

# Using multispectral imagery to estimate tornado-induced tree fall patterns identified via UAS Morgan Grayston, Daniel Burow

## **Background:**

- Analyzing tree fall patterns can be an informative way to estimate tornado wind intensity and dynamics
- Imagery obtained from UASs can be used to identify where trees fell, but this requires having resources for UAS flight
- High resolution satellite imagery is a possible alternative to identify tornado-induced tree falls without UASs
- EF-3 tornado hit Jacksonville, AL on 18 March 2018

### **Motivation:**

Determine how tree fall frequency and location can be estimated with satellite imagery by using UAS imagery as a reference

#### Method:

- Tree fall data obtained from colleagues at Jacksonville State University ullet(AL) who identified and delineated tree fall locations from UAS imagery
- Multispectral (RGBN) imagery obtained from Planet, 3-m resolution (approximate size of small/medium tree canopy)
- 08 May 2017, 15 March 2018, 22 March 2018, 08 May 2018
- Calculated Normalized Difference Vegetation Index (NDVI) and Enhanced Vegetation Index (EVI) for Planet imagery and differences between pairs of images: one before tornado and the other after
- Determine changes in NDVI and EVI at locations of 4871 tree fall locations (base) and 5023 control points located >4.24 m (one pixel) from tree fall locations

#### **Conclusions and next steps:**

- Tree fall locations and control points exhibit greatest differences in EVI and NDVI change post-green-up (May)
- EVI and NDVI change in March (immediately before/after tornado, pregreen-up) exhibits least variance WRT number of tree falls at a distance d from tornado path center
- In the future, we will test use of unsupervised classification algorithms to differentiate between tree fall locations and control points using NDVI and EVI





















