Derivation of inundation metrics derived from UAVSAR L-band imagery within the ABoVE domain.

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UAVSAR polarimetric decomposition for determining inundation extent from scattering mechanisms
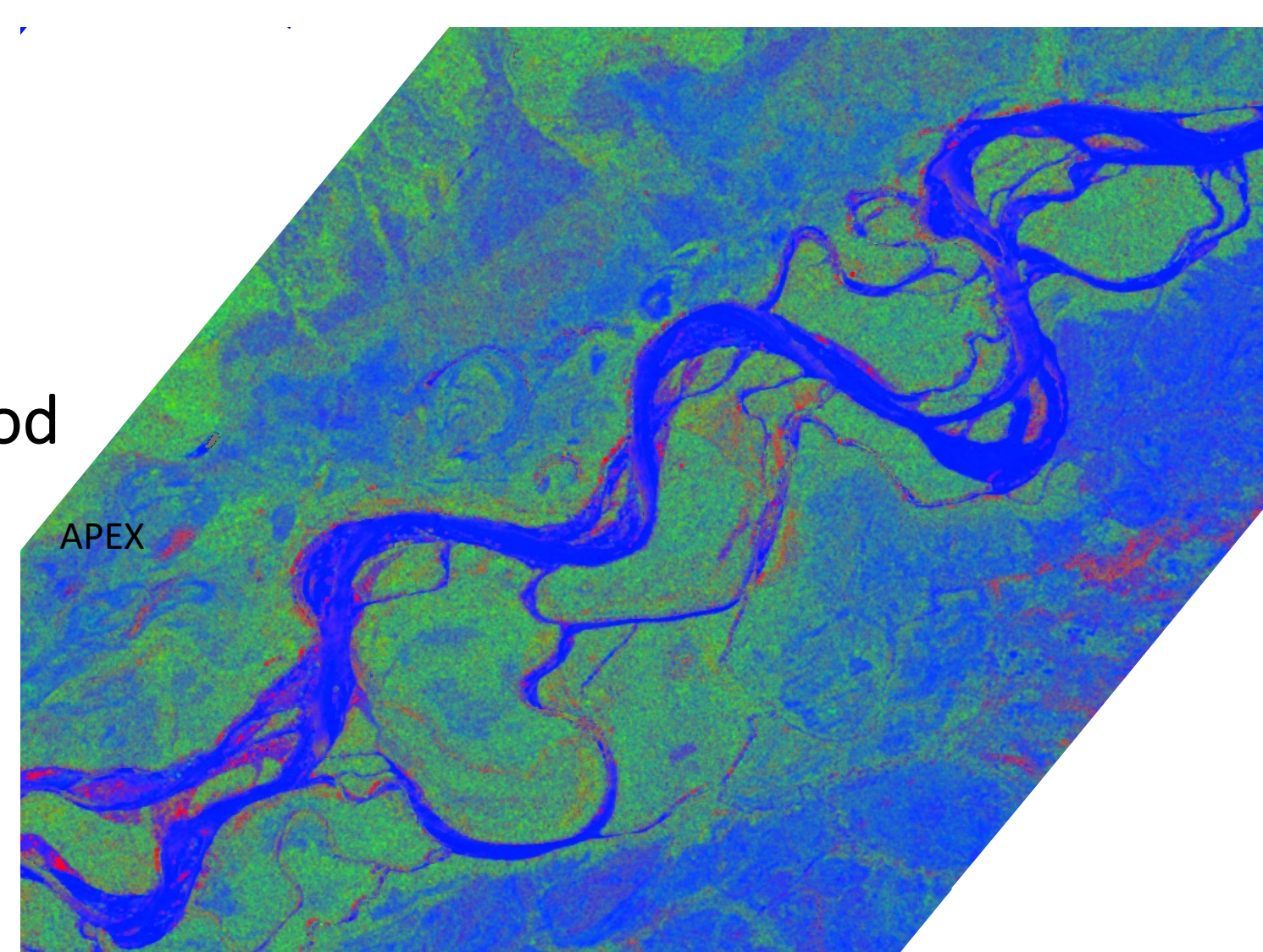
APEX site, SW of Fairbanks Alaska

UAVSAR
June 16 2017 – **high flood**

Red – Double Bounce
(flooded herbaceous)
Green – Volume Scatter
(forest)
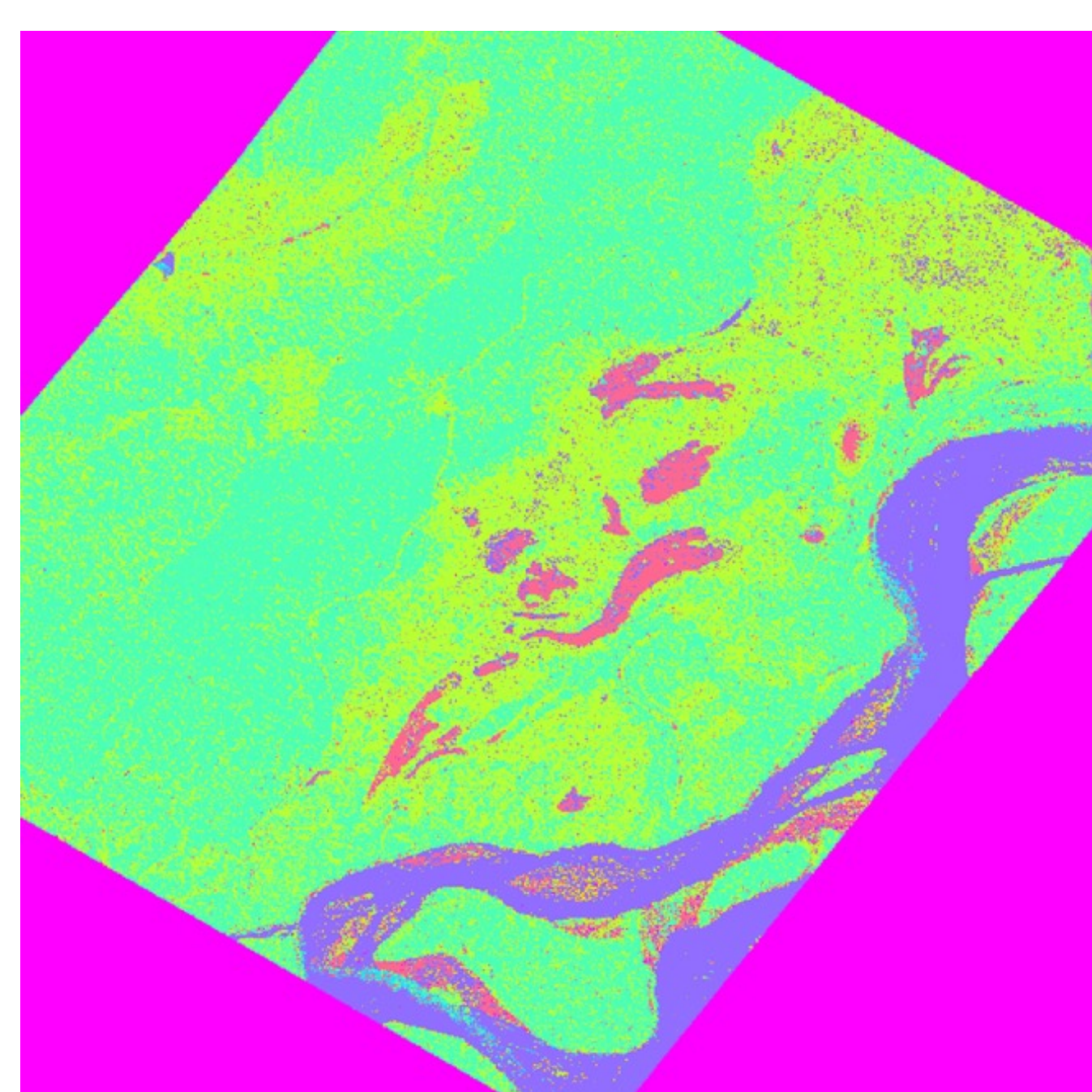Blue – Surface Scatter
(open water/bare ground)

APEX

UAVSAR
Sept 19, 2017 - low flood

APEX

May 30, 2017

Jun 16, 2017

Sep 12, 2017
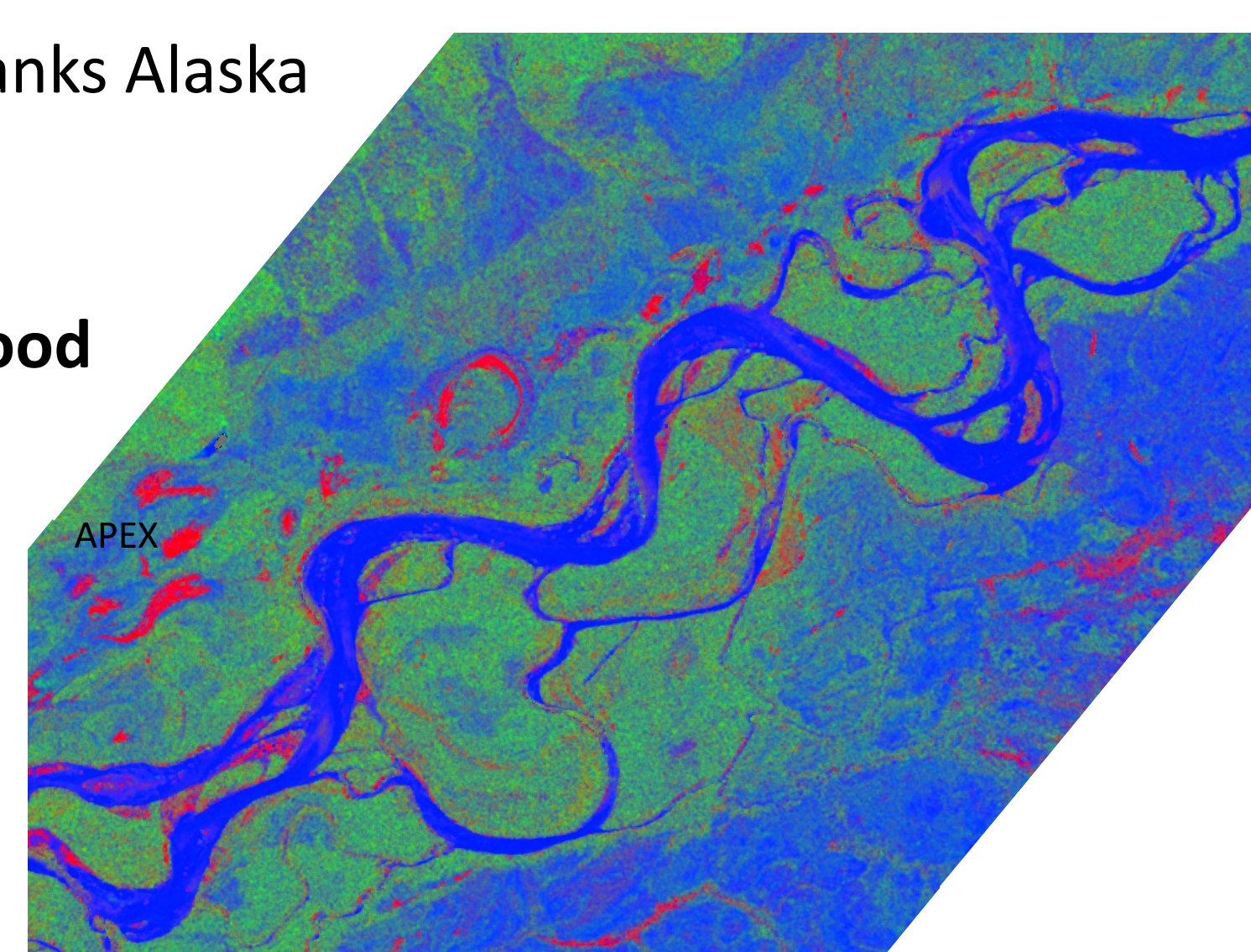
Hand held photos from nearby overlook

Classification of UAVSAR decomposition values from UAVSAR data collected on June 16, 2017.

Flooded grass-like vegetation/sedges (red)
Open water (blue)
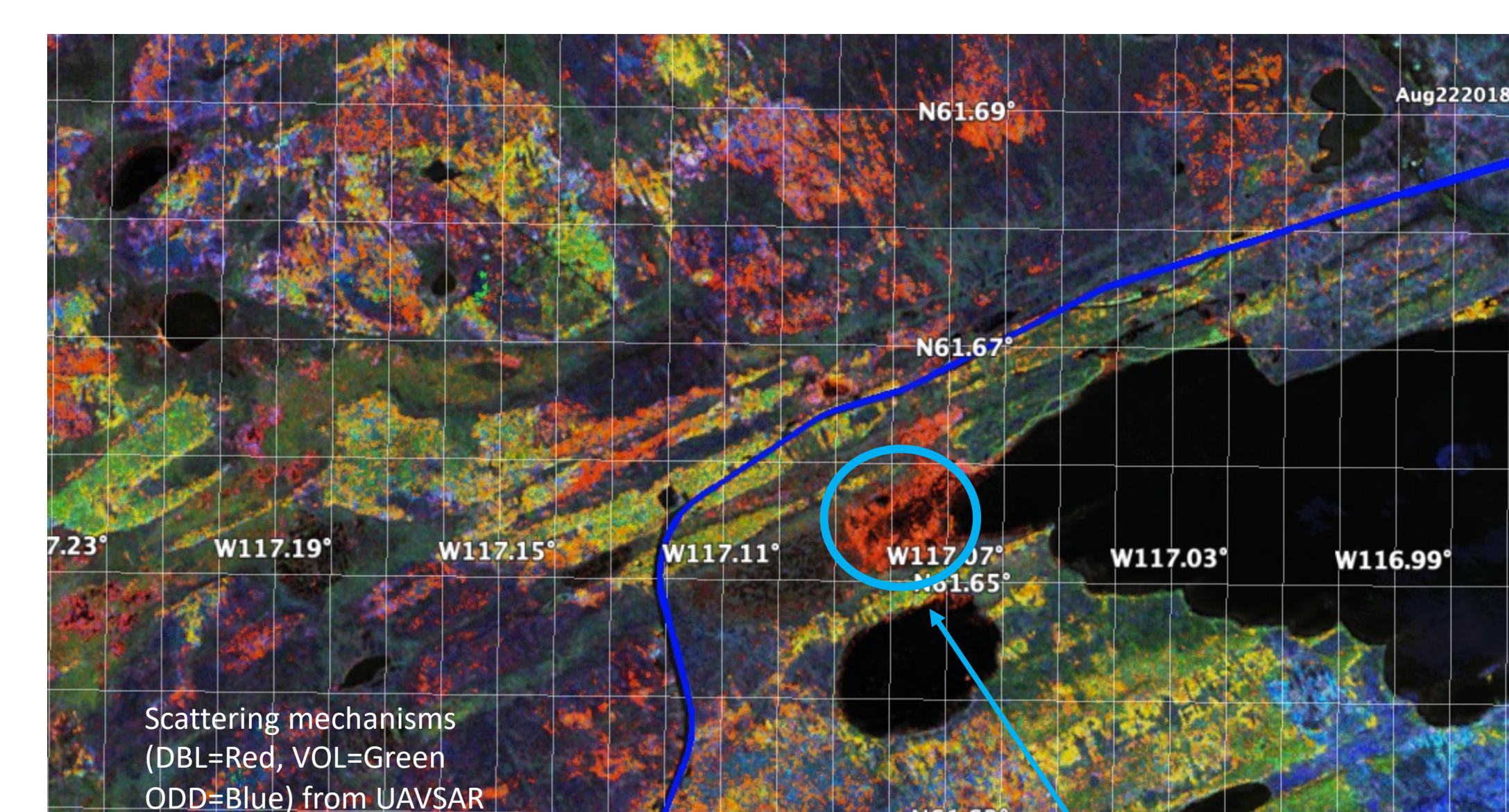Dry low vegetation (yellow)
Forest (green)

➤ UAVSAR polarimetric decomposition metrics can be used to identify surface water extent even where vegetated

UAVSAR polarimetry vs interferometry
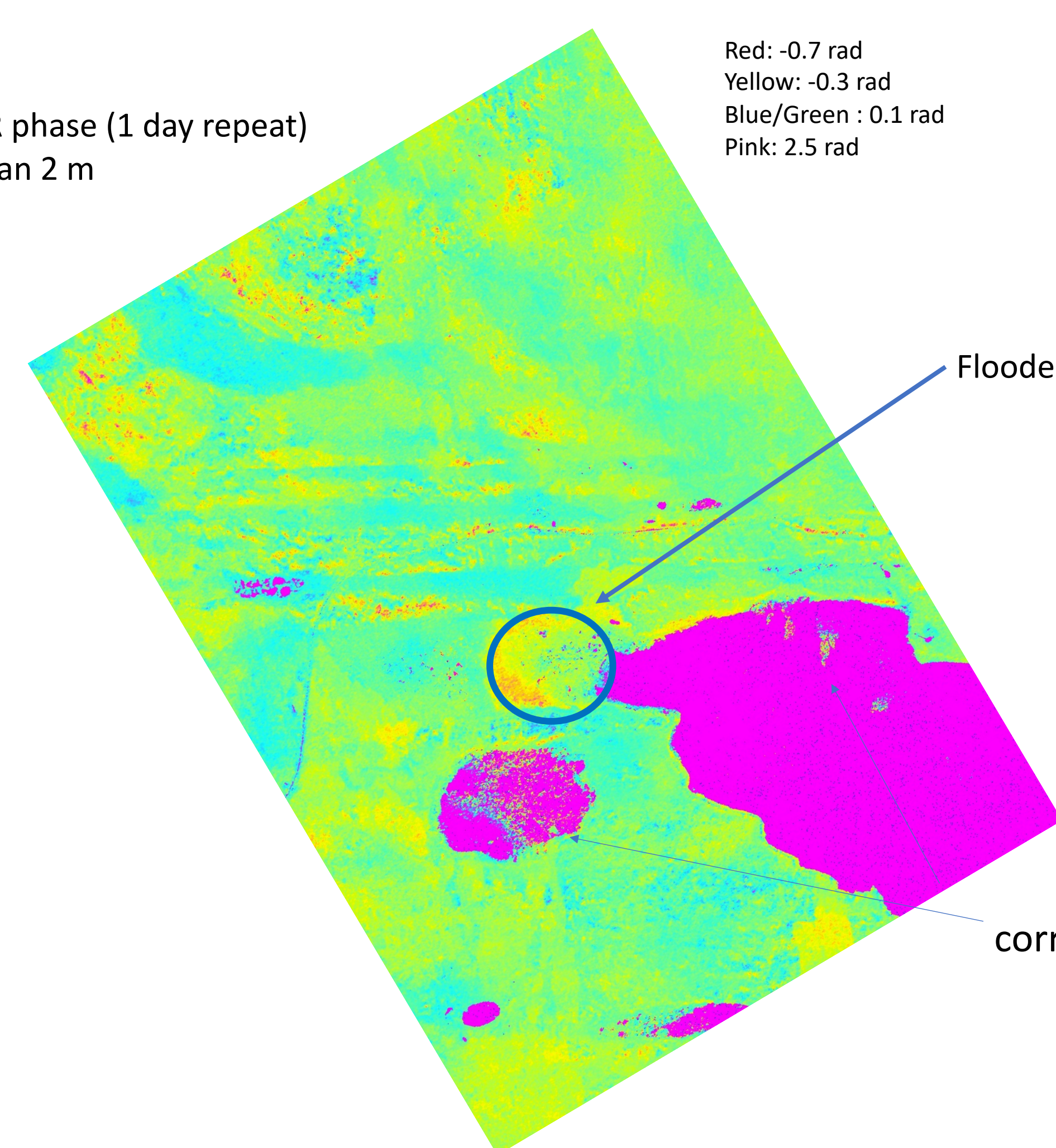
Ft Providence area, Canada, Aug 2018

Road to ft providence

Google Earth

Scattering mechanisms
(DBL=Red, VOL=Green
ODD=Blue) from UAVSAR

Polarimetric Decomposition from UAVSAR

Flooded vegetation indicated by double bounce
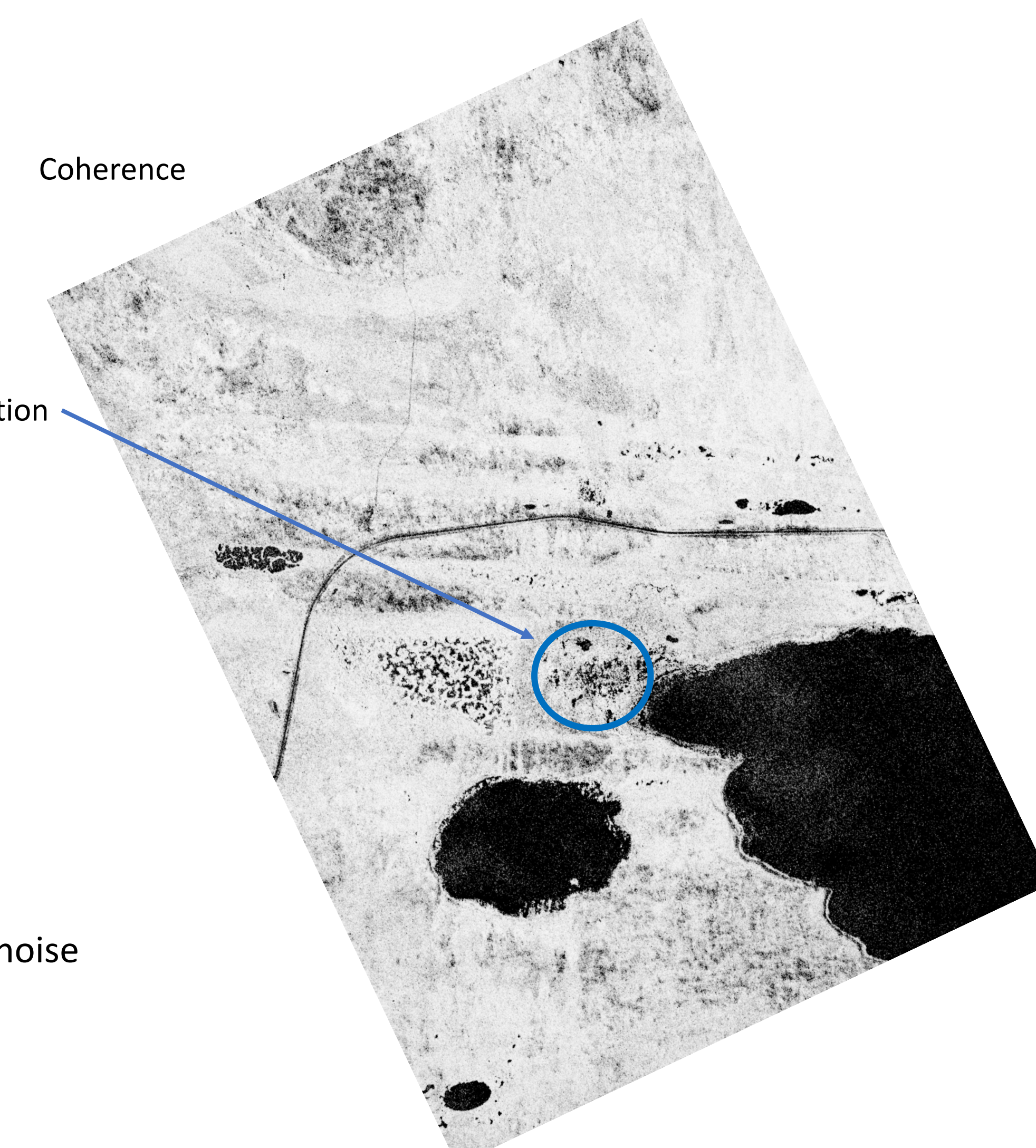
Flattened inSAR phase (1 day repeat)
Baseline less than 2 m

Red: -0.7 rad
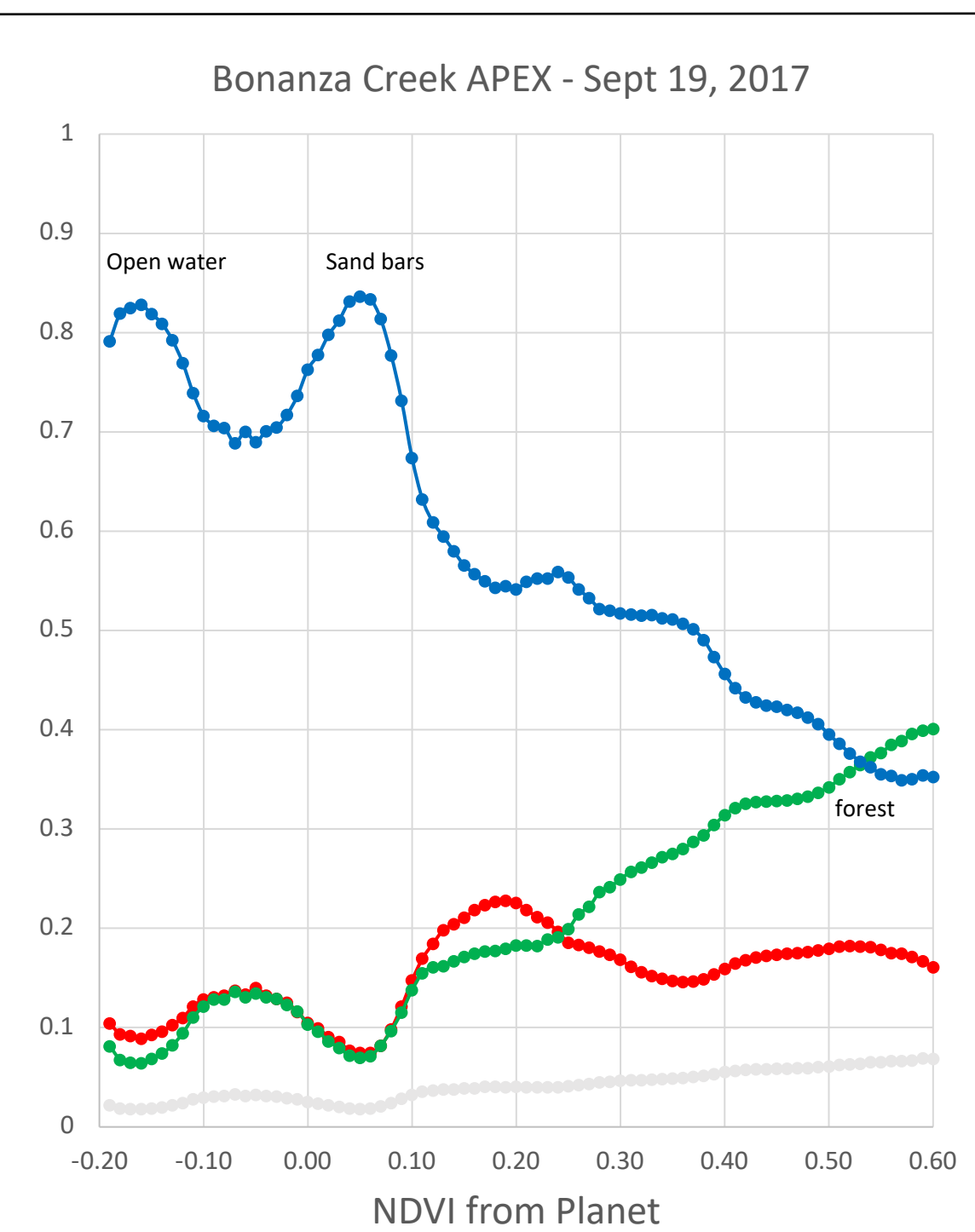Yellow: -0.3 rad
Blue/Green : 0.1 rad
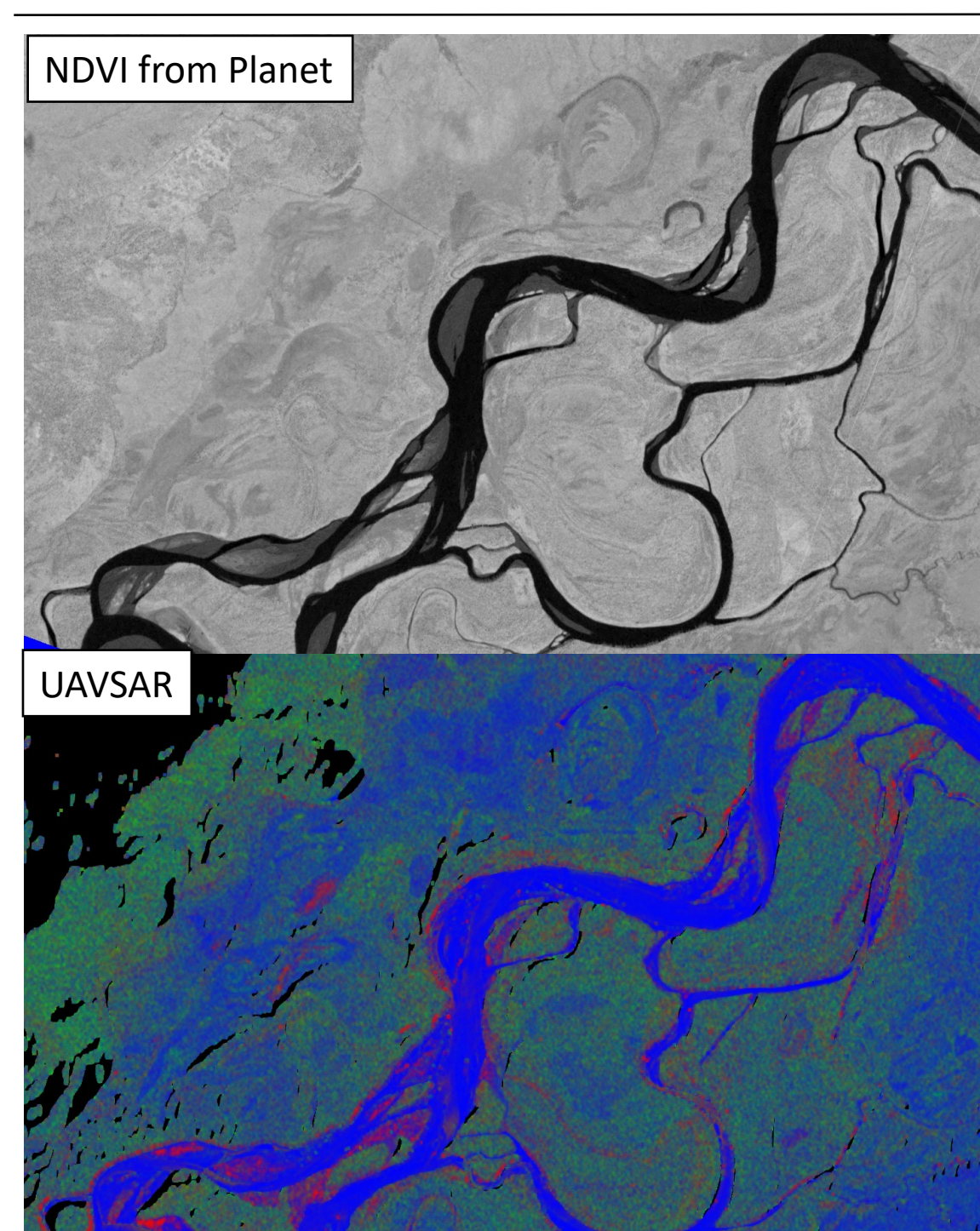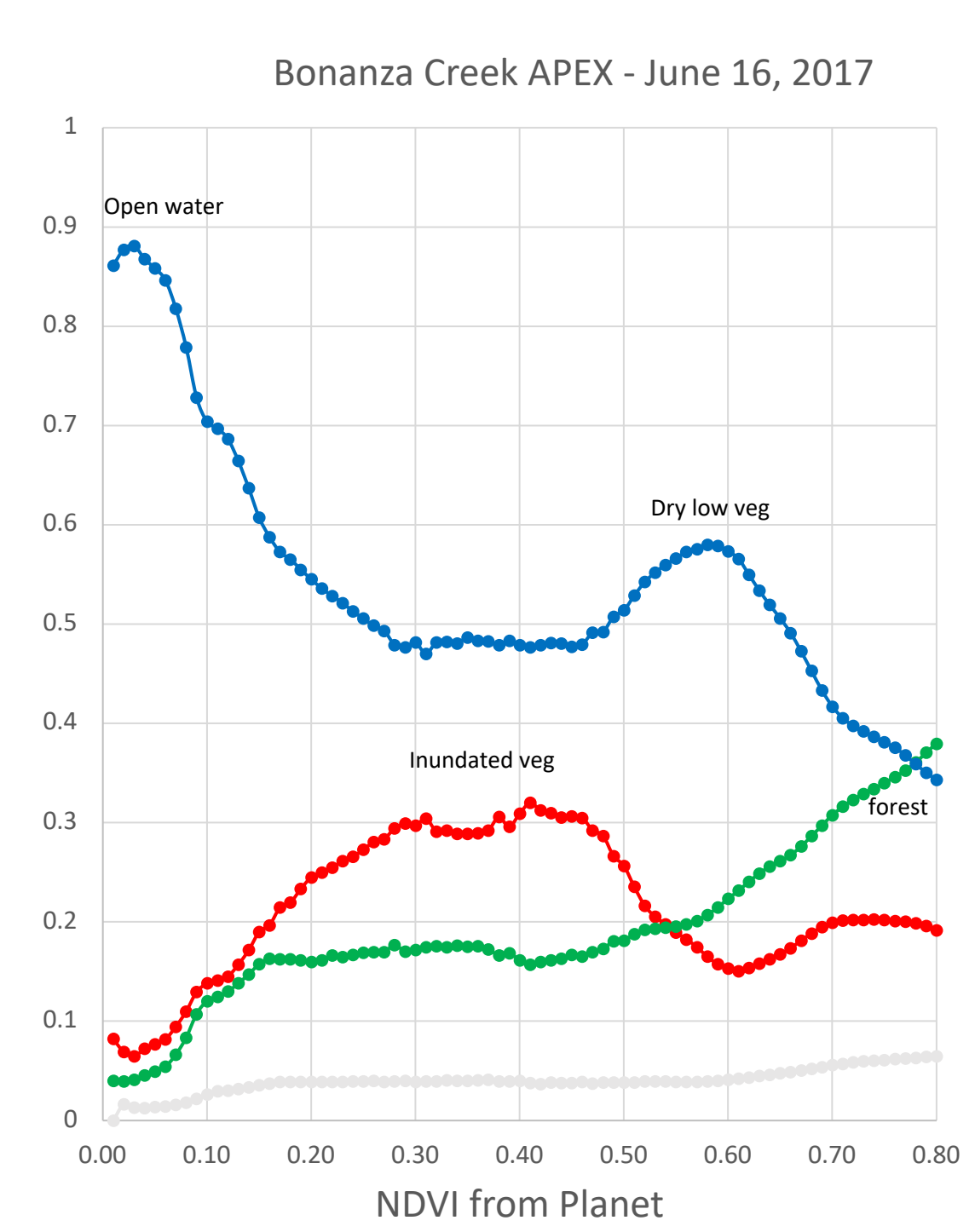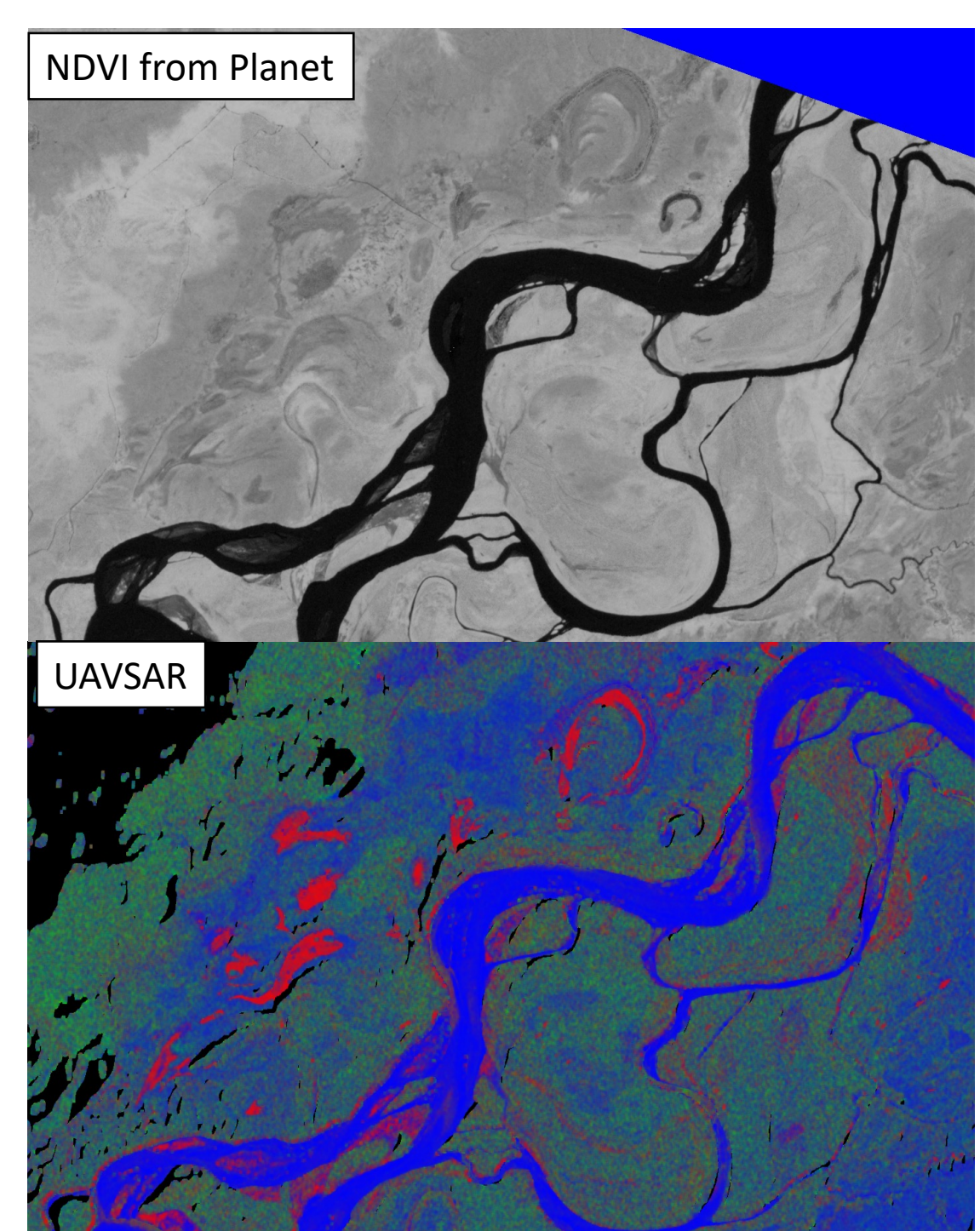Pink: 2.5 rad

Coherence

Flooded vegetation

correlated noise

➤ INSAR data may provide useful information on surface water extent, even with very short SAR baselines and short repeat intervals

What is the relationship between UAVSAR polarimetric decomposition metrics and optical metrics?

APEX site SW of Fairbanks

NDVI from Planet

UAVSAR

Bonanza Creek APEX - June 16, 2017

Open water
Dry low veg
Inundated veg
Forest

DBL
VOL
ODD
TP

NDVI from Planet

NDVI from Planet

UAVSAR

Bonanza Creek APEX - Sept 19, 2017

Open water
Sand bars
Forest

DBL
VOL
ODD
TP

NDVI from Planet

Peace Athabasca Delta

UAVSAR
PadelW_18035
Sept 6, 2017

Normalized decomposition metrics overlayed on Total brightness

Normalized decomposition metrics

Dbl
Vol
Odd

Planet RGB

Planet NDVI

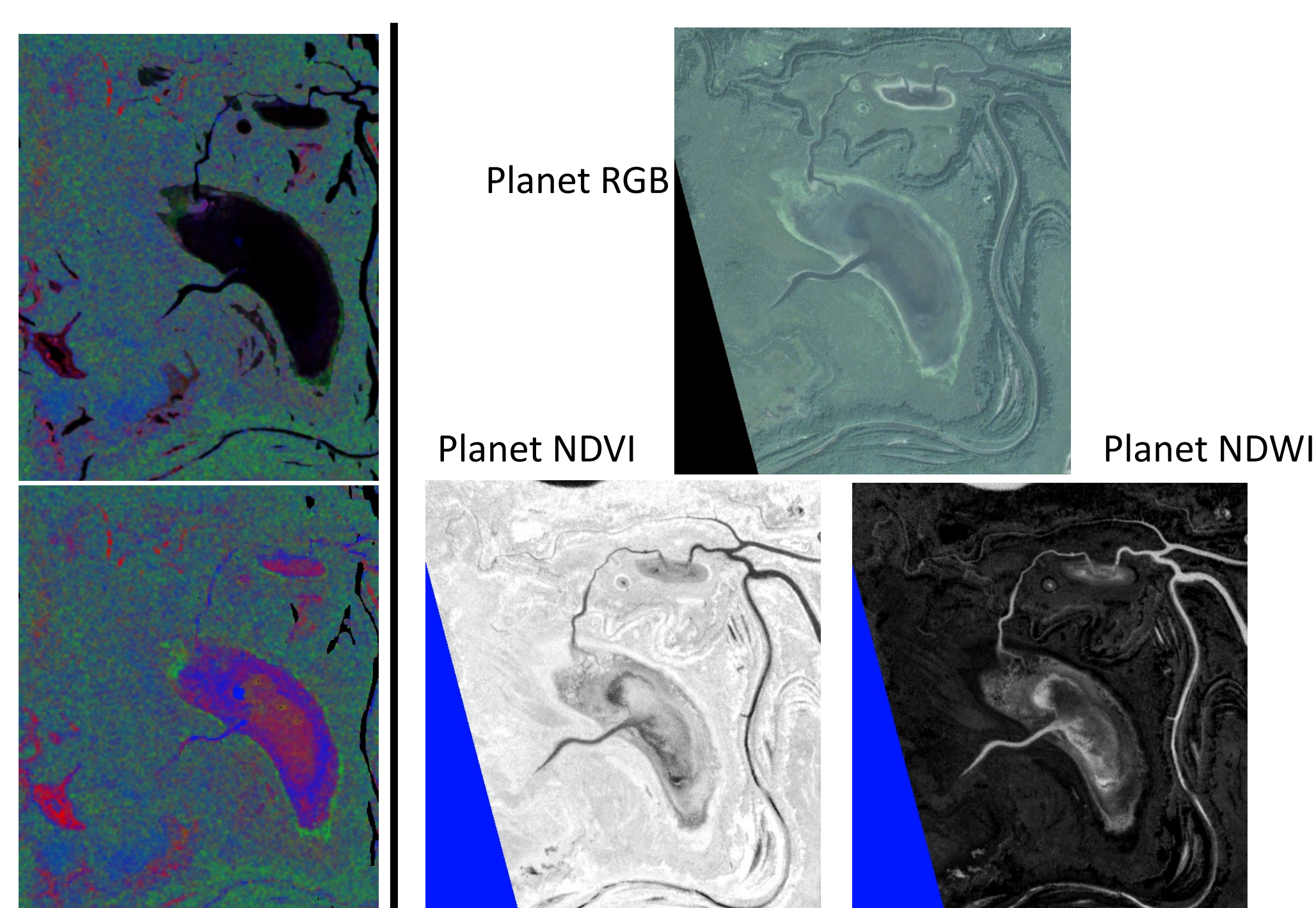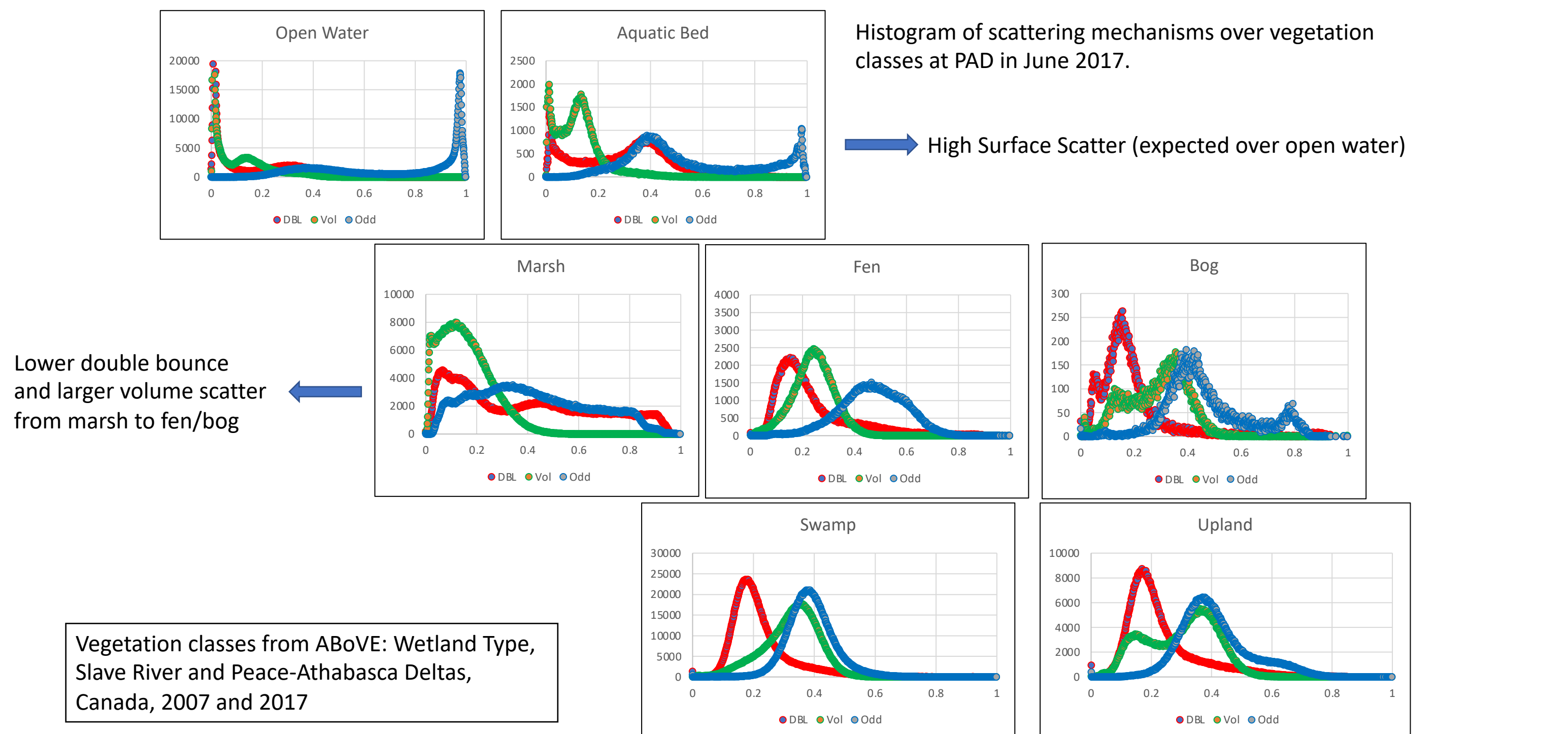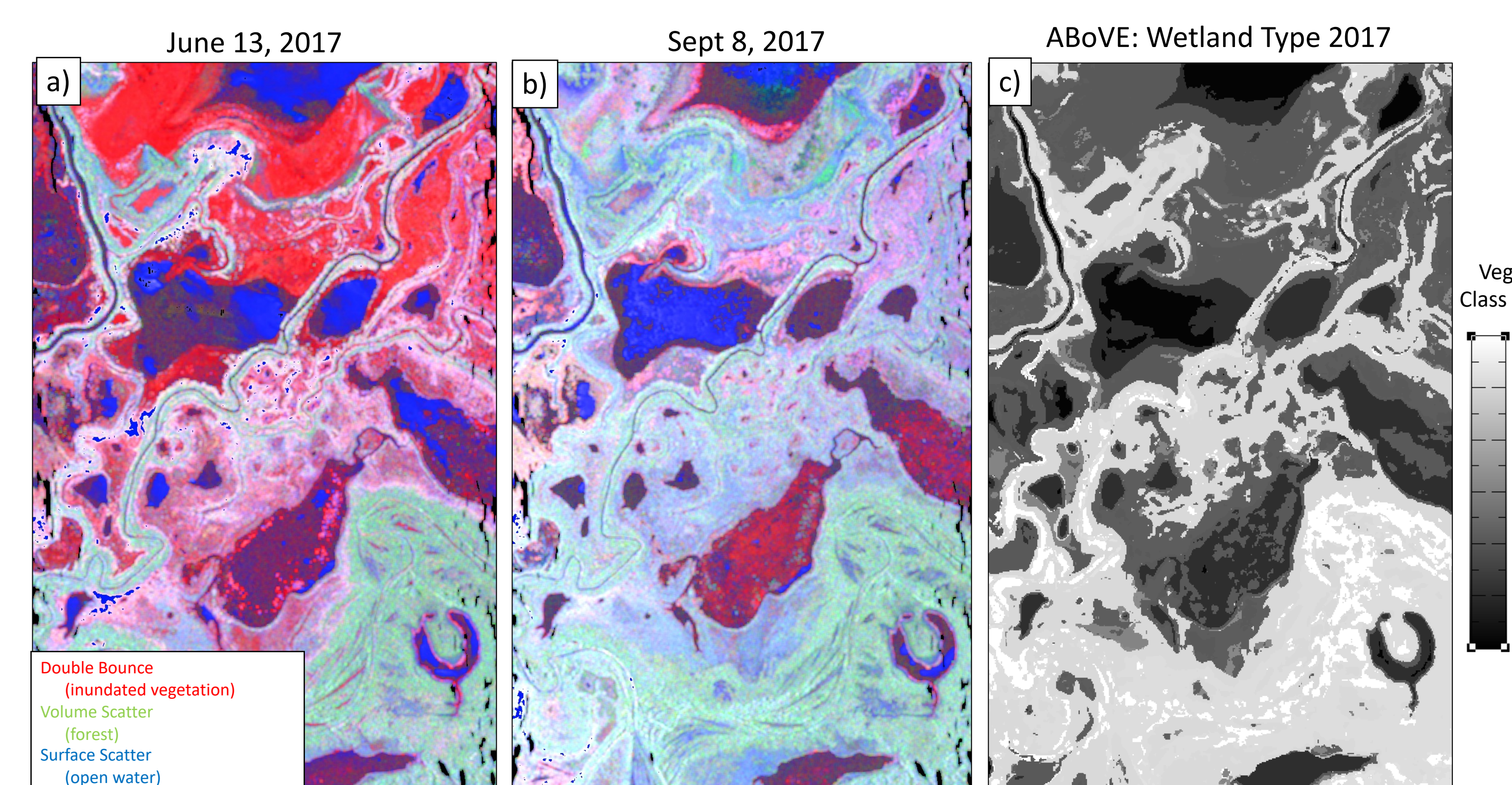Planet NDWI
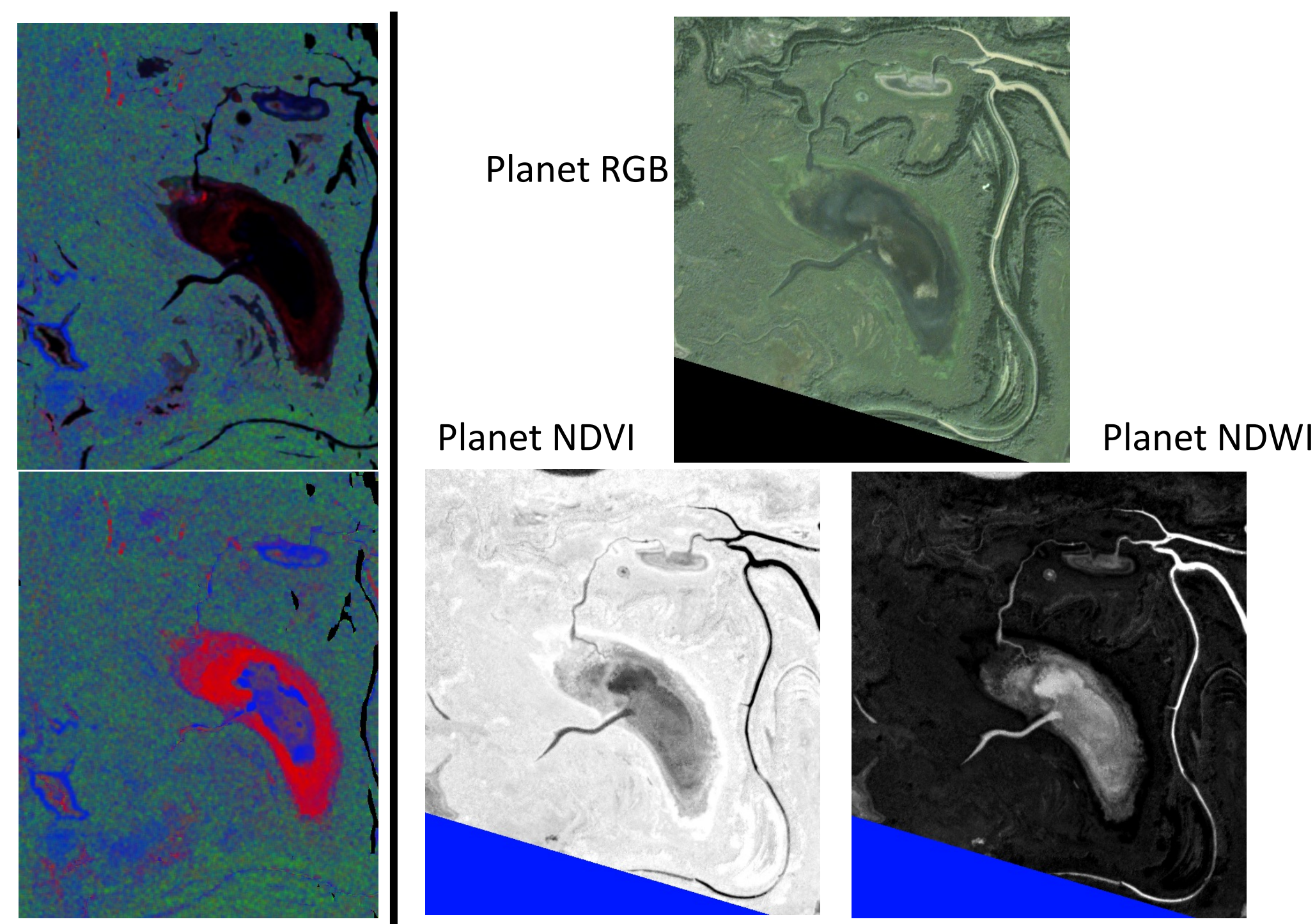
UAVSAR
PadelW_18035
Aug 21, 2018

Normalized decomposition metrics overlayed on Total brightness

Normalized decomposition metrics

Dbl
Vol
Odd

Planet RGB

Planet NDVI

Planet NDWI

➤ Optical metrics and those from L-band SAR provide complementary information

Assessing inundation dynamics within vegetation classes from UAVSAR

a) June 13, 2017   b) Sept 8, 2017   c) ABoVE: Wetland Type 2017

Veg Class ID

Double Bounce
(inundated vegetation)
Volume Scatter
(forest)
Surface Scatter
(open water)

Histogram of scattering mechanisms over vegetation classes at PAD in June 2017.

Open Water

Aquatic Bed

➤ High Surface Scatter (expected over open water)

Marsh

Fen

Bog

← Lower double bounce and larger volume scatter from marsh to fen/bog

Swamp

Upland

Vegetation classes from ABoVE: Wetland Type, Slave River and Peace-Athabasca Deltas, Canada, 2007 and 2017

➤ Inundation dynamics will enhance information on vegetation classes within wetland areas