Results for the December 12-13, 2025 Meteor Scatter QSO Party

Perseid Shower above Inyo National Forest in Bishop, California, in 2024
Image by NASA/Preston Dyches

This paper summarizes the ham radio activity recorded during the second running of the HamSCI Meteor Scatter QSO Party (MSQP), held during the peak of the December 2025 Geminid meteor shower. Hams, through reception reports, two-way QSOs, and WAV file recordings, were prolific data generators during the MSQP. The open-source data from this event will be used by the HamSCI community (and beyond) to further our understanding of 6 and 10 meter propagation, and, perhaps, to generate new insights into meteoric behavior.

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AI generated image

MSQP Science Objectives

Generate research-worthy data resulting from 6 and 10 meter meteor scatter operation. The data will be used by the research community in an attempt to answer science questions, such as:

1. What factors influence meteor scatter propagation?
    - What are the similarities and differences between HF and VHF meteor scatter propagation?
    - How does propagation change between between the Perseid and Geminid meteor showers due to their different speeds and radiant geometries?
    - How does propagation change between the various sporadic sources and minor showers with their different speeds and radiant geometries?
    - How does propagation change with radiant geometries, trail direction, meteoroid size, and speed?
2. What is the typical duration of useful meteor scatter propagation?
    - How does this duration vary with operating frequency, transmitter–receiver distance, and meteor velocity?
3. What is the minimum size of an amateur radio station needed to work meteor scatter operations?
    - What defines a 'successful' MS station? Power levels? Antenna type (directionality, gain, elevation, height, polarization)? System ERP (effective radiated power)?
    - Does the definition of a 'successful' station (judged by both the number of contacts and the contact distances) vary between HF and VHF bands? If so, what are the differences?
4. How can meteor scatter communication be distinguished from other propagation modes?
    - What percentage of reported meteor scatter QSOs are actually meteor scatter?
    - What percentage are due to other modes (e.g., tropospheric, F-layer, E-layer, auroral)?
5. How do optical and radar meteor observations compare with amateur radio observations?

The target communities included: Seasoned meteor scatter operators, meteor scatter 'rookies' (those who are new to the mode), researchers with an interest in radio wave propagation. Data sources will include participant's log files (ADIF format), 'spotting' databases, such as PSKReporter.info and operators' WAV files from MSK144 decodes.

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MSQP by the Numbers
December 12-13, 2025

Entrant's Log and Spotting Data

Total Entrants (from MSQP Entry Forms on hamsci.org)	55
Total Reported 2-way Contacts (from submitted ADIF files)	740
All Entrant's Rx Spots (data extracted from PSKReporter.info)	61,049
Entrants Submitting WAV Files (data submitted to zenodo.org)	16

Close examination of the PSKReporter data for the event period revealed that **1,197 stations** were receiving on 6 and 10 meter MSK144 during the 48 hour event period. Their **584,078 spots** are a most welcome contribution to the PSKReporter data set.

HamSCI truly appreciates everyone's contribution to meteor scatter research!

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MSQP by the Numbers
December 12-13, 2025

Entrants were asked to note their choice of operating mode. Receive-only stations ('monitors') used WSJT-X software to monitor the 6 and 10 meter bands, decoding 'pings', recording WAV files and uploading decodes to PSKReporter.

Transmit stations called and answered CQs, making two-way contacts ('QSOs') while performing the the same monitoring activities. After the event, Tx stations uploaded their ADIF (Amateur Data Interchange Format) logs to the HamSCI website.

Receive-Only vs Transmit/Receive*

Receive-Only	14	25%
Transmit-Receive	41	75%

*Out of 55 total entries

Two-Way Contacts (QSOs), Band by Band^

6 meter QSOs	185	25%
10 meter QSOs	555	75%

^Out of 740 total contacts

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MSQP by the Numbers
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Entrants were asked to note their experience level on their entry form. HamSCI is very pleased to report that the majority of the entrants self-reported that they were operating meteor scatter for the first time in their ham radio careers. The rookies successfully attempted something new in the name of citizen science!

Rookies vs Non-Rookies*

Rookies	26	47%
Non-Rookies	29	53%

*Out of 55 total entries, as self-reported by the participants

We hope all rookies enjoyed the experience and that they join the next events, in 2026, as meteor scatter veterans!

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MSQP by the Numbers
December 12-13, 2025

Entrants were asked to configure their WSJT-X software to 'Save Decodes Only' - saving WAV files of successfully decoded signals.

It is expected that these WAV recordings will greatly contribute to the scientific observations and findings.

WAV files were uploaded to a long-term, publicly accessible data repository, Zenodo.org. The procedure was somewhat cumbersome, but many persevered, ensuring that their data will be preserved for years, if not decades, to come.

Entrants Submitting WAV File Recordings*

Dec 12-13 Geminids MSQP	16	29%

*Out of 55 total entries

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Dec 2025 MSQP: Top Three Rx and Tx Spots

Receive-Only Entrants*	Grid	Rx Spot Count
Lee, W3LDB	FM19	5,868
Chris, AA6AT	CM87	2,717
David, WA5DJJ	DM62	1,420

Transmit and Receive Entrants^	Grid	Tx Spot Count
Pat, W6VJT	DM62	20,091
Juan Carlos, CO8TW	FL20	10,651
Tim, N4WLO	EM50	8,572

*Receive-Only Station Spots: Successful decode reports, uploaded to PSKReporter

^Transmitting Station Spots: Stations calling and answering CQs on 6 and 10 meters. Their transmissions were decoded by others who were listening and uploading to PSKReporter.

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Sampling of Photos/Videos From Entrants

Only one set images were received - from Ron K8DTJ:

Sampling of Soapbox Comments

AA6AT	Had a really great time participating for the first time in MSQP. Thanks for being my reason to setup MSK144 on the Pi/KX3 and zBitx. Looking forward to next time! 73 de AA6AT
AA8AA	more clarity on 10m science objectives. is it beneficial to report/ record 10m MSK144 contacts during conventional daytime propogation?
AB3GY	First time trying meteor scatter and MSK144
AE4JC	Thanks for putting on the event. Learned a lot. Hope to do it again and/or participate in other future HamSCI activities. 73!
AI4LL	Great Experiment. Would like to see if legal 12 meter band included.

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Sampling of Soapbox Comments

CO8TW	It was my first time in the contest and my first QSOs on MSK144. I enjoyed it very much.
K1HTV	After making my first meteor scatter QSOs back in 1965, I was hooked! Over the past 6 decades I've made thousands of contacts via ionized meteor trails. This year's MSQP resulted in adding dozens more M/S QSOs to the K1HTV log. With the ARRL10 Meter contest also on the same weekend as the MSQP, I wasn't able to put in a full effort, chasing meteors. But when I did, there were plenty of meteors to bounce signals off. At times there was F2 skip which resulted in MSK144 QSOs with France, Cuba and a number of western States, well beyond normal meteor range. I hope that Hamsci will sponsor another MSQP in 2026. 73, Rich - K1HTV
K4WLO	N4WLO and K4WLO(me) have been running a 24/7 Meteor Scatter Propagation study on 50 mhz for 5 years now. 10 meters added a couple of years ago and sometime about that time continuous wav file and ARGO screen captures started. We have a lot of data if you want it.
K5WO	While I did notice some short pings while operating I think most or all of my contacts were made via other types of propagation.
K7PDW	Uploaded WSJT wave files to ZENODO's to HamSCI's data repository. File name K7PDW MSQP WAV FILES.zip. The file has wav files for all 48 hours of MSQP. The MSQP is the second activity in which I've participated. I will definitely follow up when the results become available.
K8IJ	Great fun. More folks on, so you generated activity. Thanks and vy 73, Charlie
KA1DBE	Enjoyed the exercise. Looking forward to more. Very 73
KD8RV	10 meter MSK144 decodes were extremely filled with non meteor scatter communications.
KE2BTS	It was my first experience with meteor scatter and it was really fun! Thank you!
KF6HI	New to this QTH, so only had a dipole up. Had very limited time to operate. Only operated 28 MHZ. I operated on 50 Mhz a lot before moving here. Copied 20 calls, but only 1 completed QSO and one partial QSO.

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Sampling of Soapbox Comments

KK4BZ	Great fun. Thank for encouraging me to try a new mode.
KK7RZK	Thank you for the guide. I found this to be a wonderful learning experience.
KN4GDX	Looking forward to more experiments in 2026
KN4JN	I am amazed at the number of contacts I made with my inadequate antenna.
KO4JKO	Thank you for this event. I enjoyed learning.
KQ4SY	I was unable to spend a lot of time. The Days I did was to early in the am. Last August was eye opening. This is probably my 4th time seriously attempting MS. It was fun.
KR4EE	Thanks very fun. HF9D was the farthest station received.
N4WLO	Have a QSO party during non meteor shower time to compare data.
N6GP	Looks to me that the propagation morphed from MS to F2. Cuba to California definitely was not MS!
N7GHZ	Yes, for next Meteor Scatter events, please have those running power on a different frequency! I had at least 3 stations nearby, running QRO that just destroyed the entire 50.260 frequency for Receive. Separating us by 10 kHz should solve that. Thank you!
N7MHR	I tried in Oct but didn't get a single contact so I would define that as a practice session. This time I made 41 contacts but I think most were regular ionispheric skips since they were signals across the 15 second period. Hope my efforts helps further the research.
NA6MG/P	I picked a great location from which to participate in this event. It was in a desert location far from civilization, just me, jackrabbits, coyotes, night birds and bugs. My usual MSK144 location is not far from the center of metropolitan Los Angeles, high QRN and an ominous mountain range just a few miles from my QTH. This desert location was extremely low noise and I was amazed at all the traffic that was on the 6m band. I easily could copy both sides of numerous others QSOs. This was a great, fun event. Thanks for hosting this and I sure hope there will be more to follow. 73, Dan NA6MG

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Sampling of Soapbox Comments

NN4NT	Mostly non-meteor propagation modes.
NN4SA	Data from NN4SA NASA Marshall Space Flight Center club station by NN4NT. This includes some 2m data in addition to the requested 10m and 6m. TX operations on 12/14 only. Receive data for 12/13 - 12/16 will be on Zenodo.
W0DTM	Thank you! I look forward to participating more deeply with HamSCI.
W3OA	The FTdx5000 has two independent receivers so I was able two run two instances of WSJT-X, one driven by audio on 50.260 and one driven by audio from 28.145.
WA2QZP	Tried for 2way contacts on 6 meters but not much luck. Plus my time in front of radio was very limited. Switched to monitor only on 6 meters. Looked at 10 meters but signals were probably not from meteors. Uploaded decode files from WSJT.
WA4KFZ	Thank you for running this science experiment!
WA5DJJ	I was late getting setup for this and just grabbed stuff off the shelf and out of boxes and hooked it up. It was a miracle that it worked. I run one of the few all band QRSS/WSPR SUPER GRABBERS in the world. I home brewed my grabber using radio kits and Raspberry Pi's. It has been running for about 10 years. You can view the Super Grabber's output at: https://www.qsl.net/wa5djj/. It was great fun to try meteor scatter again. I had not done it for a decade or so. So thanks for the contest. It got me out of the easy chair and I set up to monitor.
WA9NBU	Copied good number of stations over the 48 hour period
WX2R	Saw a number of meteors on Saturday. Was a great learning experience.

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Dec 2025 MSQP: Receive-Only Spots

Callsign	RX Records in PSKR*	Bonus: WAV FIle Submission
W3LDB	5868	✓
AA6AT	2717	
WA5DJJ	1420	
WA2QZP	1293	✓
KD8RV	1093	✓
KE7KRF	701	
K7PDW	674	
WA9NBU	505	
WX2R	326	
N3UUS	286	✓
AF8A	215	✓
N6GP	36	✓
K4WLO	13	
W3OA		✓

*The Rx Records column indicates how many times these stations successfully 6 and 10 meter MSK144 decoded signals from other stations, and then uploaded the decodes to PSKReporter.

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Dec 2025 MSQP: Transmit QSOs and Spots

Callsign	Total QSOs^	10m QSOs	6m QSOs	TX Spots*	Bonus: ERP Calculation	Bonus: WAV FIle Submission
W6VJT	101	99	2	20091		
CO8TW	85	85	0	10651		✓
N4WLO	22	2	20	8572	Yes	✓
K1HTV	59	22	37	6934		
N7MHR	41	41	0	6541		
W0JW	59	29	30	5265		
K5WO	40	40	0	4428		
N8IK	5	0	5	4175		
KK4BZ	27	24	3	3552	Yes	
NA6MG/P	25	0	25	3540		✓
AE4JC	31	23	8	3204	Yes	✓
WG2Z	32	15	17	2875	Yes	✓
KD2UBX	12	12	0	2174		
K8IJ	8	0	8	1894		
N7GHZ	9	0	9	1584		
W5RRX	18	18	0	1545		
KK7RZK	11	11	0	1478		✓
WA4KFZ	9	5	4	1222	Yes	
KE2BTS	19	19	0	763		
KQ4SY	6	0	6	703		
KN4JN	14	14	0	683		

*The Tx Spots column indicates how many times each station's transmissions were successfully decoded by other stations (and then uploaded to PSKReporter)

Dec 2025 MSQP: Transmit QSOs and Spots

Callsign	Total QSOs^	10m QSOs	6m QSOs	TX Spots*	Bonus: ERP Calculation	Bonus: WAV FIle Submission
K8DTJ	1	0	1	657	Yes	
KD2WGB	4	4	0	546		
KO4JKO	9	9	0	431		
W0DTM	12	12	0	402	Yes	
KN4GDX	9	9	0	401		
AD8Y	9	9	0	400		
KC3RHQ	10	10	0	326		
KA1DBE	3	3	0	278		
AB3GY	8	8	0	205		✓
AI4LL	9	9	0	138		
AA8AA	7	7	0	126		✓
NN4NT	1	1	0	105		✓
AD7FC	0	0	0	97		
W8EDU	0	0	0	67		
KR4EE	2	2	0	32		
KF6HI	1	1	0	21		
W2STM	2	2	0	0		
AK6LW	10	6	4	0		
KF7ZN	4	0	4	0		
NN4SA	6	4	2	0		

^While some stations did not submit logs for actual QSOs, their participation still had value - they generated reception reports and, in some cases, WAV files for future analysis.

*The Tx Spots column indicates how many times each station's transmissions were successfully decoded by other stations (and then uploaded to PSKReporter)

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Credits

Ham Radio operating events like the inaugural MSQP don't happen without significant volunteer efforts. HamSCI would like to recognize (in no particular order):

Robert Suggs NN4NT: For sharing years of personal and professional meteor scatter experience

Nina Tormann KD3BJV: For creating WAV file collection and classification procedures

Kuldeep Pandey, Mary Lou West KC2NMC and Jay Weitzen AC1SN: For guidance and perspective from the science/research community

Bruce Crandall KN4GDX and Rich Zwirko K1HVT: For assistance with defining the event and for encouraging involvement throughout the meteor scatter community

Ed Efchak WX2R: HamSCI's Public Information Officer, and his 'all media' promotional efforts

McKenzie Denton KO4GLN: Originator of the MSQP concept, plus Social Media and School Club/Youth promoter

Philip Gladstone N1DQ: Designer/Developer/Maintainer of PSKReporter.info

Joe Taylor K1JT and the entire WSJT-X development team

Nathaniel Frissell W2NAF: HamSCI Founder (2016), HamSCI Lead, and all-around supporter of the MSQP

Further, we recognize the support of our many partners and collaborators:

Omissions or errors are the sole responsibility of the author - Gary Mikitin, AF8A

Questions or corrections to this document should be directed to hamsci@hamsci.org

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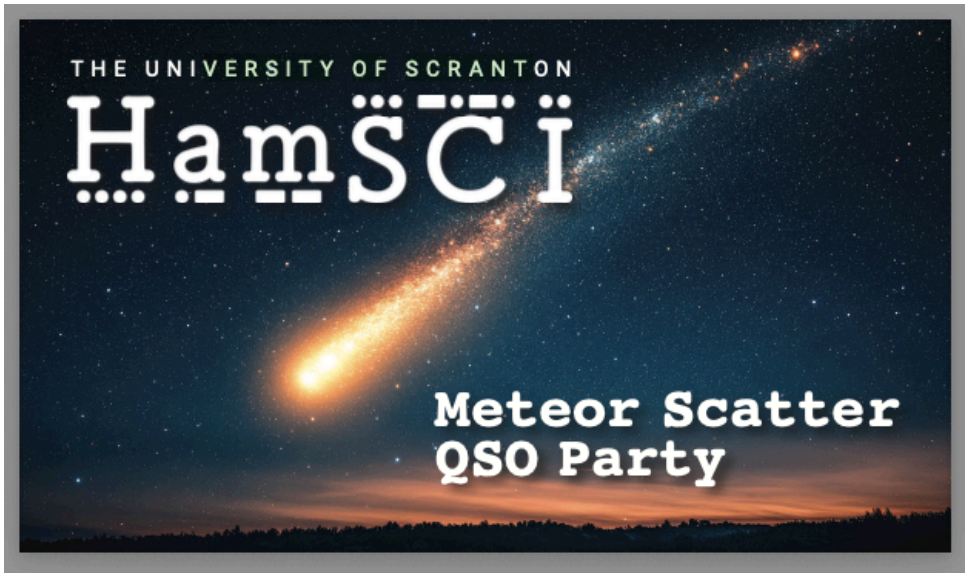
Join us for the 2026 Meteor Scatter QSO Parties



HamSCI's plans for the 2026 Meteor Scatter QSO party are under development (as of mid-April, 2026). Ideas under consideration:

Hold more events, such as during these showers:

- Daytime Arietids (June) (ZNH=49)
- Southern Delta Aquarius (July) (ZHR=20)
- Perseids (August) (ZHR=92)
- Geminids (December) (ZHR=90)

Where ZHR = Zenith Hourly Rate

- Create a Leaderboard - track who is making the most 6 and 10 meter QSOs throughout the year, with a final tally after the Geminid shower
- Increase the incentive for recording and uploading WAV files - because WAV files are the best data source for scientific analysis.

Please contact us via hamsci@hamsci.org with your suggestions.

Follow developments at hamsci.org/msqp