

AirMSPI – RSP polarimetric intercomparison

Gerard van Harten

Jet Propulsion Laboratory, California Institute of Technology

ACE Polarimeter Working Group meeting – June 12, 2015



Introduction

Jet Propulsion Laboratory

- Kirk Knobelspiesse intercomparison
 - Posters at AGU 2013/2014
 - Intensities agree within error bars, DoLP disagrees
 - <https://earthscience.arc.nasa.gov/sgg/ACEPWG/>
- AirMSPI & RSP reprocessed
- SPEX coming soon

Scenes

CLDY1943

CLDYx

CLDY2036

Rosamond

Huntington beach

Monterey Bay

Data LDEO-Columbia, NSF, NOAA
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
© 2014 Google
Image Landsat

Google earth

Imagery Date: 4/9/2013 lat 35.667775° lon -121.312913° elev 9 m eye alt 755.93 km

Credit: Kirk Knobelspiesse

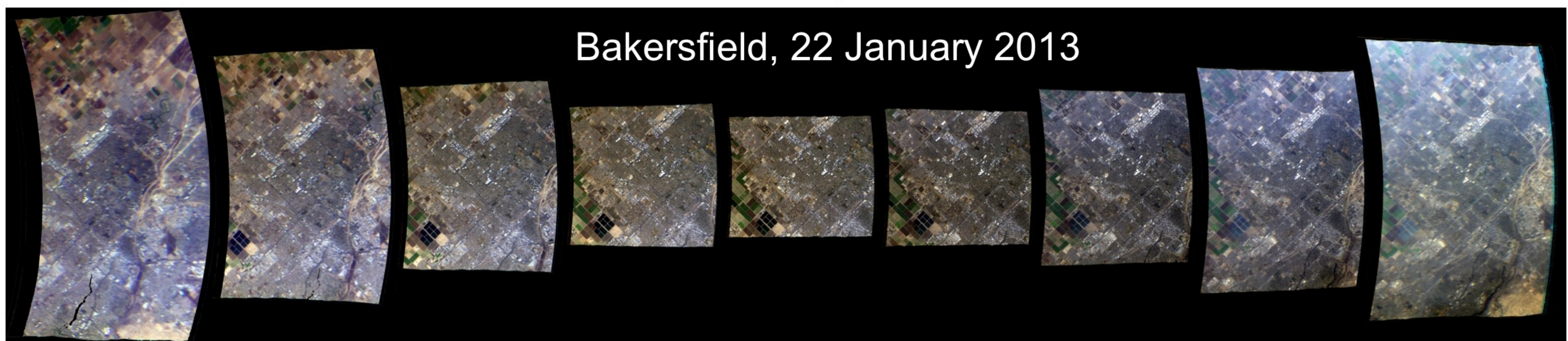
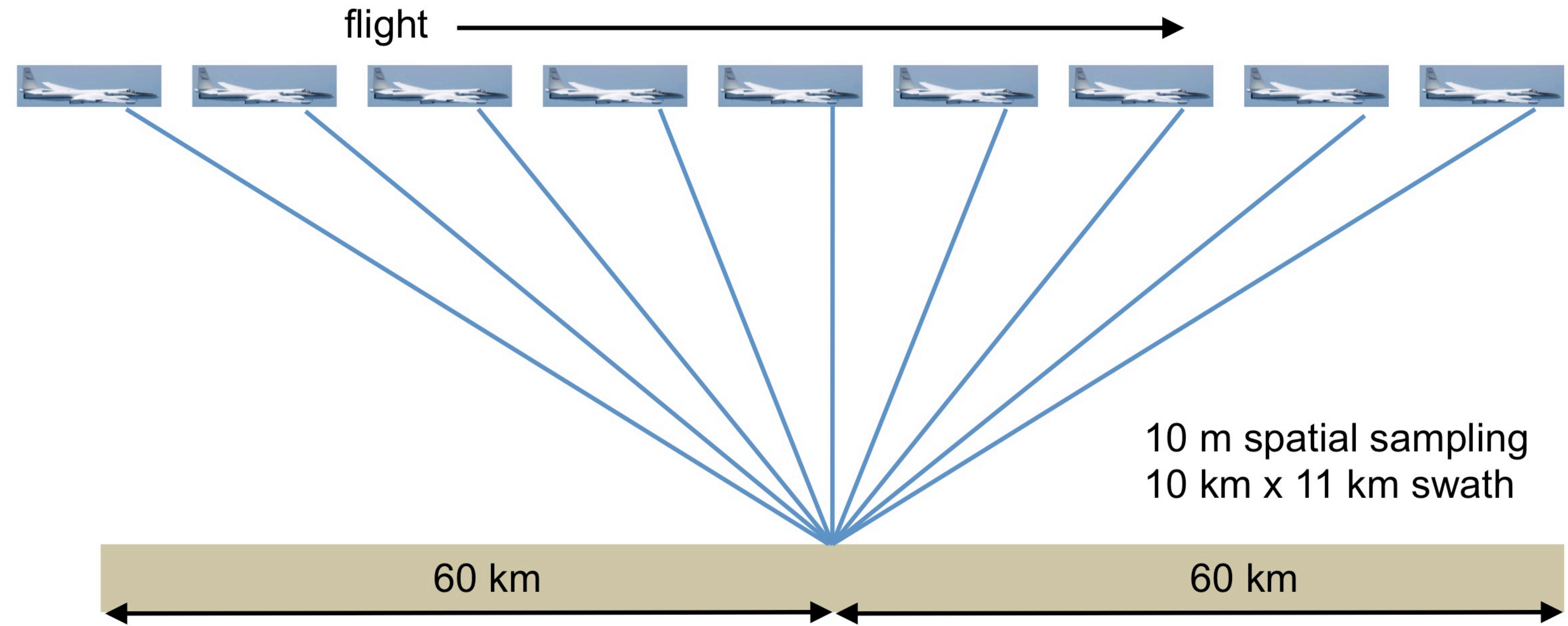




AirMSPI modes

Jet Propulsion Laboratory

Step and stare imaging

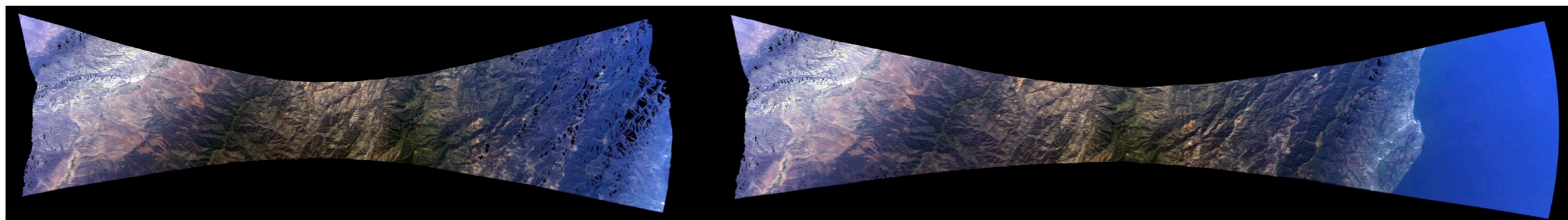
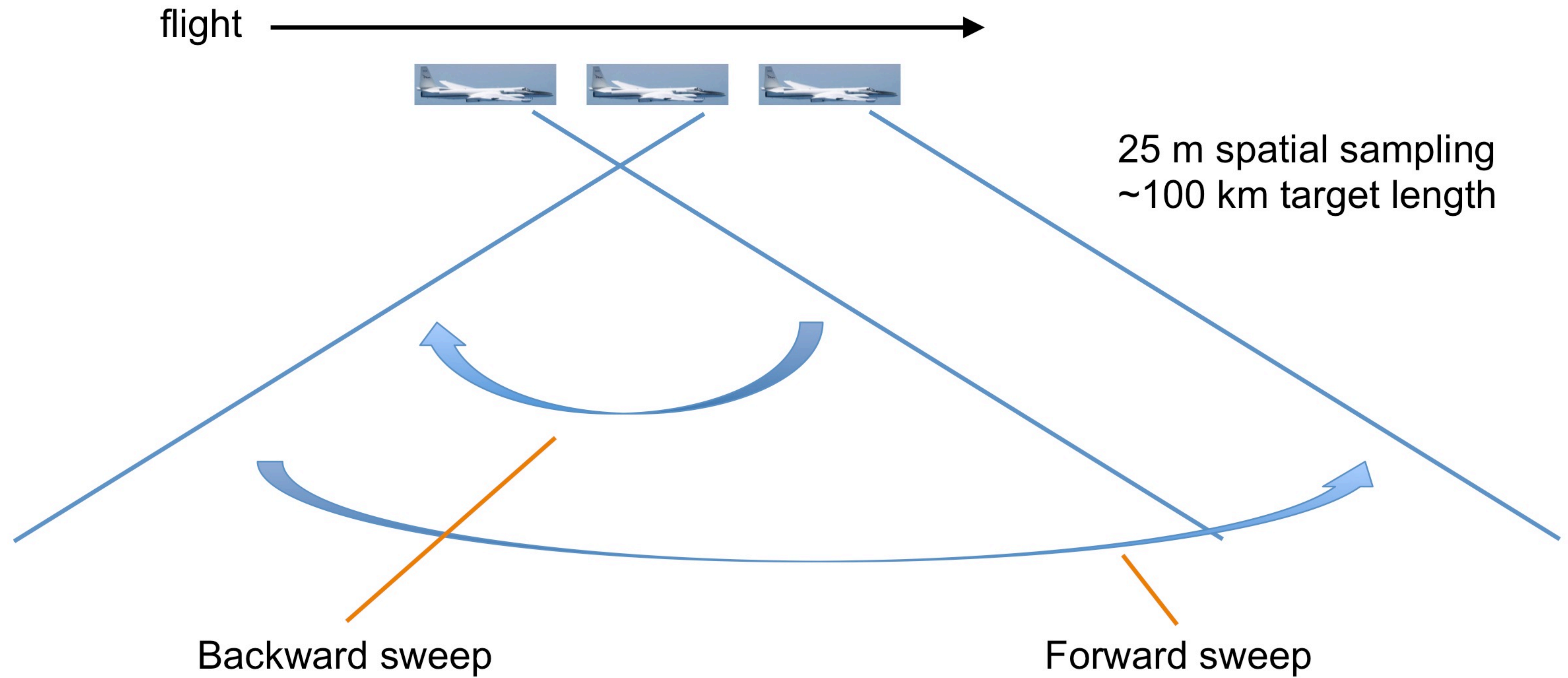




AirMSPI modes

Jet Propulsion Laboratory

Sweep mode imaging

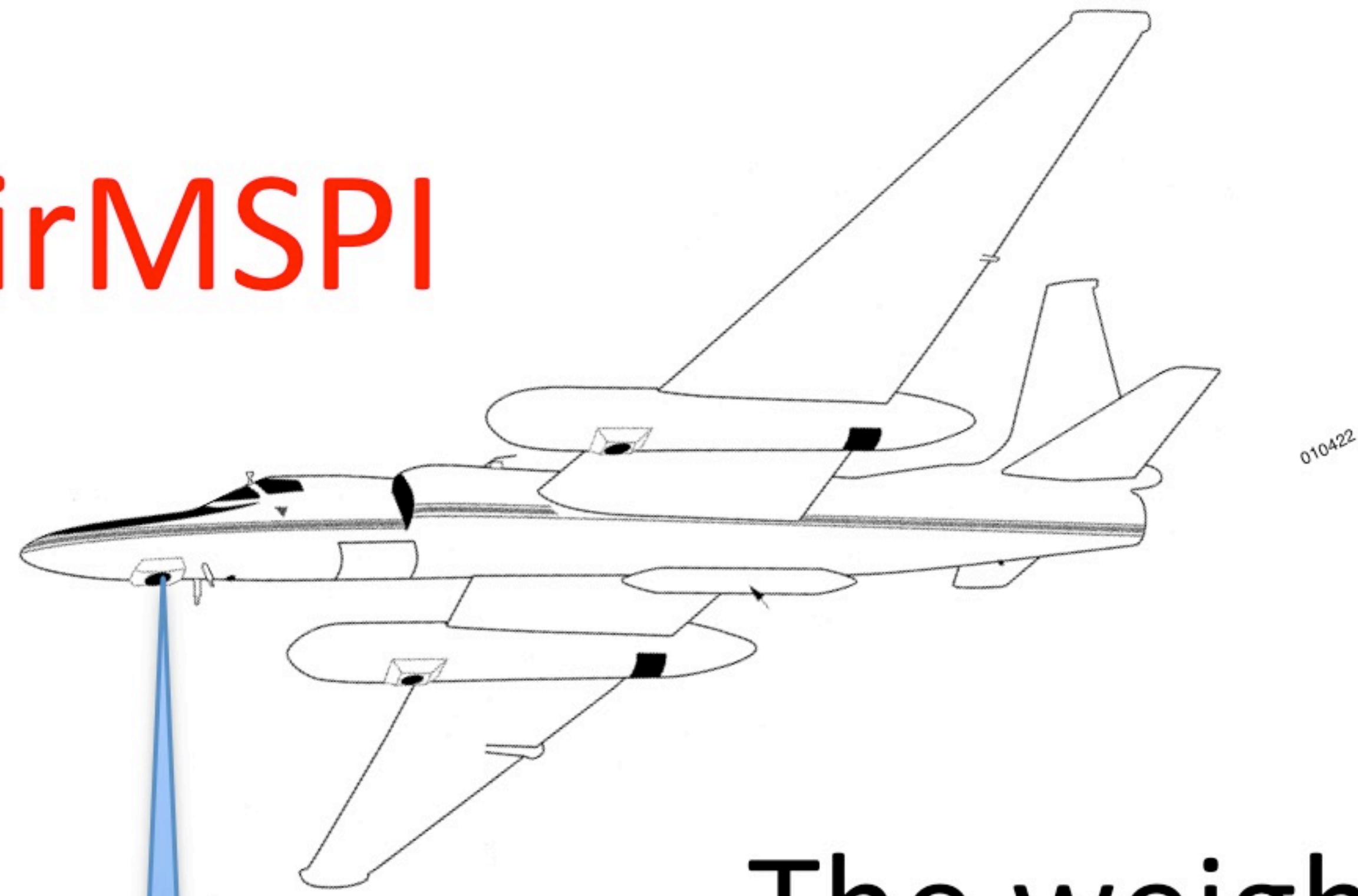


Santa Barbara, 1 August 2013

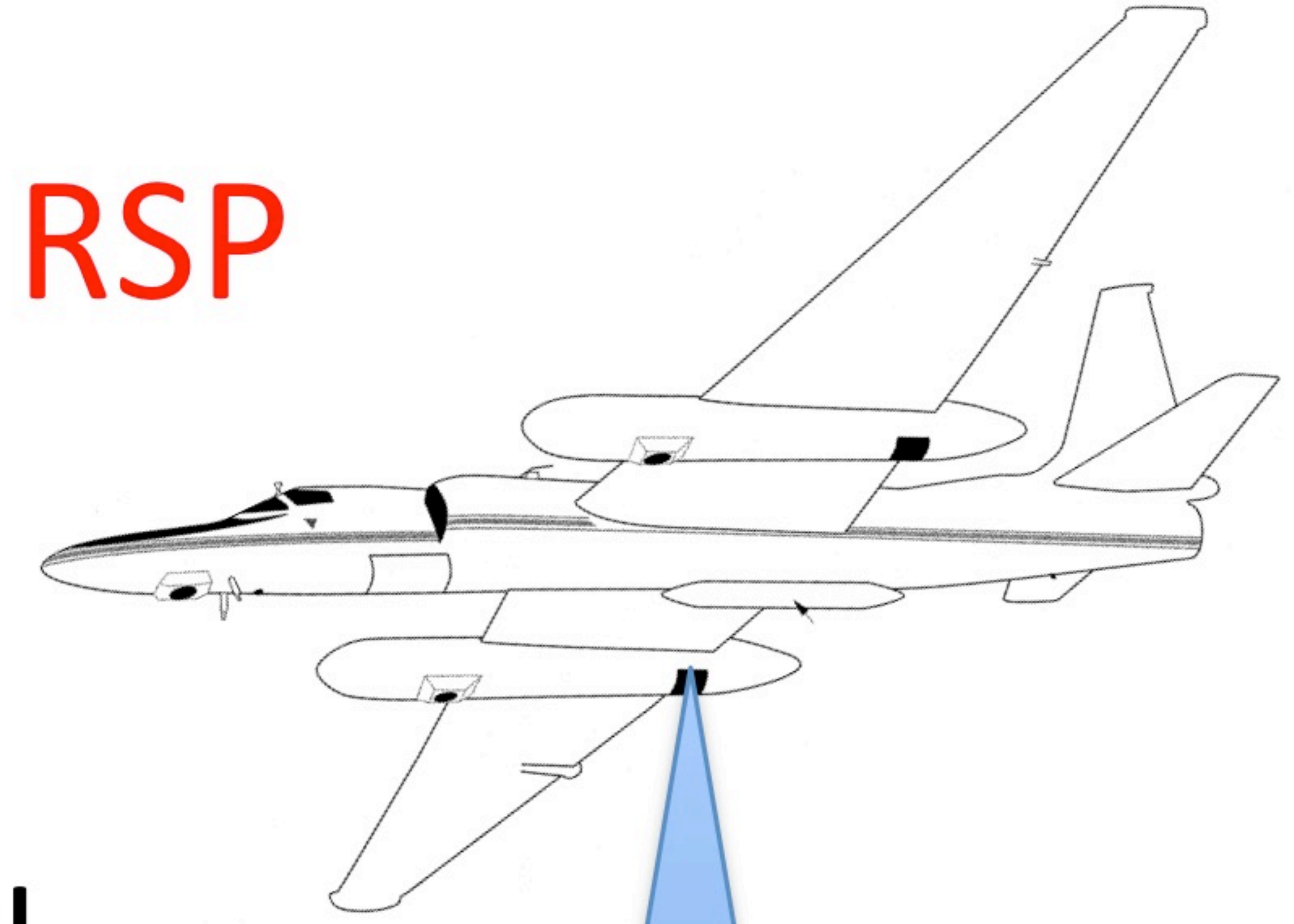
Pixel to pixel matchup

Spatial scale considerations

AirMSPI



RSP



The weighted mean of all AirMSPI data within the RSP footprint + 'smear' are extracted for comparison

7m nadir footprint,
9m along track
'smear'

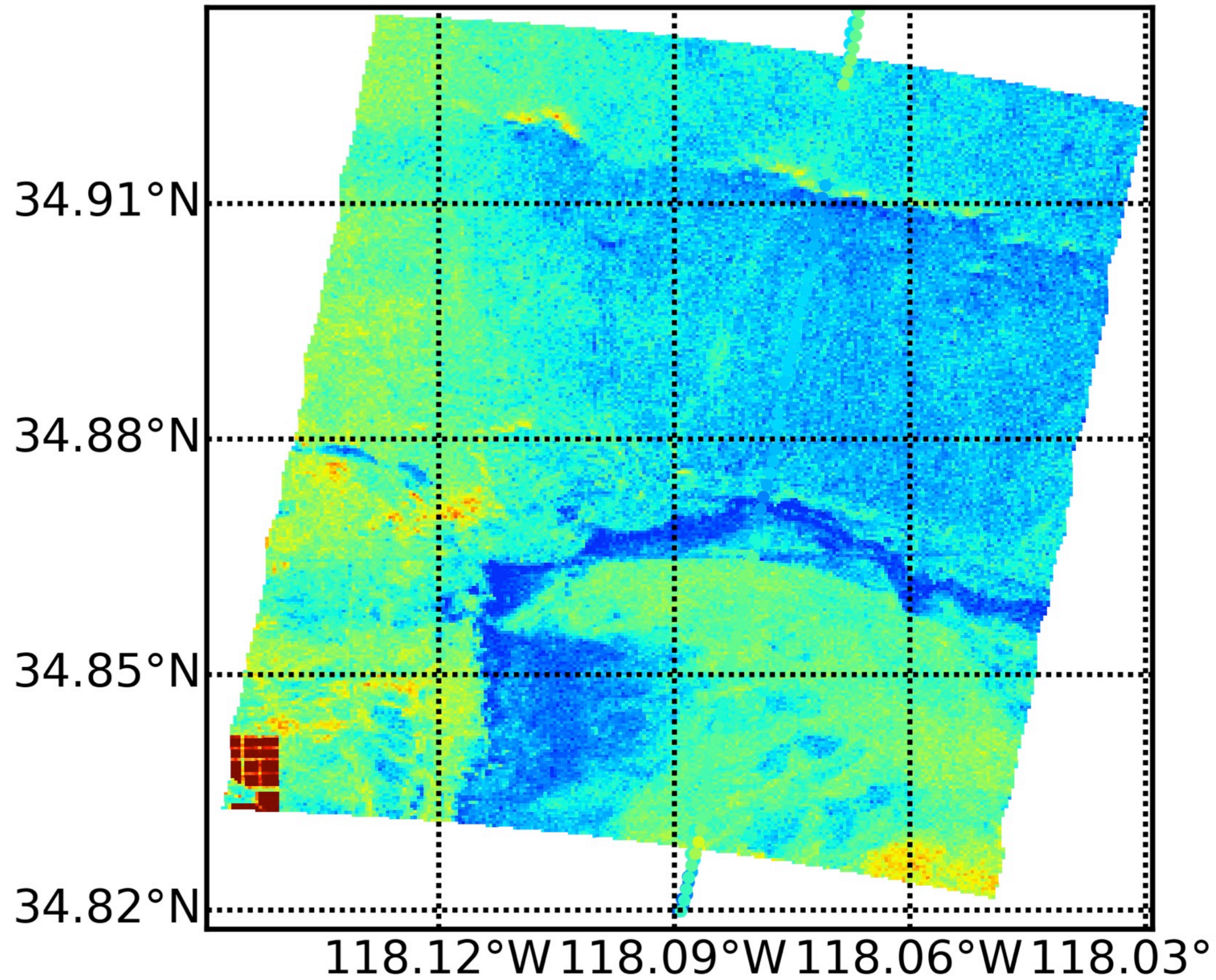
277m nadir
footprint, 277m
along track 'smear'



Rosamond

Jet Propulsion Laboratory

470 nm



0.12 0.18 0.24 0.30

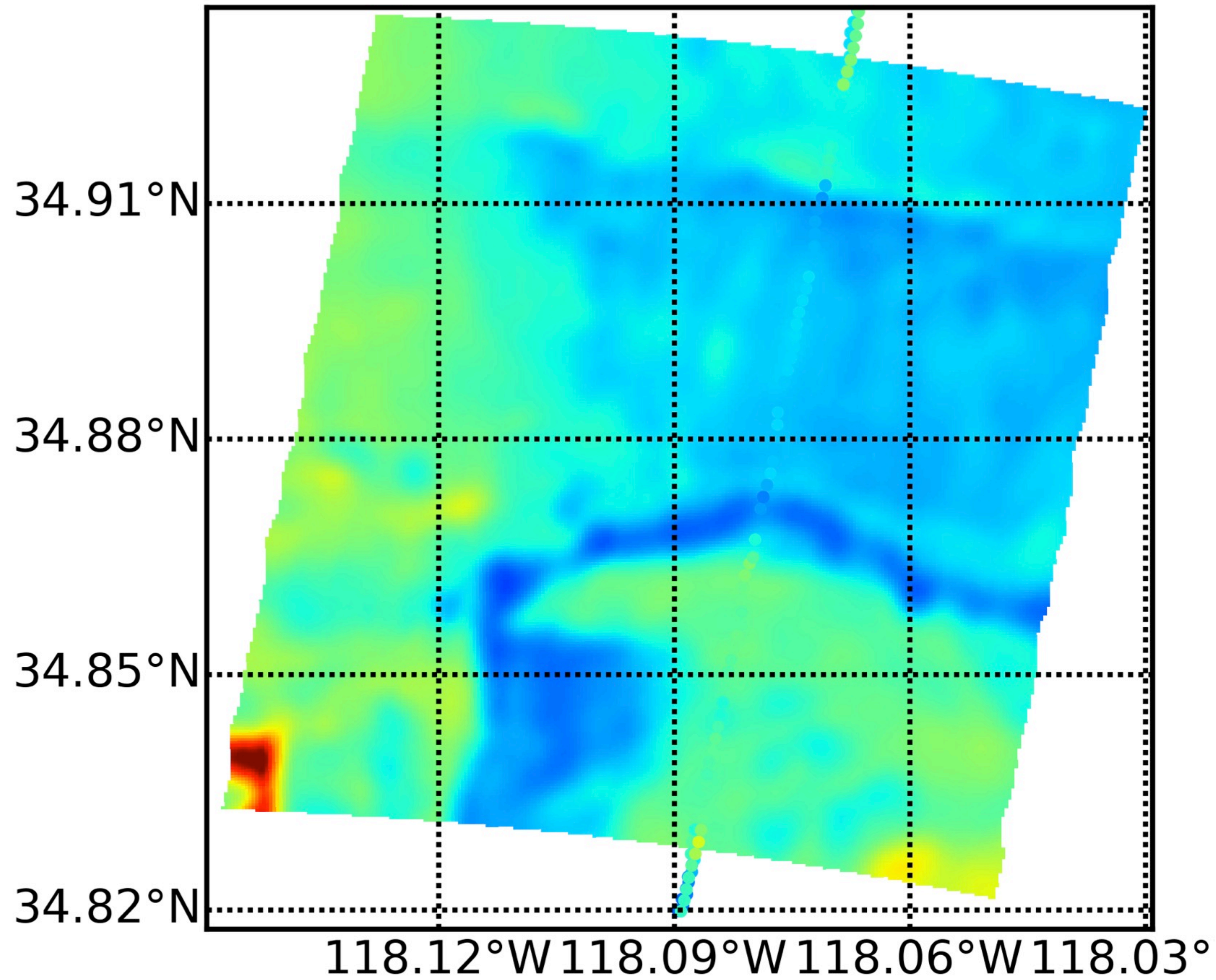
DoLP



Rosamond

Jet Propulsion Laboratory

470 nm



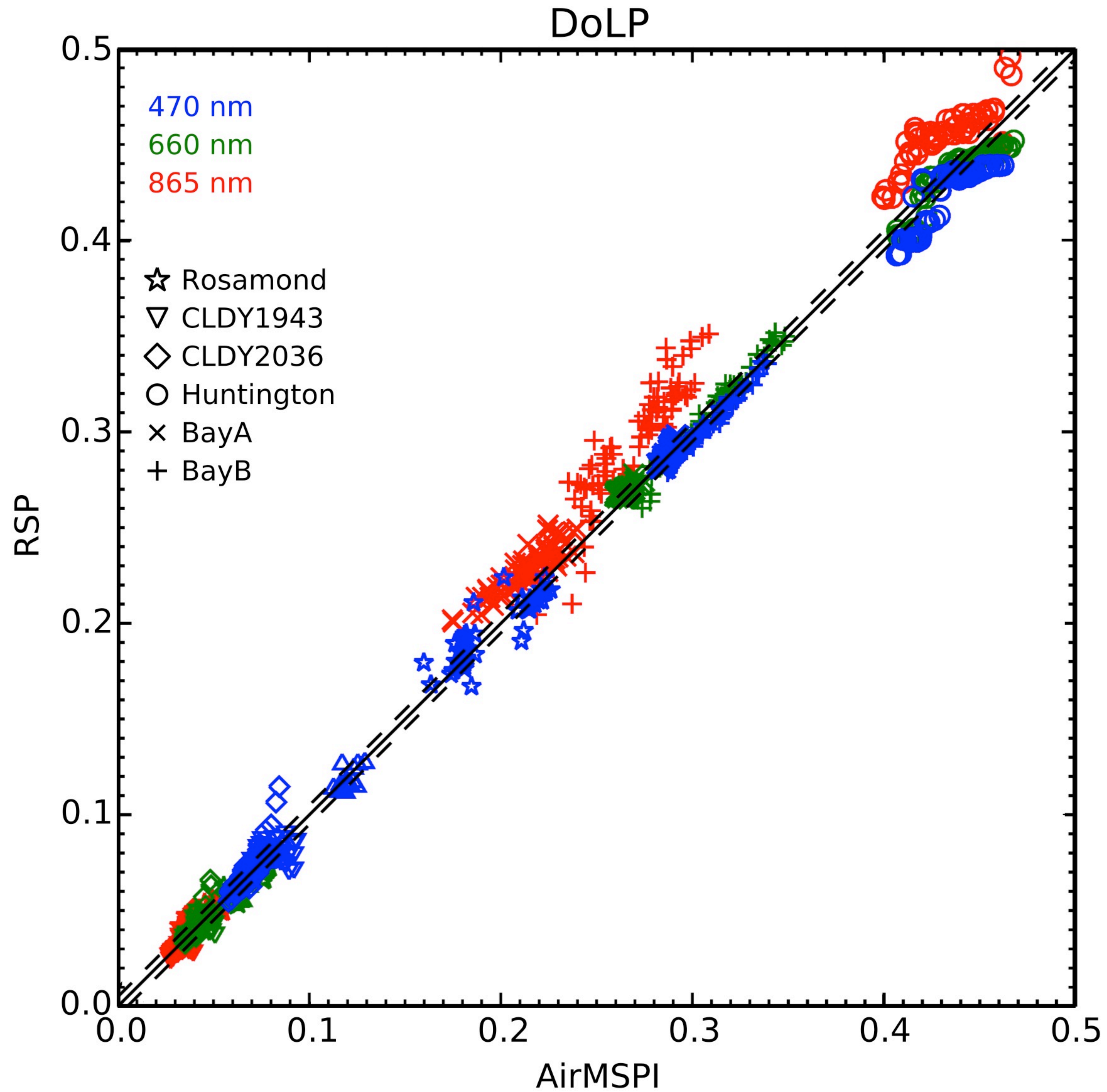
0.12 0.18 0.24 0.30

DoLP



Kirk intercomparison 2014

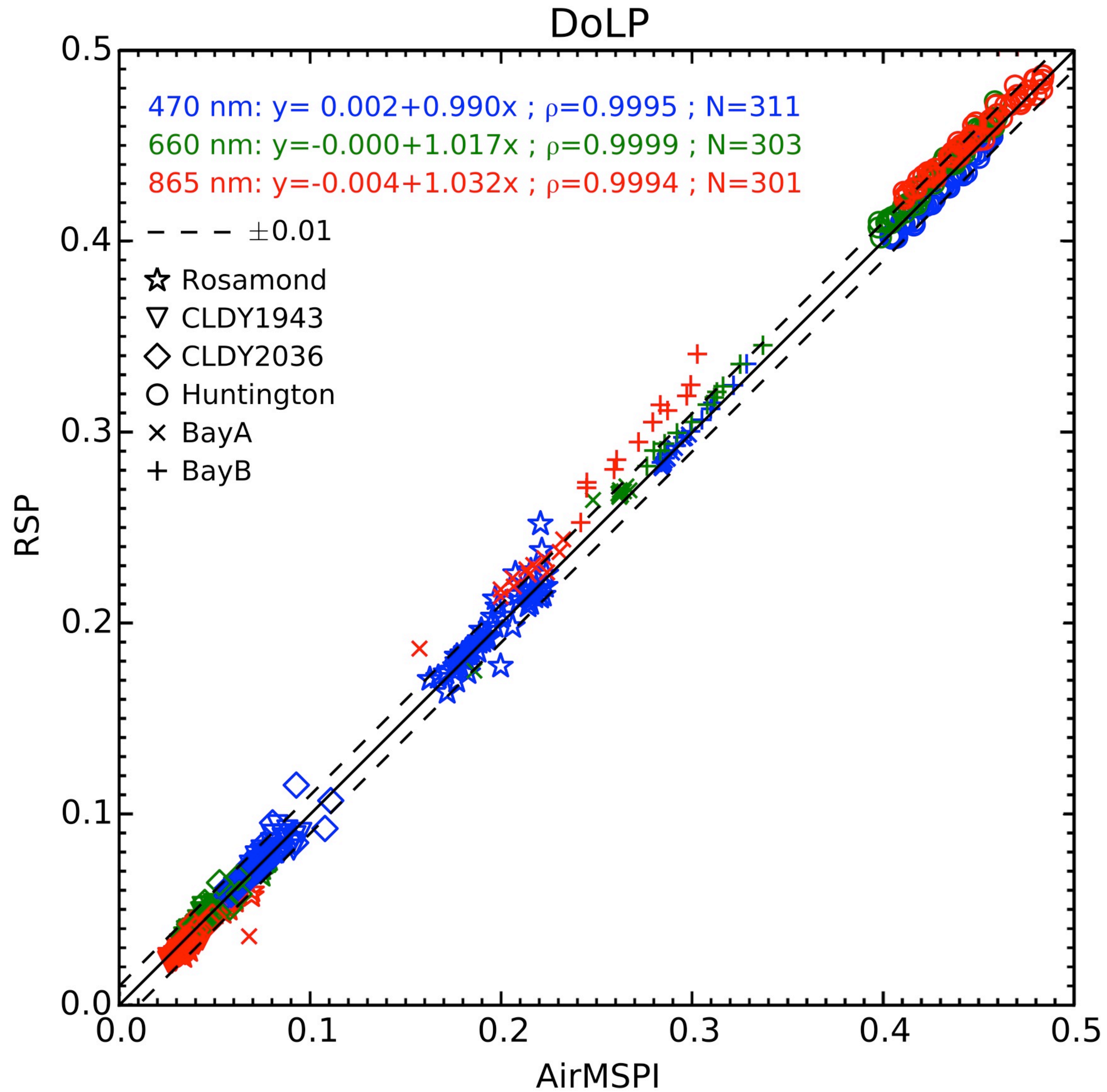
Jet Propulsion Laboratory





JPL intercomparison 2015

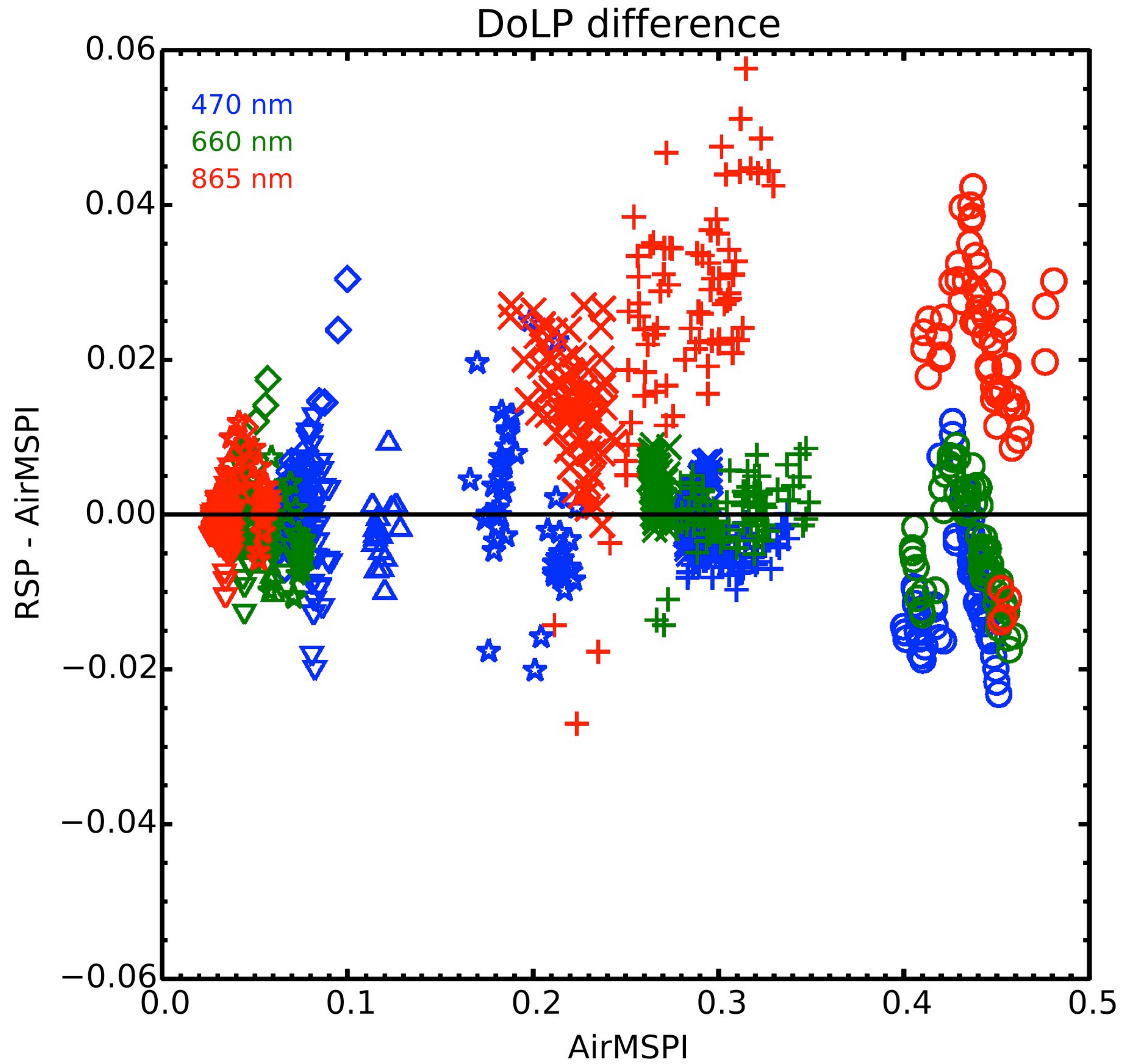
Jet Propulsion Laboratory

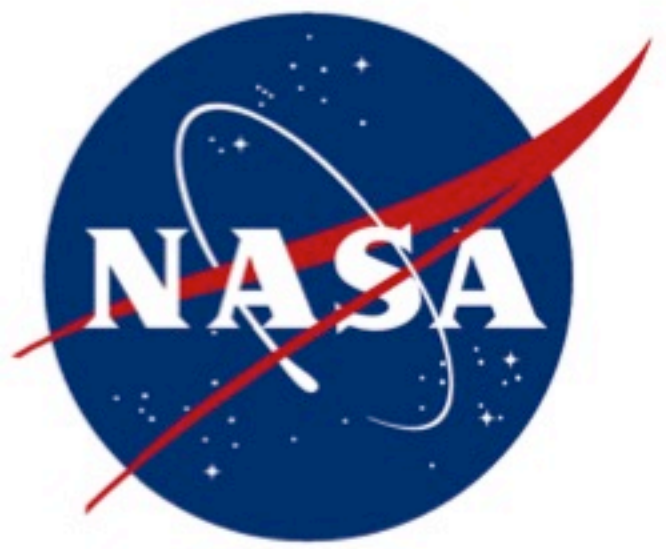




Kirk intercomparison 2014

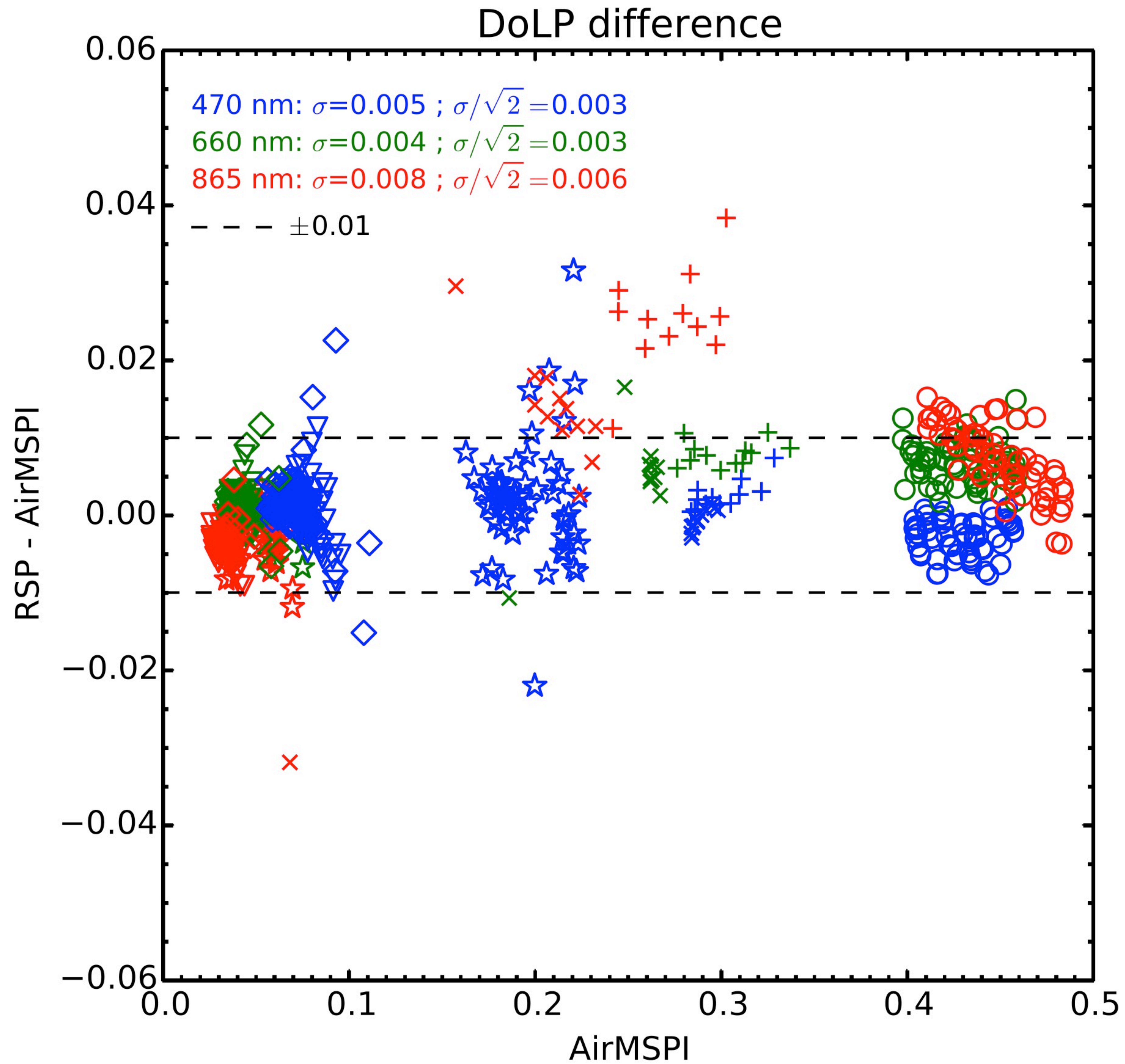
Jet Propulsion Laboratory





JPL intercomparison 2015

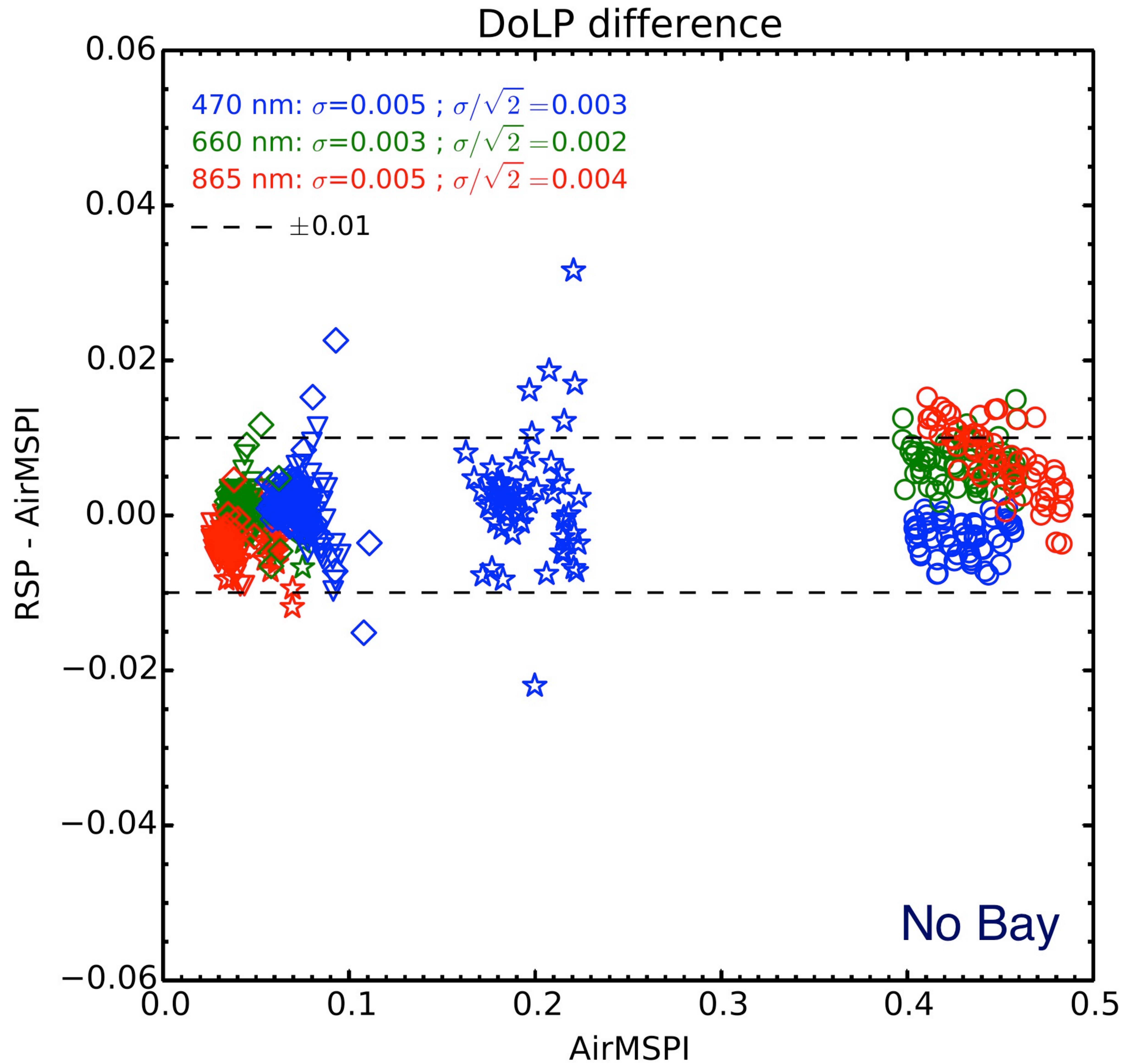
Jet Propulsion Laboratory





JPL intercomparison 2015

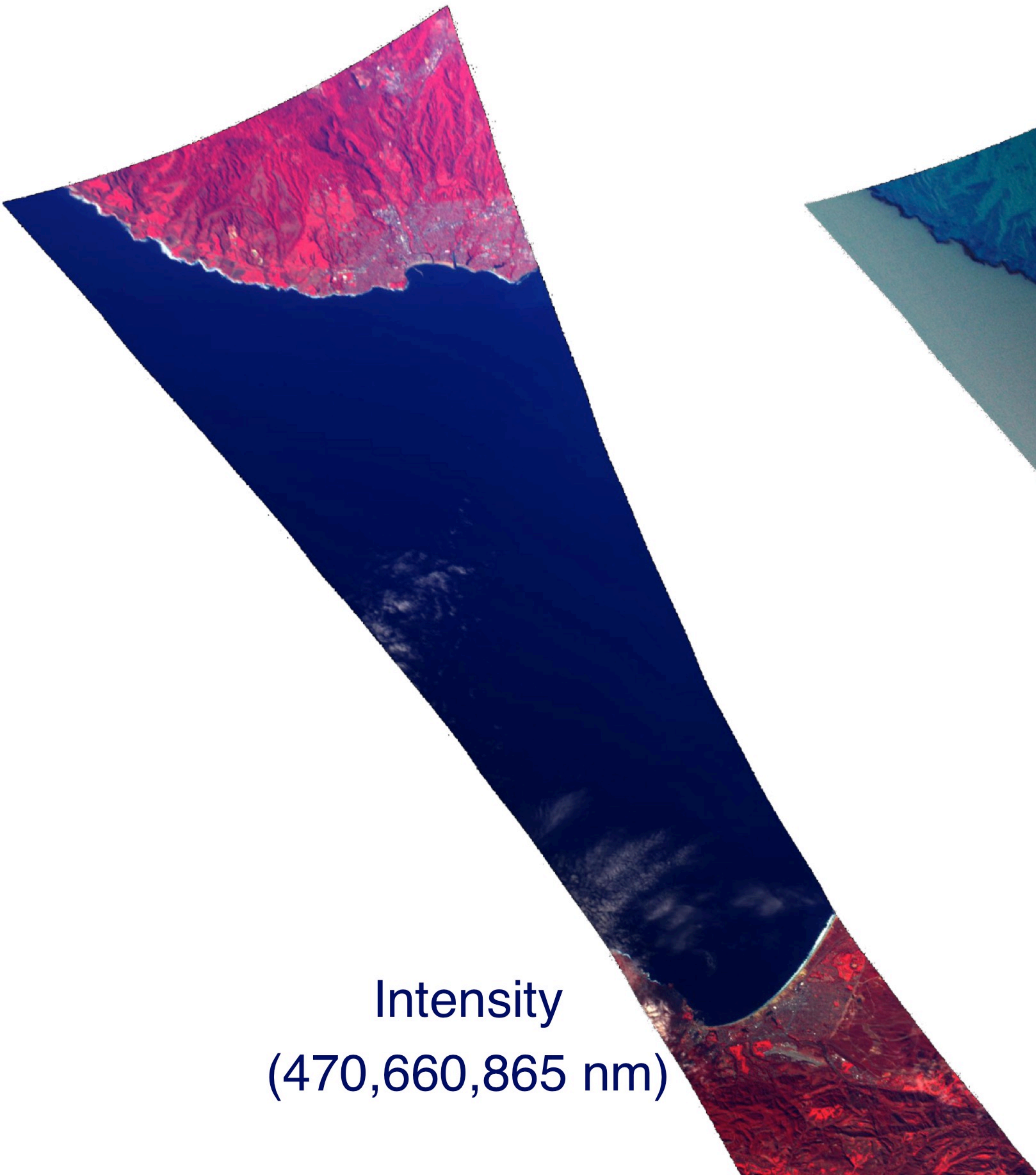
Jet Propulsion Laboratory



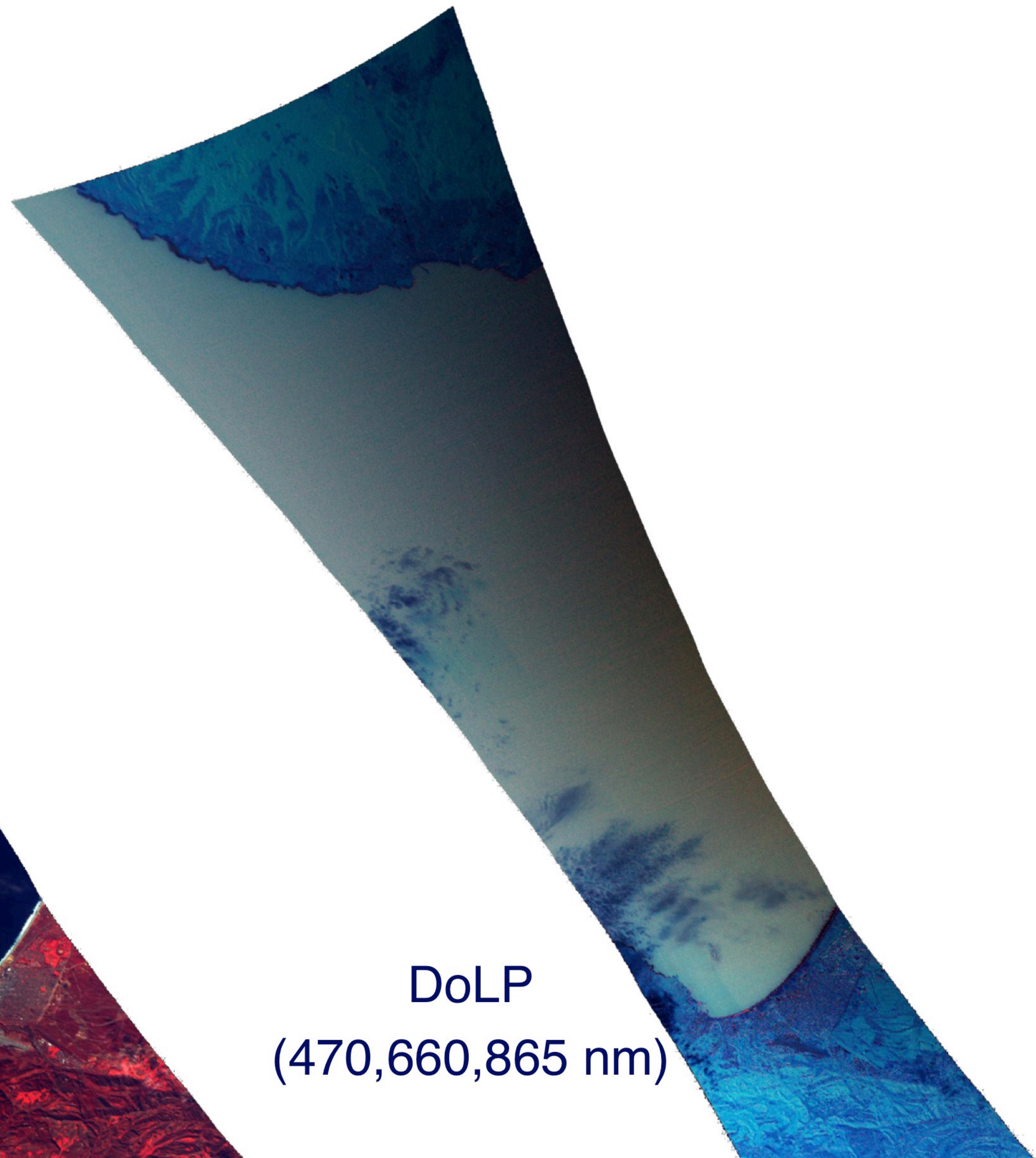


Monterey Bay

Jet Propulsion Laboratory



Intensity
(470,660,865 nm)

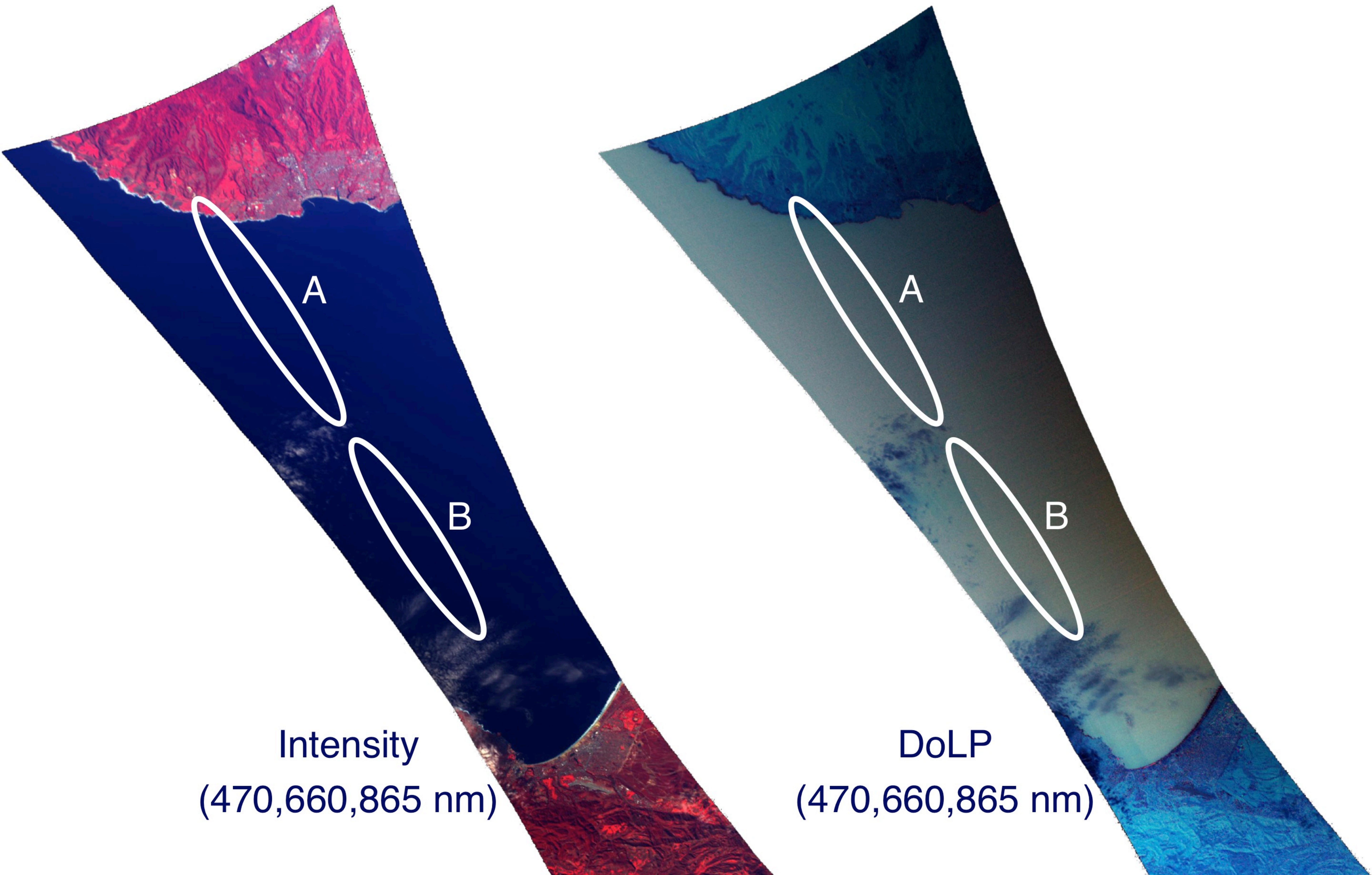


DoLP
(470,660,865 nm)



Monterey Bay

Jet Propulsion Laboratory



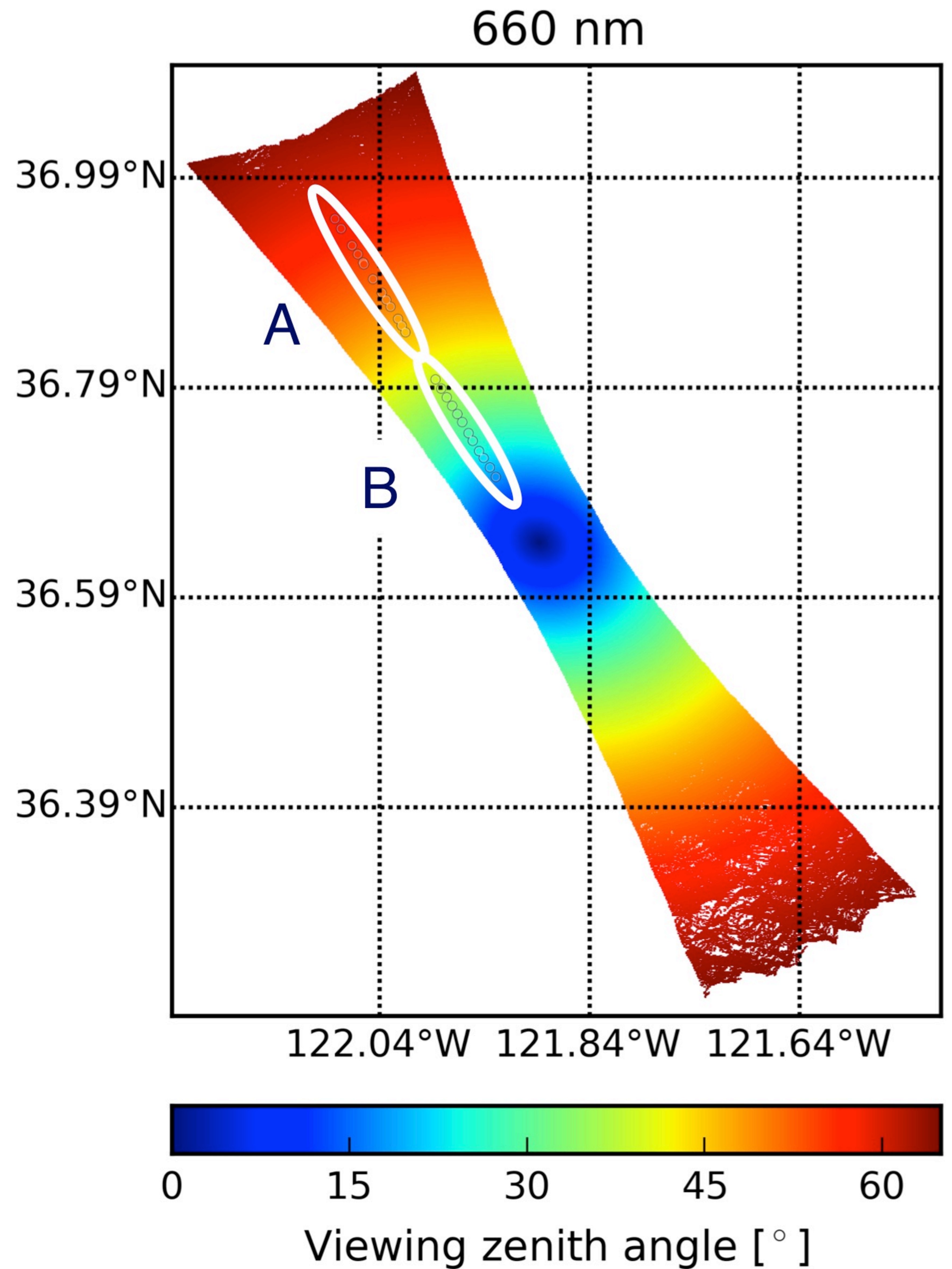
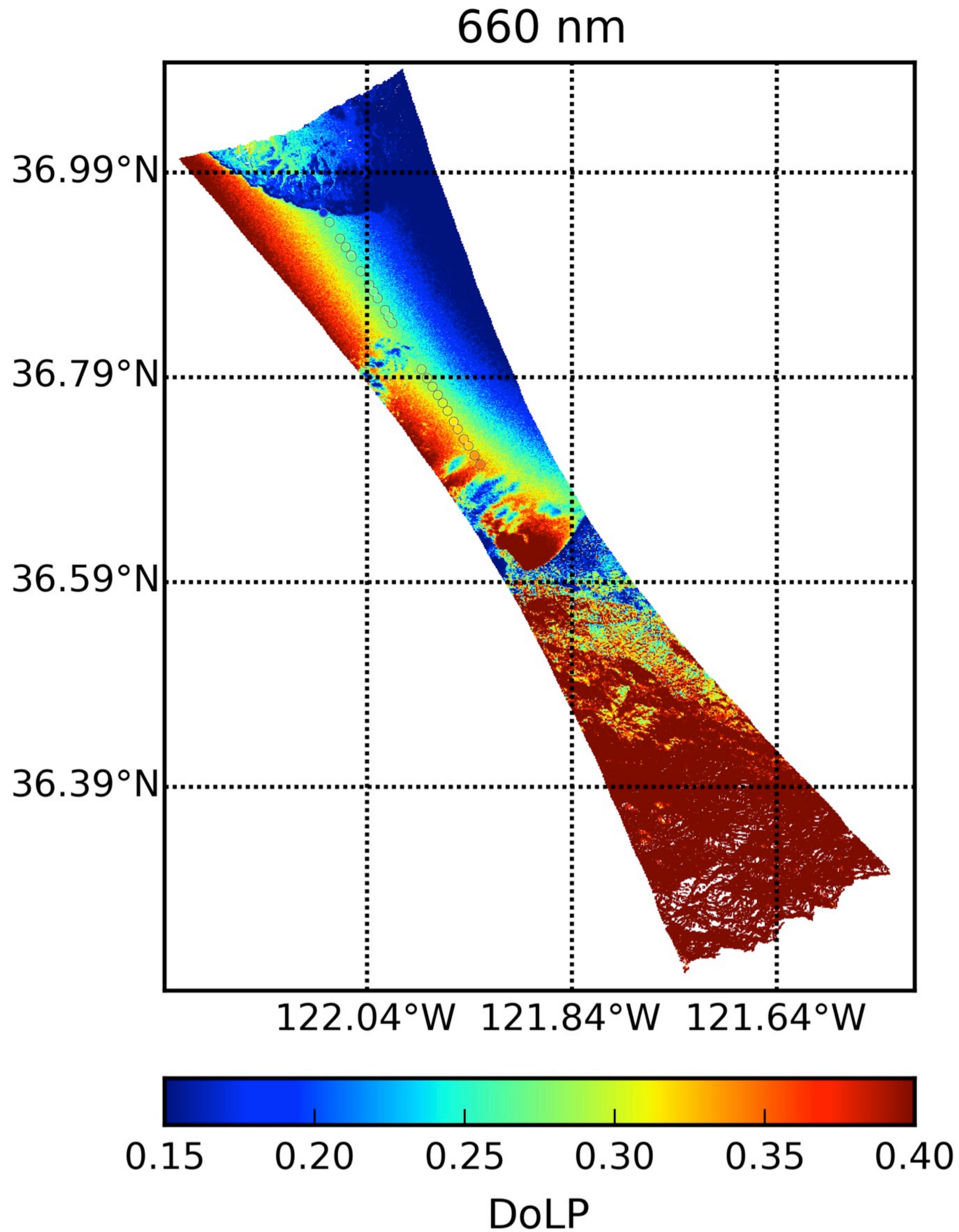
Intensity
(470,660,865 nm)

DoLP
(470,660,865 nm)



Monterey Bay

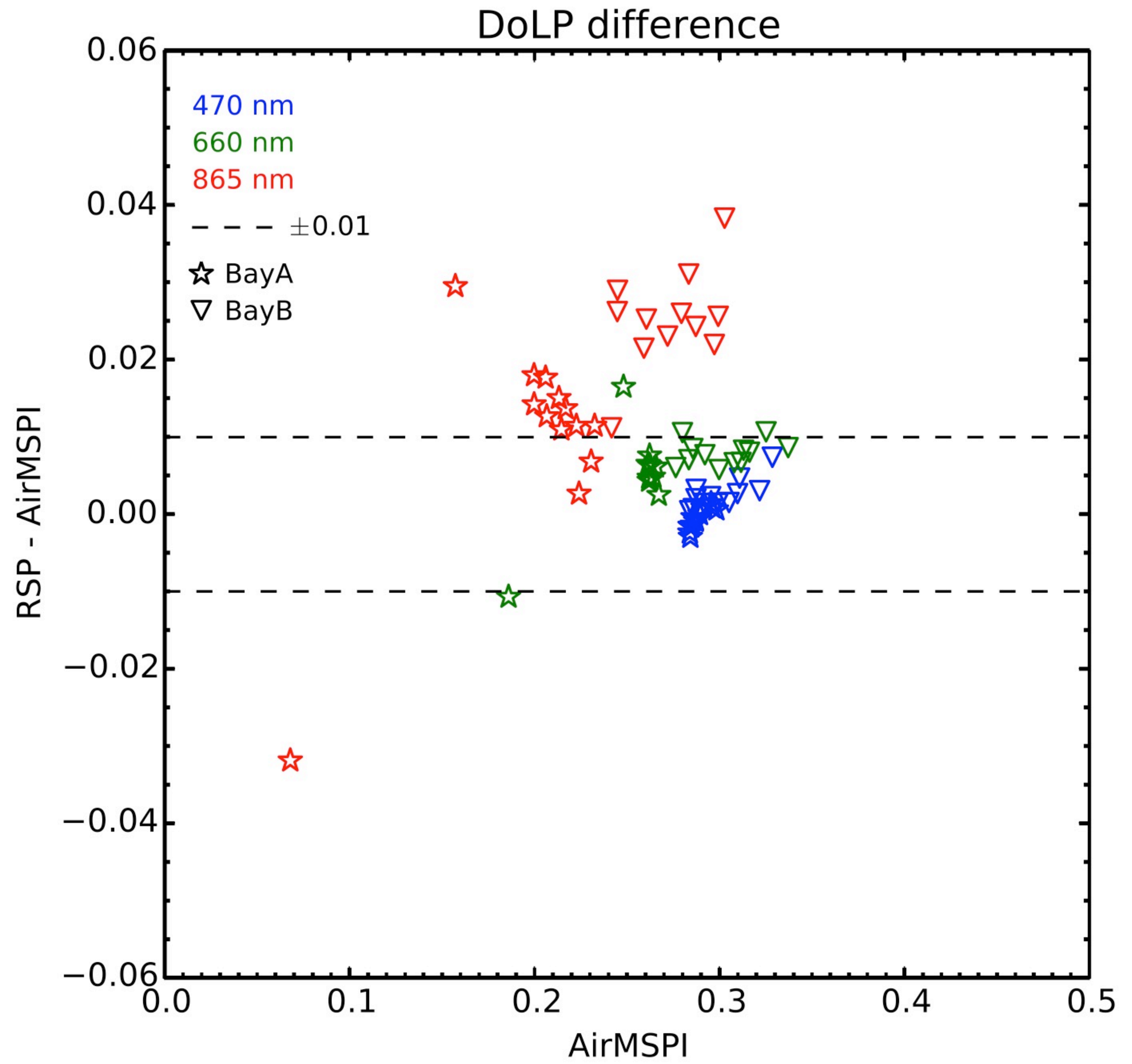
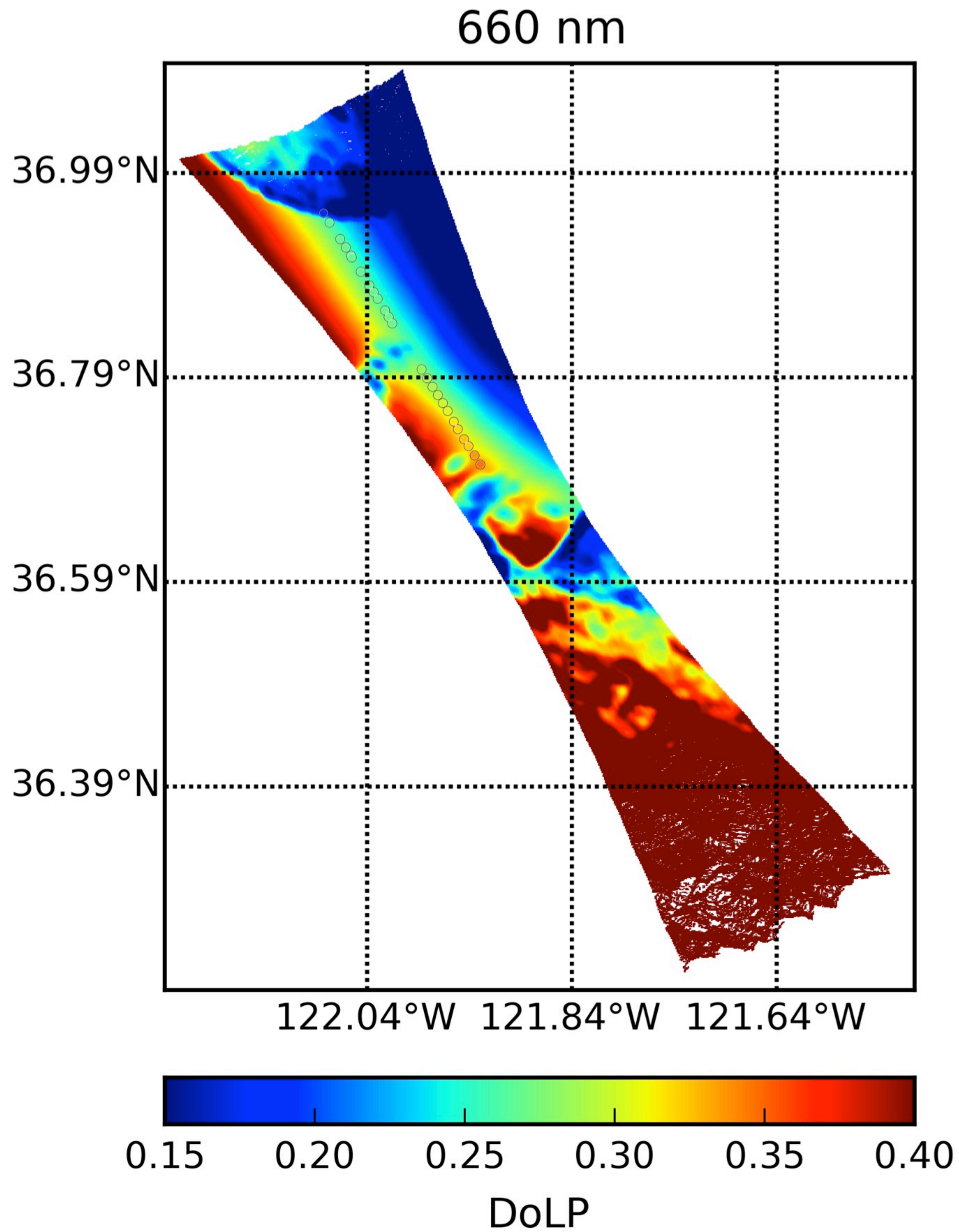
Jet Propulsion Laboratory





Monterey Bay

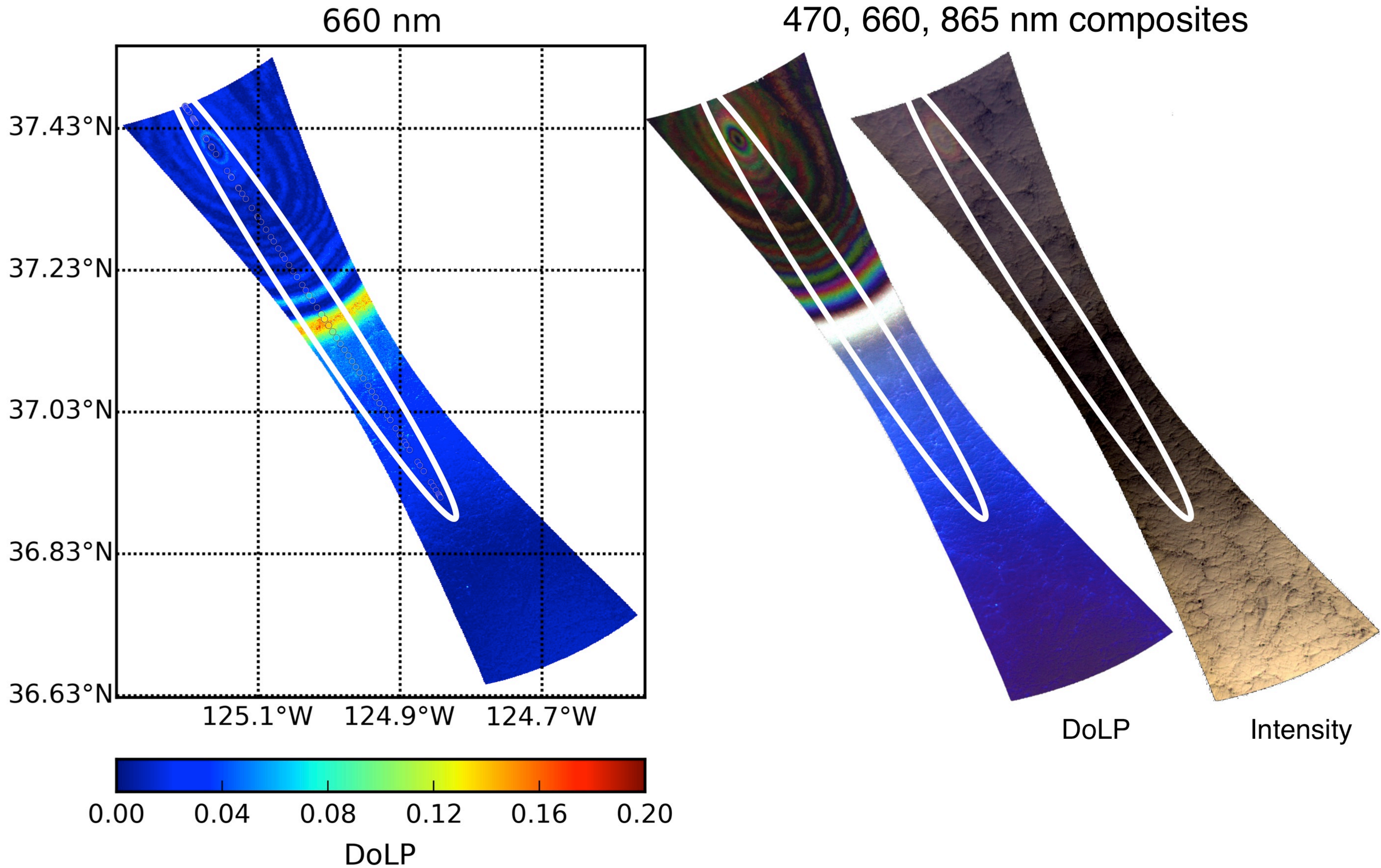
Jet Propulsion Laboratory





Cloudbow

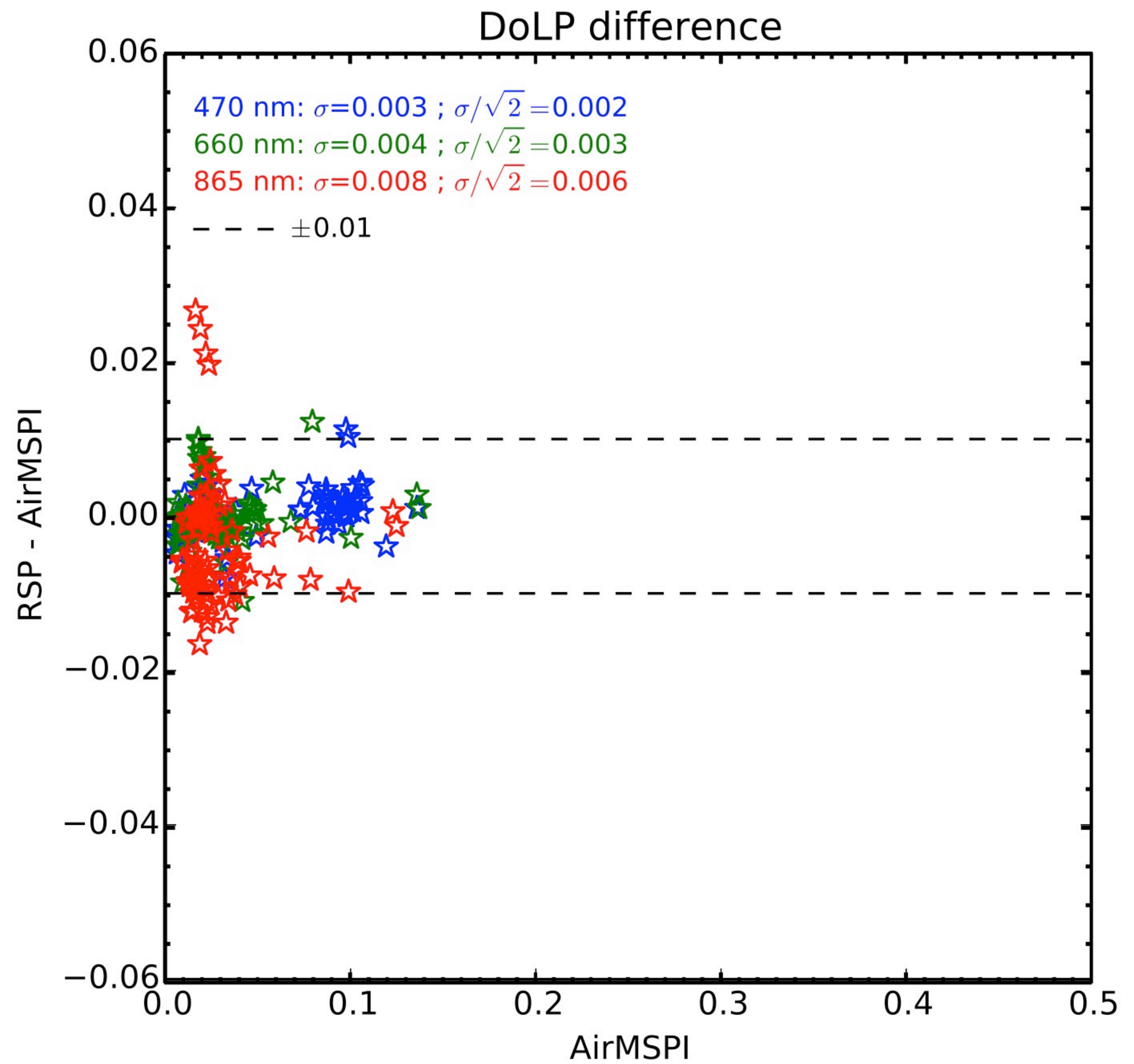
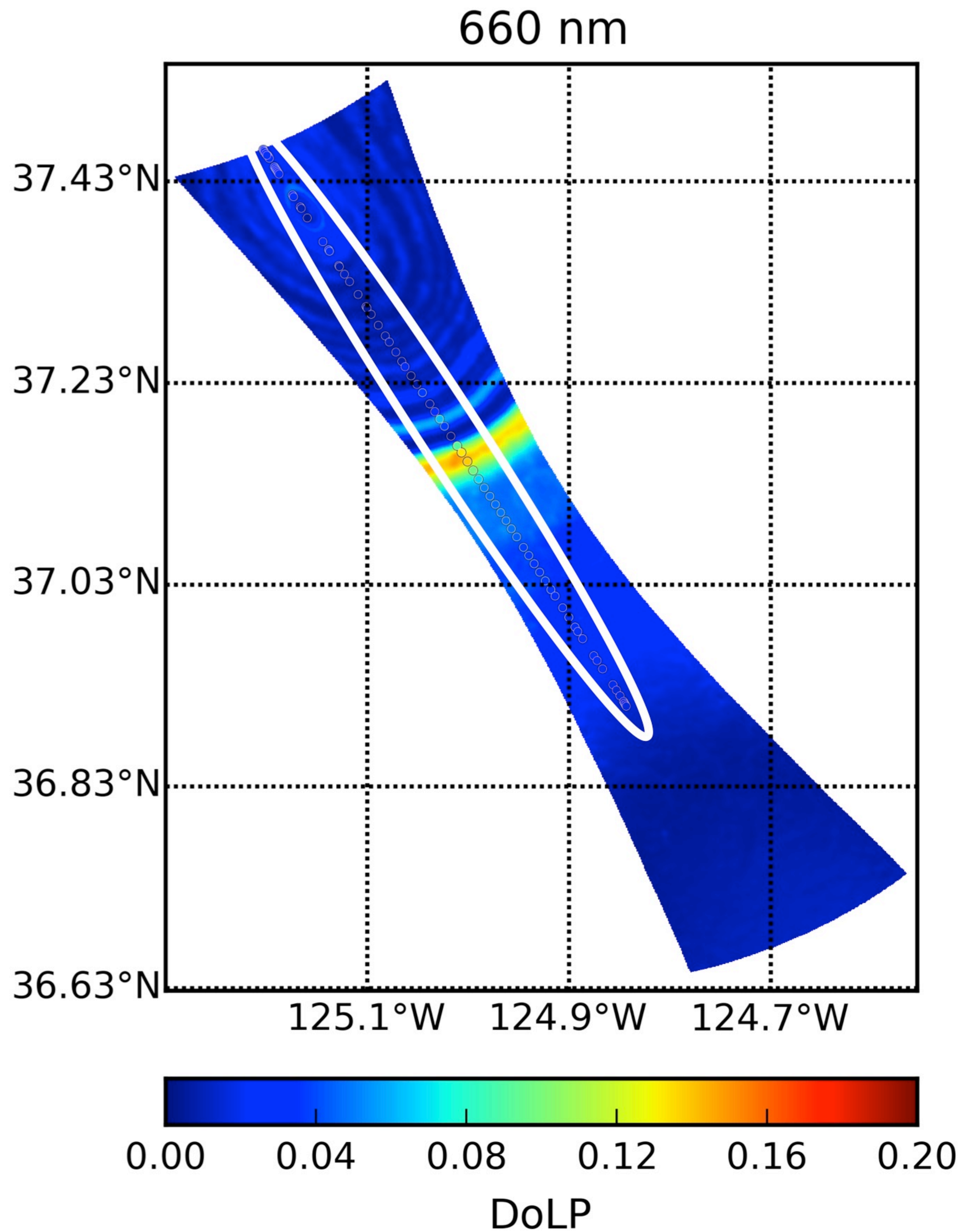
Jet Propulsion Laboratory

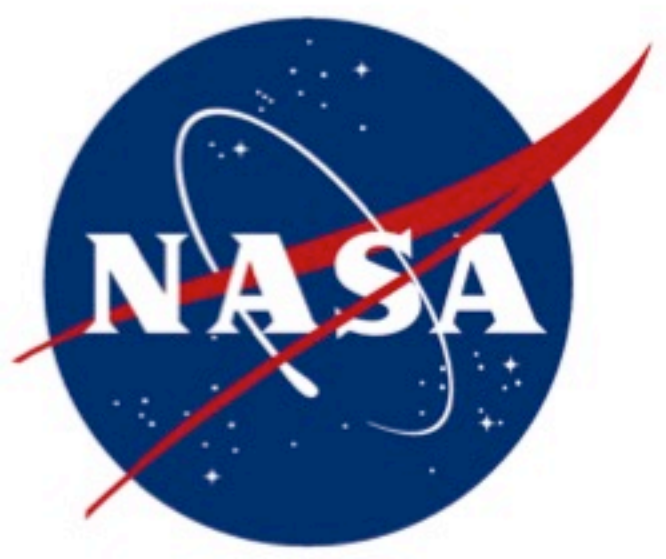




Cloudbow

Jet Propulsion Laboratory



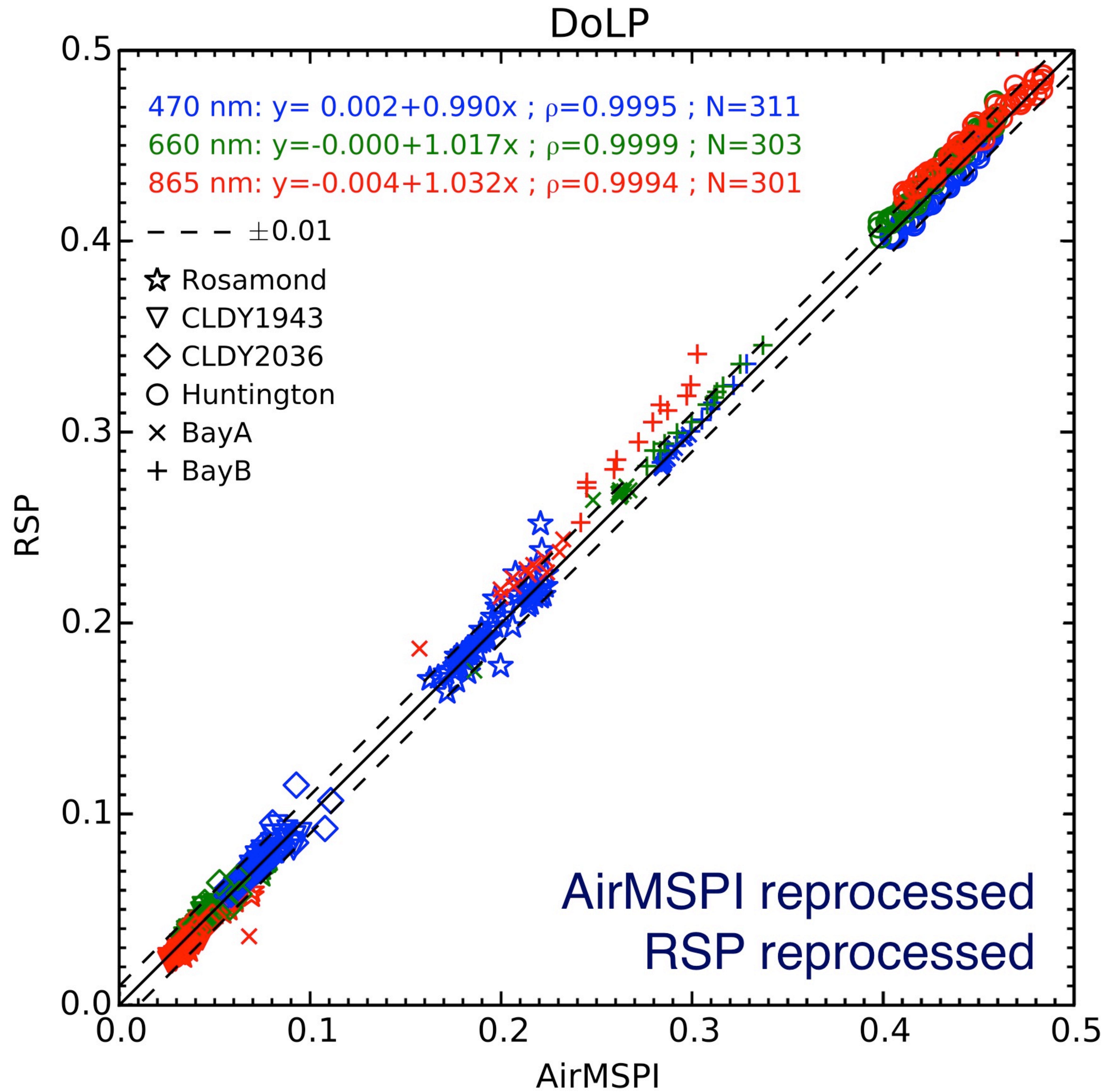


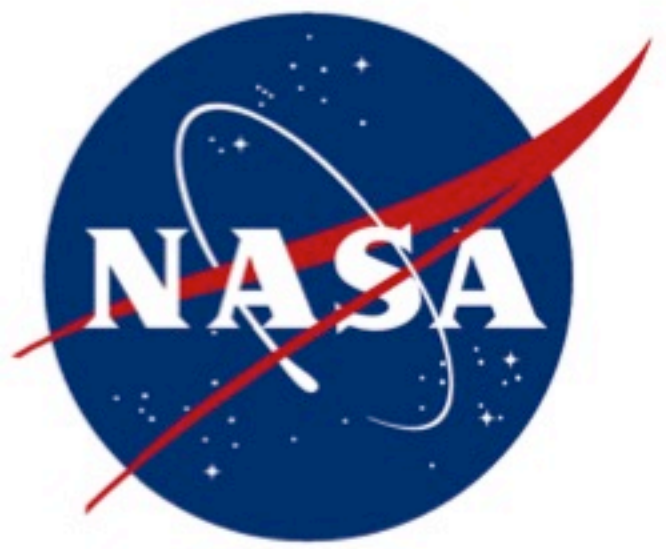
How much of the improvement comes from reprocessing of AirMSPI, how much is RSP?



JPL intercomparison 2015

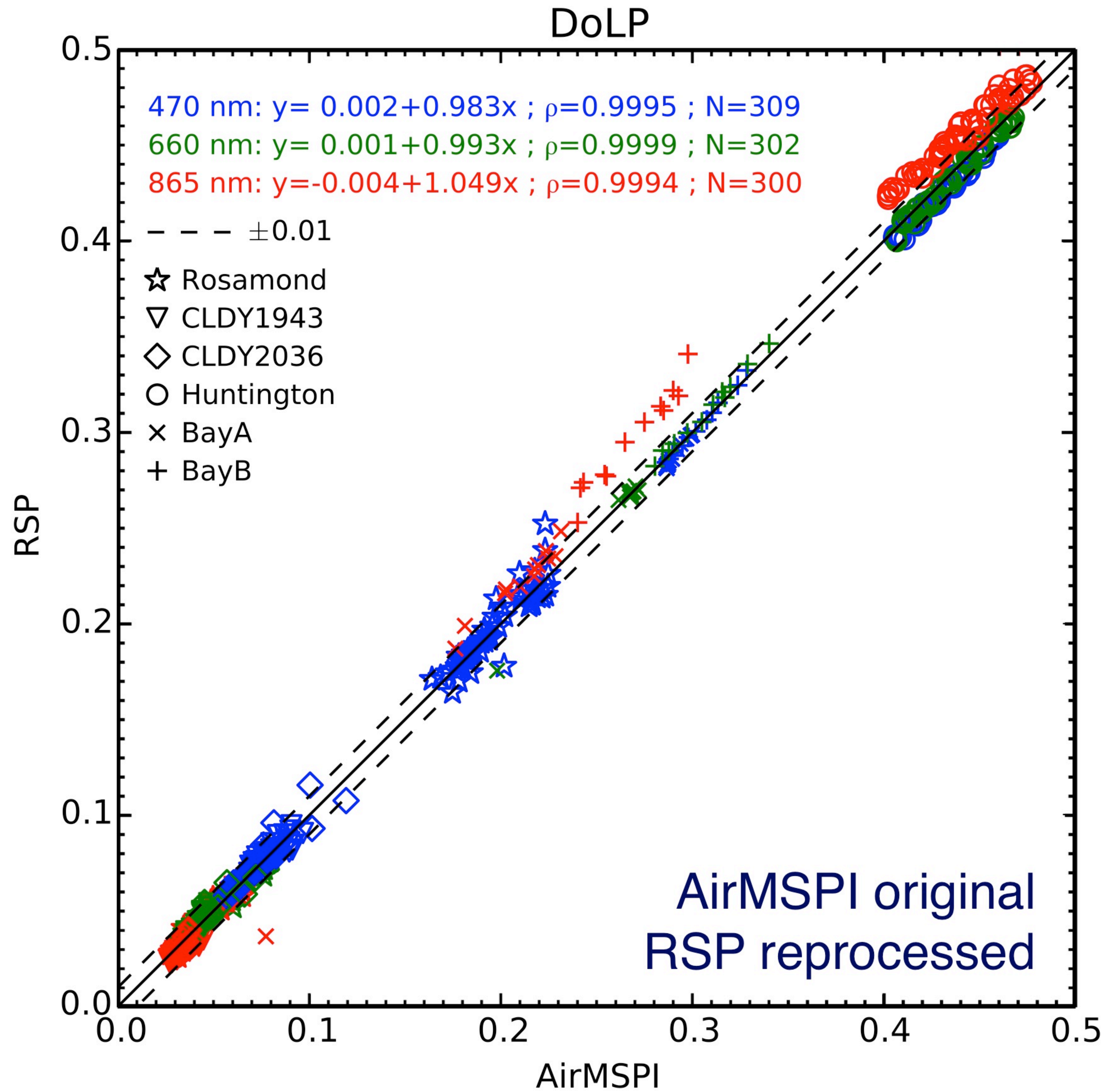
Jet Propulsion Laboratory





JPL intercomparison 2015

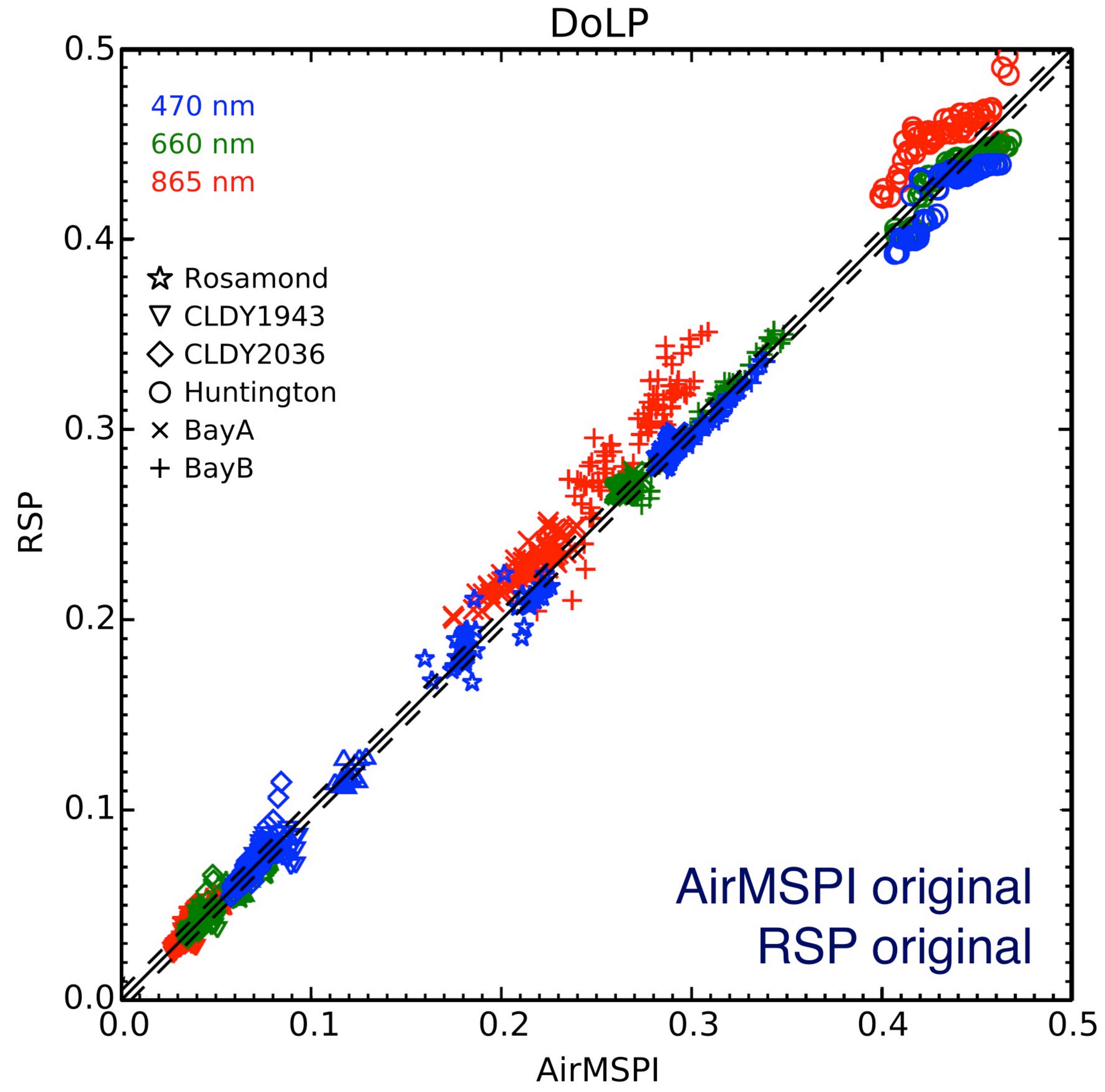
Jet Propulsion Laboratory

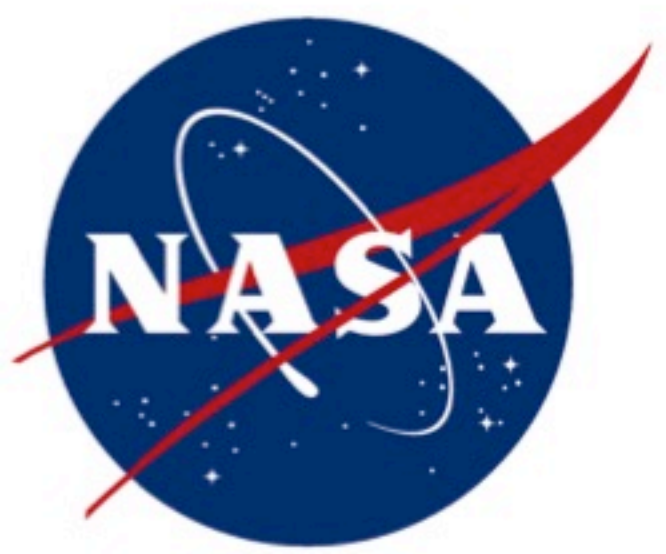




Kirk intercomparison 2014

Jet Propulsion Laboratory





Discussion

Jet Propulsion Laboratory

- AirMSPI polarimetric and RSP geometric calibration updates have improved DoLP agreement substantially.
- Small spatial mismatches can make scenes with large gradients (like Monterey Bay) difficult to intercompare and result in larger discrepancies; this is a limitation of the technique.
- The residual errors appear to be mainly due to random noise and spatial misregistration.