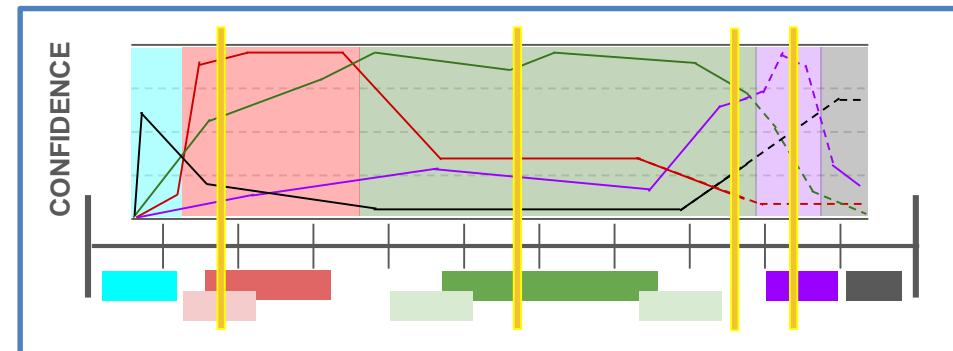


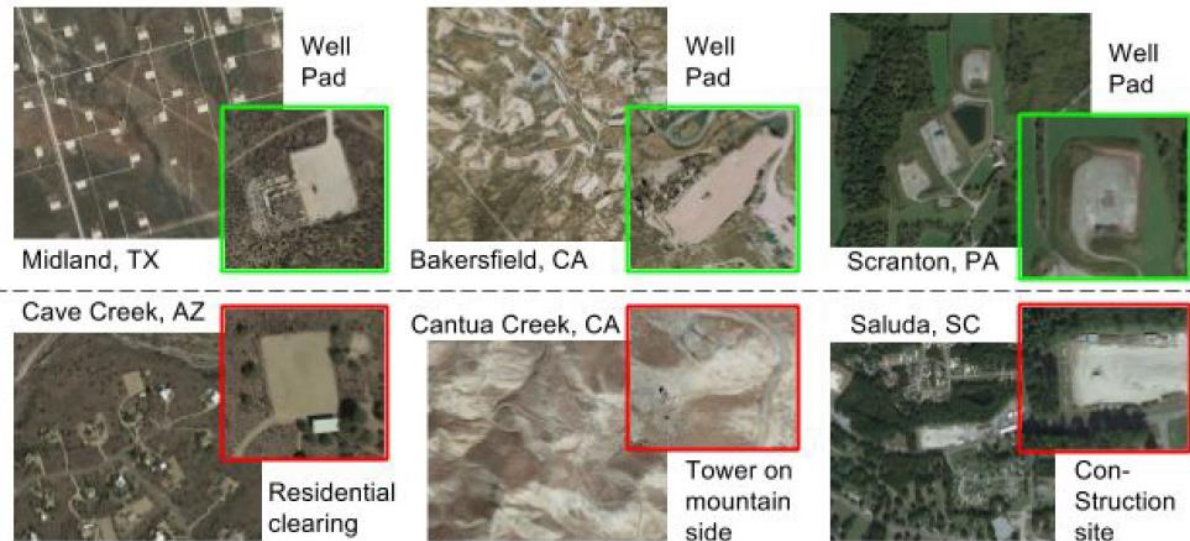
- Name of Organization: Kitware, Inc.
- Lead Investigator: Dr. Anthony Hoogs, Senior Director of Computer Vision
- Current Team Members:
  - Computer scientists and engineers from the Kitware Computer Vision group
  - In discussion with various universities
  - Looking for industry partners

# Research Areas

- Detecting new construction and classifying into one of the target classes (7 in BAA)
  - With few exemplars
- Detecting the phase of construction
  - Temporal process modeling with intermittent, multi-modal observations
- Efficiently operating at global scales



## *Intra-class variation*

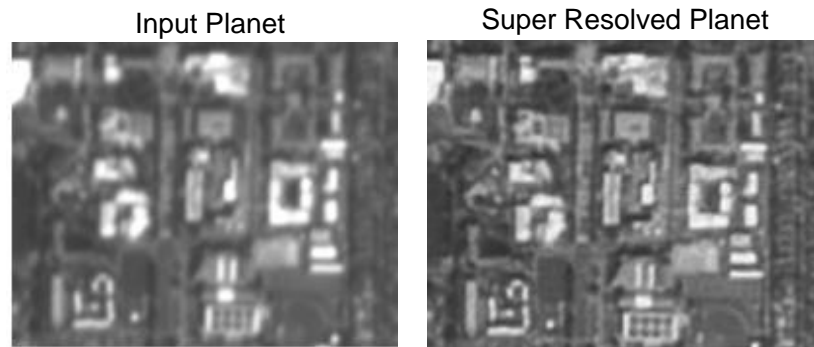


# Unique Qualifications and Capabilities

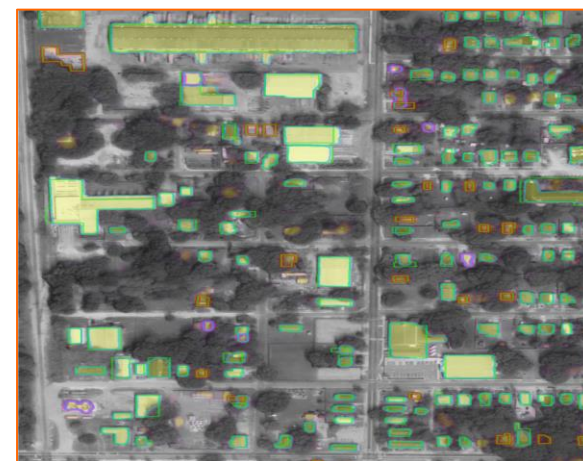
## AFRL/NGA VIGILANT program

- Object-level change detection
- Semantic map change detection
- Optimized, small network for satellite imagery analytics
- Training on few exemplars by augmenting with DIRSIG simulated imagery
- Running on a cubesat with a TX2
- Installed at NGA-R for 2+ years

Image Enhancement for improved detection



SOCOM Urban 3D Challenge  
Ranked 10<sup>th</sup>; top in USA



Cyan : detected instance  
Red : missed instance  
Magenta: false positive



Departures  
Arrivals  
Unchanged

Helicopter Change Detection

Model	mAP	Billion Mult-Adds	Million Parameters
VGG	25.7%	149.6	138.5
Inception V2	21.9%	129.6	13.3
Mobilenet	19.8%	30.5	6.1

Patch-based Search with  
Interactive Query Refinement



# Teaming

- Kitware may prime a proposal, or join a team(s) as sub
- As a prime, Kitware would look for universities and companies with specific expertise
  - Atmospheric correction and radiometry
  - Cloud detection
  - New construction domain expertise
- As a sub, Kitware offers:
  - Advanced, state-of-the-art change detection algorithms
  - Deep learning expertise in network design, anomaly detection, learning with few labels, interactive learning
  - Multi-modal image registration
- Kitware has substantial prior experience with IARPA and DARPA
  - Prime on IARPA CORE3D, ALADDIN
  - T&E support contractor on IARPA DIVA
  - Prime on DARPA Medifor, Squad-X Core Technologies, PerSEAS, VIRAT; major roles on Explainable AI, Urban Reconnaissance through Supervised Autonomy, Learning with Less Labels, PPAML, Memex, XDATA

# Contact Information

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