

# Landsat Surface Reflectance Continuity

- Sources of difference:

1. Calibration

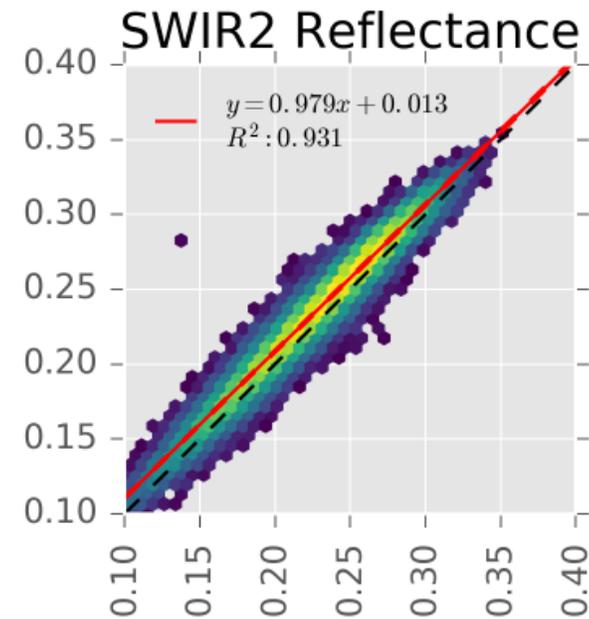
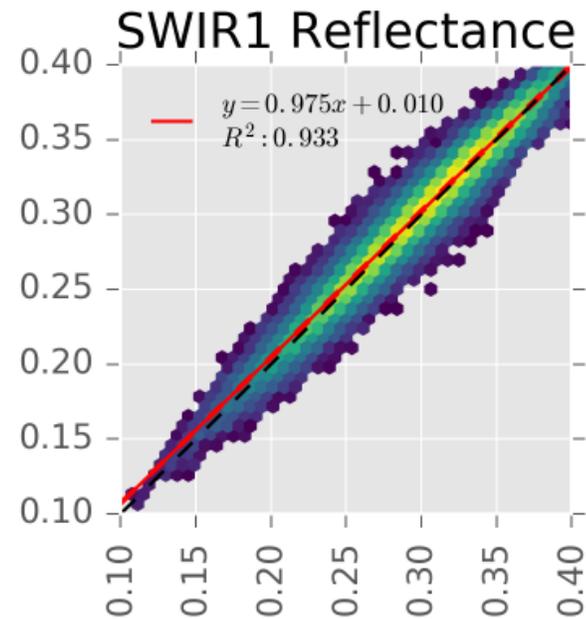
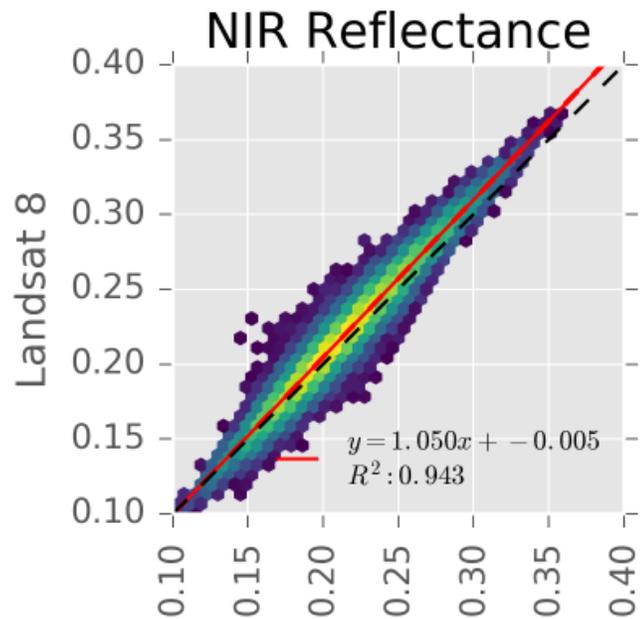
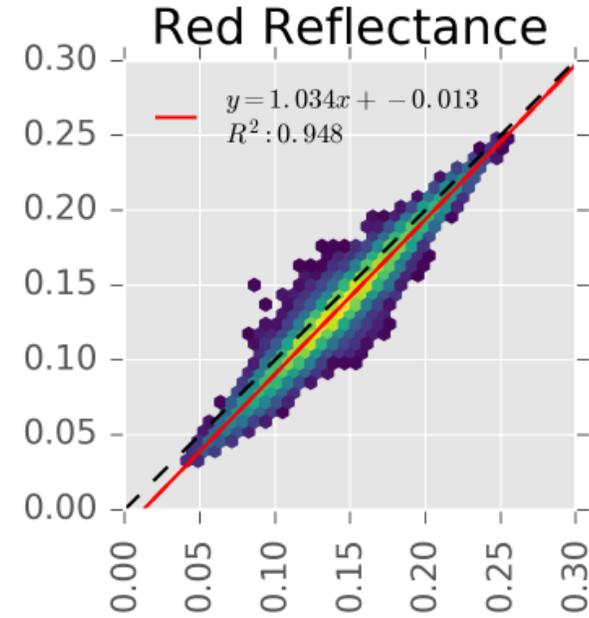
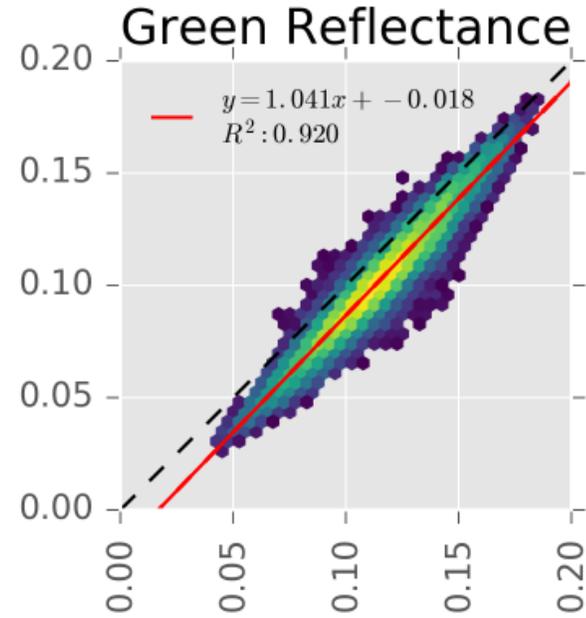
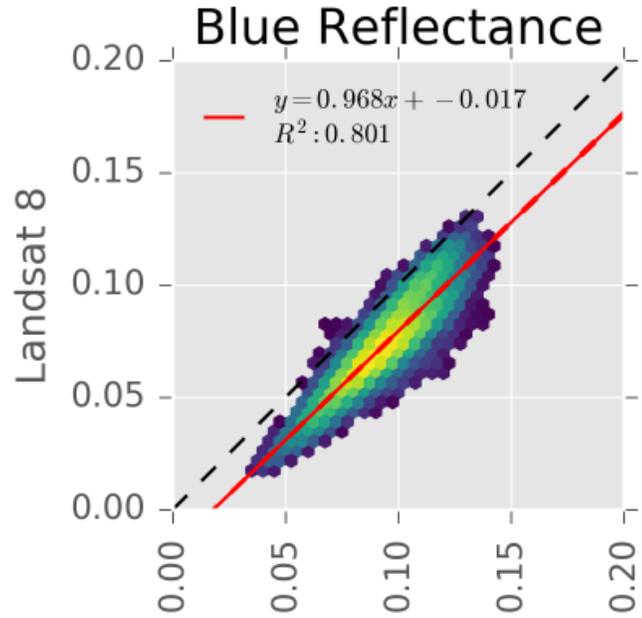
2. Sensor wavelength bandwidths

- Most bands narrowed or changed slightly
- LC8 NIR avoids water absorption feature
- Measurements may differ based on spectral response of target

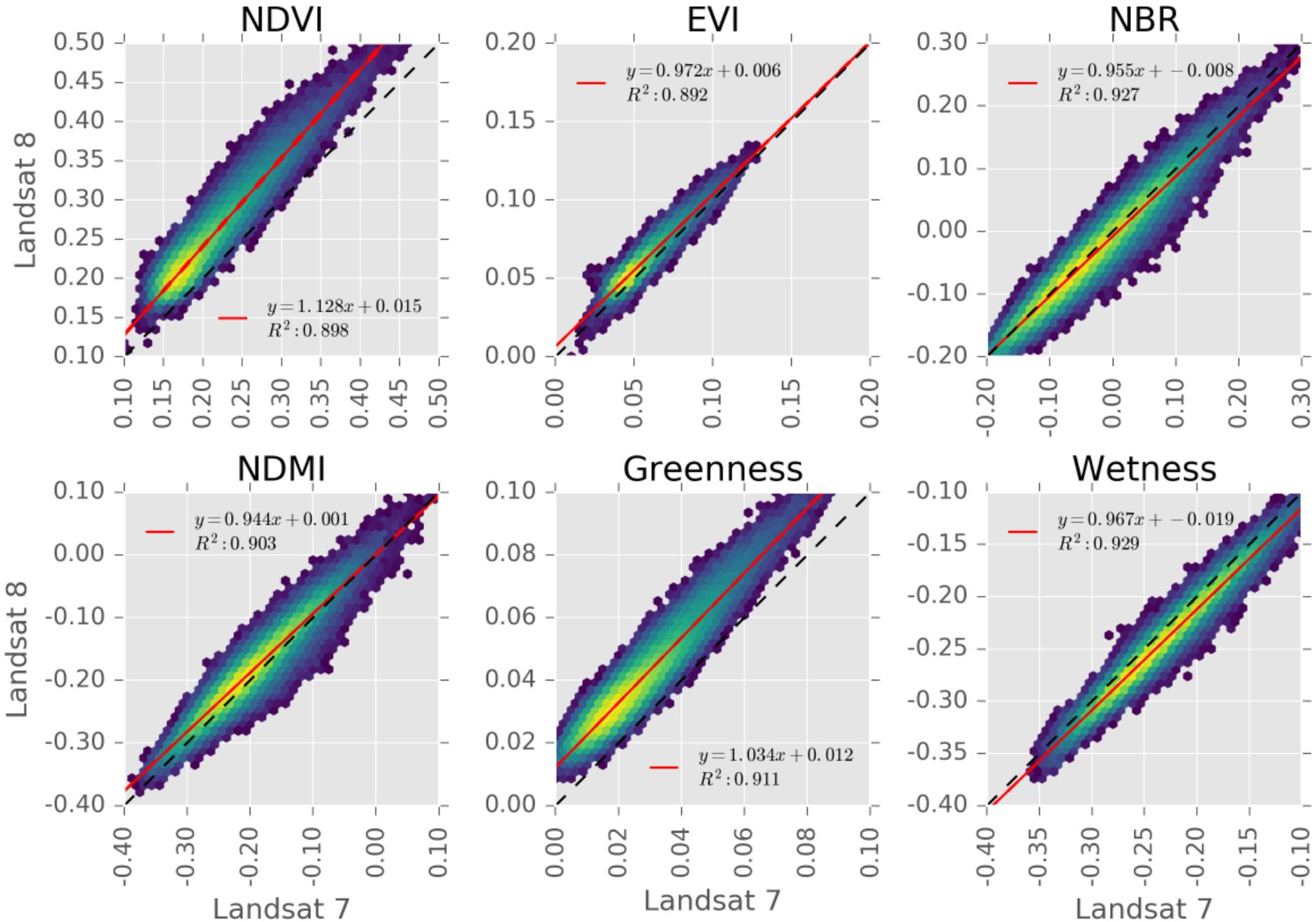
3. Surface reflectance correction

- LEDAPS: NCEP reanalysis with DDV
- L8SR: MODIS products parameterize atmospheric constituents

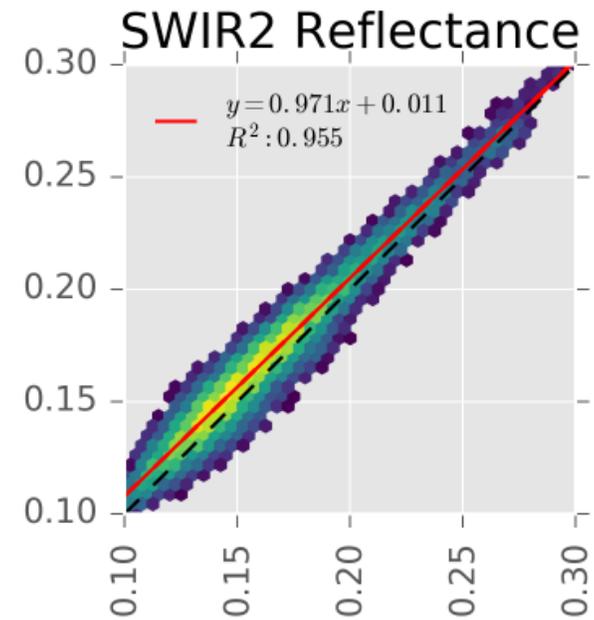
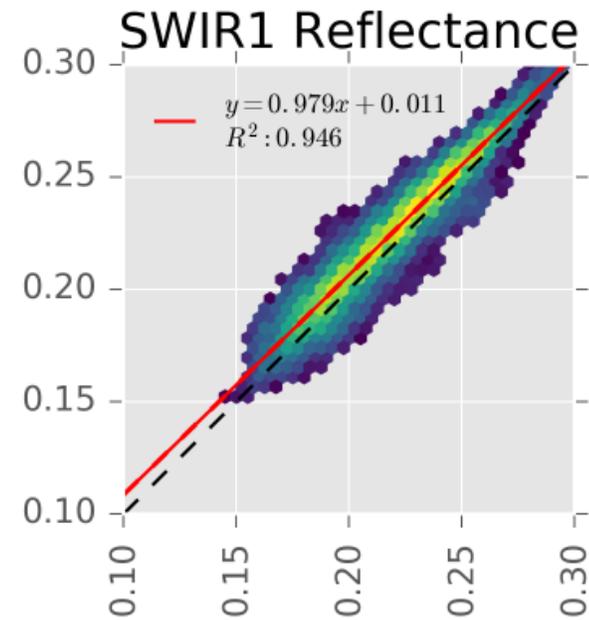
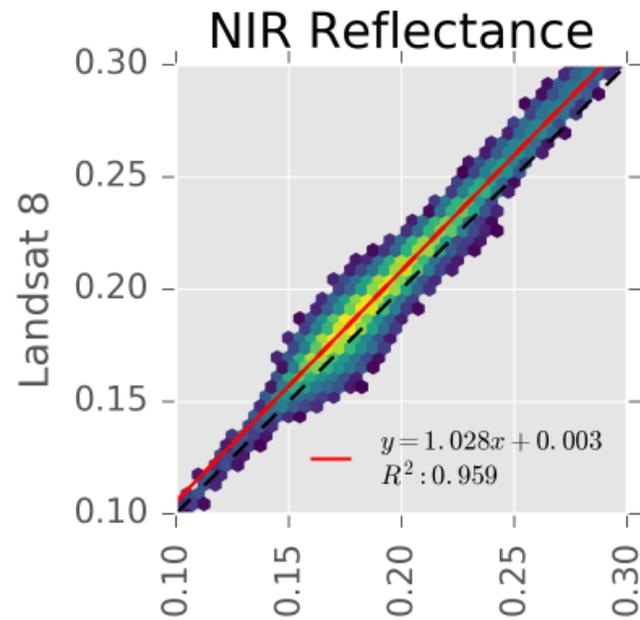
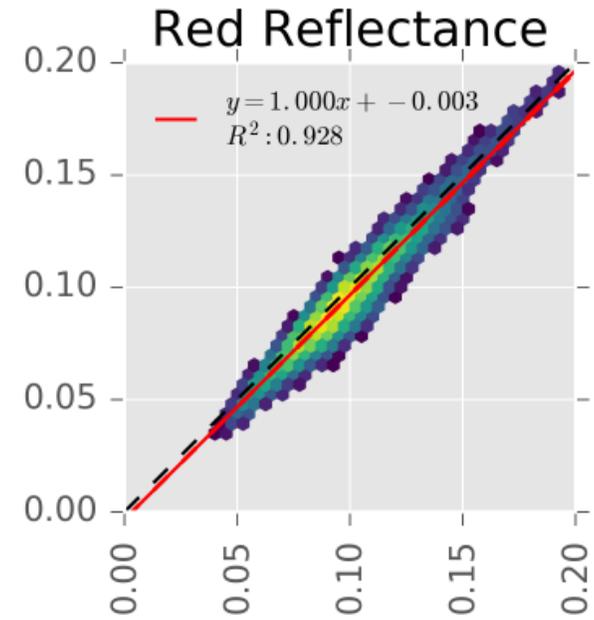
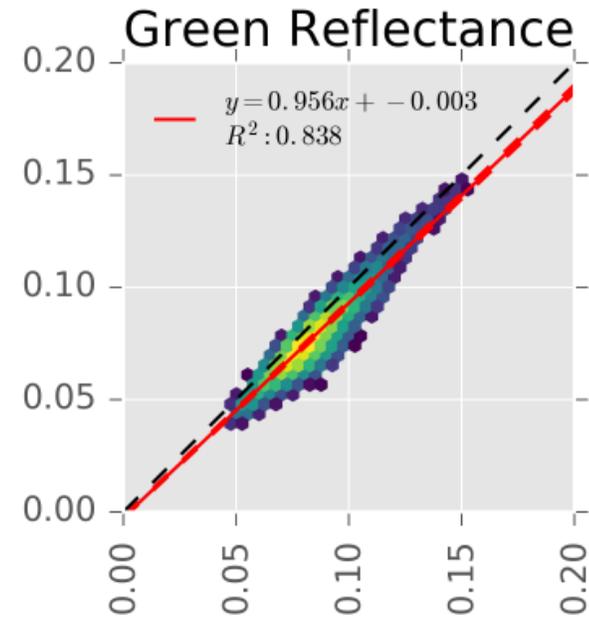
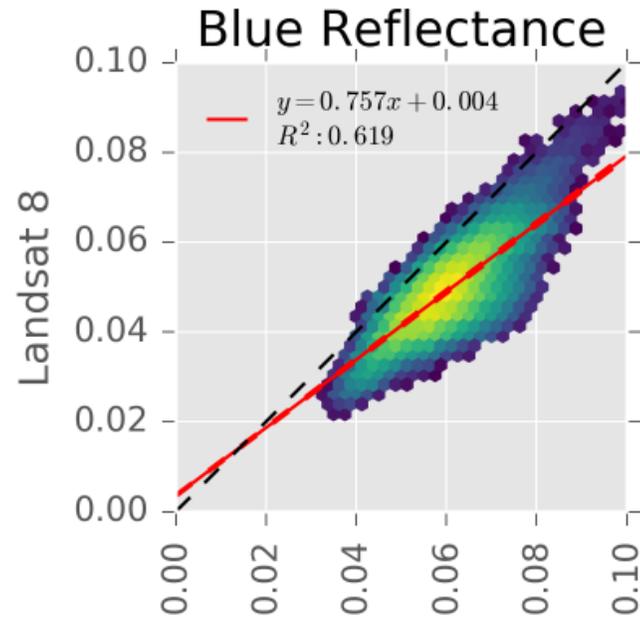
# Nebraska, US (P029R031) – March 30, 2013



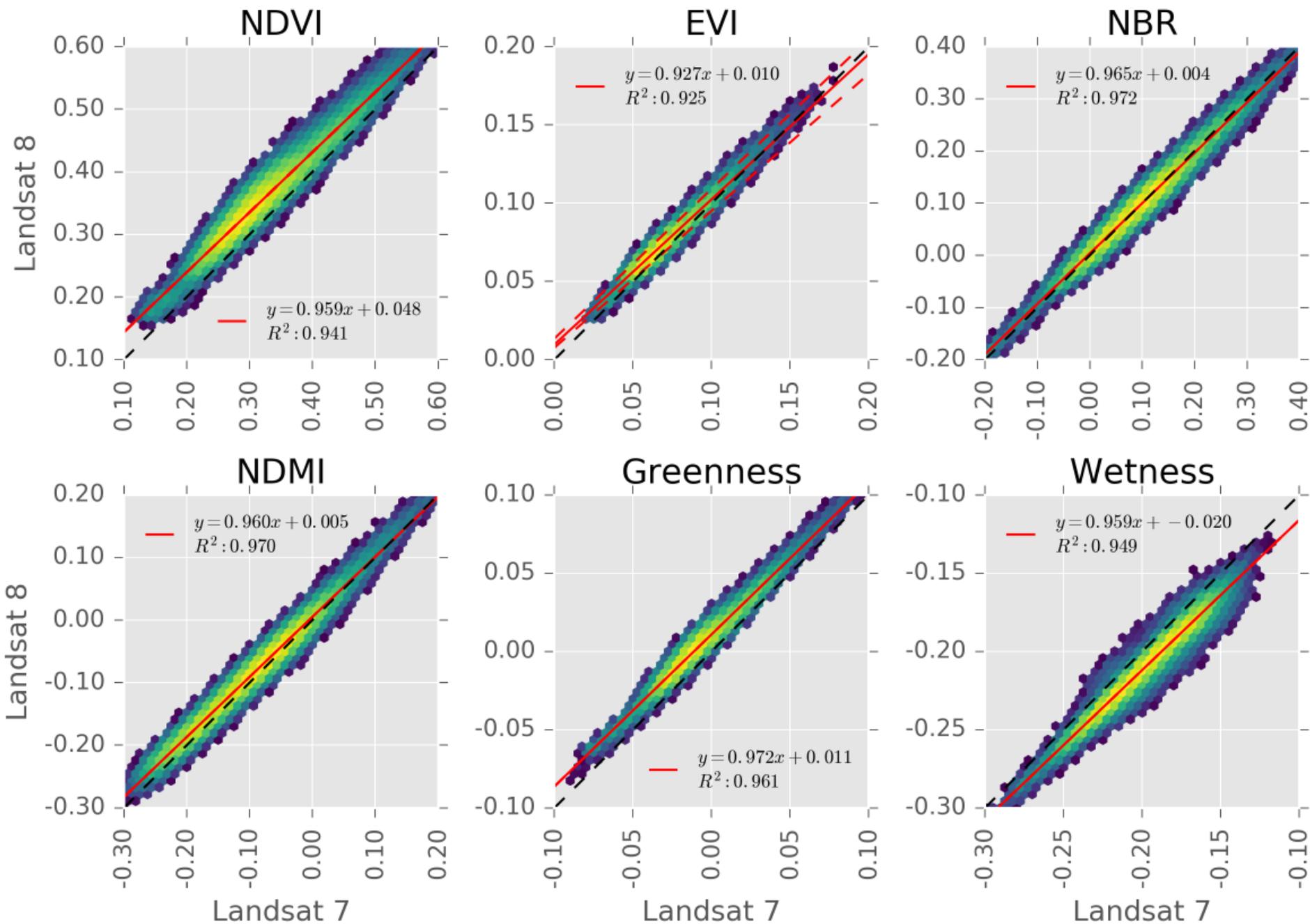
# Nebraska, US (P029R031) – March 30, 2013



# Santa Cruz, Argentina (P230R084) – March 30, 2013

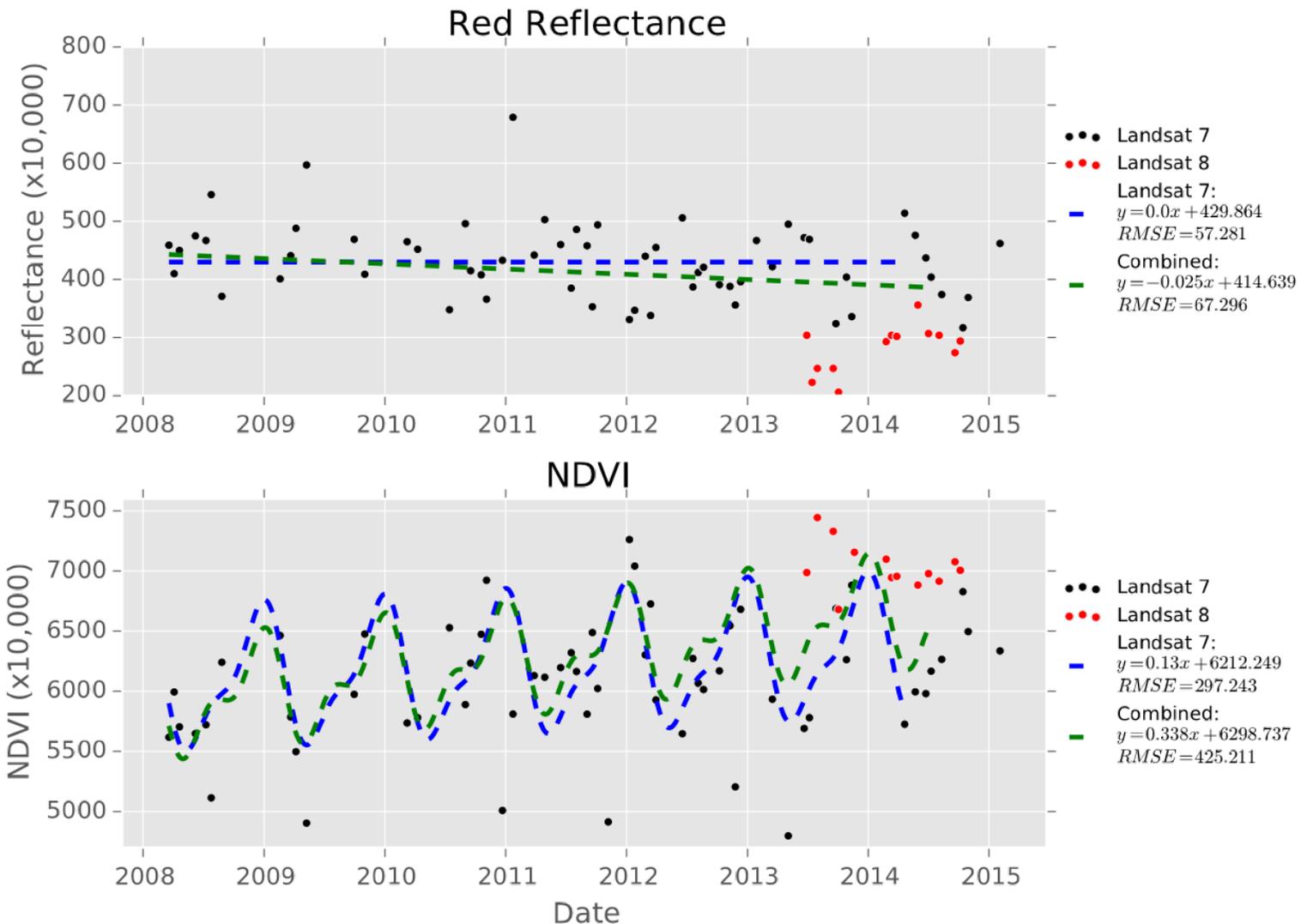


# Santa Cruz, Argentina (P230R084) – March 30, 2013



# Landsat 8 in Timeseries

- Can we simply extend Landsat TM and ETM+ into OLI?
- Example: evergreen forest stand in Colorado (P034R032)
- Bias in slope and intercept estimates; increase in model RMSE



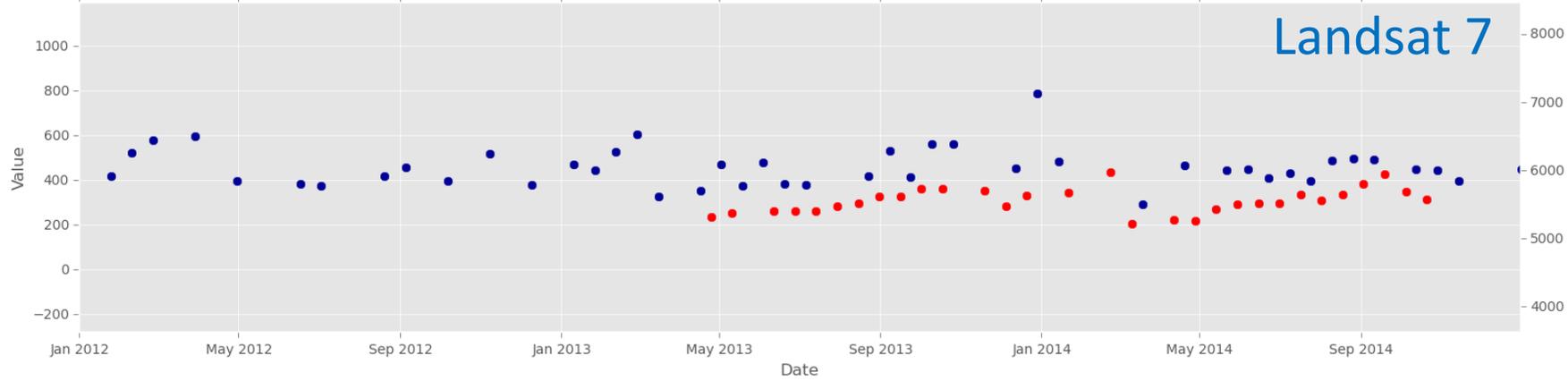
# Example: Central Valley, California

Landsat 8

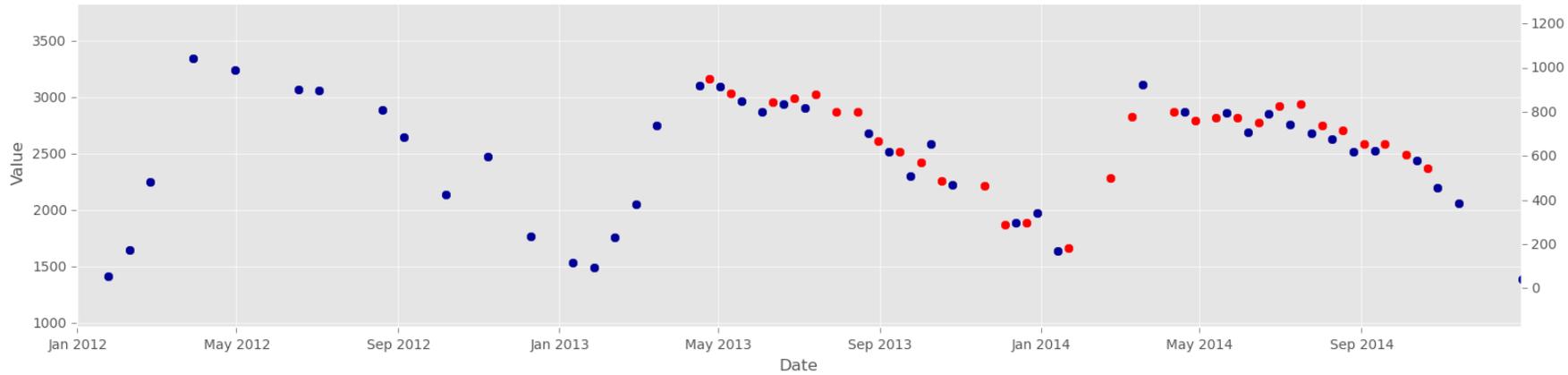
Landsat 7

Row/Col: Stacked TS - 3903/4613

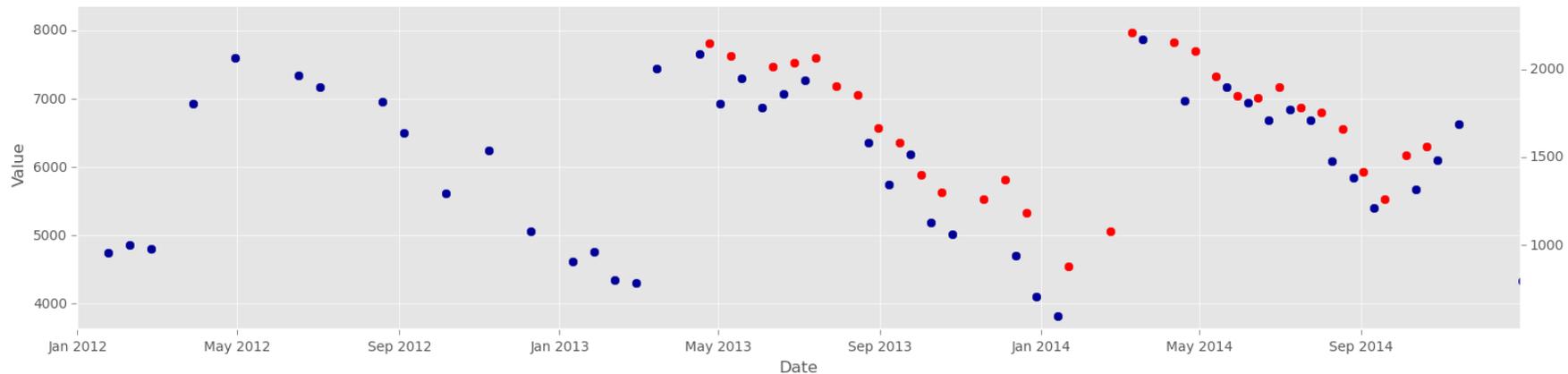
Blue



NIR



NDVI



- Orchard in Central Valley
- LC8 persistently lower in blue
- LC8 NIR may be slightly brighter
- Persistent bias in NDVI, mostly caused by bias in red band

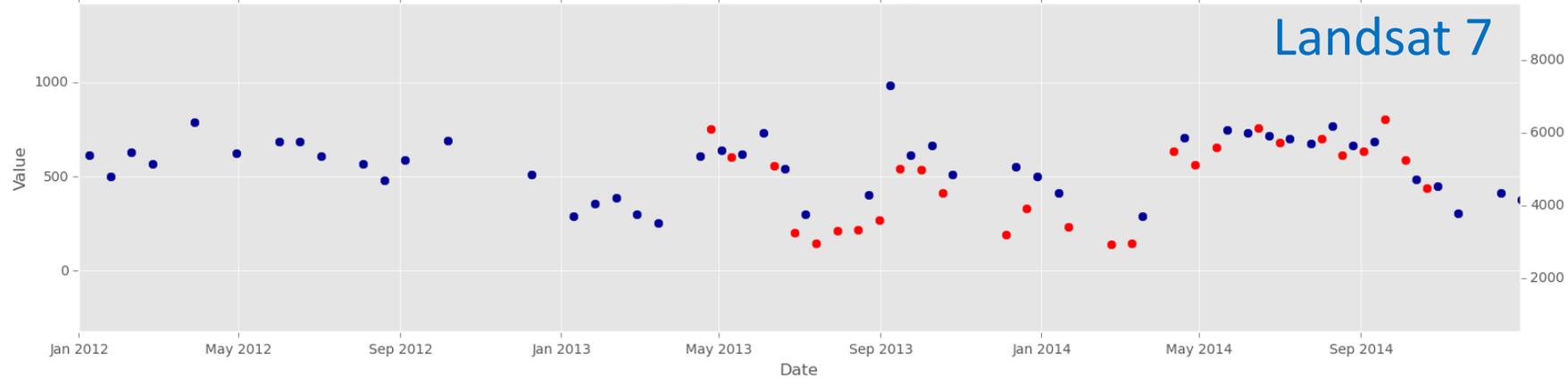
# Example: Central Valley, California

Landsat 8

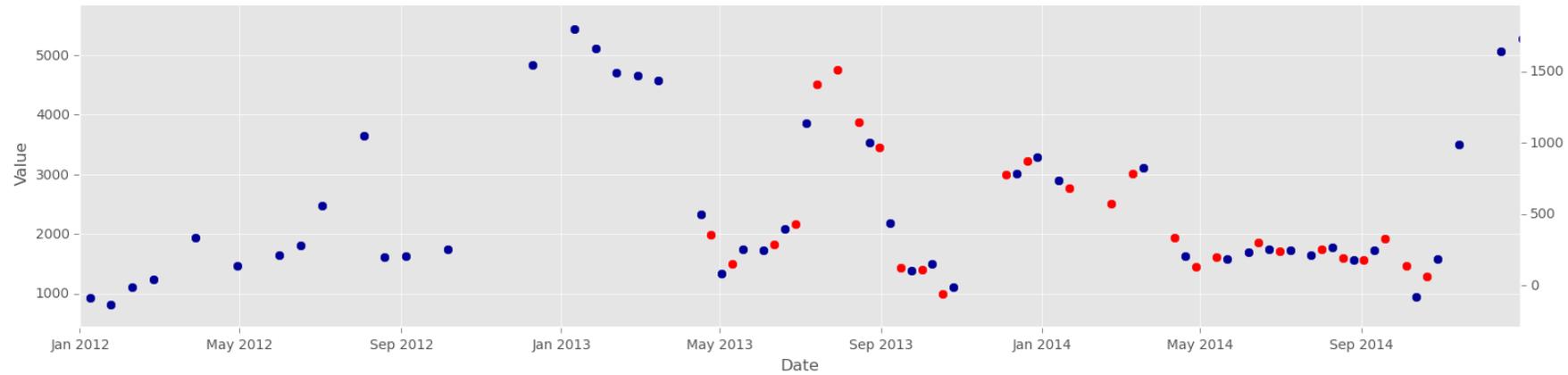
Landsat 7

Row/Col: Stacked TS - 4489/4509

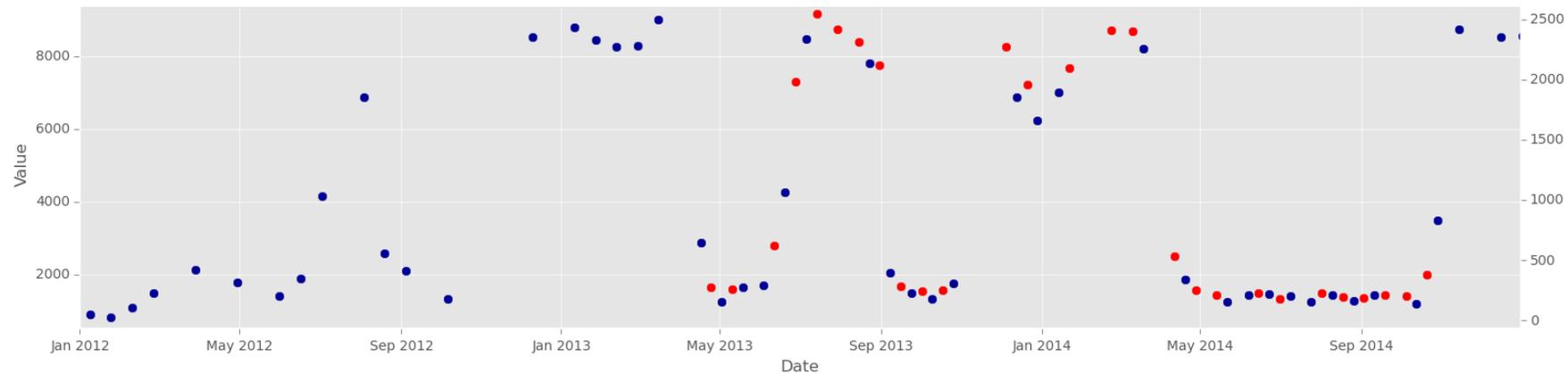
Blue



NIR

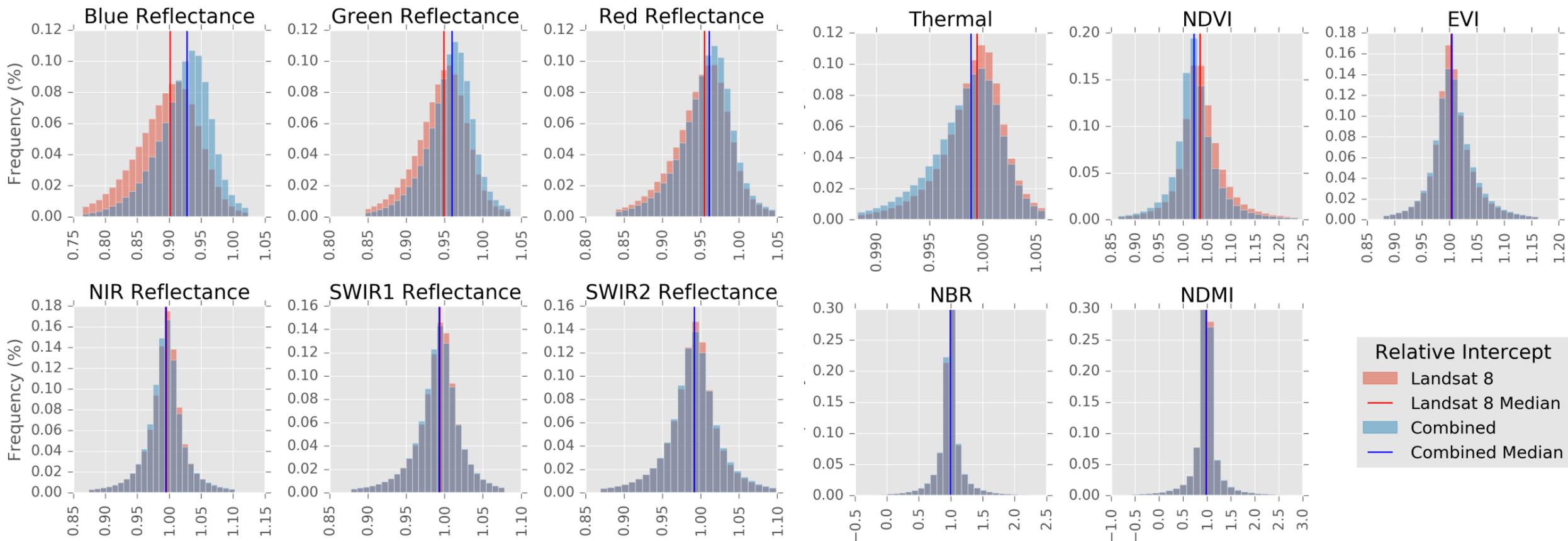


NDVI



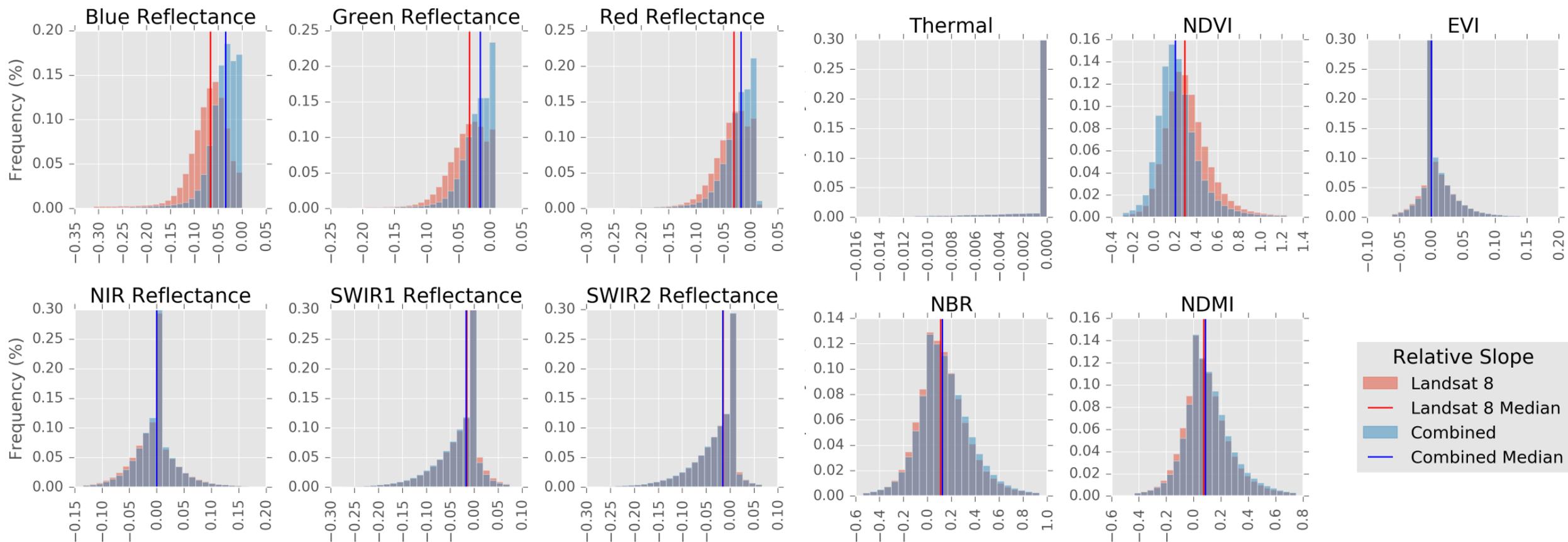
- Crop next to previous example
- Blue and NDVI more biased than NIR
- Bias in blue and NDVI more pronounced in winter growing season

# Colorado, US (P034R032)



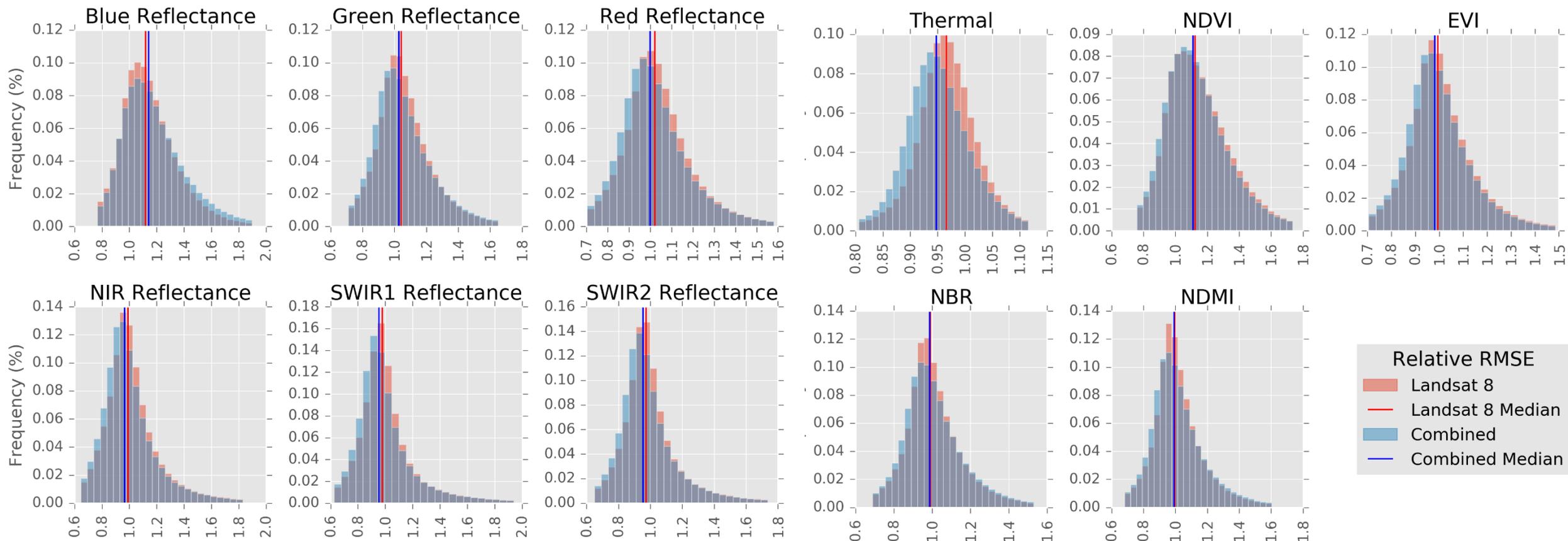
Model Intercepts: Landsat 8 / Landsat 7

# Colorado, US (P034R032)



Model Slopes: Landsat 8 - Landsat 7

# Colorado, US (P034R032)



Model RMSE: Landsat 8 / Landsat 7

# Landsat Surface Reflectance Continuity

- Location seems to matter
  - Biases differ within scenes across land cover types
  - Timeseries model attribute analysis shows variance across scenes
- Visible bands usually affected
- Spectral indices can compound problem
- Take care using Landsat 8 in timeseries (e.g., spurious greening!)
- Unknown relative contribution of 3 possible causes requires further research