COLLEGE OF SCIENCE
AND
DEPARTMENT OF
MATHEMATICAL SCIENCES

BLACK|SKY

YOUR WORLD NOW

**Left: Washington D.C. between MD and VA, taken by Sentinel-2. Courtesy: ESA**

# Department of Mathematical Sciences and College of Science at George Mason University

## meet

## BlackSky

for an interdisciplinary weekly seminar on

## Satellite Image Analysis via Deep Learning

**Speakers.** Dr. Patrick O'Neil and Dr. Diego Torrejon (BlackSky)

**Time and Location.** Starting February 14, 2019

10:30-11:30am every Thursday
Room 4106, Exploratory Hall

**Abstract.** The last decade has seen an explosion in the availability and affordability of commercial satellite imagery. This growth has yielded tremendous improvements in our ability to perform environmental monitoring, commercial development, and defense and intelligence planning. However, the deluge of data has made it difficult for image analysts to prioritize their efforts. This presents an immediate need for novel machine learning and computer vision techniques which can identify and flag significant changes among thousands of images per day. In this seminar, we will cover the basics of satellite imagery analytics using modern computer vision techniques. The seminar will have a particular focus on training deep learning models for satellite imagery analysis.

**Topics covered.** (1) Seminar Overview, (2) Satellite Imagery (Orbits, Bands, Collection, Resolution, etc), (3) Satellite Image Processing (Orthorectification, Color Correction, Dynamic Range Adjustment, Co-registration, etc.), (4) Classical Computer Vision (Convolutions, Sobel Filters, Watershed and Segmentation), (5) Deep Learning Overview (Deep Neural Networks, CNNs, RNNs, etc), (6) Deep Learning Ingredients (Dropout, Batch Normalization, Vanishing Gradient, etc.), (7) Convolutional Neural Networks, (8) U-Net and W-Net, (9) ResNet and ODEs, (10) Generative Adversarial Neural Networks.

The seminar will be accessible to both undergraduate and graduate students.

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