

TESTING UNMANNED AERIAL SYSTEMS (UAS) APPLICABILITY FOR THE OFFICE OF SURFACE MINING RECLAMATION AND ENFORCEMENT



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April 2015

OUTLINE

- ▶ What have we done?
- ▶ What did we do with the data collected?
- ▶ What did we discover?
- ▶ What are the limitations?
- ▶ What are the plans for the future?



2011 - PILOT PROJECT

- ▶ 2011 - Proof of concept project
 - ▶ 1 site, 2 days, different cameras



2012

- ▶ 2012- Inspection tool project
 - ▶ 8 sites, 3 days, for cost benefit analysis



2012 CONT.



2013- IMPOUNDMENTS

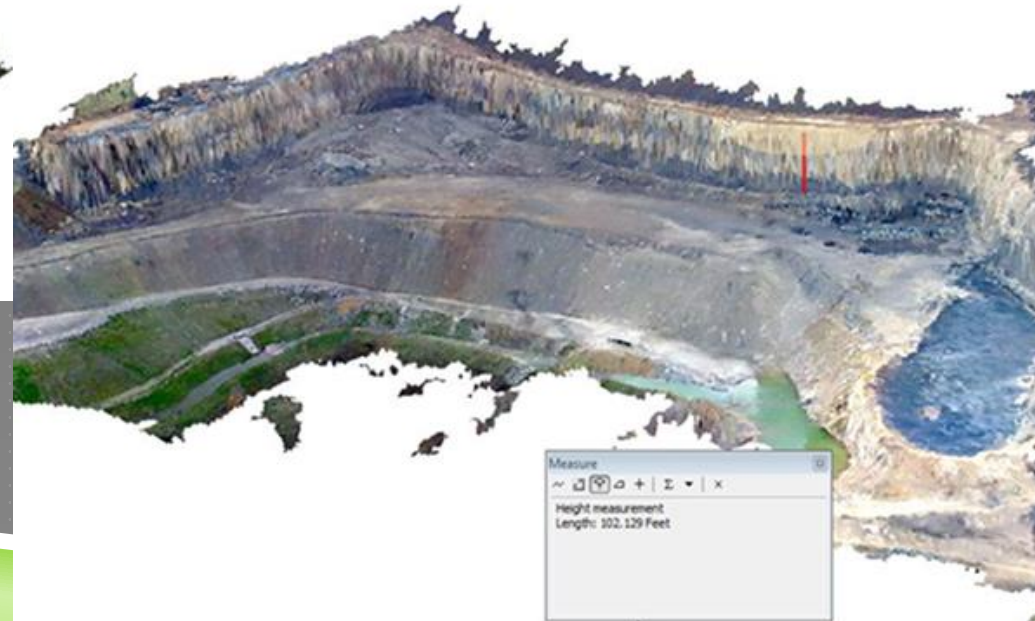
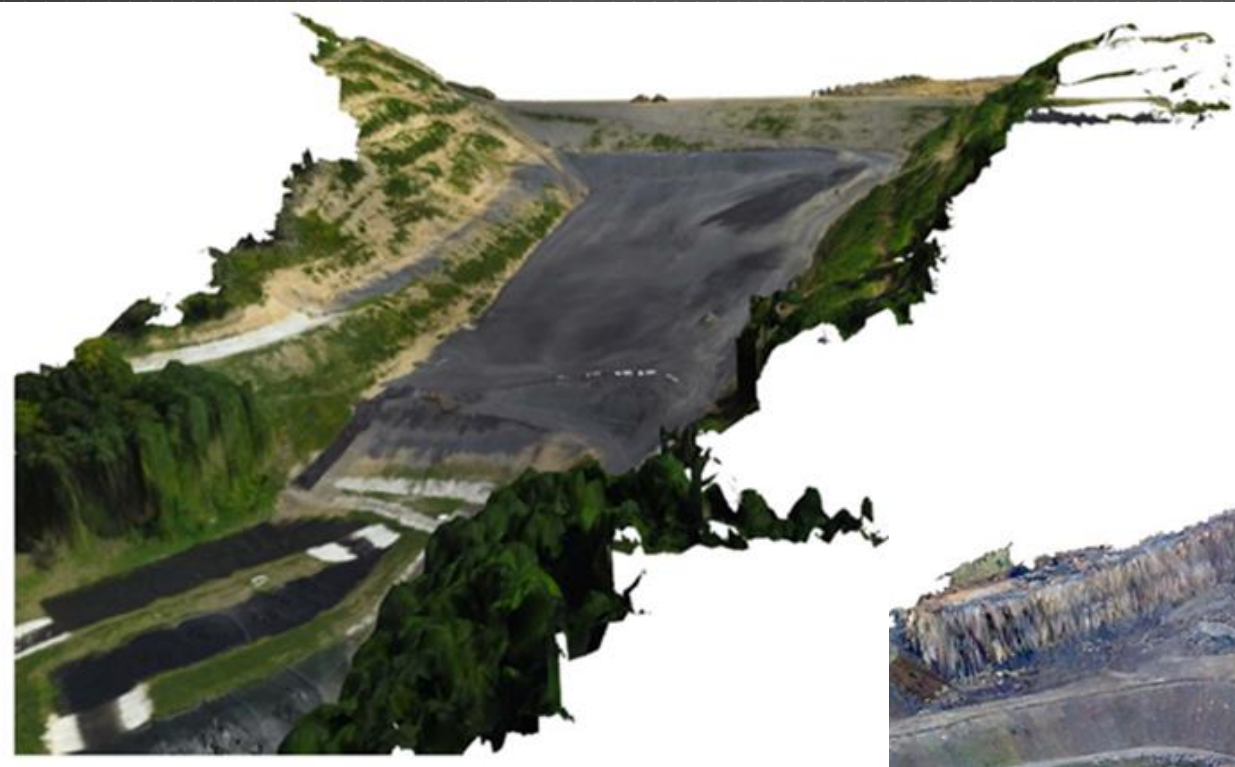
7 permits over 3 days- looking at the downstream face of the dam for seeps



2014- KENTUCKY AND WEST VIRGINIA

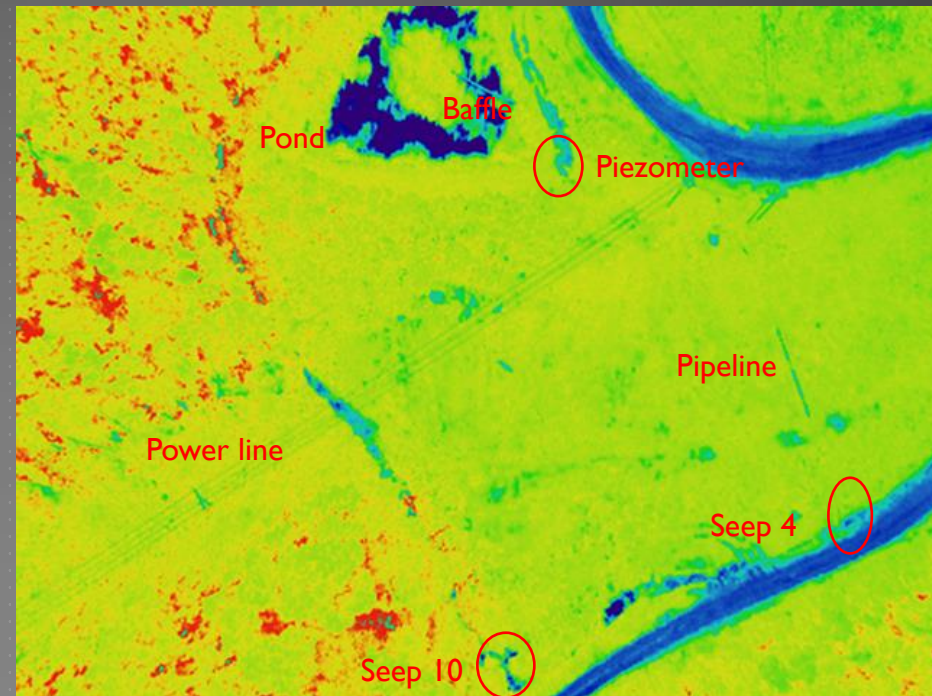


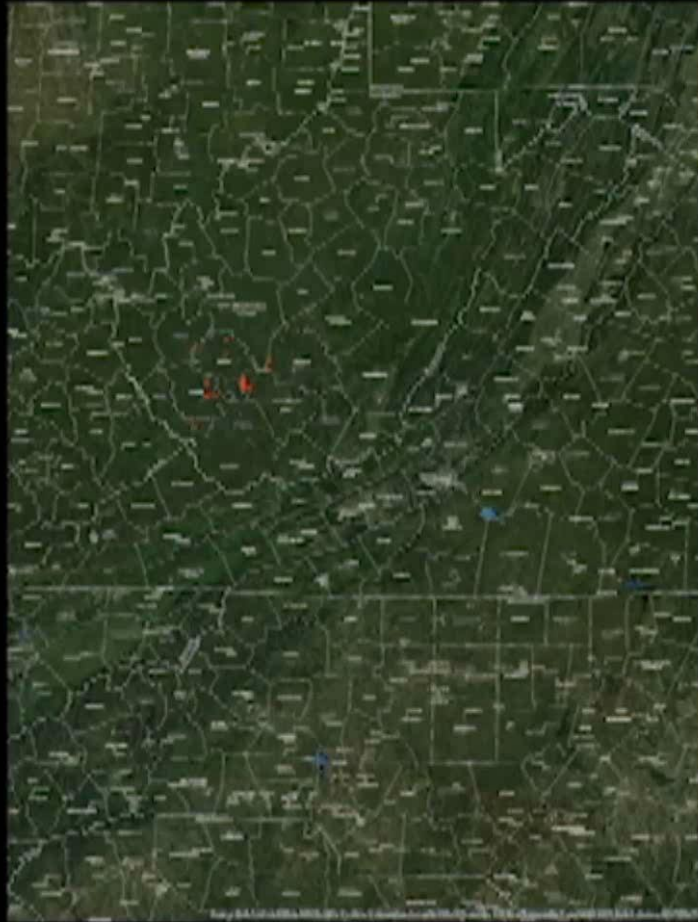
WHAT WE DID WITH THE DATA?



WHAT CAN WE DO WITH THE DATA?

- ▶ Color Infra-red-
 - ▶ Plants, soil moisture and water clarity
- ▶ NDVI images
 - ▶ *Intensity and density of vegetation*





INITIAL COST BENEFIT RESULTS

	Helicopter	Inspection w/out UAS	Inspection with UAS
Cost	\$16,800	\$0	\$3100
Sites inspected	15	3	8

INITIAL COST BENEFIT

Comparing actual hours
Inspection with UAS vs. without

Acres inspected= 5680

Total # of hours onsite without the UAS= 38 hours

Total # of hours onsite with the UAS= 16 hours

PROJECT FINDINGS



- ▶ View large areas in a short time
- ▶ Prioritize inspectors time in the field
- ▶ Can view remote/potentially dangerous areas from a safe distance- decreasing risk of injury to people and vehicles
- ▶ Save on equipment repairs
- ▶ The potential to increase inspection numbers.

PROJECT FINDINGS CONT.

- ▶ Better image quality
- ▶ Time on site reduced
- ▶ Accuracy of the data allows for measurements on imagery



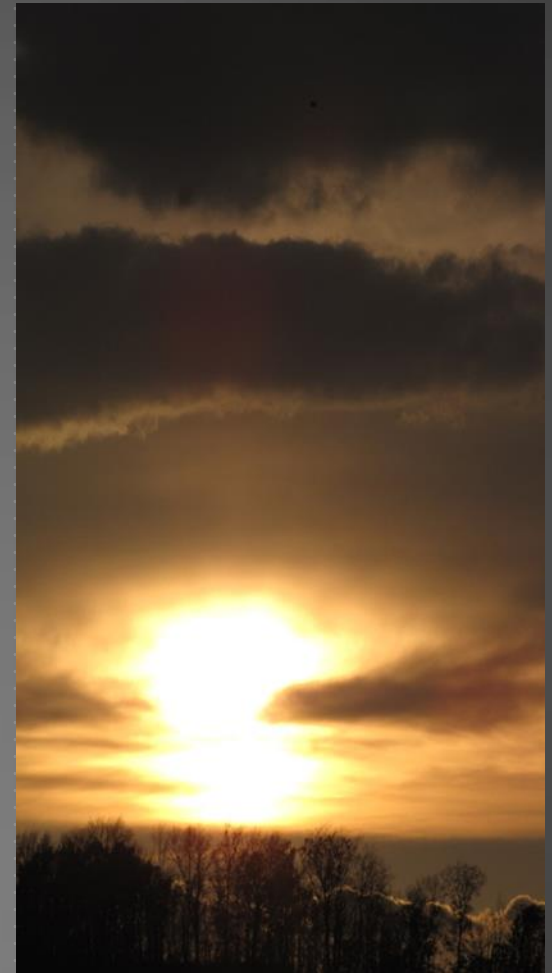
ADDITIONAL BENEFITS

- ▶ UAS operations can collect much more information
- ▶ UAS create a historical record of the site, that we now only capture by camera
- ▶ Different camera types are available when using UAS



WHAT ARE THE CURRENT MAJOR LIMITATIONS?

- ▶ FAA regulations-
 - ▶ 2 person operation
 - ▶ Maintain line of sight
- ▶ No Trained operators within OSMRE
- ▶ No UAS readily available
- ▶ Minimum 2 months to plan and coordinate flights
- ▶ We need Office of Aviation Service approval for any UAS that is not currently approved
- ▶ Possible decommissioning of previously used airframes



WHAT ARE THE PLANS FOR THE FUTURE?

- ▶ Train OSMRE personnel
- ▶ Train locally
- ▶ Proposed rulemaking in process
- ▶ Ongoing review for available UAS for testing and approval.
- ▶ Reduction of lead time from Months to Days for UAS mission

THANK YOU FOR YOUR ATTENTION!

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