

Space Weather, Radio Frequency Exposure, And Human Health

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To The U.S. Department Of Health And Human Services:

Thank you for inviting public input on electromagnetic fields, radiofrequency radiation and wireless exposure. I ask HHS to make space weather an explicit part of a coordinated environmental-health research agenda. My central recommendation is to measure natural geomagnetic conditions alongside actual RF exposure and health outcomes, and to test whether their combined effects differ from those of either exposure alone.

My Perspective And Requested Action - Question 2

My name is Sarah Starr. My work includes space-weather forecasting, astrology, consciousness education and exploration of non-human intelligence. These interests motivate my attention to the relationship between cosmic events, the natural environment and human experience. For this RFI, I base my recommendations on the government assessments and scientific studies cited below.

I recognize that this RFI focuses on non-ionizing RF/EMF [1]. I ask HHS to retain that focus while coordinating related research on natural fields, energetic-particle events and infrastructure resilience. The research question is how changing environmental conditions relate to measured exposure and health, including whether RF exposure modifies any relationship.

The Three Actions I Am Requesting

First, support synchronized environmental and personal exposure monitoring. Second, fund independently replicated health studies with a prespecified test of RF-by-geomagnetic interaction. Third, coordinate public-health preparedness for documented space-weather effects on power, communications and aviation.

The following sections address selected RFI questions by number, as the notice requests [1]. They distinguish published findings from the studies and policy actions I recommend.

RF Evidence, Standards And Exposure Assessment - Questions 5-9, 12, 13 And 15

Wireless systems use non-ionizing RF energy. Exposure depends on frequency, intensity, duration, operating pattern and proximity to the body. Gamma rays and energetic cosmic particles involve ionizing-radiation hazards and require separate dose assessment. Keeping these categories distinct allows researchers to investigate combined conditions without confusing their mechanisms or measurements [2, 3].

The RF evidence review should evaluate human epidemiology, animal studies and mechanistic work together. NCI summarizes human evidence as suggesting that cell phone use does not cause brain or other cancers [2]. NTP found clear evidence of malignant heart schwannomas and some evidence of malignant brain gliomas in male rats under its experimental RF conditions [4]. Differences in whole-body exposure, intensity, species and use patterns matter when interpreting the animal findings for people.

For Questions 6 and 12, I ask HHS to assess outcomes against verified exposure levels relative to the applicable limit. Standards are thresholds used to assess exposure; the research must identify the source, dose and outcome. The cited animal and observational findings should not be treated as a quantitative estimate of risk from a particular base station or a demonstration of harm below federal limits.

Compare FCC 47 CFR 1.1310 with ICNIRP 2020, explaining frequency coverage, public and occupational provisions, local and whole-body absorption, averaging periods and simultaneous sources [5, 3]. Publish the evidence and assumptions behind their application, and identify which unresolved outcomes require better exposure data or longer follow-up.

I recommend calibrated, frequency-selective surveys and repeated personal monitoring near homes, schools, childcare facilities, healthcare facilities and workplaces. Record handset uplinks and infrastructure downlinks, antenna orientation, beamforming, traffic, modulation, duty cycle, peaks, averaging times and uncertainty. Use validated models to estimate specific absorption rate (SAR) or absorbed power where applicable [5, 3].

Evaluate 5G, Wi-Fi, satellite terminals, wearables, smart meters, wireless medical devices and connected homes, vehicles and cities by their actual operating characteristics. Assess future 6G configurations when specified. Antenna count and distance describe a setting but do not replace field measurements or absorption models. Provide community summaries with methods, calibration, uncertainty and relevant standards comparisons.

Why Space Weather Belongs In The Research Agenda - Questions 7, 8, 13, 16 And 18

NOAA describes geomagnetic storms as energy transfer from the solar wind into Earth's magnetosphere, changing currents and fields. These disturbances affect infrastructure through mechanisms including geomagnetically induced currents. Changes in the ionosphere also affect radio propagation and satellite navigation [6]. Solar X-rays and energetic particles can change HF radio absorption and interrupt communications [7]. These are documented connections between solar activity and systems that use electromagnetic signals.

The next step is to connect those environmental observations to human exposure. Signal disruption does not by itself establish an increased RF dose to a device user. I ask HHS to support measurements of local fields and actual device and infrastructure emissions during disturbed and quiet periods, alongside health observations.

Magnetic-Field Changes And Southern Auroras

ESA's Swarm assessment documents expansion of the South Atlantic Anomaly during 2014-2025 and faster weakening southwest of Africa since 2020; it also documents strengthening over Siberia [8]. Long-term regional field changes and short-term solar-driven storms require separate time series. Researchers should examine local field strength, direction and rate of change rather than infer every location's exposure from a global average.

NASA identifies the South Atlantic Anomaly as a particle-radiation concern for spacecraft and reports no visible impacts on daily life at the surface [9]. The May 2024 G5 storm produced auroras at unusually low latitudes [10]. These findings support geographically resolved monitoring. They do not establish that all radiation reaching people is increasing everywhere or that southern auroras indicate a hazardous ground-level dose.

Natural Radiation And Event-Specific Measurements

NOAA distinguishes geomagnetic storms, solar radiation storms and radio blackouts [11]. CDC identifies cosmic radiation and solar-particle events as occupational concerns for aircrew [12]. The University of Oulu maintains a database of solar-particle ground-level enhancements, identified using neutron-monitor and space-measured proton records [13]. These measurements support event-specific radiation assessment using particle spectra, altitude, location, shielding and duration.

Atmospheric gamma radiation is a separate monitoring topic. Ringuette and colleagues detected 24 brief thunderstorm-associated gamma-ray events over 2.6 years [14]. The detections justify studying event frequency and exposure geometry; they do not establish a personal hazardous dose or a solar origin. I recommend coordinating such measurements with atmospheric researchers rather than treating thunderstorm gamma rays as wireless RF.

Health And Ecological Findings That Warrant Follow-Up - Questions 11, 14, 15 And 16

Zilli Vieira and colleagues reported associations between geomagnetic disturbance and reduced heart-rate variability in 809 older men with 2,540 visits during 2000-2017 [15]. Kim and colleagues reported associations between geomagnetic activity and mortality across 237 South Korean districts during 2001-2019 [16]. These observational findings warrant independent replication. Exposure proxies, residual confounding, multiple time windows and population differences remain relevant to causal interpretation.

I want follow-up studies to determine whether findings replicate across populations, whether changes are clinically meaningful and whether measured RF exposure modifies the association. Children, pregnant people, older adults, people with cardiovascular conditions, implant users and exposed workers deserve appropriately designed assessment. Implanted-device compatibility and aircrew ionizing-radiation exposure should be analyzed separately from tissue effects of RF [12, 3].

Wildlife And Ecosystem Outcomes

Tonelli and colleagues used approximately two million captures of 152 North American landbird species over six decades and reported an association between geomagnetic disturbance and vagrancy during fall migration [17]. Engels and colleagues experimentally reported disrupted magnetic-compass orientation in European robins exposed to anthropogenic electromagnetic noise [18]. The latter study concerned its particular noise spectrum and test conditions; it is not a direct assessment of every wireless network.

These studies support research on magnetic sensing and navigation. I recommend pairing spectral RF measurements and local magnetic records with orientation tests, migration tracking and, where feasible, survival or reproductive outcomes. Include relevant species near infrastructure, including livestock. Use blinding, sham conditions and controls for light, temperature, weather, habitat, disease and other disturbances. Establish whether an organism-level response translates into population or ecosystem harm.

Brain Responses, Perception And Consciousness

My interests include consciousness and subjective experience. Wang and colleagues reported EEG alpha-band responses to particular rotations of Earth-strength magnetic fields in a laboratory, without apparent conscious perceptual awareness [19]. This supports further work on human magnetic sensitivity, not a conclusion that solar storms raise consciousness. I ask for independently replicated studies that distinguish neural responses, cognition, sleep, mood and reported experience. Specify field amplitude, waveform and duration; an EEG frequency and an external RF carrier frequency are different measurements.

A Concrete Research Program - Questions 7-11, 16 And 18

I propose a staged, preregistered study at multiple geomagnetic latitudes. Start with a pilot to quantify instrument performance, within-person variability, recruitment and independent storm-event requirements. Monitor for at least two years and extend if too few events occur. Determine participant numbers from a prespecified meaningful effect, accounting for shared exposure dates rather than counting each participant as an independent storm observation.

Synchronize local vector magnetometers, NOAA/GFZ indices and personal frequency-specific RF monitoring. At selected sites, add suitable particle and energy-resolving gamma measurements, supported by neutron-monitor records and atmospheric data. Retain each instrument's calibration, response time and uncertainty. Distinguish field strength and variation, particle/photon spectra and radiation dose, and RF exposure and modeled absorption.

Prespecify a primary endpoint, such as standardized ECG-derived RMSSD, a heart-rate-variability measure. Use ambulatory blood pressure, actigraphy and prospective symptom diaries as secondary outcomes. Validate wearable measurements against clinical instruments. Establish lag windows and an adequately powered RF-by-geomagnetic interaction test before examining associations.

Address season, weather, air pollution, activity, medications, infection, sleep and awareness of storm forecasts. Use models that account for repeated participants, shared dates and temporal autocorrelation. Prespecify missing-data rules, multiple-testing correction and negative-control analyses. Replicate in an independent population and publish null results, code and privacy-protected data. Longer-term cohorts and registries can complement this panel for diagnosed outcomes and latency questions.

Respectful Reporting And Surveillance - Questions 3, 4 And 10

I recommend a voluntary reporting system that documents symptoms, timing, clinical findings and available measurements while supporting appropriate medical care. Reports can identify study priorities, but exposure and causation require separate assessment. Protect identifying information and use comparison groups and population denominators when evaluating clusters. This submission contributes research recommendations rather than personal case details or clinical-practice observations.

Testing Neural And Subjective Outcomes

For laboratory research, use randomized sham-controlled stimulation, participant and analyst blinding, artifact controls and preregistered EEG analyses. For field research, collect validated cognitive, sleep and mood measures prospectively, including expectations and forecast awareness. Define any claimed change in consciousness in measurable terms. This lets research address public concerns without assuming that different neural and subjective outcomes share a cause.

Coordination And Practical Protection - Questions 15, 17 And 18

I ask HHS to coordinate NIH research, FDA exposure and device expertise, and CDC/NIOSH surveillance and occupational work with NOAA, NASA, USGS, FAA and FCC. Publish an evidence map organized by exposure, dose, population and outcome, with transparent certainty judgments, conflicts of interest and updates. The goal should be reproducible answers and practical protection.

A parallel preparedness study should evaluate health consequences of power and communication failures, emergency-response delays, interrupted treatment and electrically dependent medical-device downtime. Compare affected and unaffected areas while accounting for concurrent weather and infrastructure vulnerability. Evaluate backup power, alternative communications and warning protocols. These pathways are distinct from direct biological effects of fields or radiation [11].

High-power transmitters, including HAARP, should be assessed with independent field measurements, operating records and applicable RF methods. HAARP is an HF ionospheric research facility; its operator describes a 180-antenna array capable of radiating 3.6 MW [20]. Transmitter power must be connected to actual exposure at relevant locations through measurements and models.

Natural-hazard claims also require source-specific evidence. USGS reports that a causal relationship between space weather and earthquakes has not been demonstrated [21]. I focus my request on documented space-weather hazards and testable biological questions, rather than attributing unrelated disasters to a shared cause.

My Closing Request

My work in space-weather forecasting, astrology, consciousness education and exploration of non-human intelligence motivates my interest in the wider cosmic environment. Here, I ask HHS to translate that concern into specific scientific work: measure natural conditions and wireless RF together, investigate meaningful health and ecological outcomes, test combined exposures and improve preparedness for established hazards.

I want the federal response to connect environmental observations to actual exposure and outcomes, while making its methods and findings understandable to the public. Including space weather in a coordinated research agenda would help identify which conditions require action and where better evidence is needed. Thank you for considering my submission.

Sarah Starr

References And Source Links

Sources checked October 16, 2026. Bracketed numbers identify the sources supporting factual statements; proposed studies and federal actions are my recommendations.

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