize spectrum allocation.** These measurements are especially vulnerable to

harmful interference as even faint out-of-band emissions can, in aggregate, contaminate the thermal noise floor of the target channel.

While much of the forecast improvement due to passive microwave observations has come from National Oceanic and Atmospheric Administration (NOAA), National Aeronautics and Space Administration (NASA) and Department of Defense (DoD) satellites in the U.S., there are now private sector satellites operated and planned in these bands as well, in addition to European and Japanese satellites that the U.S. relies on, which all contribute to improving weather forecasts. A NOAA roundtable report from 2021 indicated microwave sounders operating in passive bands on polar orbiting satellites operated by NOAA and the European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT) have been the most impactful remote sensing observations in numerical weather prediction (NWP) models for the past two decades and are expected to continue to be so in the future.[1]

But even more important, **while these are Federal spectrum allocations, the information used from these bands to inform weather models that improve forecasts provide 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.

While this proceeding highlights the economic value of satellite broadband, it is critical also to examine the economic and societal impacts of increasingly accurate weather forecasts fueled by satellite Earth observations from the public and private sector. A study estimated weather had a 3.4% annual effect on the nation's economy.[2] 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,[3] 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.

American lives and livelihoods depend upon reliable access to forecasts derived from appropriately calibrated Earth observations, which require access to spectrum without harmful interference. Furthermore, policymakers must recognize that the radio spectrum is utilized for many applications besides telecommunications, and these uses serve important functions in support of the economy, national security and public safety.

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[1] 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

[2] Lazo et al. U.S. economic sensitivity to weather variability. *Bull. Amer. Meteor. Soc.*, 92, 709-720. DOI: https://doi.org/10.1175/2011BAMS2928.1.

[3] 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

The Threat of Adjacent Band Interference to Passive Observations for Weather Prediction
Experts from AGU, AMS, NWA and UCAR are concerned about contamination of passive measurements near 52 GHz and in the W-band, especially adjacent to 92 GHz and 114 GHz. While later sections will highlight greater details about each band, the following is a summary of the critical importance of a range of different passive observations working as a system to generate accurate and timely meteorological forecasts particularly through numerical weather prediction.

The weather community operates a diverse network of passive microwave sensors deployed in space, on aircraft, and on the ground. 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, we can obtain a 3-D map of temperature and humidity worldwide, as well as surface characteristics such as ocean-surface windspeed. These crucial variables are the backbone of supercomputer models that allow forecasters to predict weather.

The weather forecasts derived from numerical weather prediction rely on both vertical temperature and moisture 'soundings' (or essentially data) from passive microwave sensors on satellites that sense one or multiple groups of adjacent passive microwave bands. "Soundings," most often represented as 'vertical profiles,' are essentially measurements of temperature or water vapor at many points in the atmosphere ranging from the ground to the edge of space (see figure 3), which are derived from passive observations of the weak thermal emissions from the atmosphere. These thermal emissions are only observable at specific RF bands that are determined by the physics of the atmosphere and may not be detected in different frequency ranges.

For example, relevant to this proceeding, between 50 and 60 GHz a range of important and distinct temperature sounding measurements can be collected. To most comprehensively characterize the atmosphere over all land areas (e.g., remote and urban) and over the oceans, it is important to employ a robust constellation of satellite-based instruments. Adjacent to 114.25 GHz are bands that also provide important temperature soundings, especially related to cloud properties and are important to tropical cyclone prediction. Similarly, 86 to 92 GHz information is used to sense cloud structures and precipitation, particularly for storm systems including hurricanes.

As noted earlier, it is important to emphasize that these soundings or passive measurements are not communications signals and are orders of magnitude weaker than typical communications links. Further, the properties of the atmosphere are defined by the laws of physics and chemistry and cannot be changed to optimize spectrum allocation.

As described in a 2021 comment on Earth Exploration-Satellite Service (EESS) passive measurements by the Geoscience and Remote Sensing Society of the Institute of Electrical and Electronics Engineers (IEEE GRSS),[4] "*There are three levels of contamination to passive measurements … **Obvious, Insidious, and Undetectable**.*" As noted in figure 1 below, **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.

[4] 27 June 2021. IEEE-GRSS-FARS. https://www.fcc.gov/ecfs/document/1062804433840/1

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.

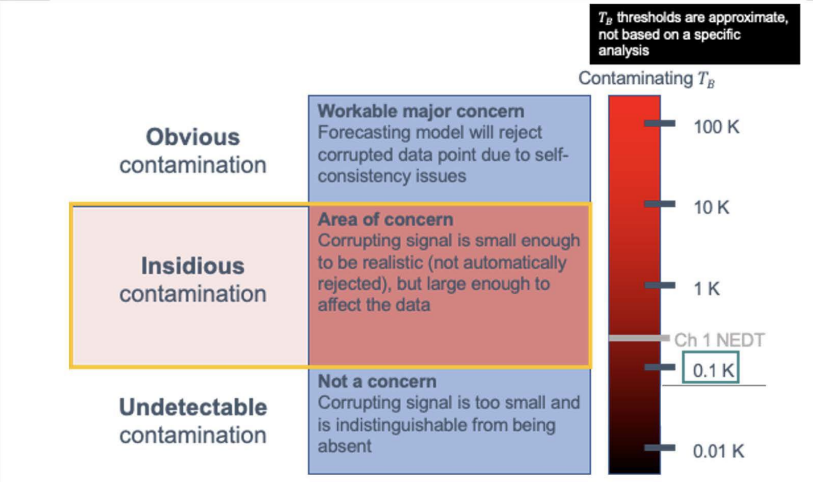

Figure 1:[5] The figure highlights how interference can contaminate passive measurements of the atmosphere. Such contamination is measured by its "brightness temperature"[6] which is measured on the Kelvin absolute temperature scale. The contaminating brightness temperature (T_B) is not necessarily static, however. Advancements in sensor design and development are expected to continue to produce increasingly sensitive instruments. While interference in the short term may be undetectable and of little concern now, it can become a source of insidious contamination in the future.

Characteristics of other emissions, for example from satellite communications, 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 derived from complex numerical weather prediction models.

Current and Planned Microwave Sensors on U.S. and International Environmental Satellites

A single polar-orbiting weather satellite (such as those carrying a passive microwave sensor) observes the entire Earth, including the U.S., at least twice daily (once during the day and once at night), with a single satellite providing coverage of the poles every 100 minutes. As multiple polar-orbiting satellites are necessary to provide more frequent coverage for observing short-term changes in the weather, the satellites are staggered in orbit to achieve that.

The current operational 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 using passive absorption bands at or near 24 GHz, 31 GHz, 50 to 58 GHz, 88 GHz, and 183 GHz. With two JPSS satellites on orbit and two more to be launched by 2031, the sensors are expected to continue to operate through the 2030s or longer.

[5] 28 Feb 2024. NTIA with NASA-NOAA attachment. https://www.fcc.gov/ecfs/document/102280462923740/2

[6] The brightness temperature is a measurement of the radiance of the microwave radiation traveling upward from the top of the atmosphere to the satellite, expressed in units of the temperature of an equivalent black body. (Remote Sensing Systems, Inc. https://remss.com/measurements/brightness-temperature/#:~:text=Overview,brightness%20temperature%20of%20the%20Earth. Accessed 25 July 2025.)

NOAA's next generation operational microwave radiometry sensor,[7] 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. There are anticipated science requirements for SMBA to operate in K (20-25 GHz), Ka (31-33 GHz), V (50-62 GHz), W (85-92 GHz), F (108-123 GHz), D (164-167 GHz), G (173-193 GHz) and J (200-235 GHz) bands, as noted in publicly available draft procurement documents, though the final composition of the satellite and its performance parameters are not yet confirmed. The satellites on which this sensor will orbit are expected to operate through at least 2055. In addition, NOAA plans its first NEON satellite, a commercially operated satellite called QuickSounder, which is anticipated to launch another ATMS sensor into orbit in 2026.[8]

DoD's satellites with passive microwave sensors include the Defense Meteorological Satellite Program (DMSP) series (which are expected to be no longer available to non-DoD users by the end of July 2025) and the Weather System Follow-on Microwave (WSF-M) with the Microwave Imager/Radiometer (MWI) sensor, which launched in April 2024 and operates near 89 GHz (most relevant to this proceeding) among other EESS (passive) bands.

NASA has multiple satellites that employ passive microwave sensors, but of relevance to this proceeding is the NASA Time-Resolved Observations of Precipitation structure and storm Intensity with a Constellation of Smallsats (TROPICS) mission, which is a constellation of four CubeSats launched in May 2023 to study the evolution and structure of tropical cyclones by measuring temperature, humidity, and precipitation in a unique, inclined low Earth orbit over Earth's tropics that allows them to travel over any given storm about once an hour. NASA TROPICS measures these characteristics using passive absorption bands at 114.5 GHz (temperature), near 90 GHz (precipitation), near 183 GHz (water vapor absorption), and near 206 GHz (cloud ice measurements).

NASA and other agencies in the U.S. and abroad are also exploring microwave sounding in geostationary orbit, which would enable more continuous observation of passive measurements of moisture and temperature over the U.S. A NASA Jet Propulsion Laboratory (JPL) mission called GeoSTAR has developed and tested a ground-based test model of such a microwave mission and has a test sensor ready for deployment on a commercial geostationary satellite.[9] Operational agencies like NOAA and EUMETSAT, as well as China and Japan, have explored geostationary microwave sounding options as well. Since such a geostationary mission would dwell over the U.S., rather than sample the whole Earth, this would require even more reliable and continuous access to passive bands without adjacent or in-band interference threats, especially between 50 and 58 GHz, to enable significantly improved short-term forecasting of severe thunderstorms and hurricanes.

In addition to U.S. operational weather satellites, the U.S. relies on passive microwave observations collected with satellites operated by EUMETSAT, the Japan Aerospace Exploration Agency (JAXA)

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[7] EUMETSAT is also developing future satellite systems with microwave sounders and has plans to operate systems beyond the end of life of the current operational satellite systems, which are described later in this comment.

[8] World Meteorological Organization's Observing Systems Capability Analysis and Review Tool (WMO-OSCAR). https://space.oscar.wmo.int/satellites/view/quicksounder. Accessed 24 July 2025.

[9] Lambrigtsen, Bjorn H. 2020. "GeoSTAR – a 'Shovel Ready' Geostationary Microwave Sounder." IEEE International Geoscience and Remote Sensing Symposium (IGARSS), Waikoloa, Hawaii, July 19-24, 2020, JPL Open Repository https://hdl.handle.net/2014/53065

and the Korean Meteorological Agency (KMA), which are harmonized with U.S. assets to provide similar data. In addition to NOAA's own global models, the U.S. relies on the numerical weather prediction models developed by the European Centre for Medium Range Weather Forecasts (ECMWF), (informally known as the "Euro" model) which also rely on similar passive microwave data sources, including NOAA's above-mentioned satellites as well as passive observations from other international satellites.

There are also three U.S. companies that are currently operating or planning to operate passive microwave sensors in the bands highlighted in this proceeding.

- Tomorrow.io is operating a constellation of microwave radiometers measuring precipitation for improving weather forecasting,[10] building on the technologies first deployed on NASA TROPICS. Tomorrow S1-10 operate and/or plan to operate near 92 GHz.
- Spire intends to operate its Hyperspectral Microwave Sounder (HYMS) near 54 GHz, launching a demonstrator capability in 2025 and a constellation in the future.[11]
- Weatherstream plans to fly its Global Environmental Monitoring System – 2nd Generation (GEMS2) microwave radiometer starting this year, operating at 108.6 GHz, 118.8 GHz and higher.[12]

Important Role of Microwave Measurements in Weather Forecasting

Today, U.S. seven-to-ten-day weather forecasts are as accurate as three-to-five-day forecasts were 20 years ago. Much of this increase in skill is directly attributable to enhanced satellite observations of the atmosphere from passive microwave sensors, as shown in figure 2 below. This improvement is a major scientific research and development success that has helped society in a significant way.

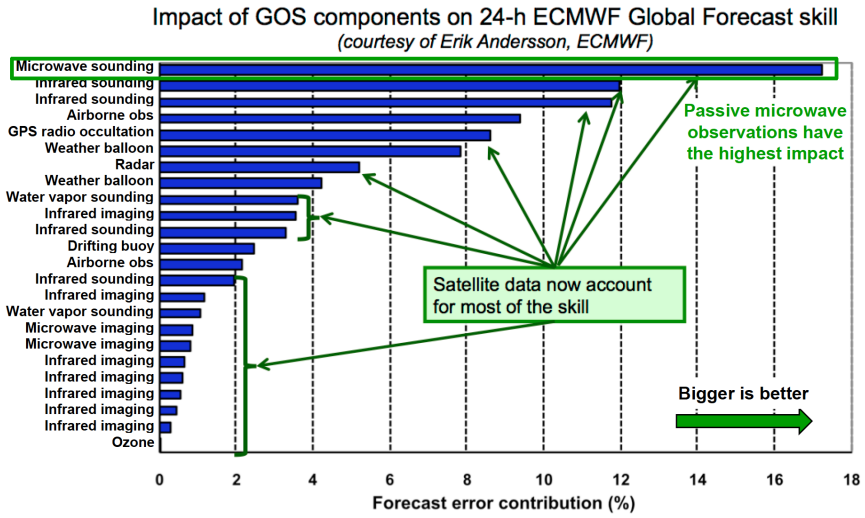

Figure 2: **Impact of various observations on 24-hour ECMWF Global Forecast Skill.**[13] *(In this figure, larger values constitute larger impacts on reducing forecast error.)* This diagram shows the various satellite, ground and airborne technologies that make up the global observing system (GOS) and their impacts on increasing the "skill" or accuracy of weather

[10] WMO-OSCAR. https://space.oscar.wmo.int/satelliteprogrammes/view/tomorrow_io Accessed 24 July 2025.
[11] WMO-OSCAR. https://space.oscar.wmo.int/satelliteprogrammes/view/hyms Accessed 24 July 2025.
[12] WMO-OSCAR. https://space.oscar.wmo.int/instruments/view/gems2 Accessed 24 July 2025.
[13] Zavodsky, B.; Dunion, J.; Blackwell, W.; Braun, S.; Velden, C.; Brennan, M.; and Adler, R. First Time-Resolved Observations of Precipitation Structure and Storm Intensity With a Constellation of SmallSats (TROPICS) Mission Applications Workshop Summary Report. NASA Earth Science Division Applied Science Program. Marshall Space Flight Center. October 2017. 13. https://tropics.ccs.miami.edu/wp-content/uploads/2017/11/NASA-CP-2017-219705-TROPICS-Workshop-Summary.pdf

models. While this example highlights European models (ECMWF), U.S. models use many of the same inputs, especially satellites.

Concerns about the Use of the 51.4-52.4 GHz Band for Satellite Communications

The AGU, AMS, NWA and UCAR are significantly concerned about FCC's proposed rulemaking to make the 51.24-52.24 GHz band more available to satellite communications given its likely impact on weather forecasting and particularly on temperature soundings. Of greatest concern is the continued reliability of the information from the ATMS sensor's channel 4, which measures the lower troposphere (figure 3), or within 10 km of the ground, centered at 51.76 GHz. While we realize this is not a band allocated for EESS passive use, nearby ATMS channel 3, centered at 50.3, and ATMS channel 5, centered at 52.8 GHz, and potentially any other channel in the 50 GHz range that would share front end electronics with channel 4 are likely to be degraded with substantial additional radio traffic in the 51.4-52.4 band, which would overlap the channel 4 passband as an in-band signal.

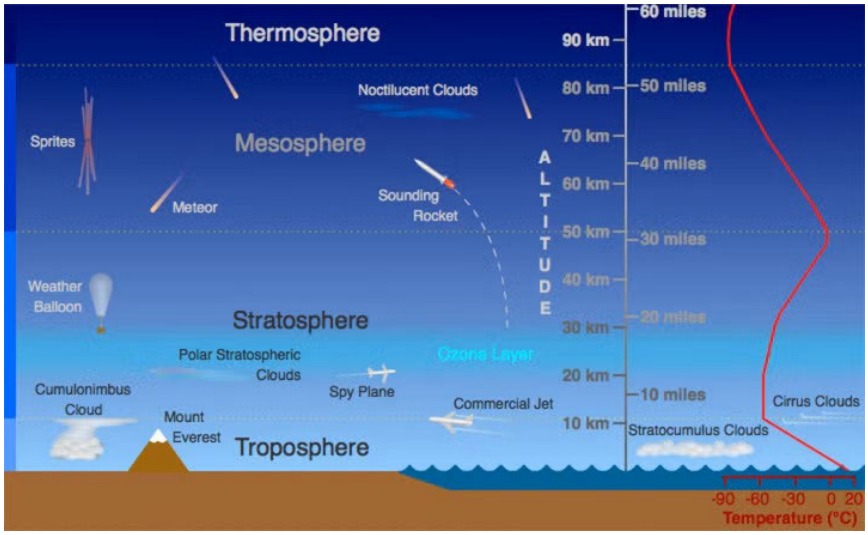

Figure 3: This diagram illustrates some of the features and phenomena found in the various layers of Earth's atmosphere. Starting from ground level, the layers include the troposphere, stratosphere, mesosphere and thermosphere. The exosphere, which is above the thermosphere, is not shown in the diagram. Phenomena include noctilucent clouds, meteors, and a sounding rocket in the mesosphere; weather balloons, cirrus clouds and the ozone layer in the stratosphere; and cumulonimbus clouds, commercial jets, and the peak of Mount Everest in the troposphere.[14]

Also important to U.S. weather models are the assimilation of data from current and future European microwave radiometers, especially those operated by EUMETSAT. These include the Microwave Imager (MWI) on Metop-Second Generation (SG)-B1-3, which are anticipated to launch in 2026, 2033 and 2040, respectively, and operate at relevant bands to this proceeding centered at 50.3 GHz, 52.7 GHz, 53.2 GHz, 53.75 GHz, 89 GHz and 118.8 GHz.[15] In addition, the European Microwave Radiometer (MWR) on European Polar System-Sterna (EPS-STERNA) 1-3, a constellation of microsatellites launching in 2029, operating at 52.6-57.6 GHz.[16]

[14] UCAR Center for Science Education. https://scied.ucar.edu/image/atmosphere-layers-diagram Accessed 23 July 2025.
[15] WMO-OSCAR. https://space.oscar.wmo.int/instruments/view/mwi_metop_sg Accessed 24 July 2025.
[16] WMO-OSCAR. https://space.oscar.wmo.int/instruments/view/mwr_sterna Accessed 24 July 2025.

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 earlier this year. The band 51.4–52.4 GHz is proximate (on both sides) to the 50.2–50.4 GHz and 52.6–54.25 GHz oxygen absorption bands that are 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), while the 52.6–54.25 GHz band is particularly good at measurements in a wide range of weather conditions.[17]

Given the quiet transmissions that are relied on in the lower 50 GHz band by weather forecasters, our organizations have considerable concern about the impact of potential new (and comparatively strong) satellite communications entrants into the 51.4-52.4 GHz band. Not only are there concerns about in-band and out-of-band emissions, but also how such new emissions would negatively impact the calibration of the whole ATMS instrument on NOAA's JPSS satellites both on-orbit and still to launch. In simple terms, the concern is the increased energy being directed at Channel 4 of ATMS, centered at 51.76 GHz, will drive the "amplifier" for that channel to a new level, impacting the immediate and ongoing calibration of nearby channels. This could impact the science data from multiple channels on NOAA's primary operational microwave sounders in non-geostationary orbit.

In addition, given the robustness of NOAA's current operational satellites, ATMS measurements between 50 and 60 GHz are used to calibrate other microwave sounding instruments on other satellites,[18] including S1-S10 operated by Tomorrow.io at 91.6 GHz. As noted in a NOAA roundtable report on microwave sounding and modeling from 2021, even without new spectrum entrants, a robust mix of microwave sounding instruments from across missions and countries needs a robust calibration strategy to continue to assure the accuracy of all EESS passive measurements and achieve the weather modeling advances that are required to improve weather forecasts.[19] This helps to ensure that microwave sensors are cross-calibrated so their inputs can reliably be assimilated into models minimizing bias. The passive bands between 50 and 60 GHz are crucial to this calibration across all passive bands, which is what makes added interfering energy from satellite communications troubling for the future of weather forecasts. These calibration issues require additional study and careful consideration of the FCC in evaluating whether such a rulemaking is in the public interest.

In response to FCC's specific questions in the NPRM in paragraph 59, AGU, AMS, NWA and UCAR views are:

1.
The proposal to grant access to the 51.4-52.4 GHz band by satellite operators would represent intensive use of the band in the Earth-to-space direction that has a significant likelihood of harming critical atmospheric observations for weather forecasting. While additional due diligence is

[17] 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.

[18] The 50-60 GHz bands are selected because they offer clear and stable information about atmospheric temperature due to oxygen absorption, and they can penetrate clouds. The robustness of NOAA's satellites, their long operational history, consistent data quality, and dedicated calibration efforts make ATMS a highly reliable and trusted standard for calibrating other microwave sounding instruments globally.

[19] Kalluri at 5.

warranted, such research must consider the operational realities for passive sensing of numerous geographies in the U.S. and examine the calibration challenges that additional noise in the 50-60 GHz band would cause.

2.
As noted on page 2, while much of the 50-60 GHz band is allocated to EESS (passive) and used by government satellites, there is extensive use of the information derived from these bands (including 51.4-52.4 GHz) that is both used by and benefits the private, public and academic sectors more broadly. We believe limits on unwanted power emissions could assist to protect incumbents, but rigorous studies are required that account for weather forecasting needs in the lower atmosphere closest to the ground.

Given this, our organizations call for studies to determine what are appropriate levels of out-of-band-emissions (OOBE) that do not harm accessibility to key atmospheric parameters for forecasting. These studies should be funded using Spectrum Pipeline Act funds to ensure they are completed quickly and are not limited given significant budgetary constraints at many Federal science agencies. The studies should be conducted together with atmospheric science 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. This is particularly important since the satellite communications uplinks proposed in these areas are expected to include Earth stations tracking non-geostationary orbiting (NGSO) satellites constantly changing directions distributed across the sky. The sheer number of potential ground stations communicating with NGSO satellites, pointing all over the sky, can disrupt the measurement integrity and calibration uniformity of space-based instruments conducting operational passive measurements.

In addition, we understand SpectrumX, the National Science Foundation (NSF) Spectrum Innovation Center, is conducting research related to scientific coexistence in the lower 50 GHz band. Funded under the Spectrum Innovation Initiative in partnership with FCC and NTIA, SpectrumX's continued engagement over the past four years with the satellite communications industry, the radio astronomy community and weather and Earth science stakeholders, indicates their research will be important and complementary to the studies recommended above.

Concerns about the Use of the "W-Band" for Satellite Communications
The AGU, AMS, NWA and UCAR are significantly concerned about FCC's proposed rulemaking to make the 92.0-94.0 GHz band and the 111.8-114.25 GHz band more available to satellite communications given its likely impact on weather forecasting and particularly on moisture and temperature soundings, respectively.

Of concern is continued reliability of the atmospheric information from near 92 GHz, especially the NASA TROPICS and future constellations of passive microwave imager- and sounder-equipped small sats from both commercial entities and international partners. Both are centered at 91.7 GHz and collect moisture profiles in that band. These smallsat constellation missions represent a new architectural approach to microwave sensing and represent important innovation tests for the future for satellite meteorology. All the same, however, whether Federal or non-Federal missions, there is concern about OOBE that could contaminate these important measurements that are used in tandem with other passive measurements. SMBA, NOAA's next generation operational microwave radiometry sensor described above, is expected to have channels between 85 and 92 GHz and also

include the channels now on ATMS. NOAA's NEON series 2 mission, which will host SMBA, is expected to operate approximately through 2050.

We support the positions expressed related to agenda item 1.18 in the "Views of the U.S. NASEM on Agenda Items at Issue at the World Radiocommunication Conference 2027" published earlier this year. Notable among these are those bands around 118 GHz, which are areas (or "lines") where oxygen absorption can be measured and conveys information on atmospheric temperature. These lines are very broad (multiple gigahertz) at Earth's surface, narrowing with increasing altitude (decreasing pressure {e.g., hundreds of megahertz at 15km elevation, approximately where commercial jets fly}), which can provide important insights to forecasters. However, this demands interference-free access to broad, contiguous bands for accurate results.

In addition, our organizations fully support these words of the NASEM Committee on Radio Frequency Allocations:[20]

> *The committee underscores that EESS (passive) observations act as a system. No one band provides unique information on an Earth system variable. Rather, the various bands provide complementary information on different combinations of geophysical parameters. Only when measurements in multiple bands are considered in concert can sufficiently unambiguous geophysical information be obtained. Thus, interference into a single band undermines the value of the complete observing system.*

We also have concerns about reliable access to the atmospheric information from near 114.25 GHz. The NASA TROPICS constellation is operating at 114.5 GHz that would face considerable threat of OOBE from satellite communications operations. This is a spectral region emerging as an increasingly important source of temperature sounding information. Though not as informative as the temperature bands between 50 and 60 GHz,[21] due to precipitation impacts,[22] these are still important bands to sense for a broader understanding of atmospheric temperature to support the continued improvement of weather forecasts, especially for hurricanes, at higher spatial resolution. SMBA, NOAA's next generation operational microwave radiometry sensor, is also expected to operate between 108 and 123 GHz through approximately 2050.

In summary related to the "W-Band," the FCC should continue to protect EESS passive as a primary service where applicable meteorological satellites operate and provide internationally consistent protection criteria to keep out-of-band signals from interfering with sensitive passive microwave sensing in those allocations.

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[20] 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.

[21] Kalluri at 5.

[22] Zhang, M.; Ma, G.; He, J.; Zhang, C. Impact of Channel Selection with Different Bandwidths on Retrieval at 50–60 GHz. Remote Sens. 2024, 16, 1323. https://doi.org/10.3390/rs16081323

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.[23]

Given the overall systematized importance of the passive observations in the lower 50 GHz band and adjacent to 92 GHz and 114.25 GHz, any additional uses of these bands must take into consideration the interdependence required for the modeling and weather forecasting derived from the data provided from these observations, and the other important uses of passive spectrum, such as radio astronomy. **It is critical for comprehensive studies to be conducted that consider the modeling and weather forecasting impacts to any such adjacent or shared band operations, before further regulatory actions are taken to change allocations in these spectral areas.**

We appreciate the opportunity to provide input into this proceeding.

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President
University Corporation for Atmospheric Research

[23] 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.