RANGELAND MONITORING WITH VERY-LARGE SCALE AERIAL (VLSA) PHOTOGRAPHY

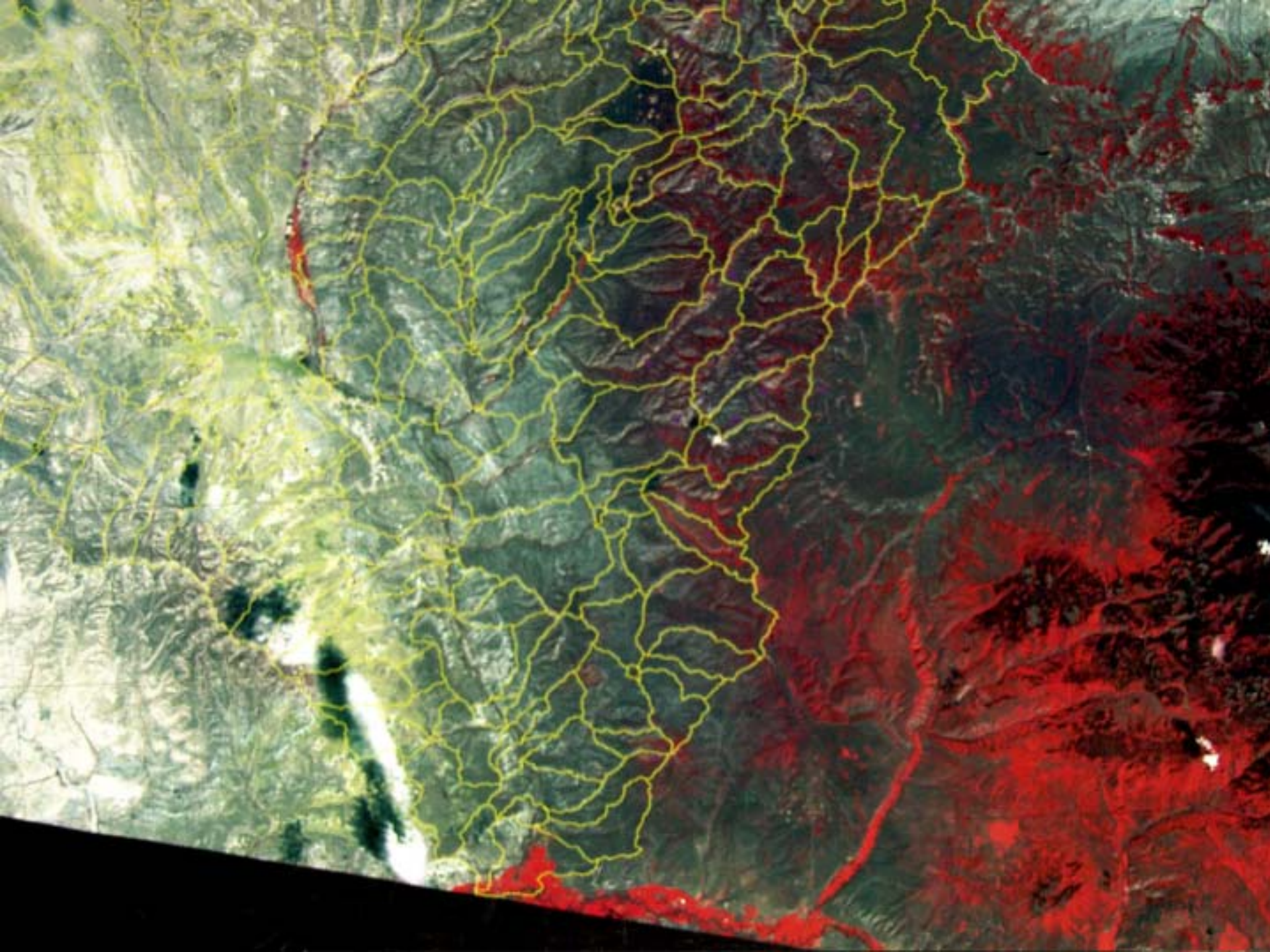
D. Terrance Booth[1], Don Glenn[2], Bruce Keating[2], Sam Cox[1], Joe Nance[3] and Andy Warren[4]

[1]USDA-ARS, High Plains Grasslands Research Station, Cheyenne

[2]Wyoming State Office, USDI-BLM, Cheyenne

[3]CloudStreet AirSports, Fort Collins

[4]Rawlins Field Office, USDI-BLM



There are two levels of observation in range inspection: one extensive and the other intensive. …<u>Intensive observations on small areas are necessary to secure the detailed facts from which the only valid conclusions of range condition can be made</u>.

L. Ellison & A.R. Croft, 1944

Hulcher 123

Color 70 mm film format
20 frames per second
Shortest shutter: 1/4,000 sec
500 mm Mamiya lens
<u>100 m AGL:</u>
Scale: 1:200
Field of View: 12 x 12 m
Resolution (scanned film): 1 pixel = 0.5 cm

RANS

THE TRACKER - LICENSED TO USDA - [CPER/job1a]

1-File 2-Hide 3-Config 4-Sub-plans 5-Tools 6-Photo 7-Runs 8-Planning 9-Equipment 10-Help

Synchronization OK.

NR	346
ROLL	None
RUN	6
MSL	164
SCAL	333
LENS	150
DLAY	0
CORR	1
INTR	10.4
DONE	0/1
LEFT	1
IMOT	288

RUN 3

MCRS 079.9 079.9 MTRK

0.05

DISP	2
GSPD	55.8kt
TTRK	090.0
MVAR	E10.1
MTRK	079.9
LAT	N40.837
LONG	W104.765
GALT	164 ft
XTRK	0.0
XCRS	>000<
ATD	0.0nm
MBRG	NA
MILE	0.2nm
DNXT	85m
DLST	385m
TNXT	0:00:03

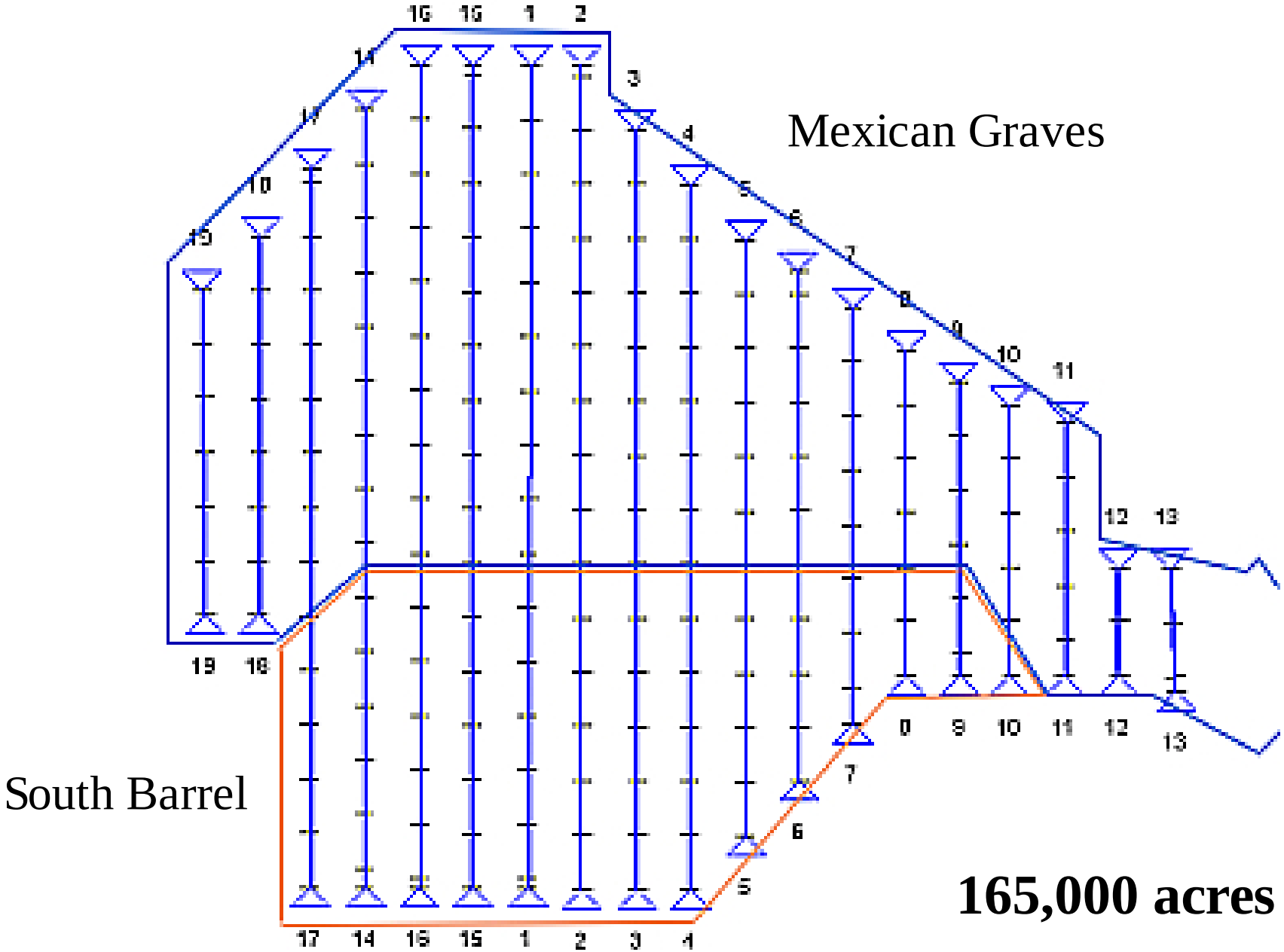
VWE 00.0 CRS 079 TTG 00.0 ILS1

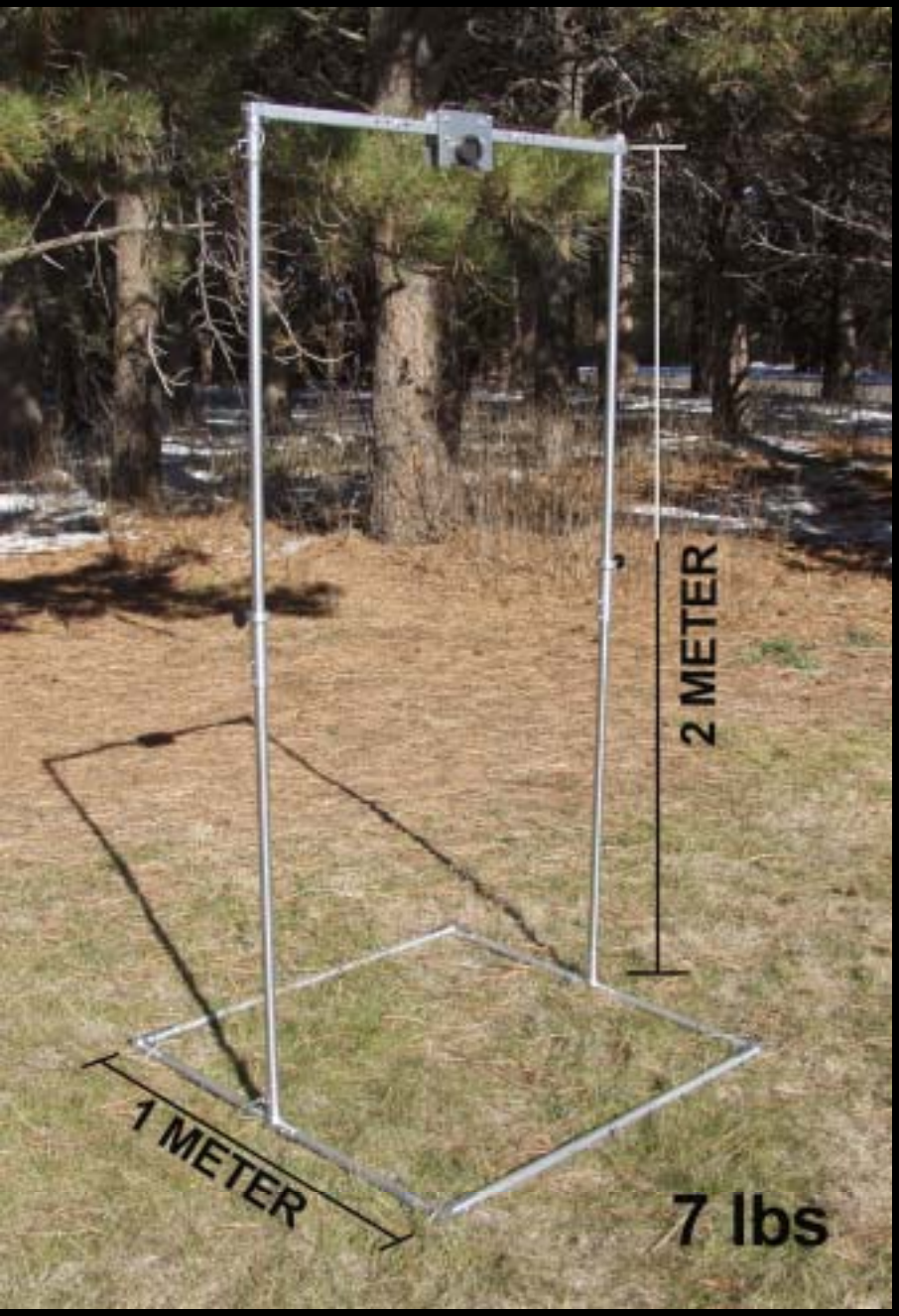
snapSIM

Hide Start Autopilot Left Straight Right Config

56 079.9 2 MIN.

Pa... Mi... TH... sn... 9:01 AM


Mexican Graves
South Barrel
165,000 acres


2 METER
1 METER
7 lbs

Olympus E20

2/3 inch Color (RGB) CCD
4.9 megapixel: 2560 x 1920
2 frames per second
Shortest shutter: 1/640 sec
35-140 mm Olympus lens

<u>2 m AGL:</u>
Scale: 1:60
Field of View: 1 x 1.4 m
Resolution: 1 pixel = 0.03 cm

Olympus Digital Camera

2 m AGL

1m

Muddy Creek Film Aerial 2002 - VegMeasurement

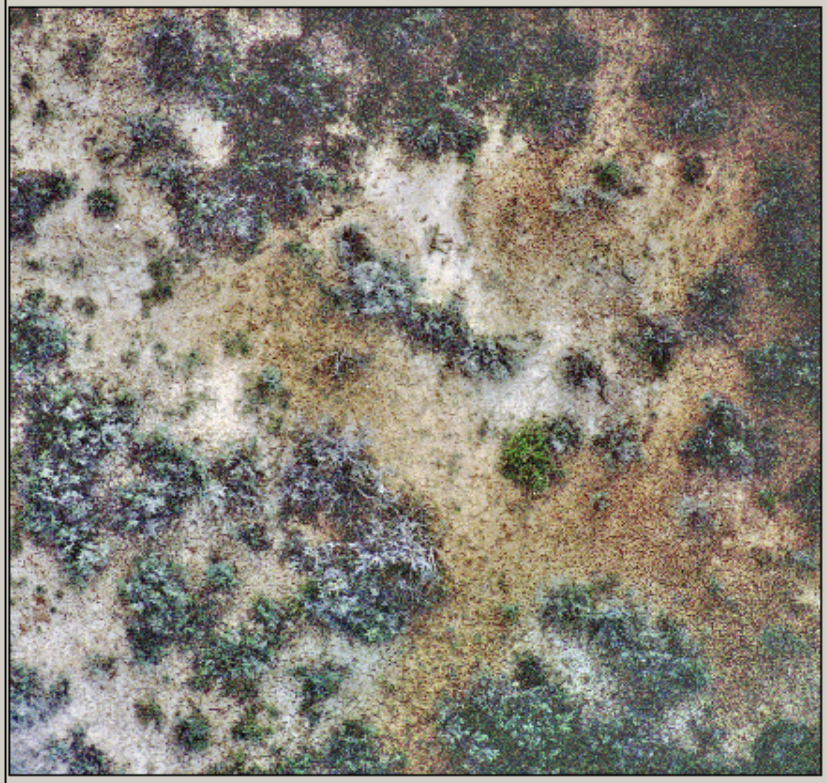
File Edit Image Project View Help

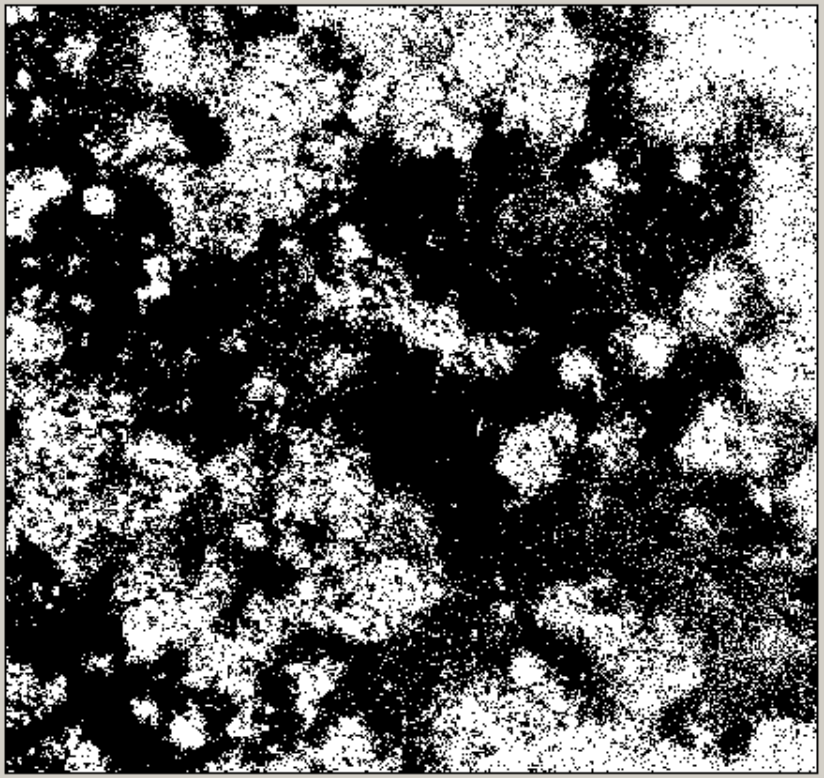
New Open Save Acquire Delete Properties Select Zoom Process

Order by Time

Muddy Creek 5-02 T
Muddy Creek 5-02 T
Muddy Creek 5-02 T
Muddy Creek 5-02 T
Muddy Creek 5-02 T
Muddy Creek 5-02 T
Muddy Creek 5-02 T
Muddy Creek 5-02 T
Muddy Creek 5-02 T
Muddy Creek 5-02 T
Muddy Creek 5-02 T
Muddy Creek 5-02 T
Muddy Creek 5-02 T
Muddy Creek 5-02 T
Muddy Creek 5-02 T
Muddy Creek 5-02 T
Muddy Creek 5-02 T
Muddy Creek 5-02 T

All None Invert





Processing Attributes

Threshold: 0.116

Blue Band Gradient

Process

Preview

% White	36.434
% Black	63.566
Area White	0.3643 meters²
Area Black	0.6357 meters²

Image Attributes

Dimension: 1 X 1 Processed

Units: meters Status: New

Coordinate: Fix

Notes:

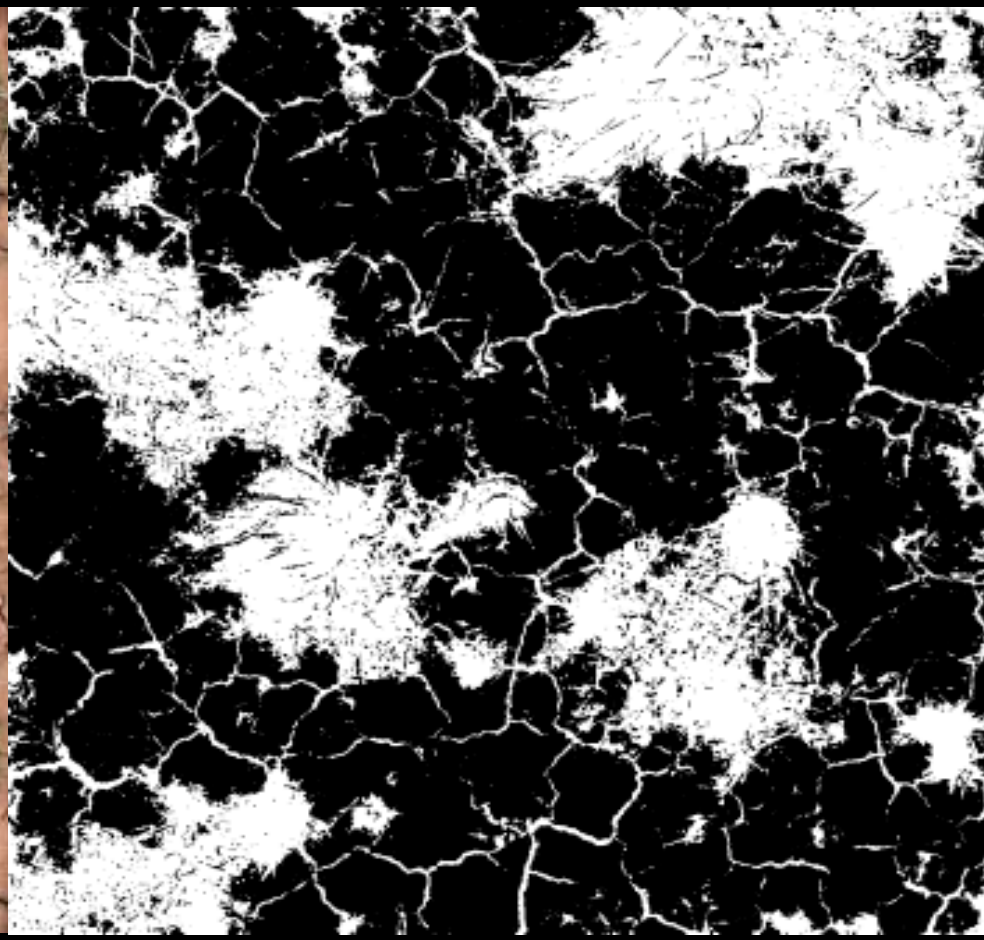
Ready GPS unit not connected 12:45 PM 12/23/2002

Start Microsoft PowerPoint - [S... WordPerfect 10 - [C:\...\... Muddy Creek Film Aeri... 12:45 PM

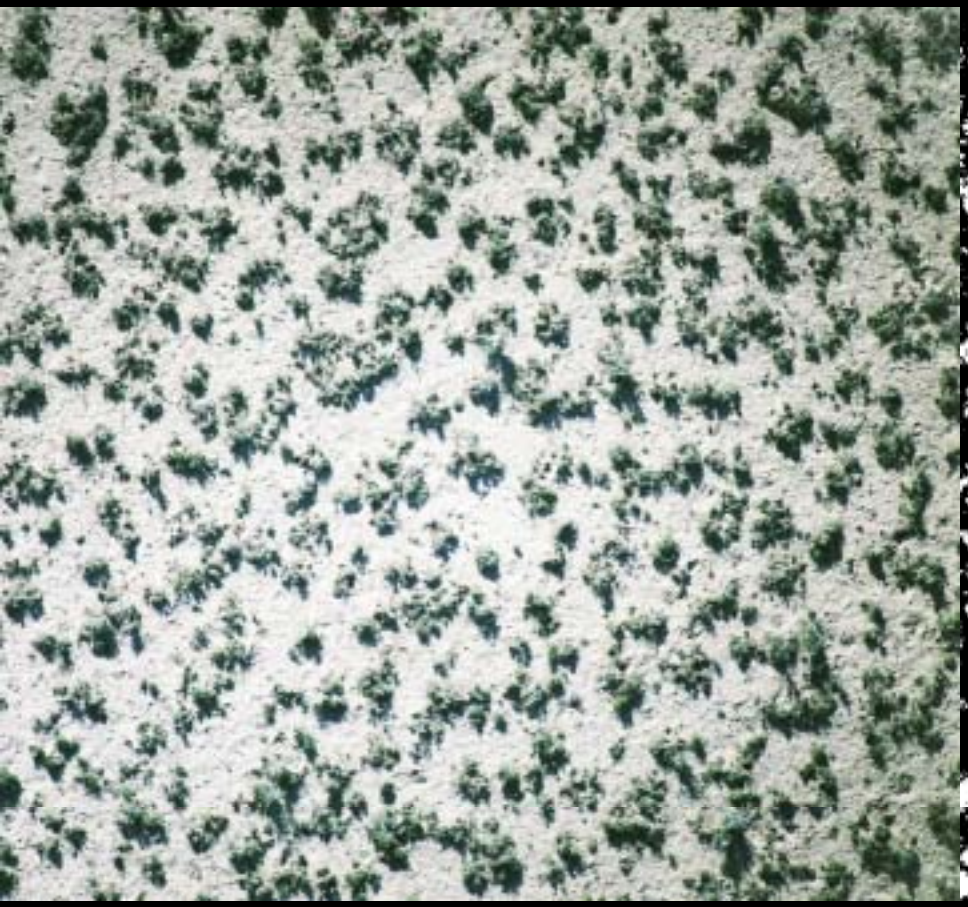
Hulcher Film Camera

100 m AGL

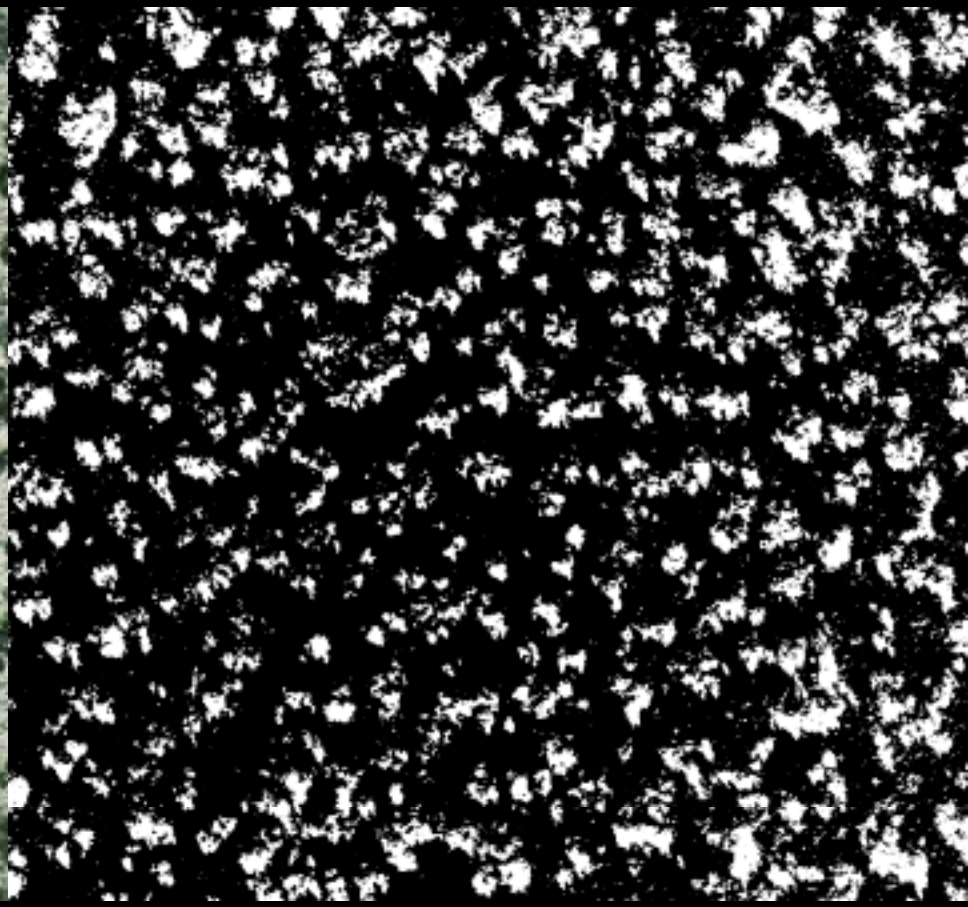
Olympus Digital Image



Processed Image

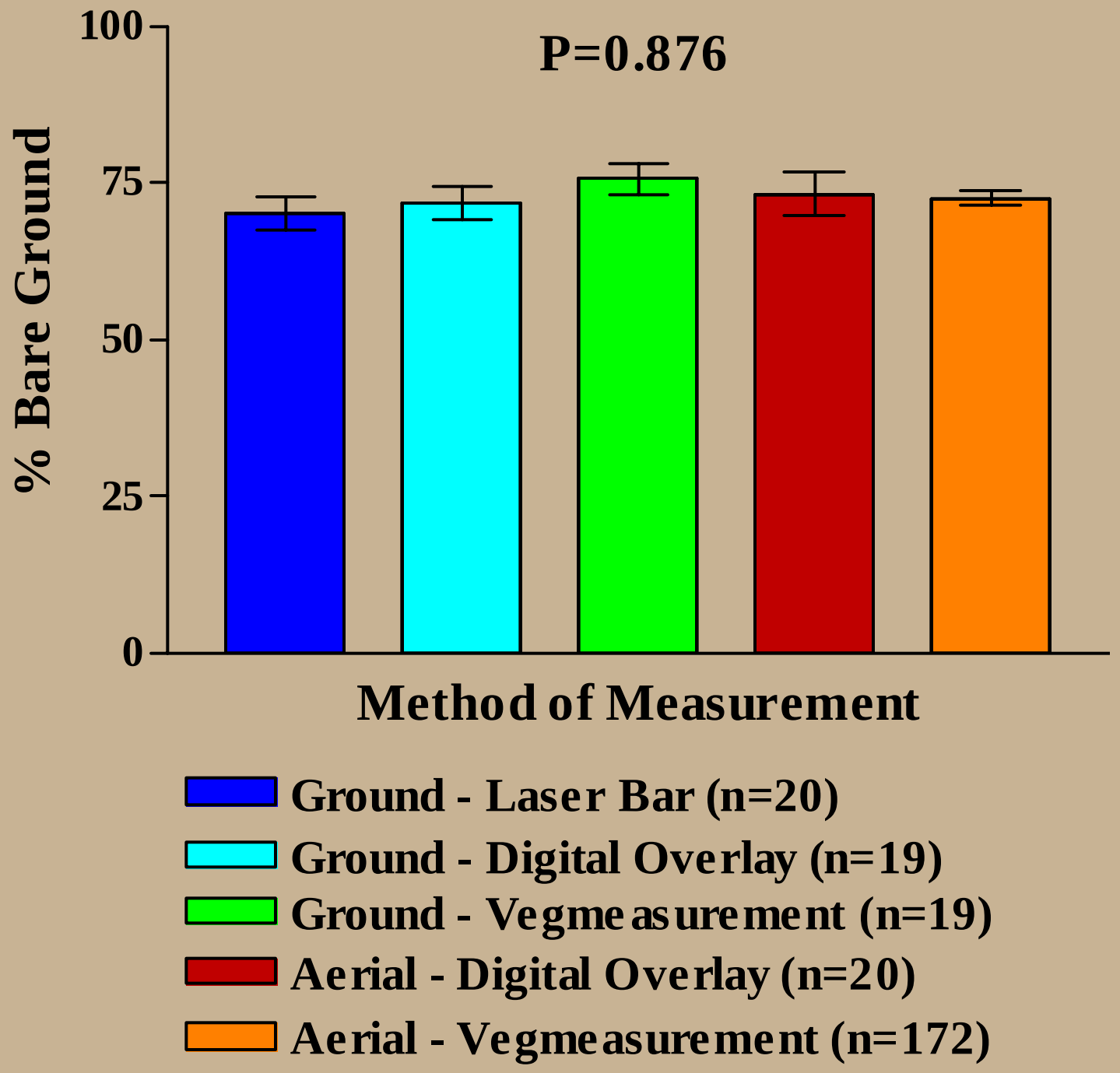


70 mm Image

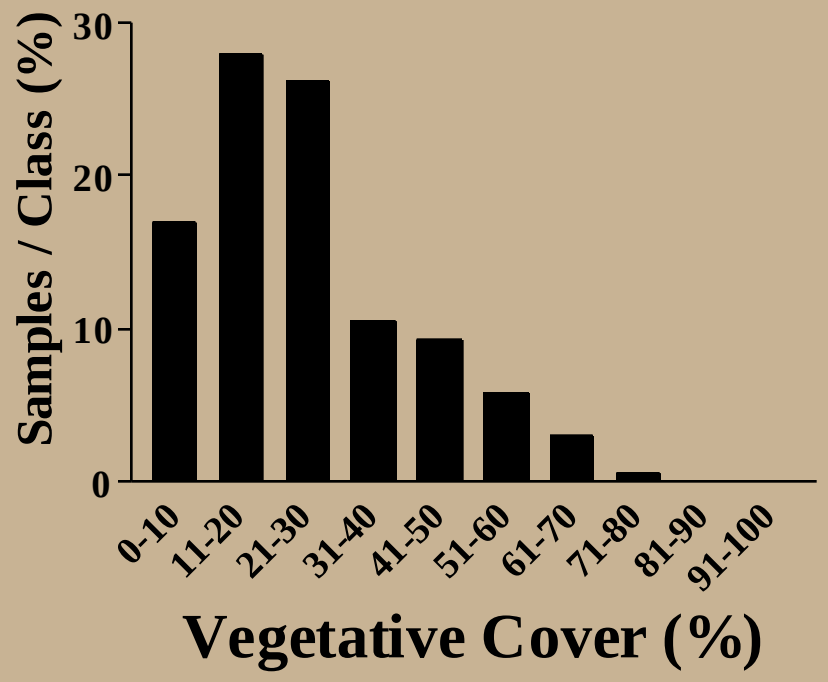


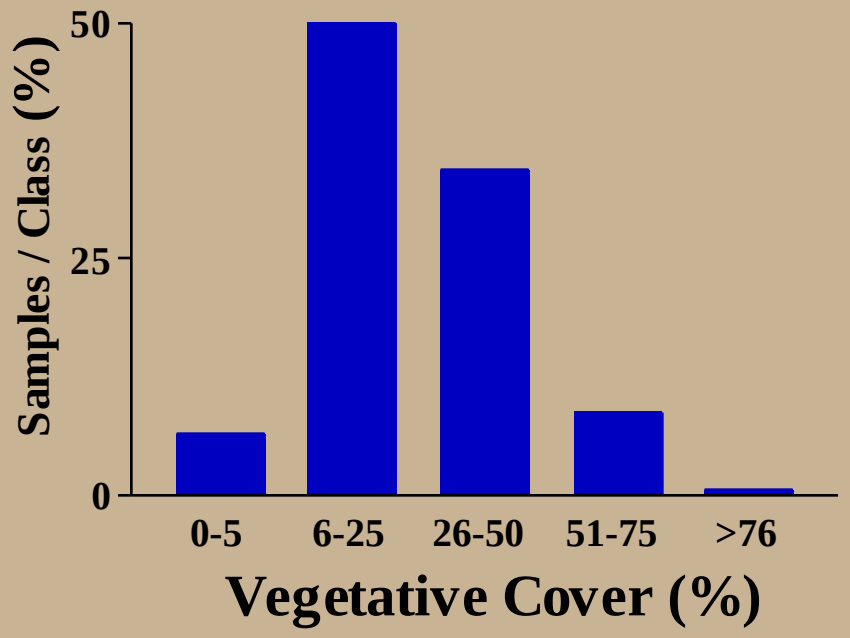
Processed Image

Project Information		
Name	Red Canyon - East Burn	
Researcher Name(s):USDA-ARS		
Research Facility: RRRU Cheyenne, WY		
Location: Red Canyon Ranch		
Field: Commissary Hill		
Notes	June 2002	
Image Information		
Filename	White %	Black %
Red Canyon 061802 East Burn 01-L 1m.BMP	48	52
Red Canyon 061802 East Burn 02-L 1m.BMP	49	51
Red Canyon 061802 East Burn 03-L 1m.BMP	63	37
Red Canyon 061802 East Burn 04-L 1m.BMP	66	34
Red Canyon 061802 East Burn 05-L 1m.BMP	66	34
Red Canyon 061802 East Burn 06-L 1m.BMP	75	25
Red Canyon 061802 East Burn 07-L 1m.BMP	43	57
Red Canyon 061802 East Burn 08-L 1m.BMP	42	58
Red Canyon 061802 East Burn 09-L 1m.BMP	39	61
Red Canyon 061802 East Burn 10-L 1m.BMP	62	38
Red Canyon 061802 East Burn 11-L 1m.BMP	81	19
Red Canyon 061802 East Burn 12-L 1m.BMP	56	44
Red Canyon 061802 East Burn 13-L 1m.BMP	66	34
Red Canyon 061802 East Burn 14-L 1m.BMP	74	26
Image Statistics		
Average White %	59.2035	
Average Black %	40.7965	
Minimum White %	39.428	
Minimum Black %	19.4136	
Maximum White %	80.5864	
Maximum Black %	60.572	
Standard Deviation	3.6455	
# of Images	14	


P=0.876
% Bare Ground
100
75
50
25
0
Method of Measurement
Ground - Laser Bar (n=20)
Ground - Digital Overlay (n=19)
Ground - Vegmeasurement (n=19)
Aerial - Digital Overlay (n=20)
Aerial - Vegmeasurement (n=172)

Entire Study Site



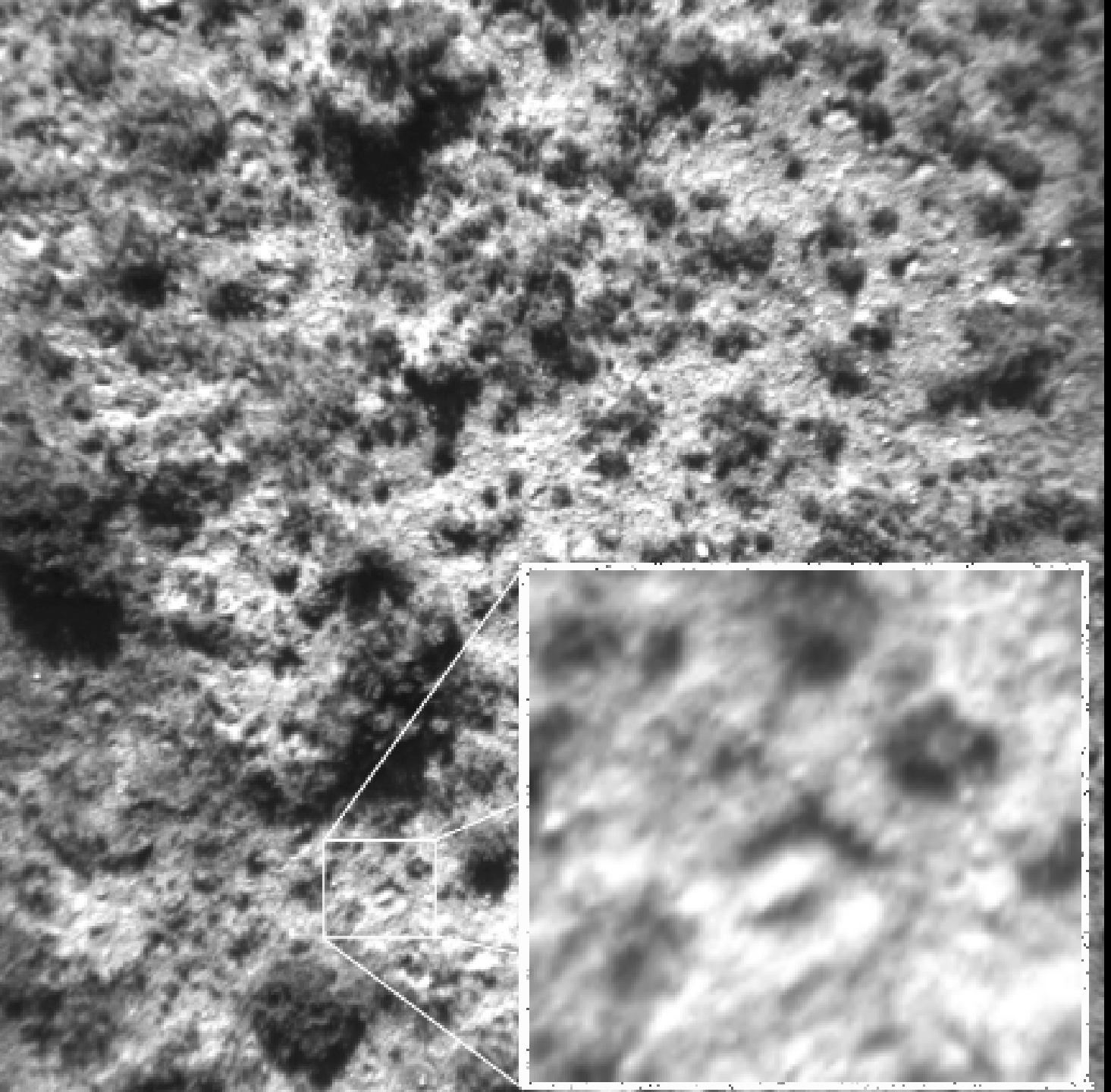


Pulnix TM-1020-15

1 inch Monchrome CCD
1.0 megapixel: 1008 x 1018
15 frames per second
Shortest shutter: 1/16,000 sec
50 mm Cosmicar lens
Cosmicar 2X Teleconverter

100 m AGL:

Scale: 1:360
Field of View: 9 x 9 m
Resolution: 1 pixel = 0.9 cm



Pulnix
Digital
Camera

100m
AGL

Canon EOS-1DS

1.4 x 1 inch Color (RGB) CMOS
11.1 megapixel: 4064 x 2704
3 frames per second
Shortest shutter: 1/4,000 sec
Auto aperture adjustment
Adapter available for current Mamiya 500 mm lens

<u>100 m AGL:</u>
Scale: 1:200
Field of View: 7 x 5 m
Resolution: 1 pixel = 0.17 cm