

Modeling Amateur Radio Soundings of the Ionospheric Response to the 2017 Great American Eclipse

Nathaniel A. Frissell, W2NAF¹

Joshua D. Katz, KD2JAO¹, Spencer W. Gunning, K2AEM¹, Joshua S. Vega, WB2JSV¹, Andrew J. Gerrard, KD2MCQ¹, Gregory D. Earle, W4GDE², Magda L. Moses, KM4EGE², Mary Lou West, KC2NMC³, J. D. Huba⁴, Philip J. Erickson, W1PJE⁵, Ethan S. Miller, K8GU⁶, Robert Gerzoff, WK2Y⁷, William Liles, NQ6Z⁷, H. Ward Silver, N0AX⁸, and the HamSCI Community

¹New Jersey Institute of Technology, K2MFF

²Virginia Tech

³Montclair State University

⁴Naval Research Laboratory

⁵MIT Haystack Observatory

⁶Johns Hopkins University Applied Physics Laboratory

⁷HamSCI Community

⁸American Radio Relay League

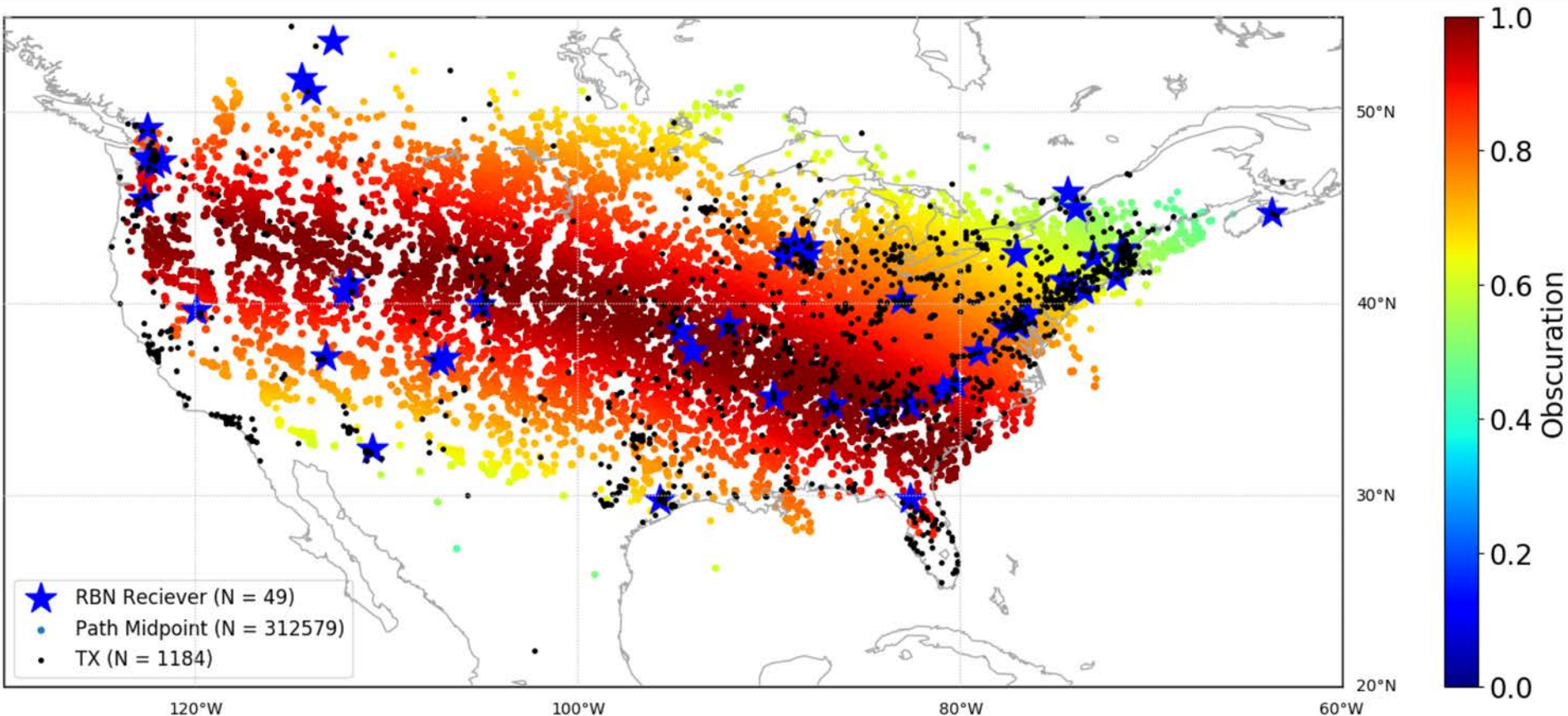
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SEQP RBN Observations



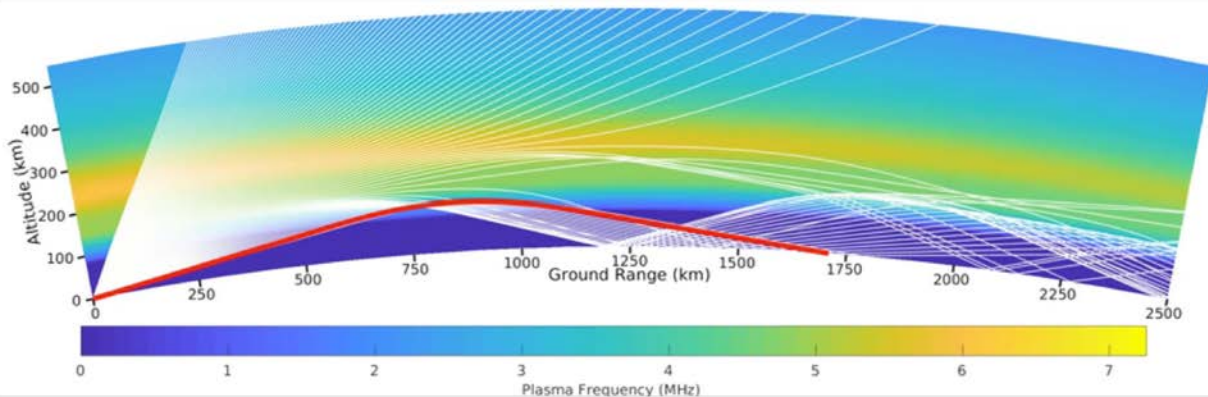
21 August 2017 1400 – 2200 UT
Ham Radio Bands 1.8 – 50 MHz

Amateur Radio and the HF Bands

Frequency	Wavelength
1.8 MHz	160 m
3.5 MHz	80 m
7 MHz	40 m
10 MHz	30 m
14 MHz	20 m
18 MHz	17 m
21 MHz	15 m
24 MHz	12 m
28 MHz	10 m
50 MHz	6 m



*K2MFF, The NJIT
Ham Radio
Station*



- Hobbyists routinely use HF-VHF transionospheric links.
- Often ~100 W into dipole antennas.

**1600 UT 21 Aug 2017 14.03 MHz - Eclipsed SAMI3
TX: AA2MF (Florida) RX: WE9V (Wisconsin)**

Solar Eclipse QSO Party (SEQP)

- August 21, 2017 from 1400 – 2200 UT
- **Contest-like**
 - 2 Points CW or Digital
 - 1 Point for Phone
 - Multiply Score by # of Grids
- **Exchange**
 - RST + 6 Character Grid Square
- **Data sources**
 - Reverse Beacon Network
 - PSKReporter
 - WSPRNet
 - Participant-submitted logs



<http://hamsci.org/seqp>

Ham Radio Eclipse Data

21 Aug 2017 1400 UT - 21 Aug 2017 1405 UT

QSO/Spot Midpoints; 300.0 km Obscuration Alt

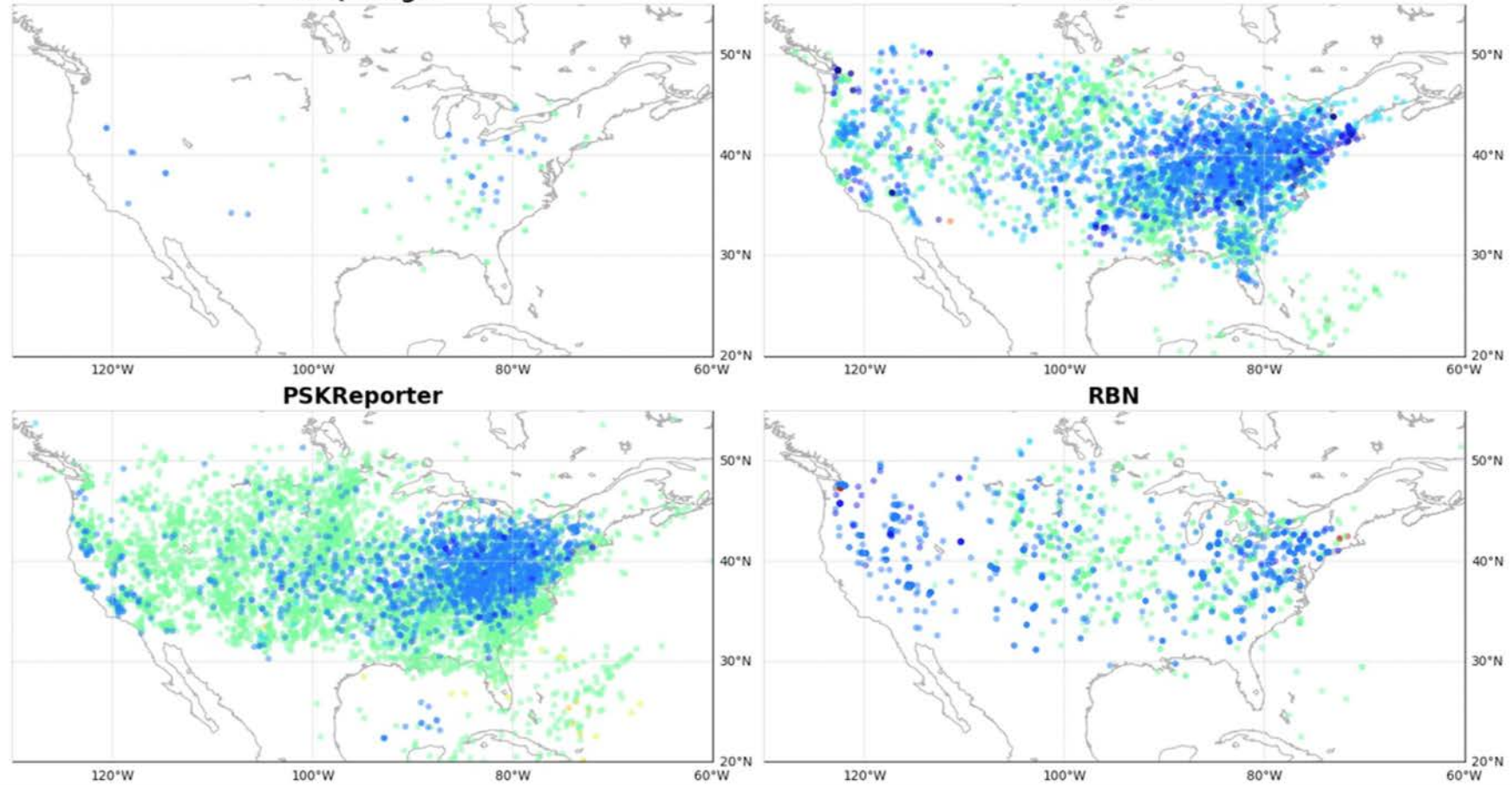
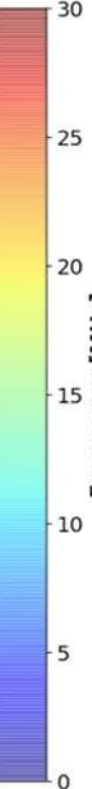
SEQP Logs

WSPR

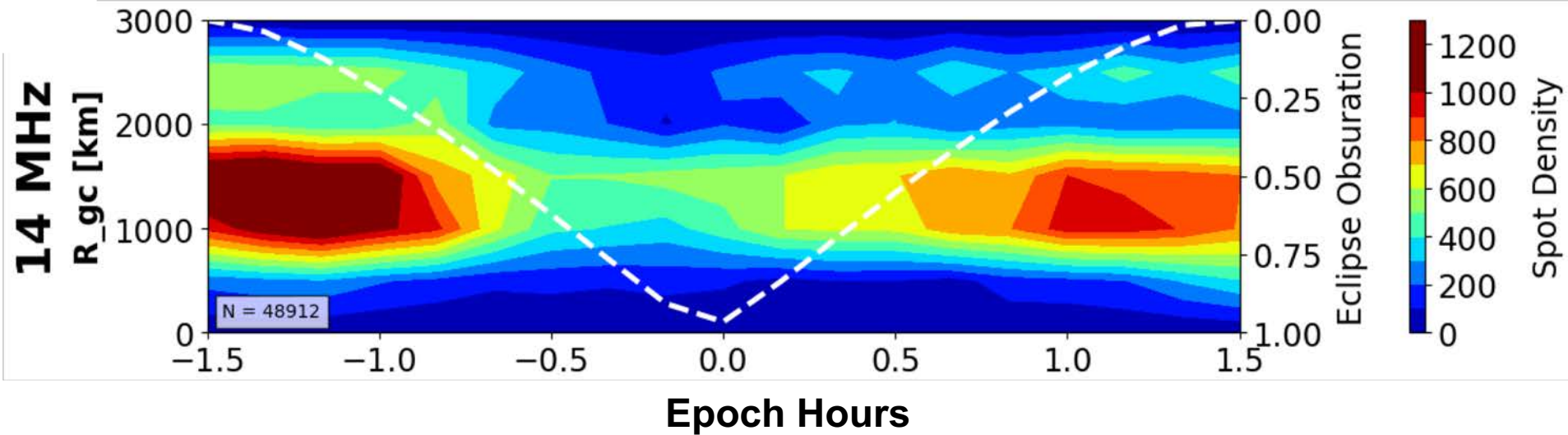
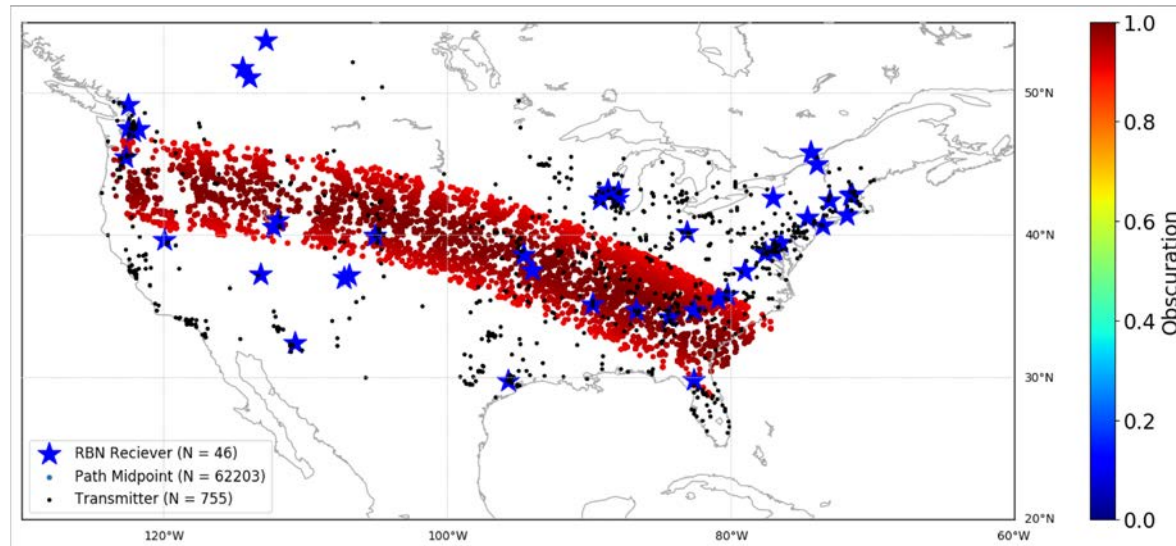
PSKReporter

RBN

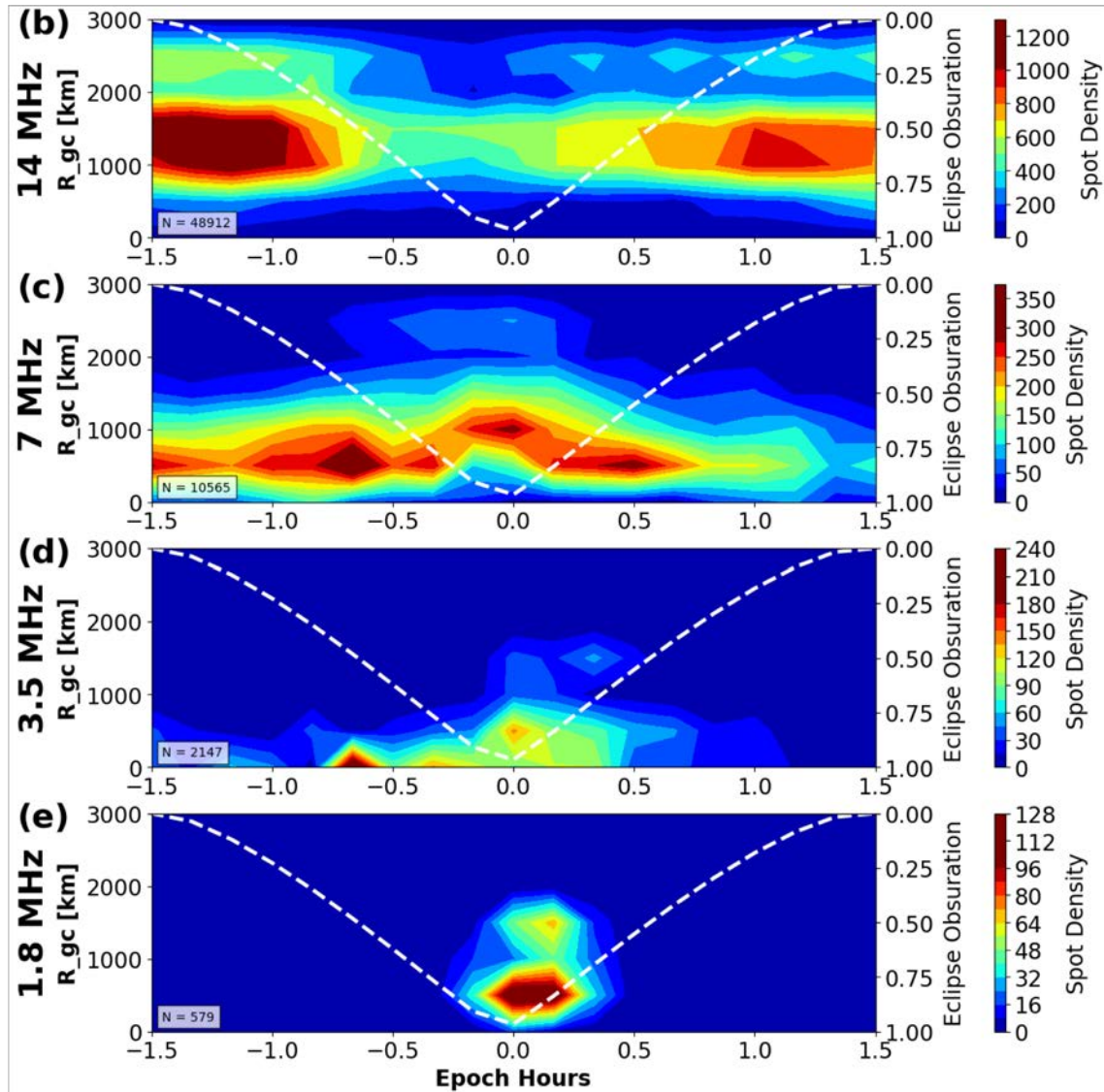
Frequency [MHz]



14 MHz SEQP RBN ($O_{300} \geq 0.9$)



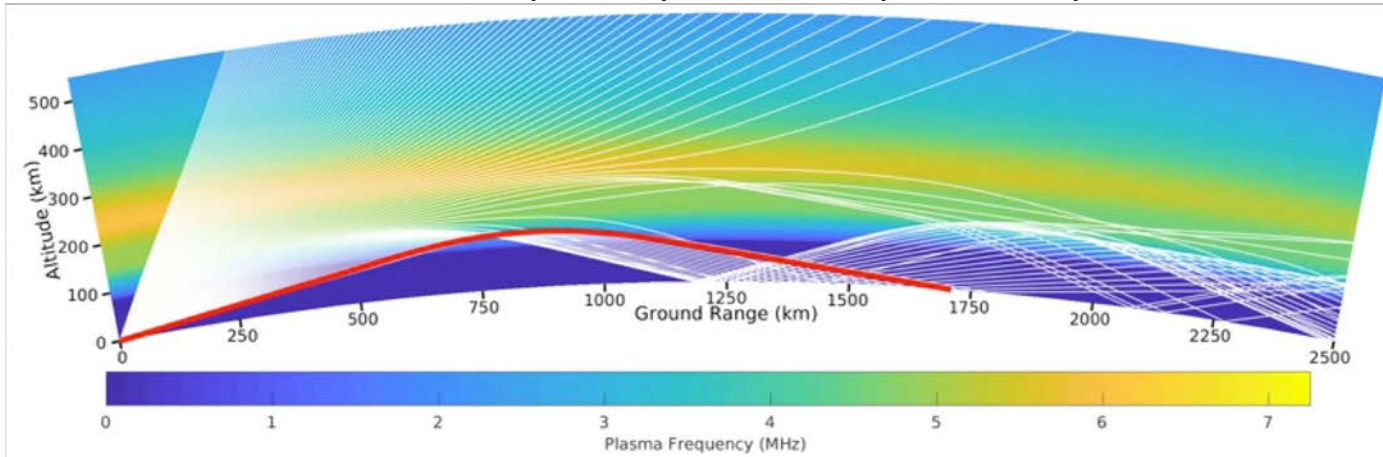
SEQP RBN ($O_{300} \geq 0.9$)



SAMI3-PHaRLAP Raytrace

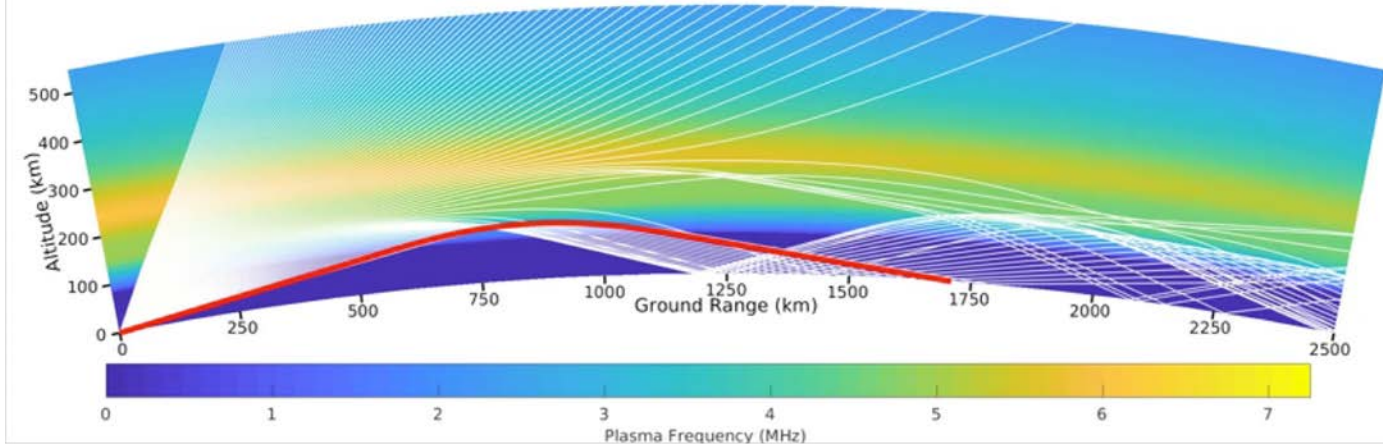
1600 – 2200 UT 14.03 MHz
TX: AA2MF (Florida) RX: WE9V (Wisconsin)

Non-Eclipsed

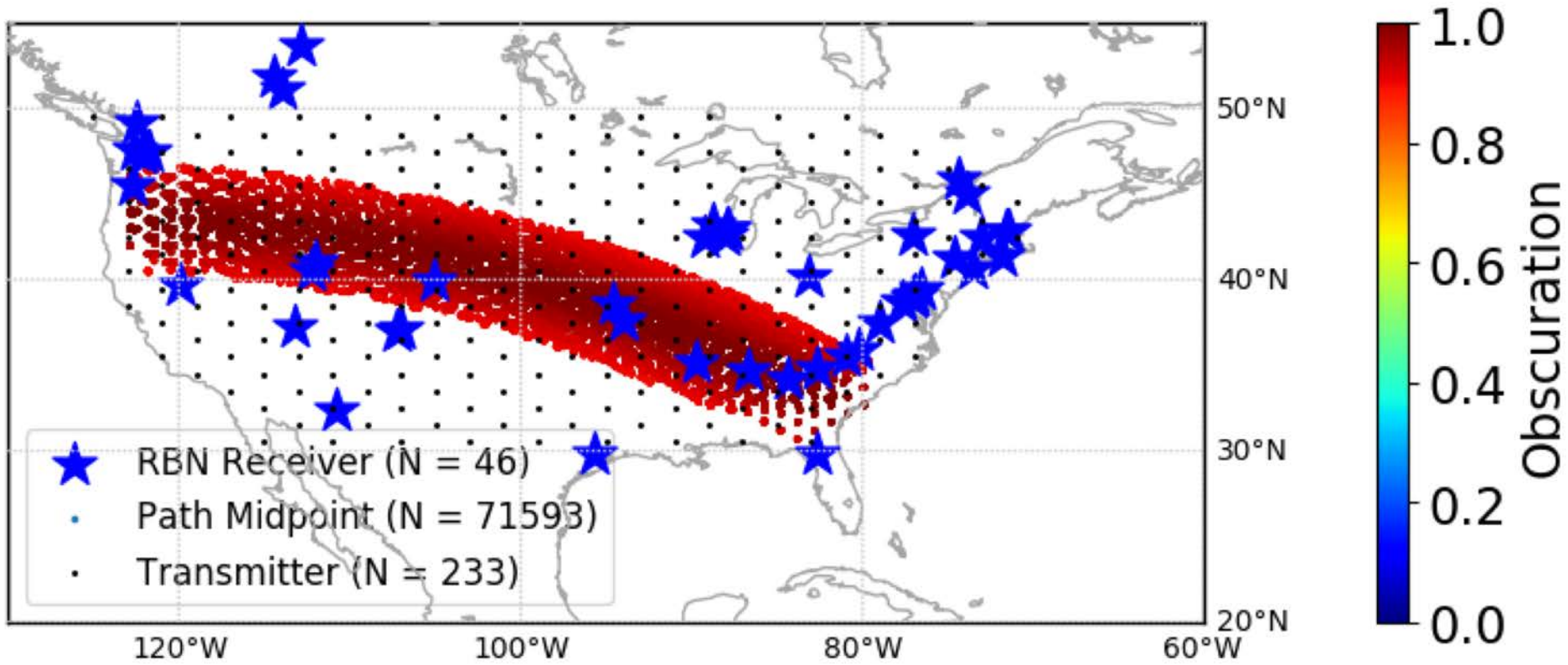


Eclipse 2017-08-21 16:00:00
TX: AA2MF Rx: WE9V 14.03 MHz

Eclipsed

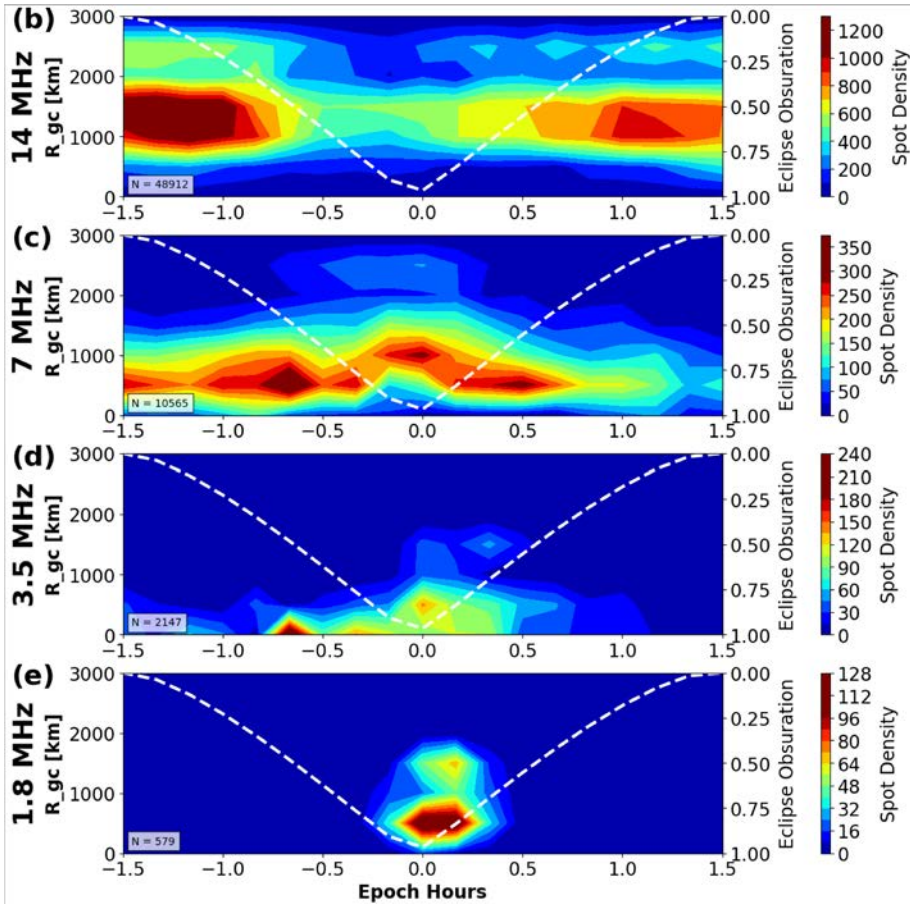


PHaRLAP-SAMI3 Raytracing

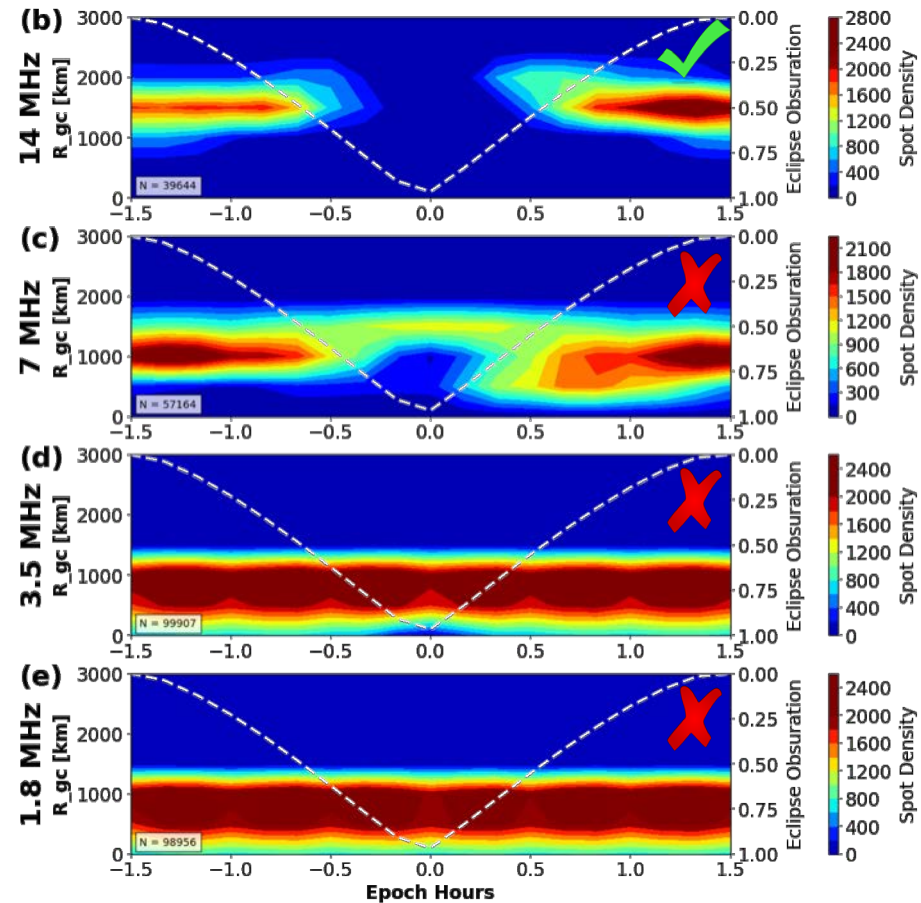


SAMI3 < 125 km alt

RBN Observations

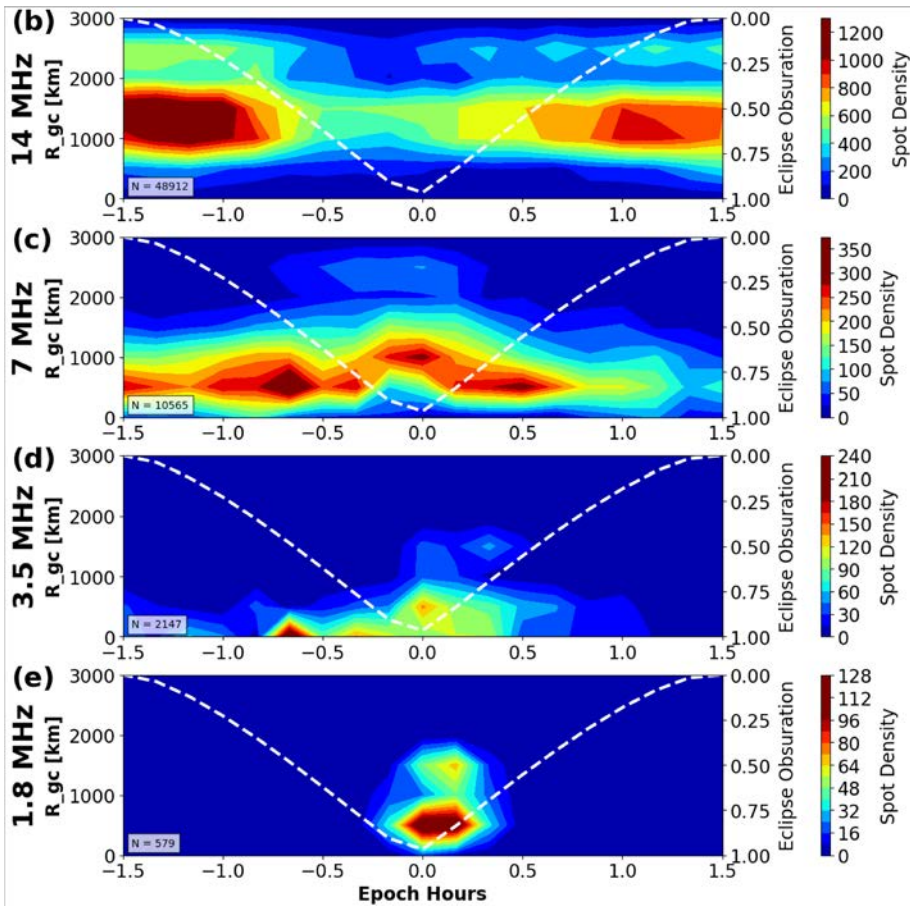


SAMI3 < 125 km Altitude

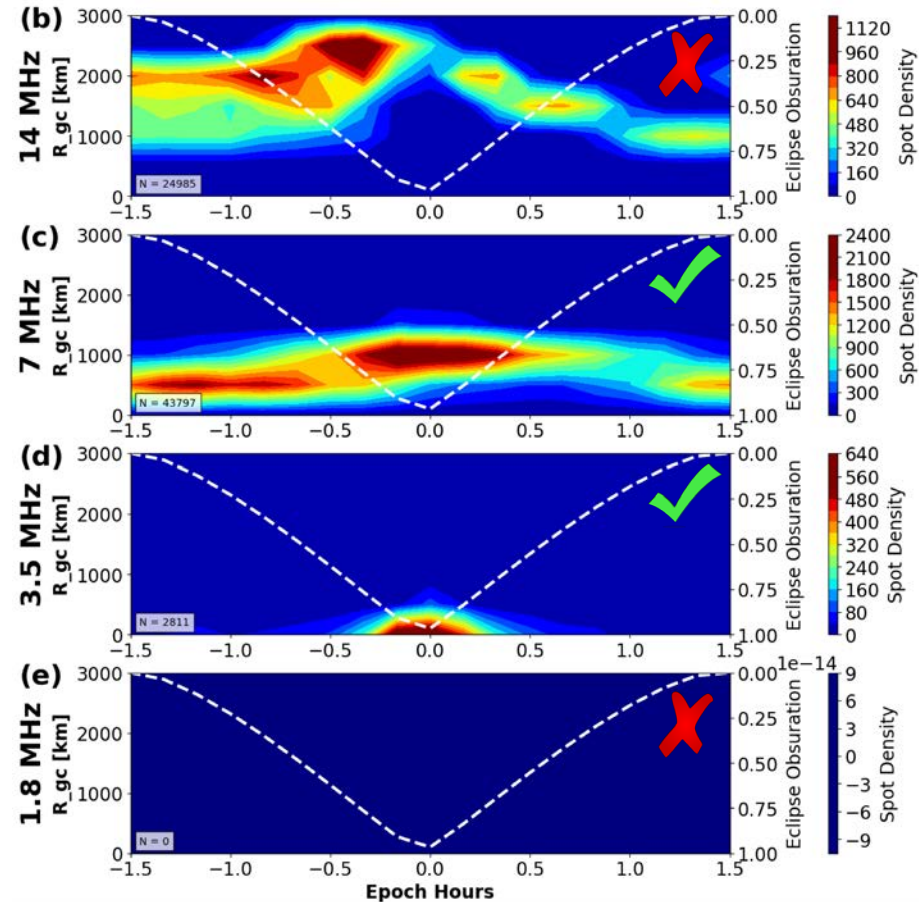


SAMI3 ≥ 125 km alt

RBN Observations



SAMI3 ≥ 125 km Altitude



Conclusions

- SEQP generated over 2.5 million link soundings.
- Eclipse effects are observed:
 - ± 0.3 hr on 1.8 MHz
 - ± 0.75 hr on 3.5 and 7 MHz
 - ± 1 hr on 14 MHz
- Raytracing suggests:
 - 14 MHz signals refracted at $h < 125$ km
 - 1.8 - 7 MHz refracted at $h \geq 125$ km altitude

Thank you!
