RETRIEVAL OF AEROSOL PROPERTIES FROM THE HYPER ANGULAR RAINBOW POLARIMETER (HARP) DURING THE LMOS CAMPAIGN

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Introduction:

The largest impediments to estimating climate change revolve around a lack of quantitative information on aerosol forcing and our poor understanding of aerosol-cloud processes and cloud feedbacks in the climate system. This is so because global aerosol and cloud data come from satellite sensors that, today, measure limited subsets of the full Stokes parameters.

To overcome this scientific gap UMBC developed the Hyper Angular Rainbow Polarimeter (HARP): a sensor that can simultaneously measure 3 angles of polarization, at 4 different wavelengths, to observe the same target with up to 60 viewing angles, with no moving parts. The HARP-Cubesat mission will fly next January.

AirHARP is an exact copy of the HARP sensor but prepared to fly on aircrafts. Here we describe the data processing necessary to retrieve aerosol properties.
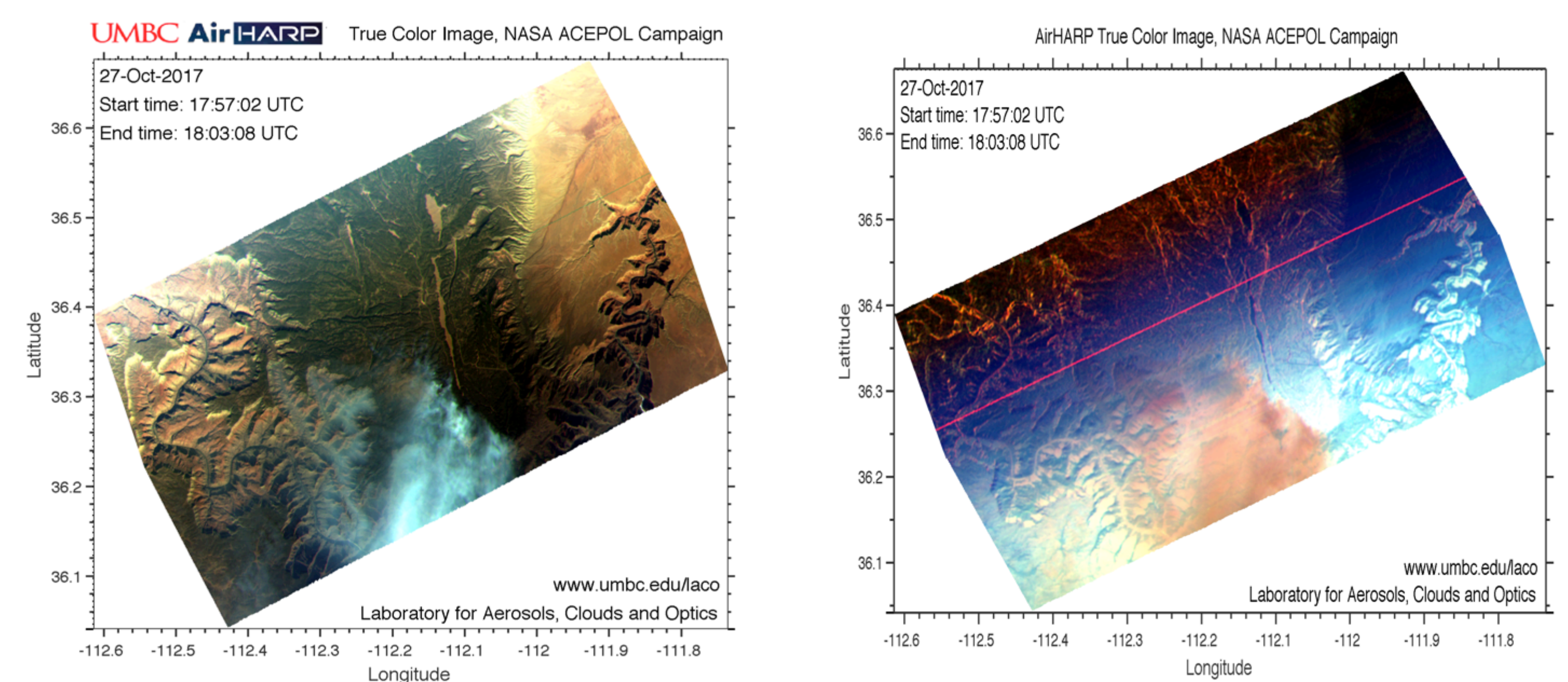
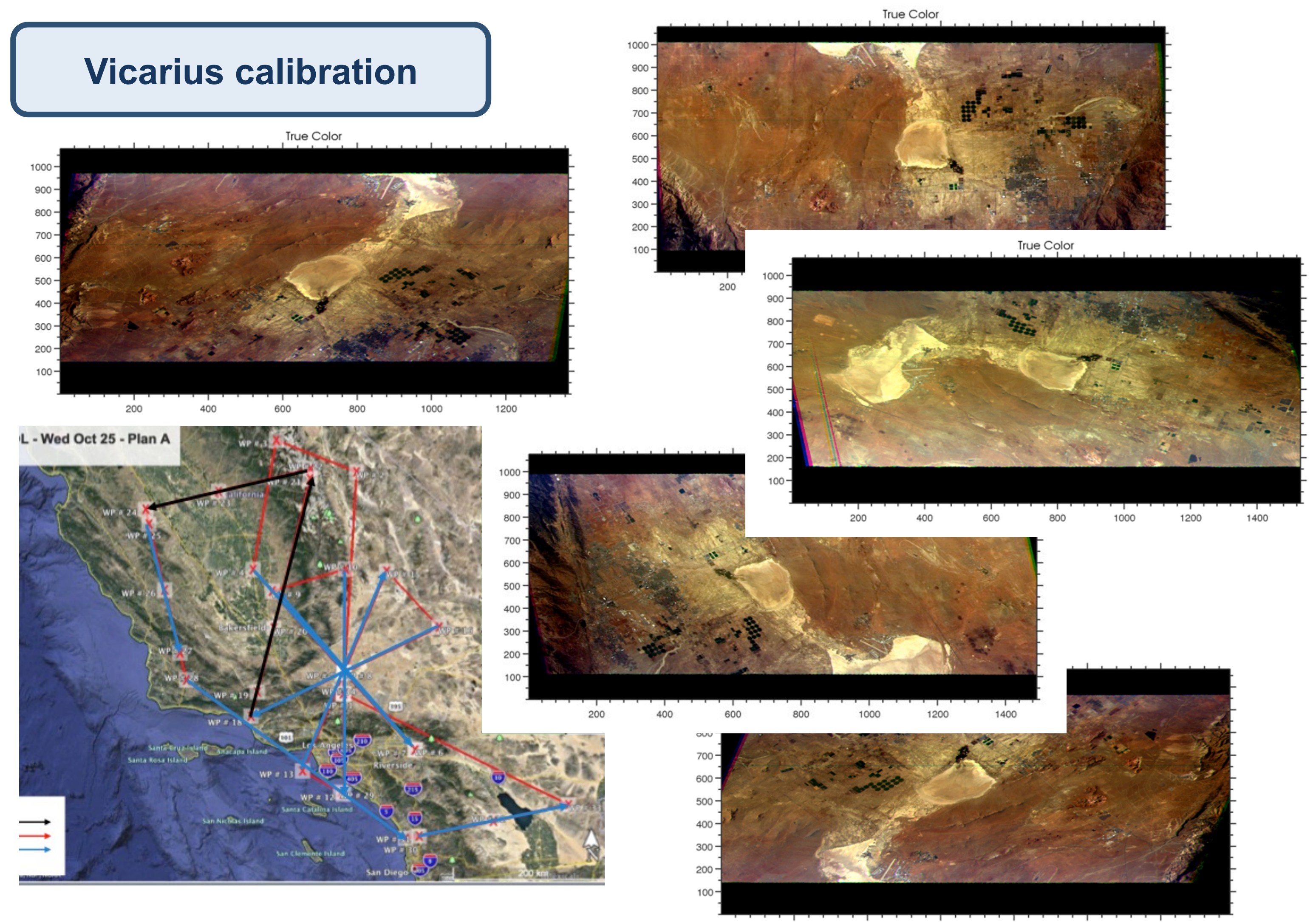## Single-angle Composite Image Processing Pipeline (SCIPP)
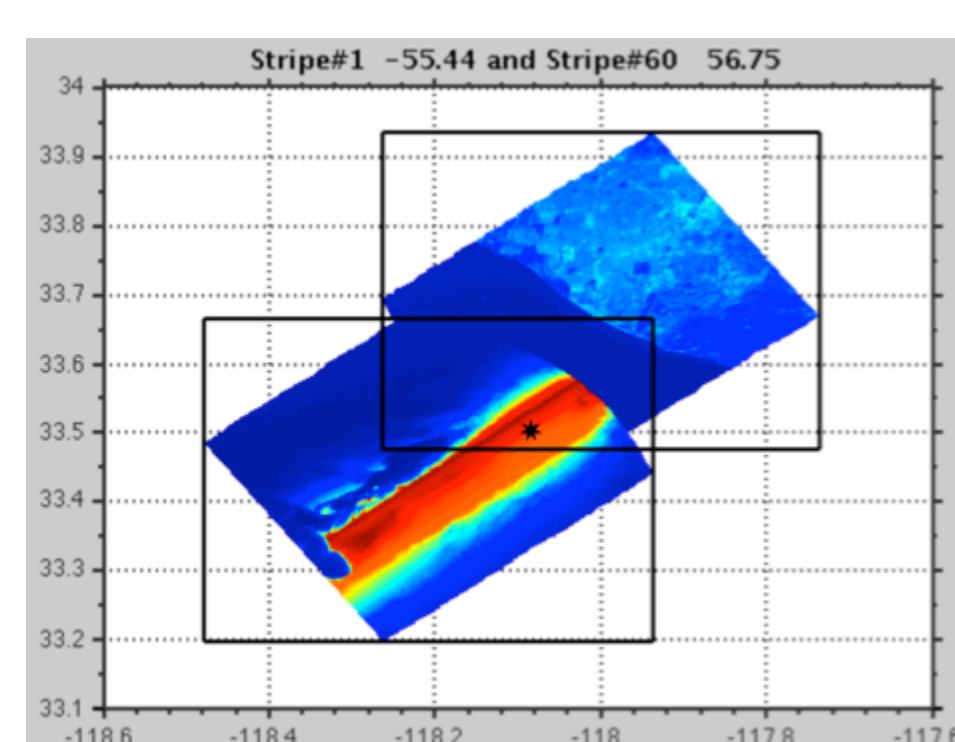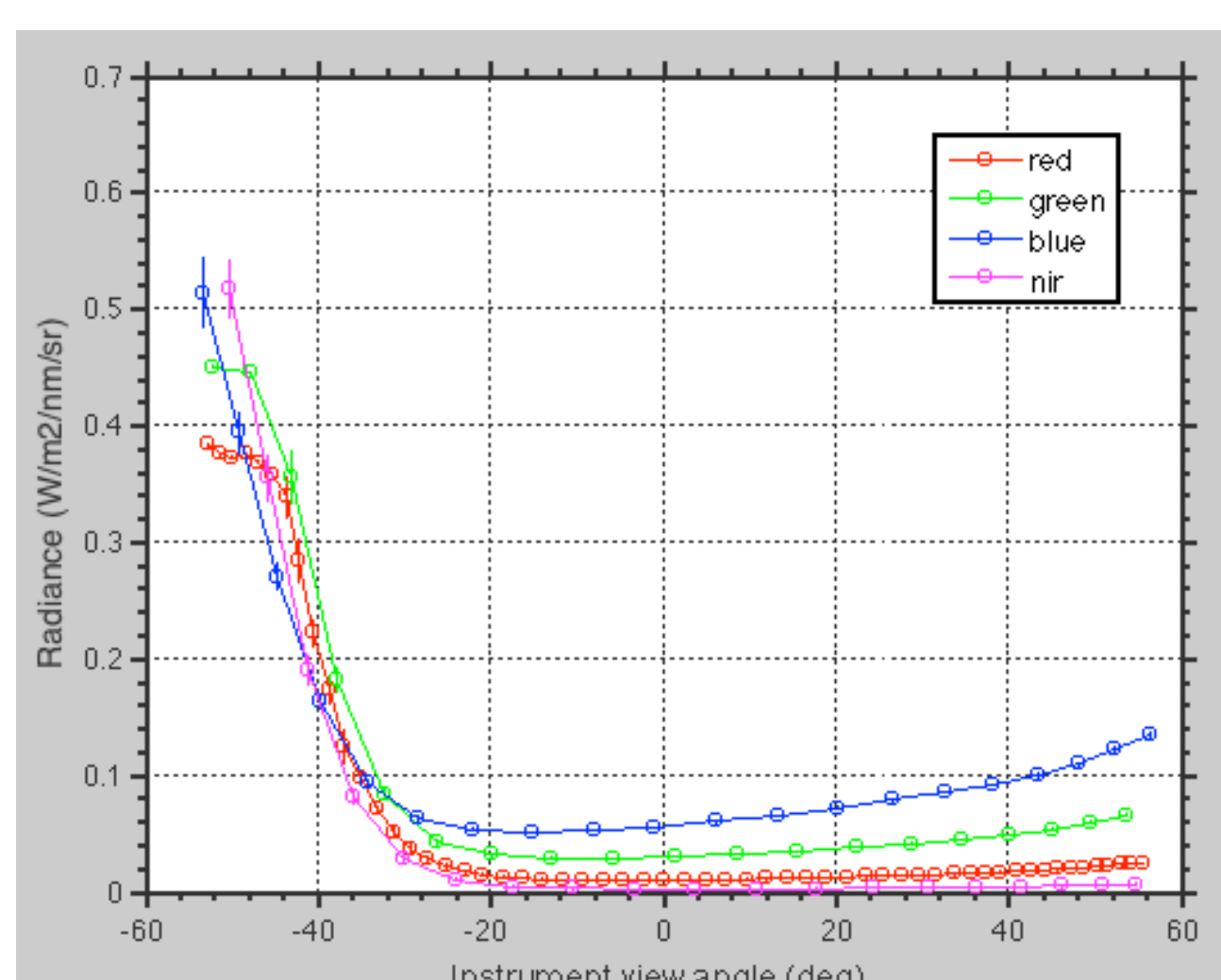

Programs, **Calibration**, **Flight data**, **Temporary**
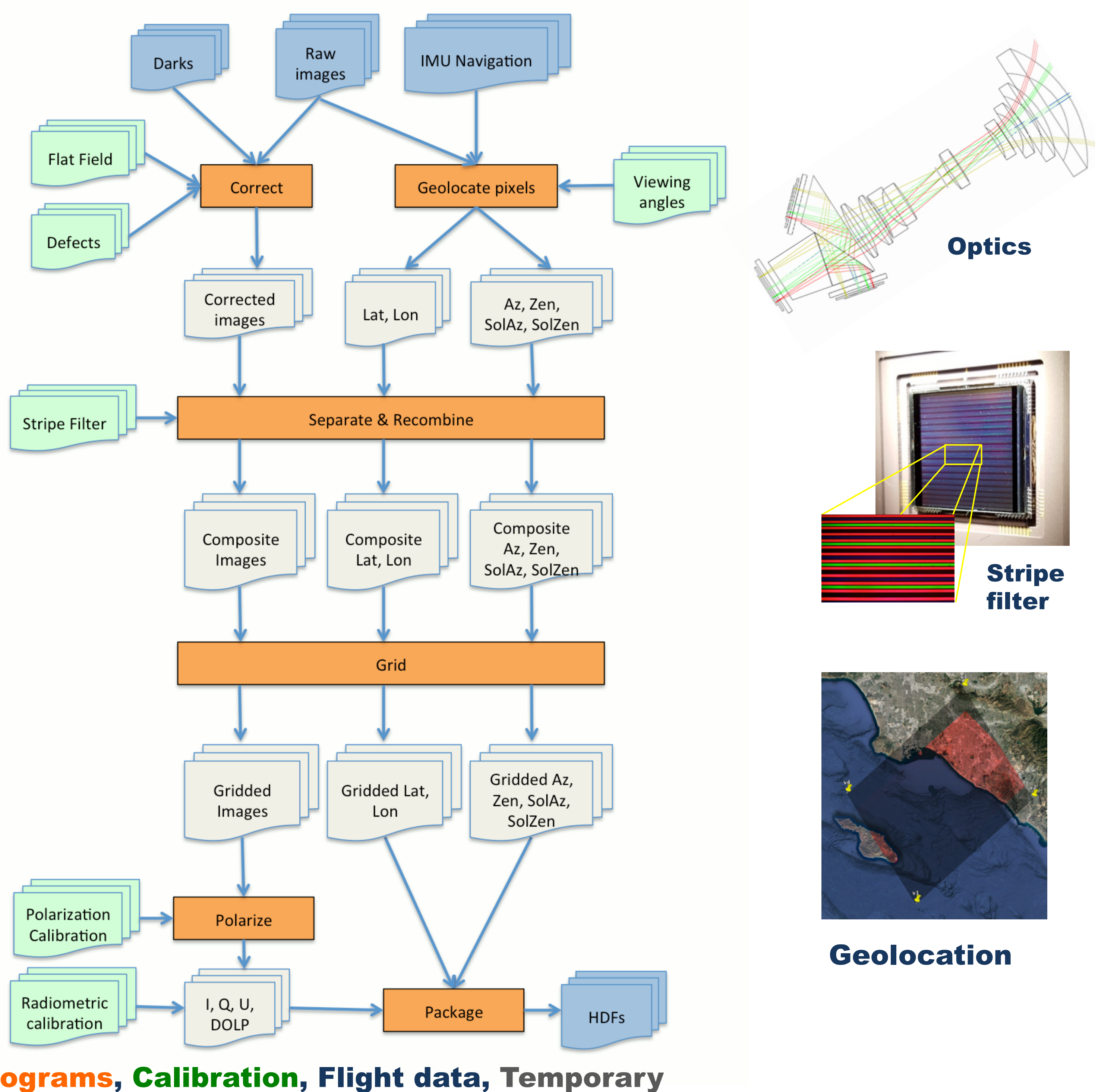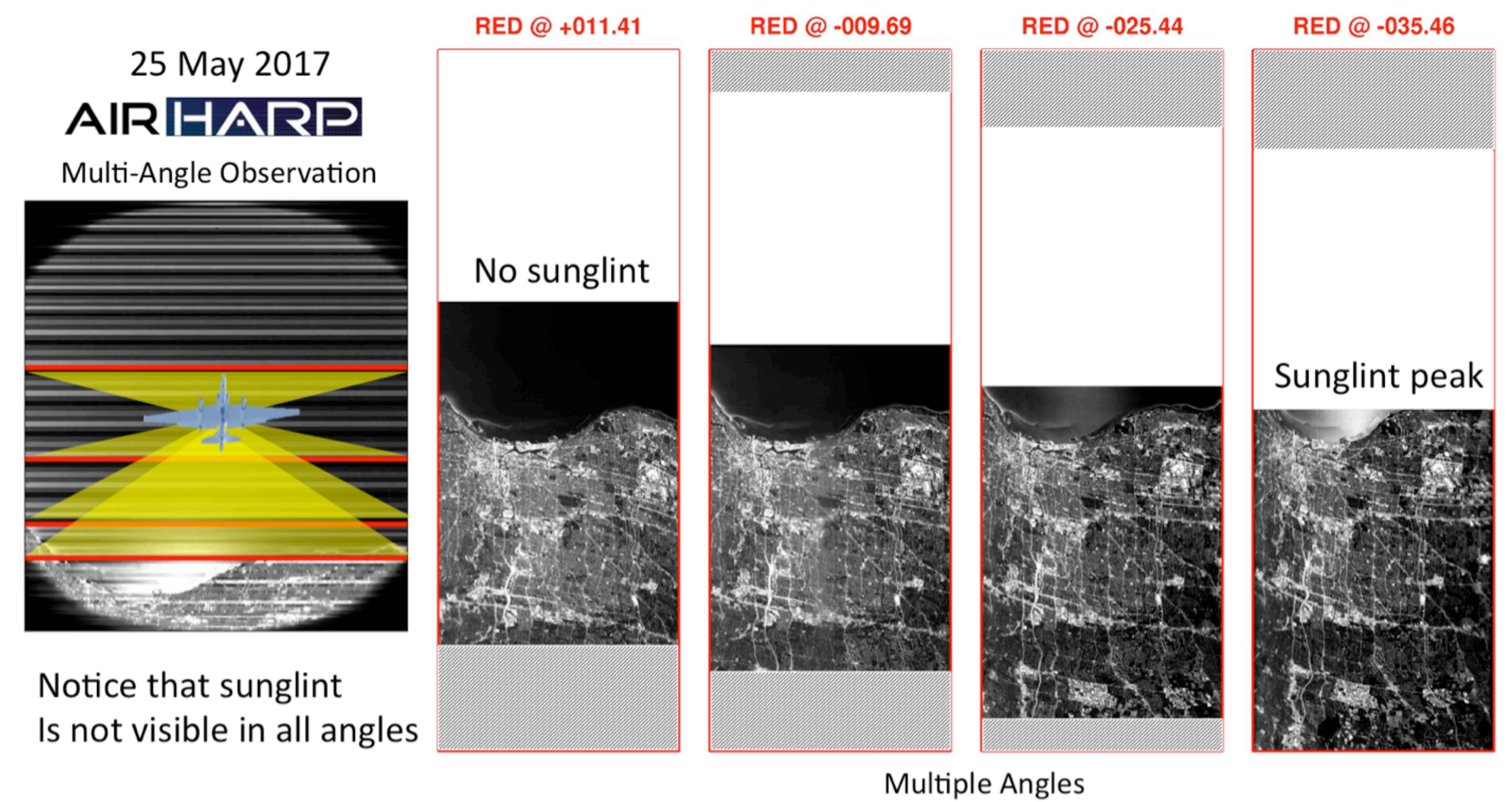
GRASP

GRASP is a highly accurate aerosol retrieval algorithm that processes properties of aerosol- and land-surface-reflectance. It infers nearly 50 aerosol and surface parameters including particle size distribution, the spectral index of refraction, the degree of sphericity and absorption.

Example of Radiances x viewing angle measured during ACEPOL campaign. Glint increases

Multi-angle observation

25 May 2017
AIRHARP
Multi-Angle Observation

RED @ +011.41   RED @ -009.69   RED @ -025.44   RED @ -035.46

No sunlight

Sunglint peak

Notice that sunglint Is not visible in all angles

Multiple Angles

Example: smoke

UMBC AirHARP True Color Image, NASA ACEPOL Campaign
27-Oct-2017
Start time: 17:57:02 UTC
End time: 18:03:08 UTC
www.umbc.edu/laco
Laboratory for Aerosols, Clouds and Optics

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Vicarius calibration

Future Perspectives:

This is an on-going effort, and we are currently working on the polarization and radiometric calibrations, spheroid projection, aerosol retrieval using GRASP, and cloud retrievals from the cloudbow.