

## Sample of HF Meteor Trail Reflections Observed at Anchorage, Alaska USA

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This brief article shows some samples of meteor trail reflections (echoes) observed at the beginning and end of 2020; see figures 1 and 2, respectively. The reflections involve the time-frequency stations WWV or WWVH on 15 MHz and WWV on 25 MHz. Both stations are about 4000 km from Anchorage (figure 3). The samples show both short- and long-duration echoes. The short-duration echoes likely correspond to underdense meteor trails and the long-duration echoes to overdense meteor trails.

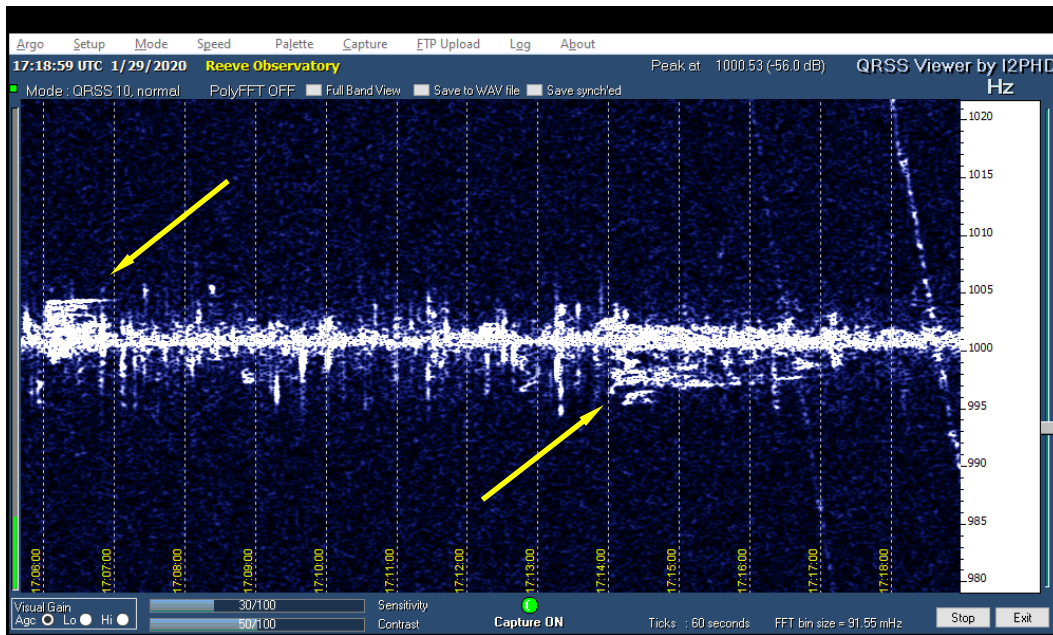


Figure 1 ~ 12-minute Argosoft record from 29 January 2020 ending at 1719 UTC. Meteors probably are from the Quadrantids. The many blips and ticks are short-duration meteor trail reflections at 15 MHz. Two long-duration echoes are indicated by yellow arrows. The left-most echo lasted 1 min and the other 6 min. Both long-duration echoes are striated. A spurious signal slowly drifted through the narrow spectrum at 1718.

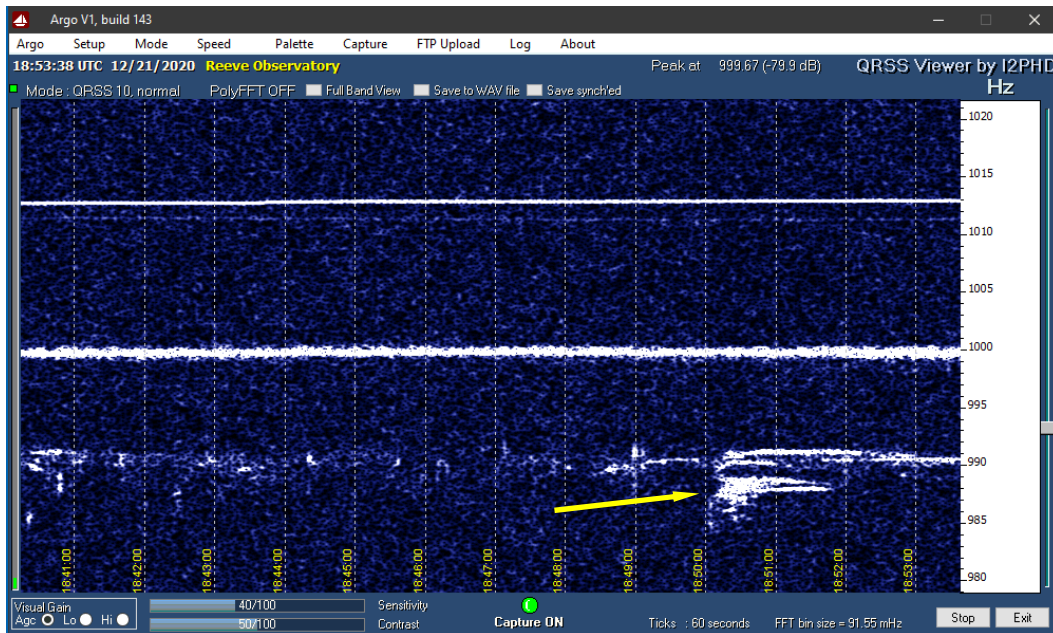


Figure 2 ~ 12-minute Argosoft record from 21 December 2020 ending at 1853 UTC. The meteors probably are from the Geminids. The top trace is spurious, the middle trace is 15 MHz (either WWV or WWVH) and the bottom trace is WWV on 25 MHz. The yellow arrow points to a long-duration echo that has several striations. Some short-duration echoes also are visible.

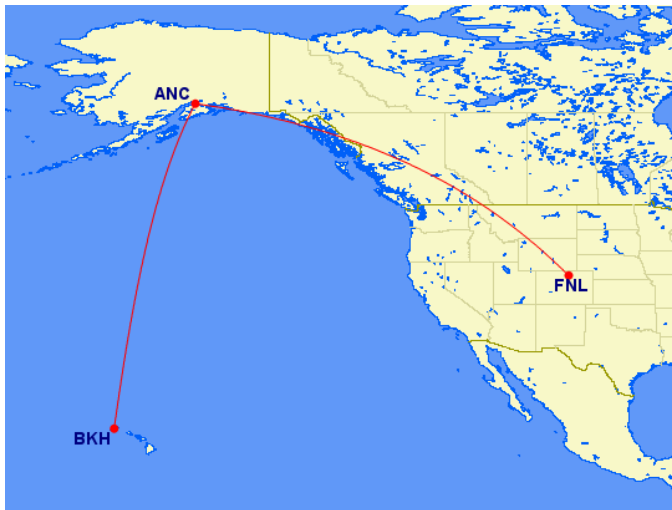


Figure 3 ~ Great circle paths shown in red between WWV near Fort Collins, Colorado (FNL) and Anchorage (ANC) and between WWVH near Kekaha on Kauai, Hawaii (BKH) and Anchorage. The WWVH path is 4414 km and almost entirely over water and encounters different propagation conditions than the WWV path, which is 3801 km and entirely over land. The paths are long enough to require multi-hop propagation. Anchorage is at the southern edge of the auroral oval, which introduces additional complicating factors in propagation toward Anchorage. Image from {GCMaP}.

The echoes at 15 MHz were observed with an Icom R-75 general coverage receiver tuned to 15 001 000 Hz and set to LSB mode, thus producing a 1000 Hz beat note that is processed by the Argo software. The echo at 25 MHz was observed with an Icom R-8600 general coverage receiver tuned to 25 000 990 Hz and set to LSB mode, thus producing a 990 Hz beat note that is processed by Argo. The AGC was turned off in both receivers. Both receivers were connected to the same antenna, an 8-element log periodic dipole array, through a multicoupler. A block diagram shows the general setup (figure 4).

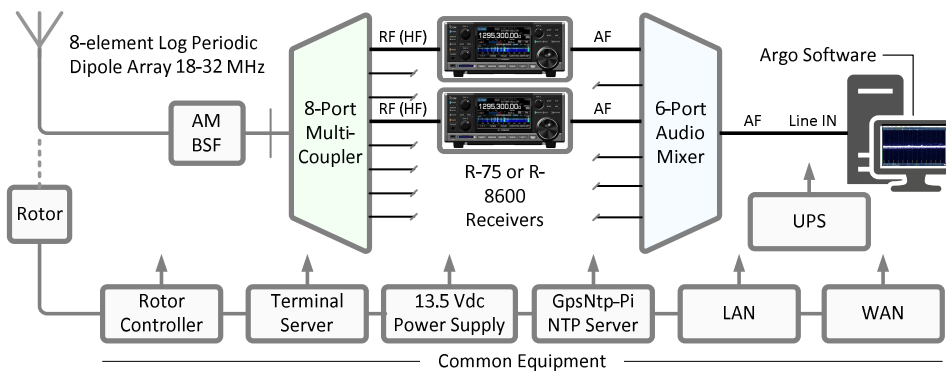


Figure 4 ~ Receiver and antenna system block diagram. PC timing is controlled by two GPS receiver-based network time servers. Common equipment includes infrastructure shared with other observatory equipment. The antenna usually was rotated to point at WWV on a true azimuth of 107°. Image ©2020 W. Reeve

The Argo software is setup for QRSS10 mode with a spectrum image length of 720 s (12 min), thus producing 43 800 images each year. Argo is adjusted to display a frequency span of 1000 ±20 Hz, which encompasses the receiver settings mentioned above.

Near real-time Argo images may be found at the Reeve Meteor webpage at {Meteor}. The best time to observe meteor trail reflections at Anchorage is between about 1400 and 1900 UTC (0400 to 0900 local solar time).

#### Weblinks and references:

{Meteor} [http://www.reeve.com/Meteor/Meteor\\_simple.html](http://www.reeve.com/Meteor/Meteor_simple.html)

{GCMaP} <http://www.gcmapp.com/mapui?P=FNL-anc-bkh>