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## Unmanned Aerial Vehicle (UAV) for Monitoring Agricultural Activity

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**Abstract** Namık Kemal University Agricultural Faculty experiment area is where different crops are planting and monitoring in every year. This study includes an application for soil erosion in the experimental area of Namık Kemal University Agricultural Faculty by using UAV. The DJI Matrice 600 pro equipped with a multispectral camera was used for imaging. Plant losses due to soil erosion was tried to be determined by interpretation of multispectral images taken from 50 m elevation

For this purpose, high resolution sub-decimeter level resolution orthomosaic images were obtained in Agisoft Pro by using multispectral images taken in February 2018. The NDVI vegetation index were used to detect damaged parcels due to soil erosion in the field. It was evaluated that UAVs serve as a very useful tool for identifying production problems in agricultural areas

**Keywords** UAV, NDVI, Soil erosion, multispectral image

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### 1. Introduction

Thanks to the remote sensing technology, valuable information can be accessed by processing the collected data in a wide area with fast economic and high accuracy. Until this time, various platforms such as satellite, airplane and ground have been used for remote sensing due to their different advantages Nowadays, unmanned aerial vehicles are increasingly being used due to high resolution, low cost and minimal impact from weather conditions such as cloudiness. Unmanned aerial vehicles have a promising future in environmental ([1], [2], [3]) and agricultural studies ([4], [5]) like soil erosion detection due to their many technical and economic advantages [6].

Soil erosion is a driving factor for land degradation and therefore destruction of valuable crop area. Besides precipitation behavior, soil and slope characteristics are major influencing forces [7]. Determination of the size and the effects of soil erosion is highly important.

This study was carried out to determine the damage caused by flood caused by excessive rainfall at the experimental area of Namık Kemal University Faculty of Agriculture in 2018. In order to reveal flood damage, images of study area captured with Dji Matrice 600 pro used. Parrot Sequoia multispectral camera was used for imaging. Images were processed in Agisoft Pro and Arcgis Desktop program to determine the size of the damage.

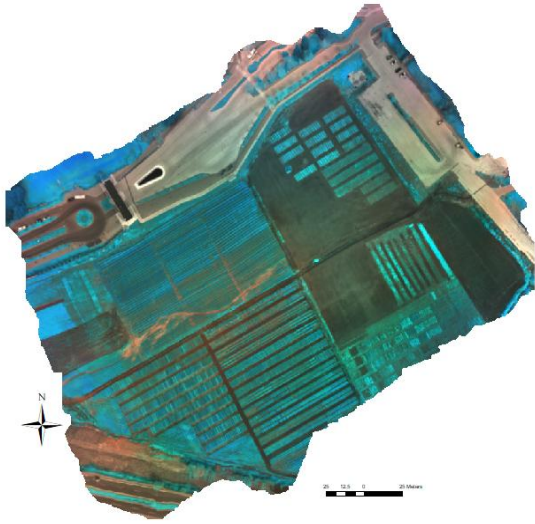
### 2. Material and Method

Namık Kemal University Agricultural Faculty's experimental area was selected as research area. Experimental area was located Tekirdag city and cover approximately 72000 m<sup>2</sup> (Figure 1). Mostly fields crops growing in



research area. Flood damage occurred in the research area in 2018 (Figure 2). This damage was investigated by used UAV is mounted a multispectral camera.

DJI Matrice 600 Pro is a multi-rotor aircraft. It is an industrial product, has 6 rotors with a 35 minutes' average flight time. Parrot Sequoia multispectral camera is ultra-precise agricultural camera that compatible with every drone. It is only 108 g and capturing 16 MP RGB image. It is also capture Near Infrared and Red edge bands. The camera was placed onboard the UAV. Images captured 75 m above the ground in 2018. The images were acquired at approximately 75 overlapped and 75 side lapped. Image capturing were made in sunny and low wind conditions. Agisoft Pro has been used to process the images. NDVI indices were used to determine areas damaged by floods [8]. NDVI values of typical plants with soil background change between 0.3 to 0.8.



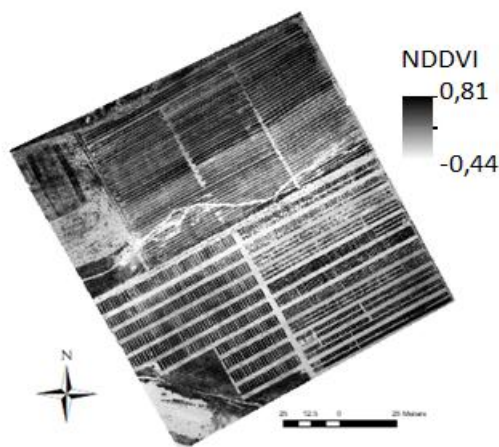
*Figure 1: Research Area*



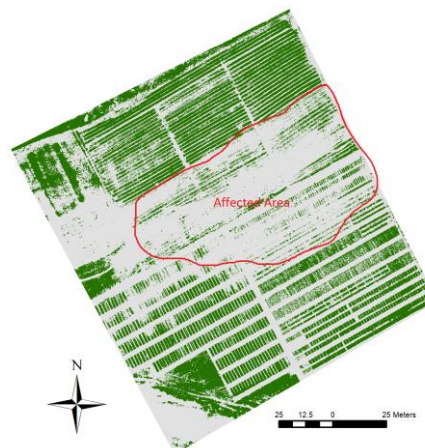
*Figure 2: Deformation caused by flood*

### 3. Result and Discussion

Orthomosaic image of research area is created by using approximately 400 images. When the multispectral image is examined, drainage canal due to the flood is clearly seen, but if you are analyzing the NDVI map you can see damaged area was much more then. NDVI were created by using orthomosaic image and damage was tried to detect in the research area (Figure 3). It was seen that flood damage occurred mainly in the slit and its immediate vicinity NDVI map has been imported to ArcGIS Desktop and tried to identify flood damaged area by using raster calculator plug-in (Figure 4). As a result of the study, it was determined that about 6196 m<sup>2</sup> of 72000 m<sup>2</sup> land was damaged due to flood.



*Figure 3: NDVI maps of research area*



*Figure 4: General situation of the flood-damaged parcels*

#### 4. Conclusion

Unmanned aerial vehicles continue to take up more space in our lives with extra features. Agricultural activities supported by remote sensing technology make a great contribution to meeting the country's food needs. On the other hand, these studies have a greater regard, since these were very serious studies such as developing new variety. Estimating of economic value of these scientific studies are not easy.

UAVs are seen as a useful tool for both damage detection and prevention of similar problems that may arise in the future.

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