

Where is the Most Efficient Location to Place a New Microwave Tower at Fairfield Osborn Preserve?

Chase Barloga, Audrey Cordisco, and Ryan Burns

Department of Science and Technology, Sonoma State University, Rohnert Park, CA 94928 E-Mail: barloga@sonoma.edu, cordisco@sonoma.edu, burnsry@sonoma.edu

Abstract

Fairfield Osborn Preserve would benefit greatly from the addition of a new microwave tower. A new tower would improve the efficiency of the preserve's wireless communications. The microwave tower must be located in an area that is not affected by interference from factors such as large foliage, metal, or plastic. In order to find an ideal location for the new microwave tower, we will go to five predetermined sites at different parts of the Fairfield Osborn Preserve and test the efficiency of the microwave signal. The five sites are the summit, the clearing, Kelly Pond, the marsh, and one more at the bottom of the summit. We will also record elevation, canopy cover, and degree of view at each of the five sites. We expect to find at least one site that is ideal for the new microwave tower which we predict will be the summit. This new microwave tower will help the researchers at FOP send communications throughout the preserve faster.

Methods and Materials

- Our research was conducted at the Fairfield Osborn Preserve.
- We went to five different predetermined sites to test microwave signal efficiency, canopy cover, elevation, and degree of view (portion of 360° view that is not obstructed).
- We then analyzed our data and decided which site dealt with the least amount of interference.

In order to collect our data we used...

- Densiometer
- Compass
- Map of Fairfield Osborn Preserve
- Microwave Transmitter
- Microwave Receiver

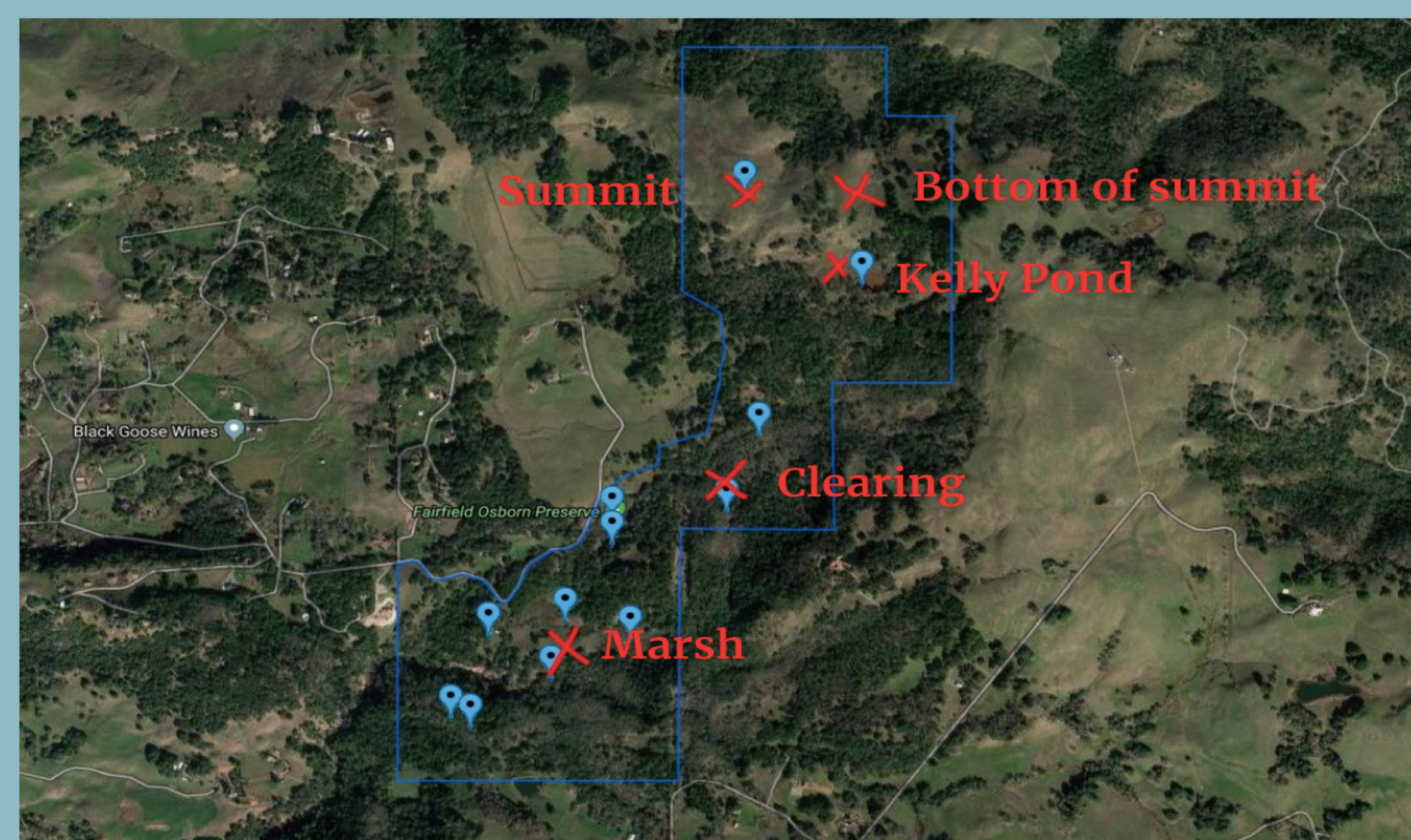
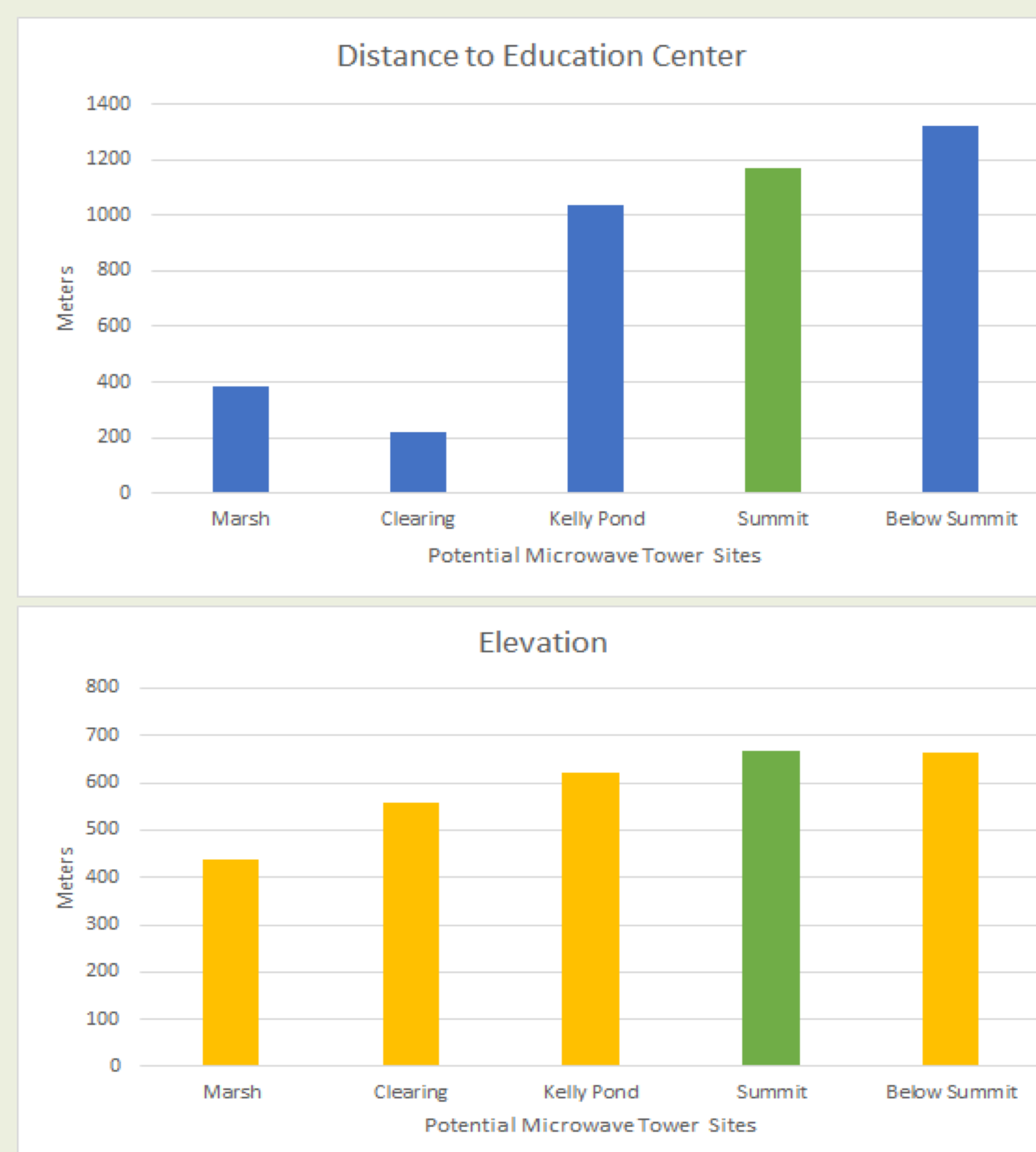


Figure 1: Map of Fairfield Osborn Preserve and all of the sites where we recorded data

Acknowledgements

We would like to thank Dr. Shott, Dr. Rank, and Dr. Halle for their assistance on our research project.

Data



Legend: Green(Signal), Blue & Orange(No Signal)

Figure 2: Arriving at Kelly Pond



Figure 3: Recording Data at the Summit

Discussion

We were only able to obtain one measurement of the microwave transmissions. This measurement was taken at the summit, which shows that it has sufficient signal. This conveys that we failed to disprove our hypothesis. The summit also has 100% field of view, and the highest elevation of the five sites which is 667.38 meters. Most of the sites have 0% canopy coverage, except the marsh.

References

- "Radio Waves & Microwaves." Tectonic Plates I Revision World, revisionworld.com/gcse-revision/physics/electromagnetic-radiation/radio-waves-microwaves.
- Vougioukas, S., Anastassiou, H., Regen, C., & Zude, M. (2013). Influence of foliage on radio path losses (PLs) for wireless sensor network (WSN) planning in orchards. *Biosystems Engineering*, 114(4), 454-465. doi:10.1016/j.biosystemseng.2012.08.011
- Huang, Zhang, Ni, Chai, Qin, Liu, 2018. "Extending Rapid Model to Simulate Forest Microwave Backscattering": Remote Sensing of Environment. <https://doi.org/10.1016/j.rse.2018.08.011>