

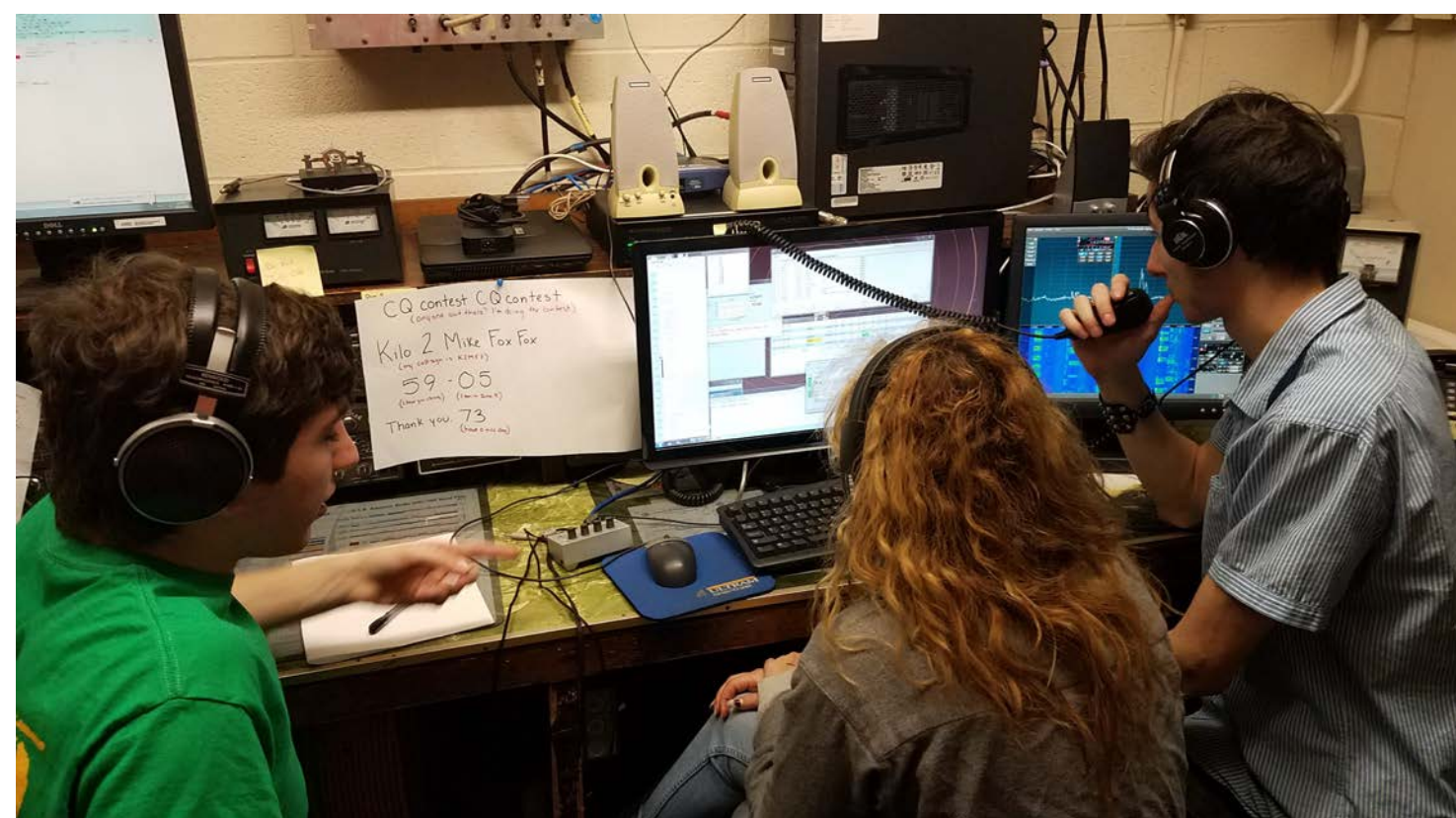
# HamSCI

## Ham Radio Science Citizen Investigation

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### Ham Radio

- **Ham Radio** is a hobby for radio enthusiasts, including communicators, builders, and experimenters.
- Ham radio operators are of all ages and all walks of life.
- There are over 730,000 US hams, and ~3 million globally.



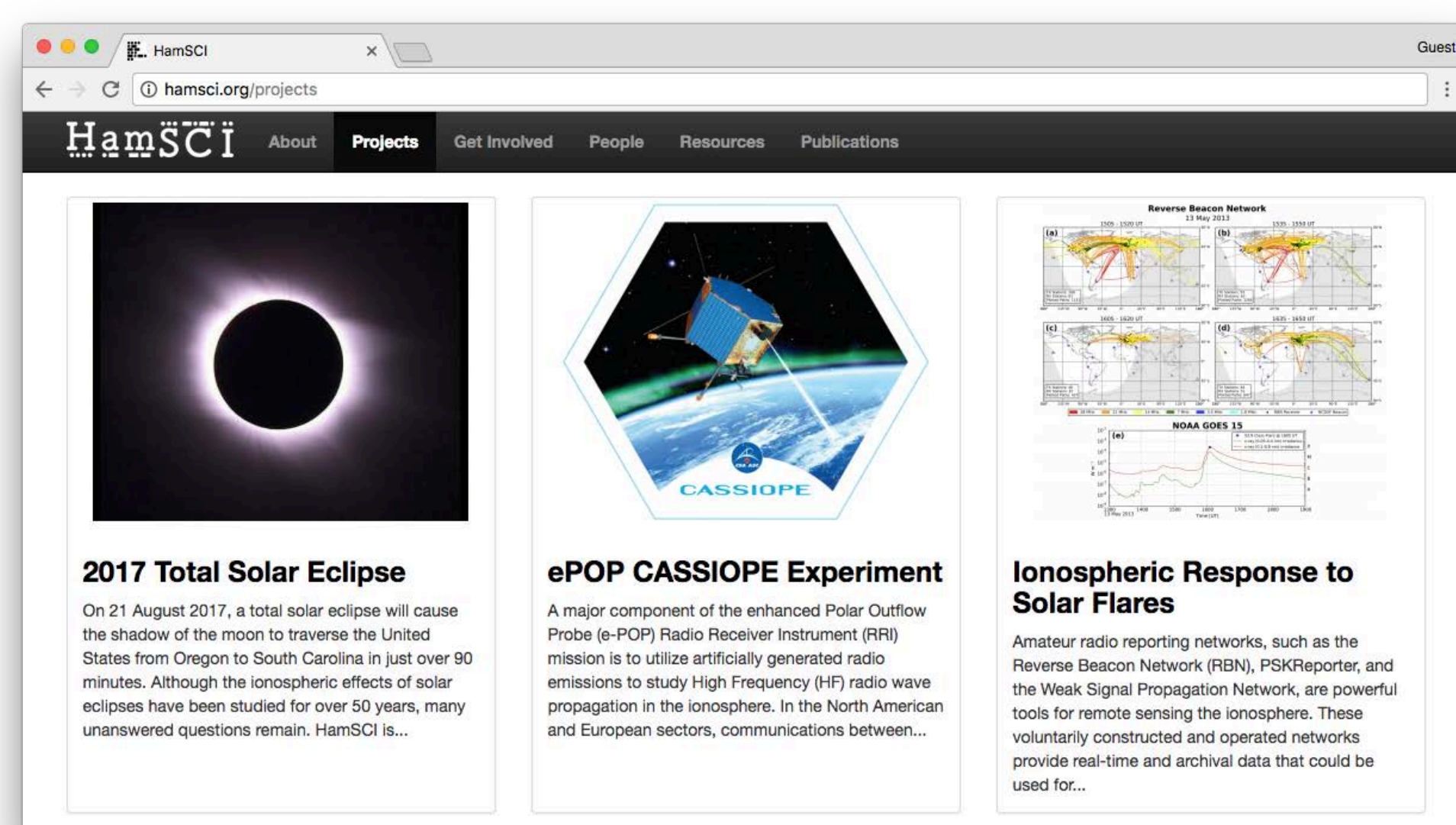
Student members of the NJIT Amateur Radio Club participating in a radio contest at NJIT club station K2MFF.

### HamSCI

The **Ham Radio Science Citizen Investigation (HamSCI)** is an organization that aims to connect professional researchers with the amateur radio community. It is an umbrella organization that includes multiple projects and institutions. HamSCI aims to foster collaborations and communications; not fund or manage projects.

HamSCI's goals are:

- Advance scientific research and understanding through amateur radio activities.
- Encourage the development of new technologies to support this research.
- Provide educational opportunities for the amateur community and the general public.

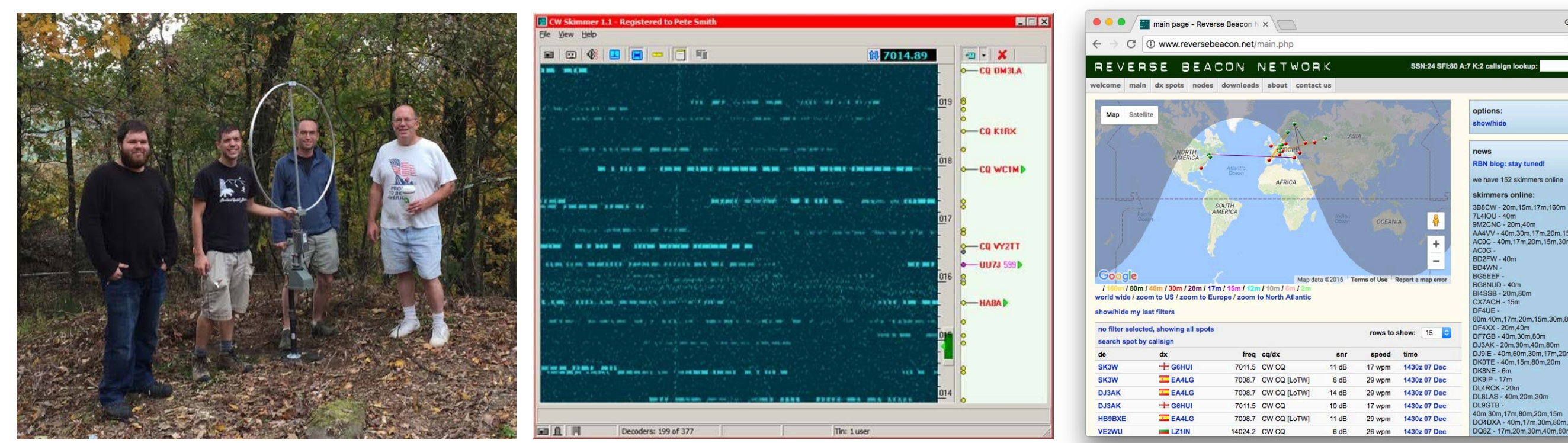


<http://www.hamsci.org/>

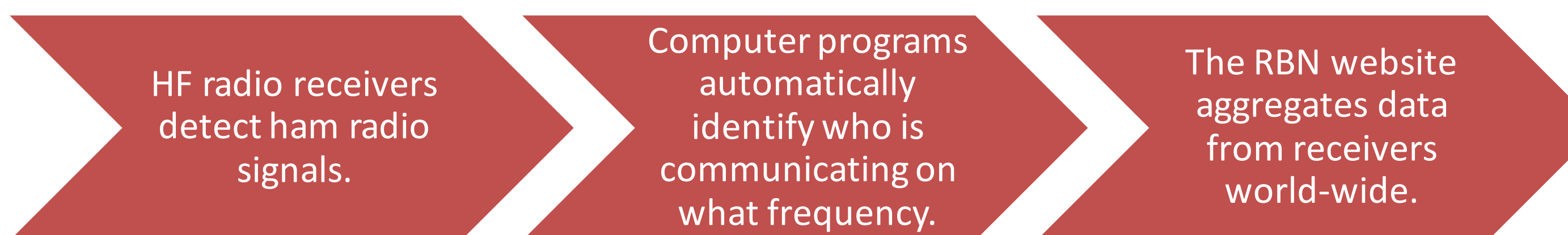
### Data and Methodology

The HamSCI organization supports a variety of projects and techniques. A major source of HamSCI data comes from the **Reverse Beacon Network (RBN)**.

The **Reverse Beacon Network** is an automated shortwave (1.8 – 144 MHz) receiving network created and maintained voluntarily by ham radio operators. Although its primary purpose is to help ham radio operators communicate, its data can also be used to remote sense the ionosphere.

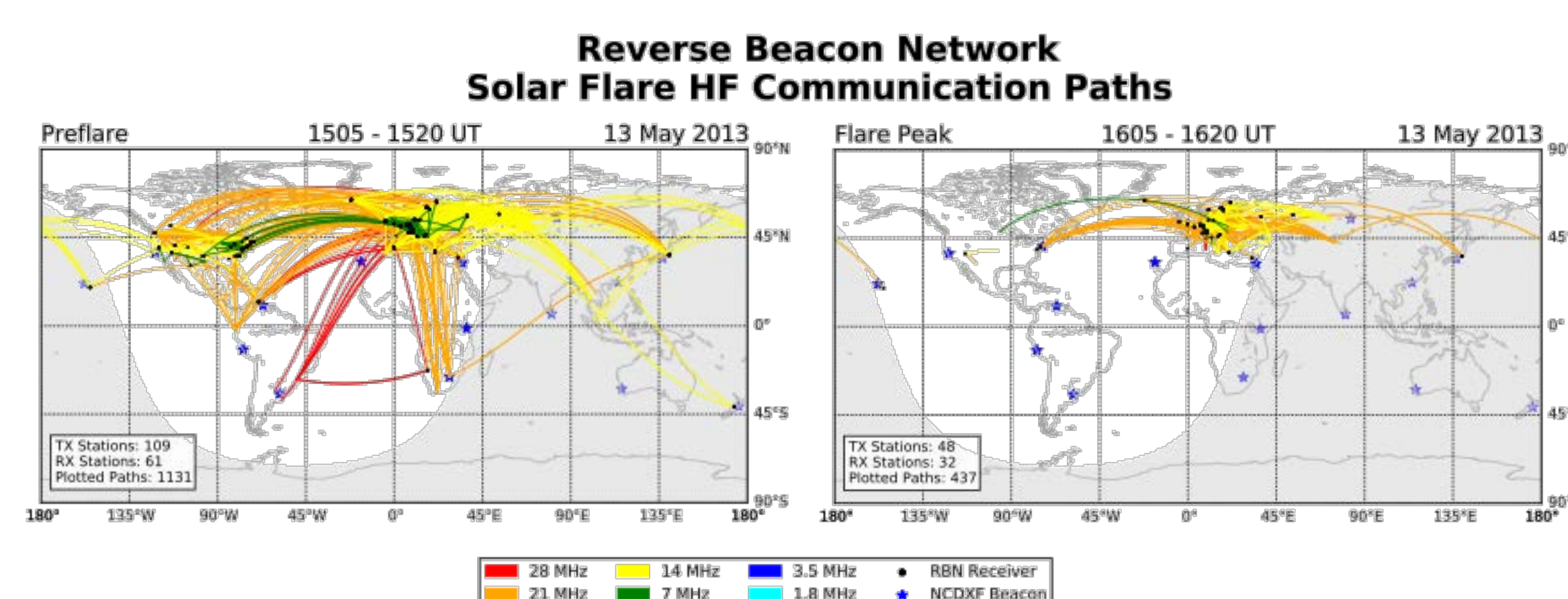
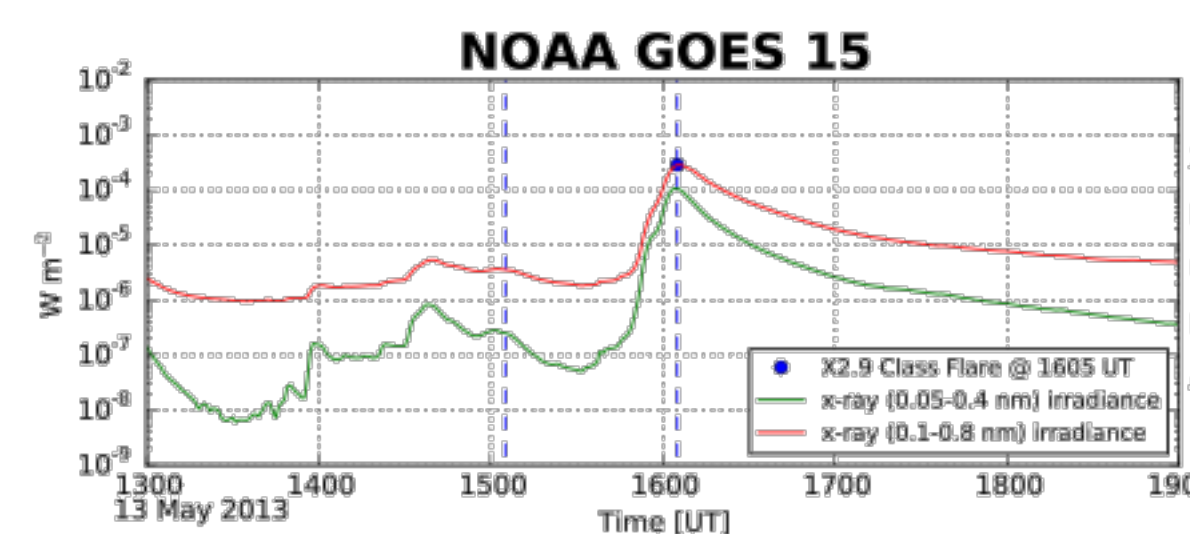


NJIT RBN Receive Antenna CW Skimmer Decode Program <http://www.reversebeacon.net/>



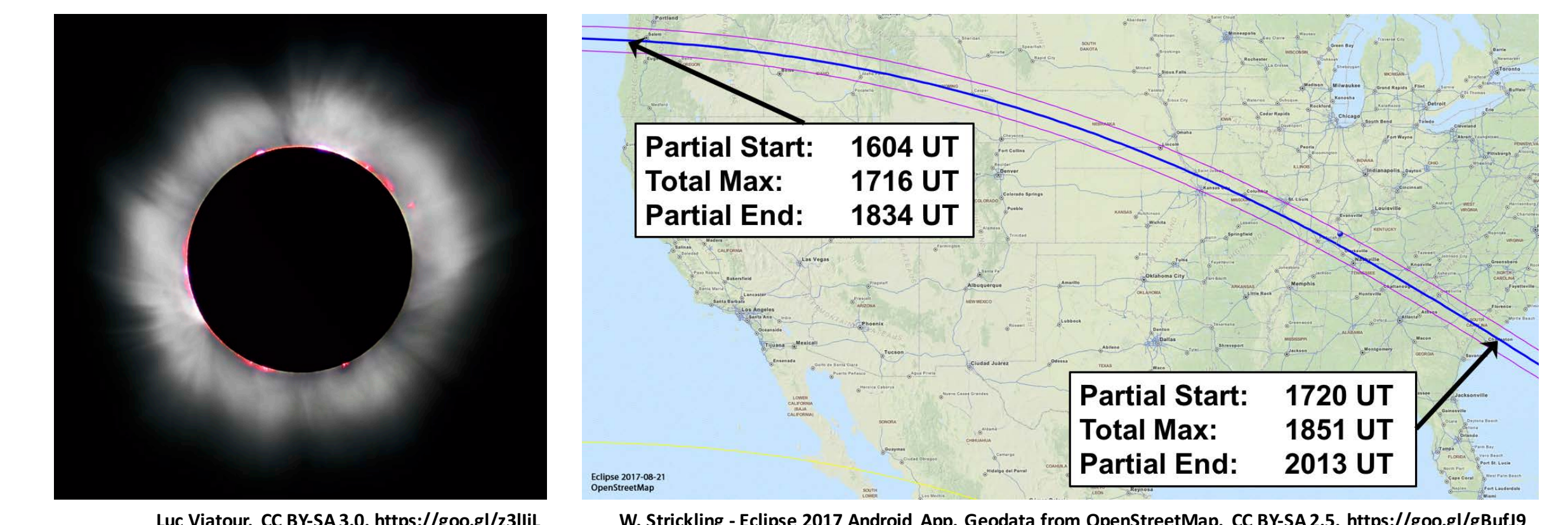
### Space Weather Effects

Frissell et al. [2014] first demonstrated the use of ham radio data as a space weather instrument by showing the effects of an X-class solar flare on HF communications.

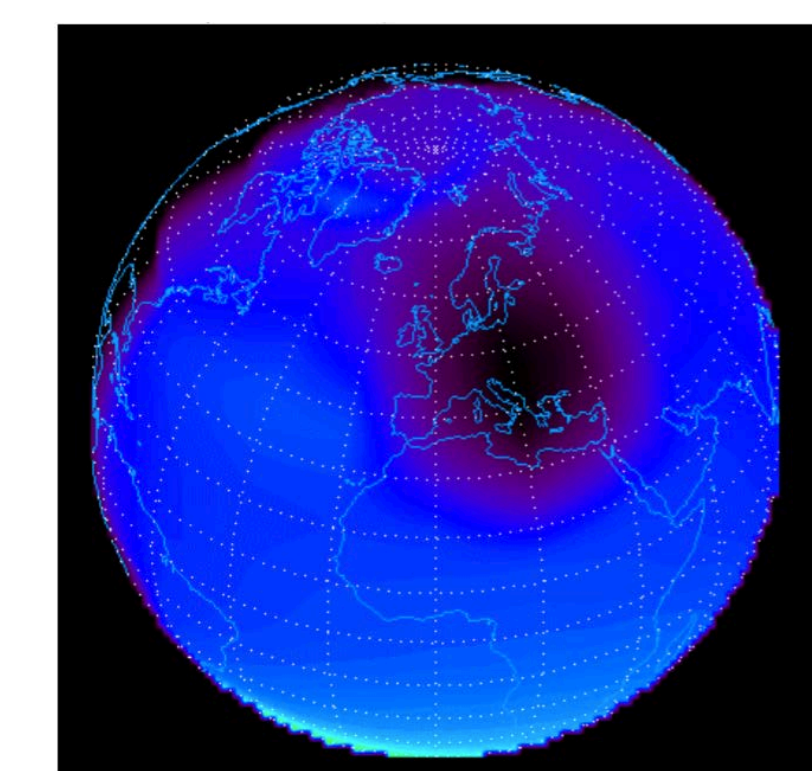
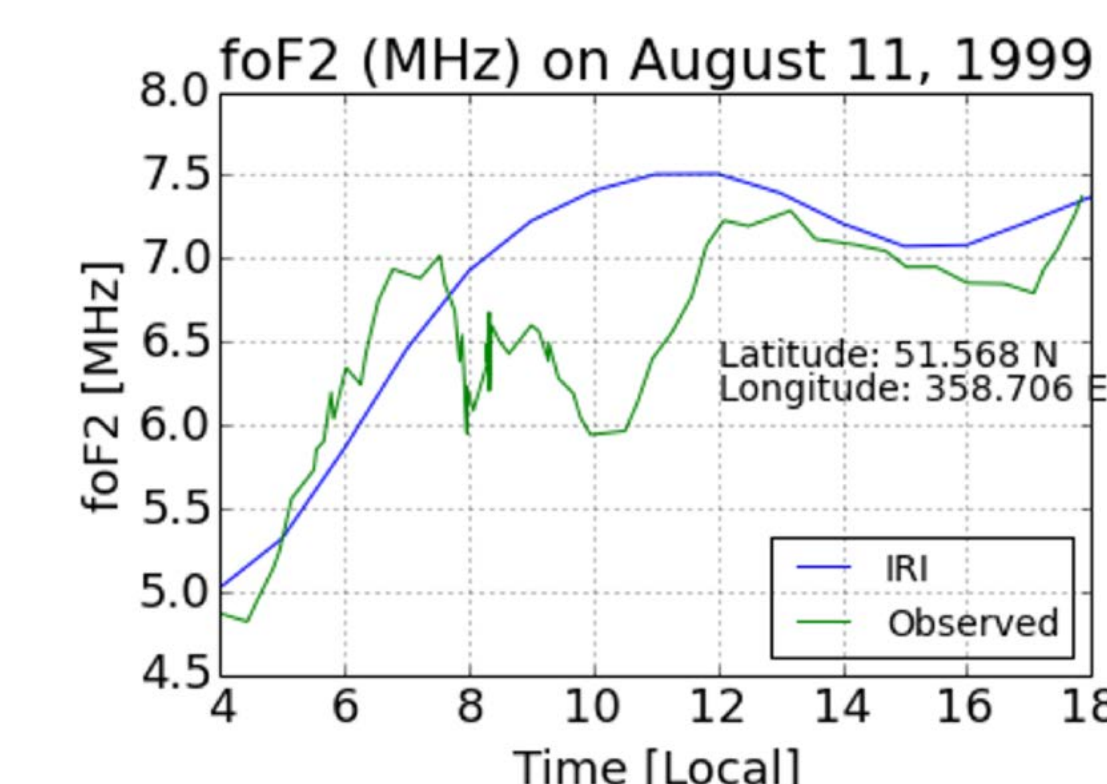


### The Great American Eclipse

A total solar eclipse will traverse the continental United States on 21 August 2017.



In addition to their stunning visual effects, solar eclipses are also known to impact the ionosphere.

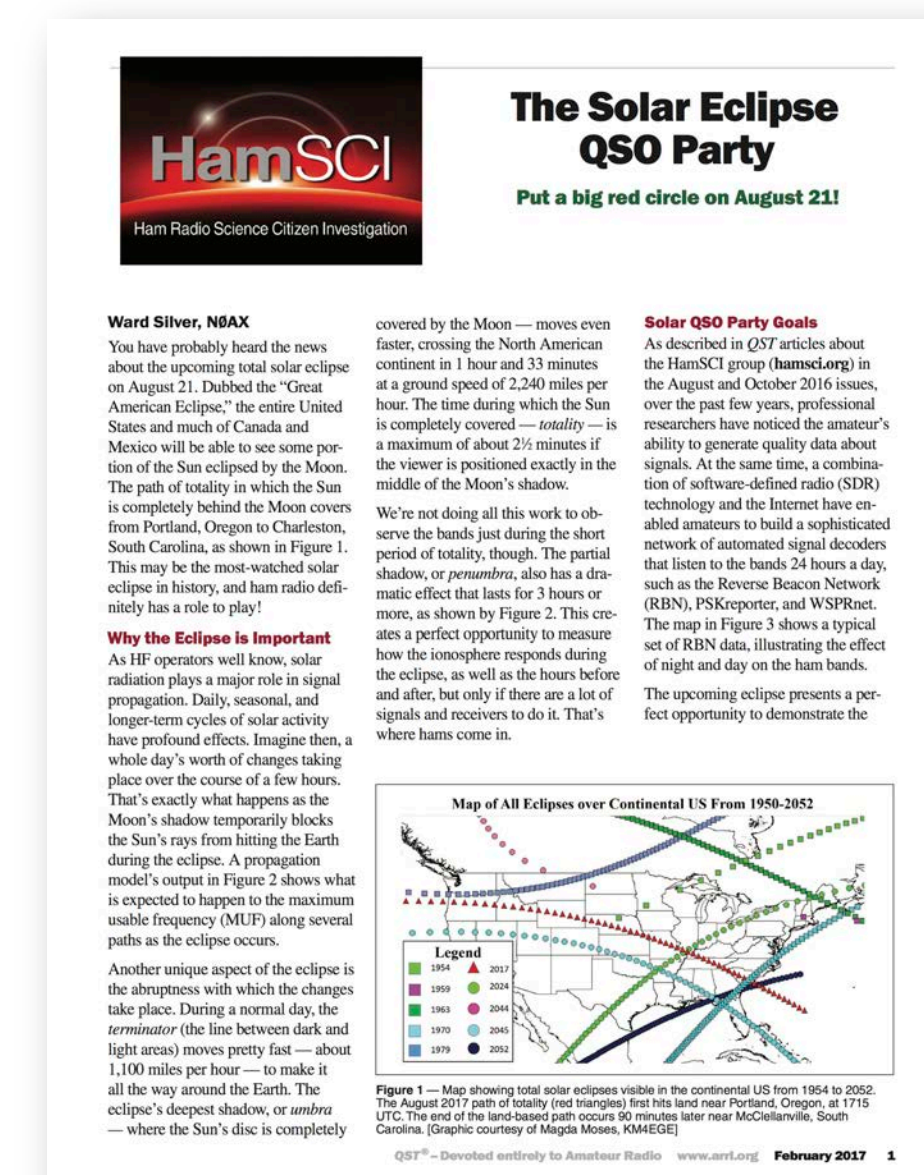


(Left) Ionosonde measurements show a decrease in the foF2 parameter during the 1999 U.K. eclipse compared to expected values from a non-eclipsed Intl. Reference Ionosphere (IRI).

(Right) Model electron density at ~280 km alt. during 1999 Eclipse [Bamford, 2000].

The spatial and temporal extent of these effects is not well understood. Ham radio data will help answer this.

To generate data, the American Radio Relay League (ARRL) and HamSCI are organizing and promoting a **Solar Eclipse QSO Party**. This is a contest-like operating event designed to get hams on the air during the eclipse.



### Summary

- Ham radio operators can contribute to space science.
- HamSCI joins researchers with the ham radio community.
- A large-scale ham radio event will take place during the 2017 eclipse to address ionospheric science questions.

### References

Bamford, R. (2000), Radio and the 1999 UK Total Solar Eclipse, Rutherford Appleton Laboratory, Chilton, Didcot, UK.  
 Frissell, N. A., E. S. Miller, S. R. Kaeppler, F. Ceglia, D. Pascoe, N. Sinanis, P. Smith, R. Williams, and A. Shovkoplyas (2014), Ionospheric Sounding Using Real-Time Amateur Radio Reporting Networks, Space Weather, 12, 651–656, doi:10.1002/2014SW001132.  
 Banner photo by Ann Marie Rogalcheck-Frissell.