

Unfiltering of the EarthCARE BBR: The BM-RAD processor

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Summary

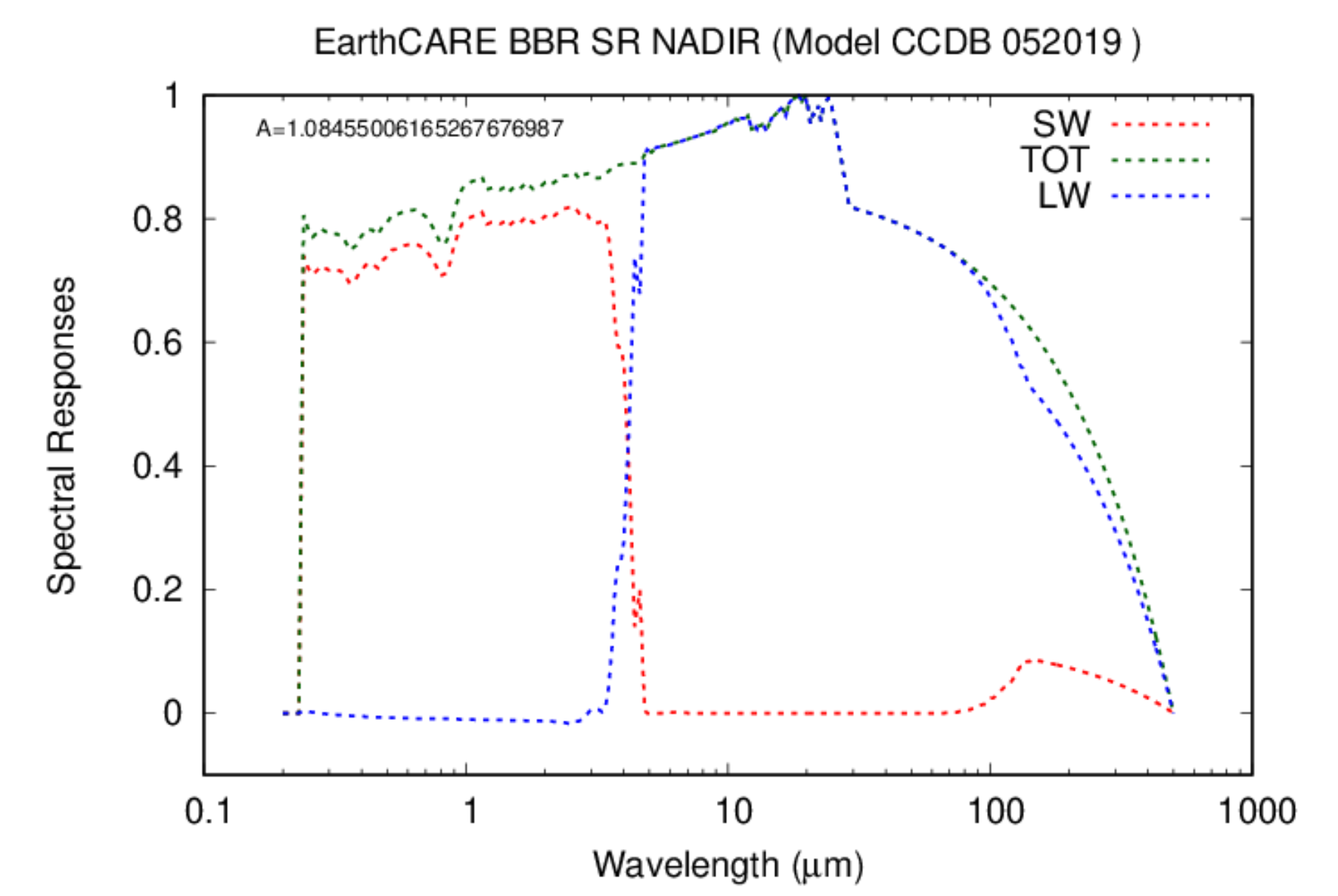
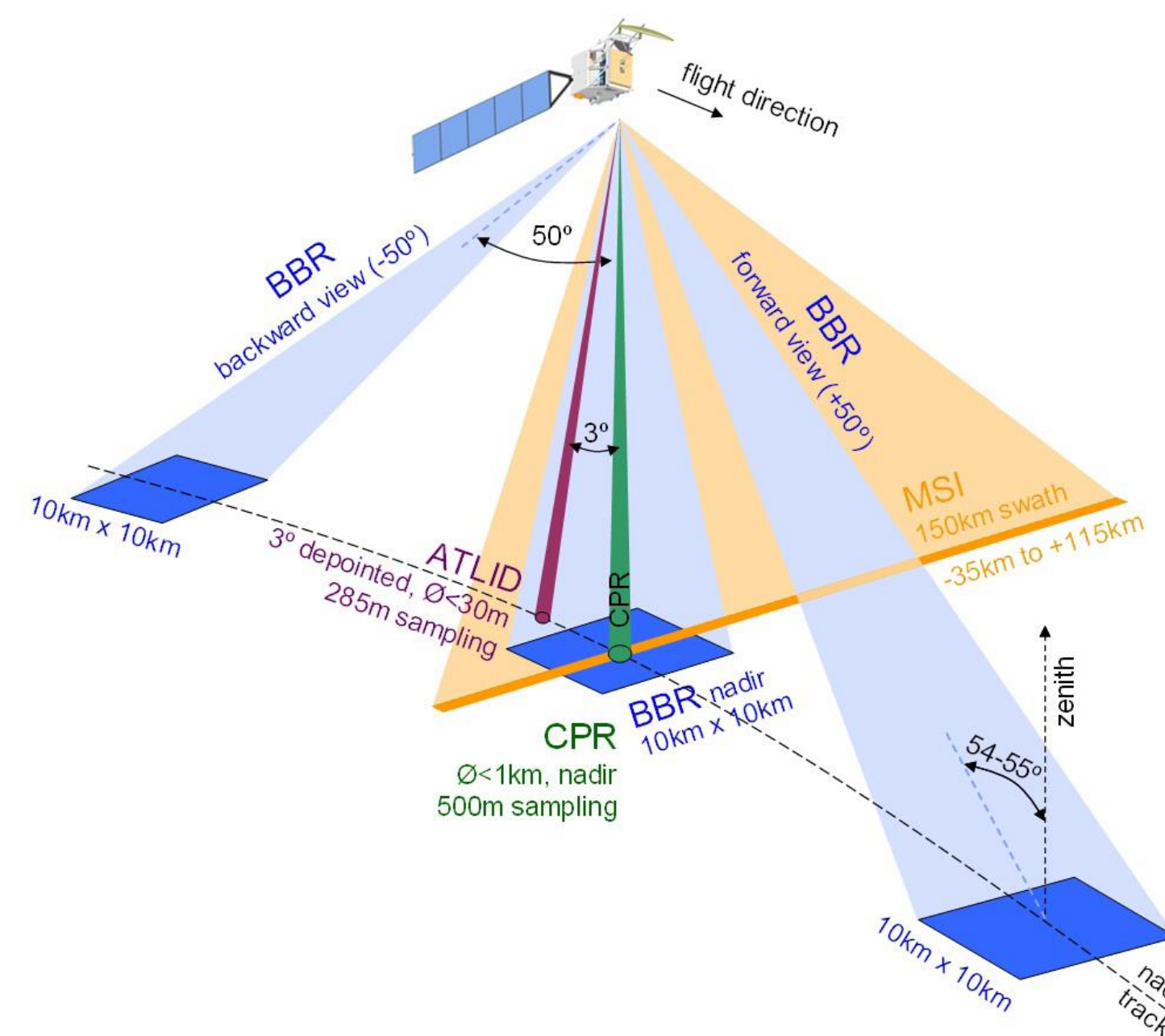
The BBR will measure **SW** (0.2 - 4μm) and **TW** (0.2 - >50μm) radiances at three fixed viewing zenith angles in an along track configuration.

The signal provided by the BBR radiometer is a radiance filtered by the spectral response of the instrument, which is corrected in the unfiltering process in order to reduce the effect of a limited and non-uniform spectral response.

In practice, the **SW** and **TW** measurements of the BBR must be converted into solar and thermal unfiltered radiances.

The unfiltering parametrization is based on a large RT-based database of fine spectral resolution SW and TW radiances convolved with the spectral responses of the BBR channels.

The contamination of the SW and synthetic LW channels is corrected in the process of obtaining the unfiltered radiances.

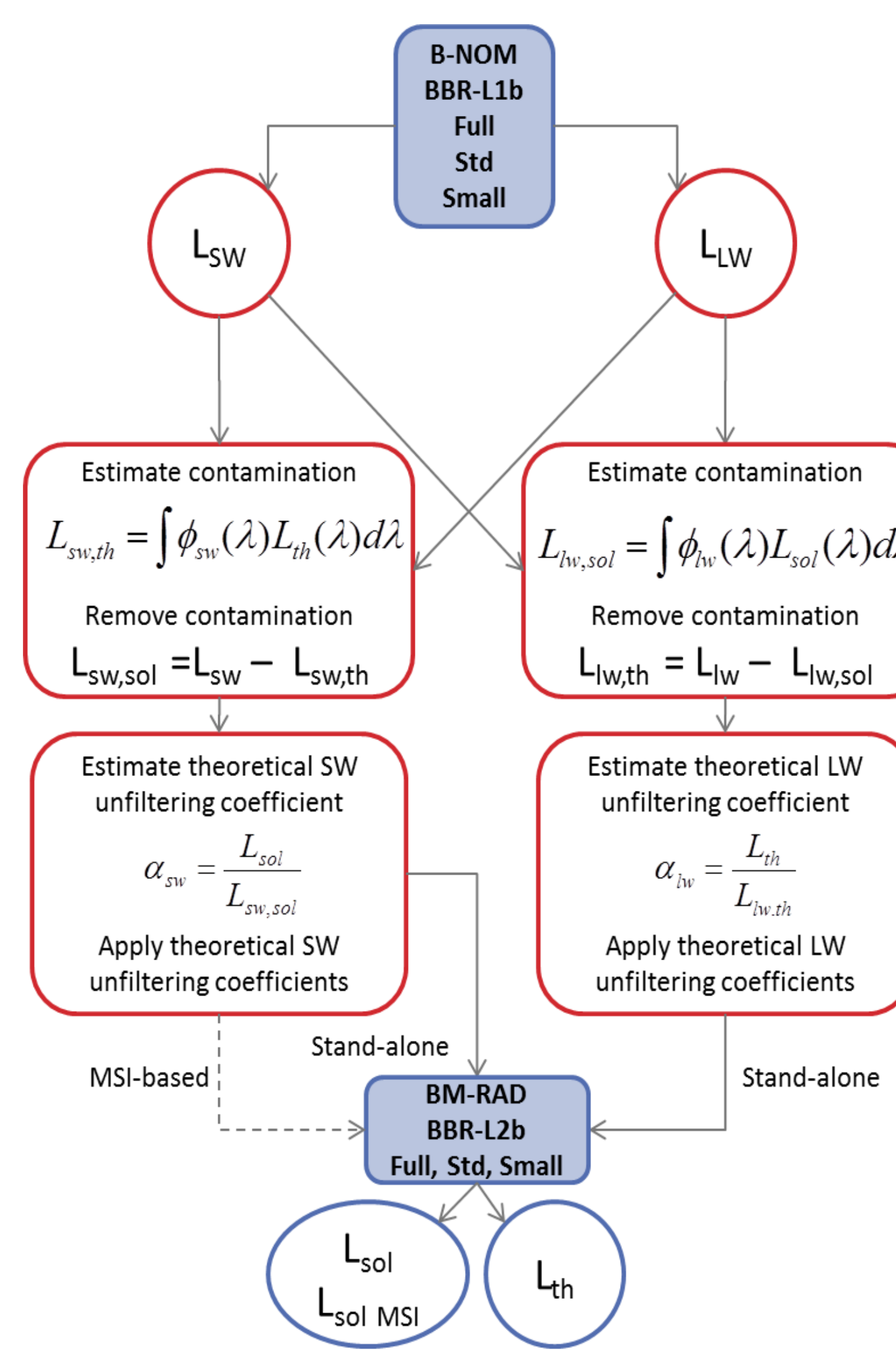


$$\phi_{tot}(\lambda) = \phi_{det}(\lambda) \cdot \phi_{teles}(\lambda) \quad L_{LW} = L_{TOT} - A \cdot L_{SW}$$

$$\phi_{sw}(\lambda) = \phi_{det}(\lambda) \cdot \phi_{teles}(\lambda) \cdot \phi_{quartz}(\lambda) \quad \phi_{LW}(\lambda) = \phi_{tot}(\lambda) - A \cdot \phi_{SW}(\lambda)$$

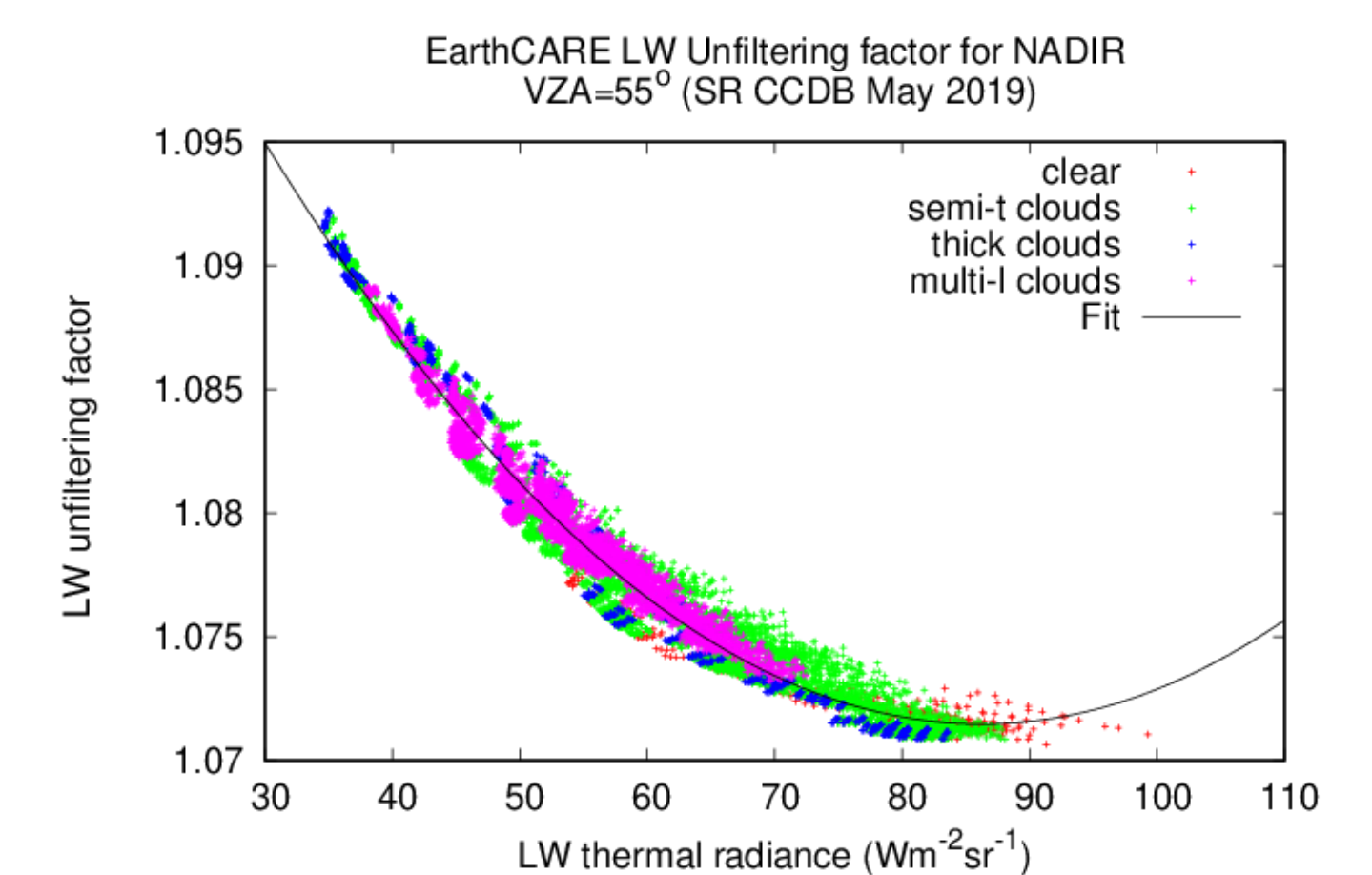
BM-RAD INPUTS AND OUTPUTS

Input Products	Output Products	6 Spatial resolutions
<ul style="list-style-type: none"> B-NOM, B-SNG M-NOM, M-CM X-JSG X-MET 	<ul style="list-style-type: none"> Filtered BBR SW and LW radiances Unfiltered BBR SW and LW radiances IGBP surface types in the BBR PSFs BBR PSF-weighted MSI cloud products 	<ul style="list-style-type: none"> BBR grid Small, Full, Standard JSG Assessment Domain, JSG and JSG PSF corrected



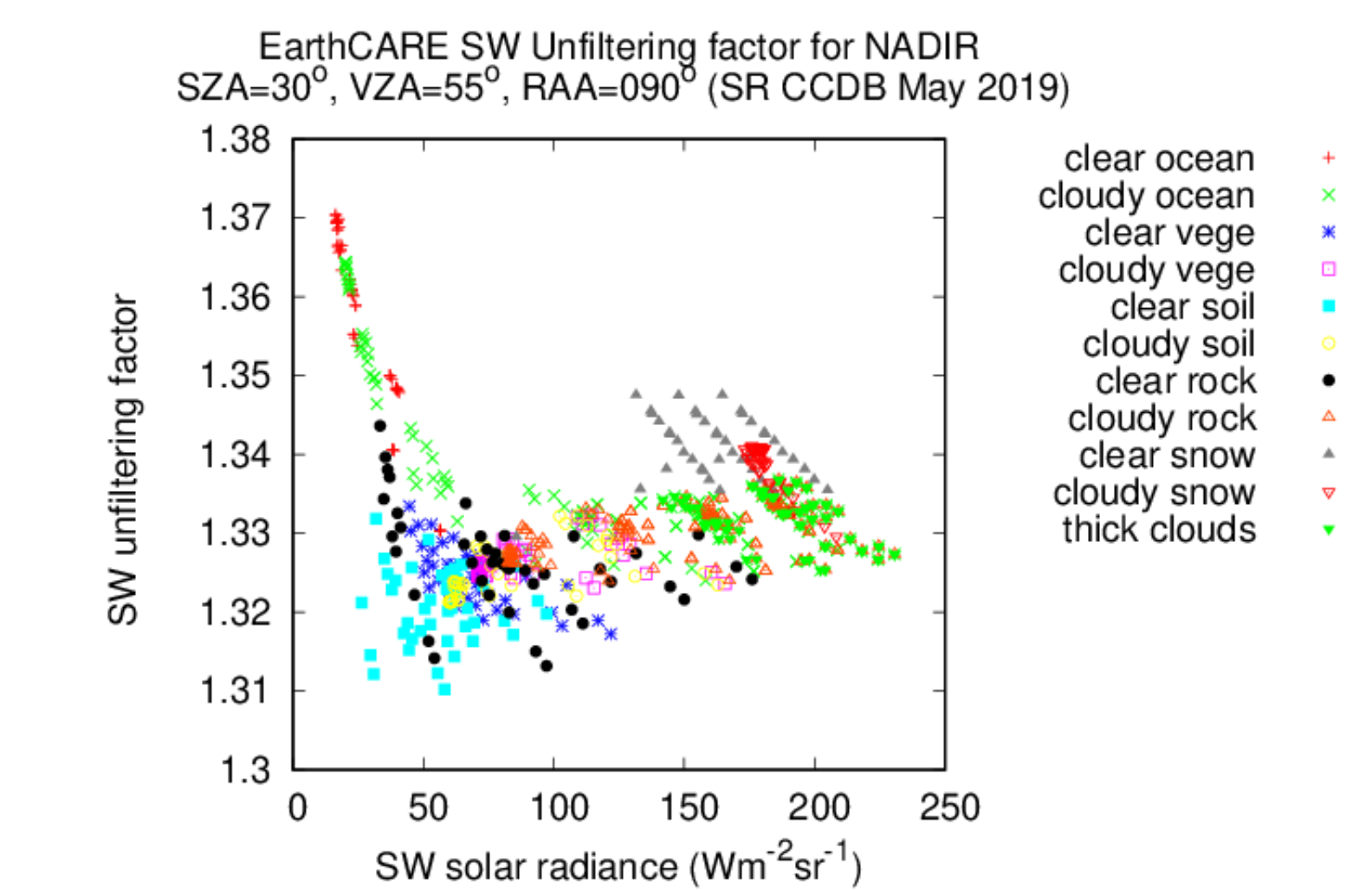
LW unfiltering

$$\text{Surface type independent} \quad \alpha_{lw} = a + b \cdot L_{lw,th} + c \cdot L_{lw,th}^2$$



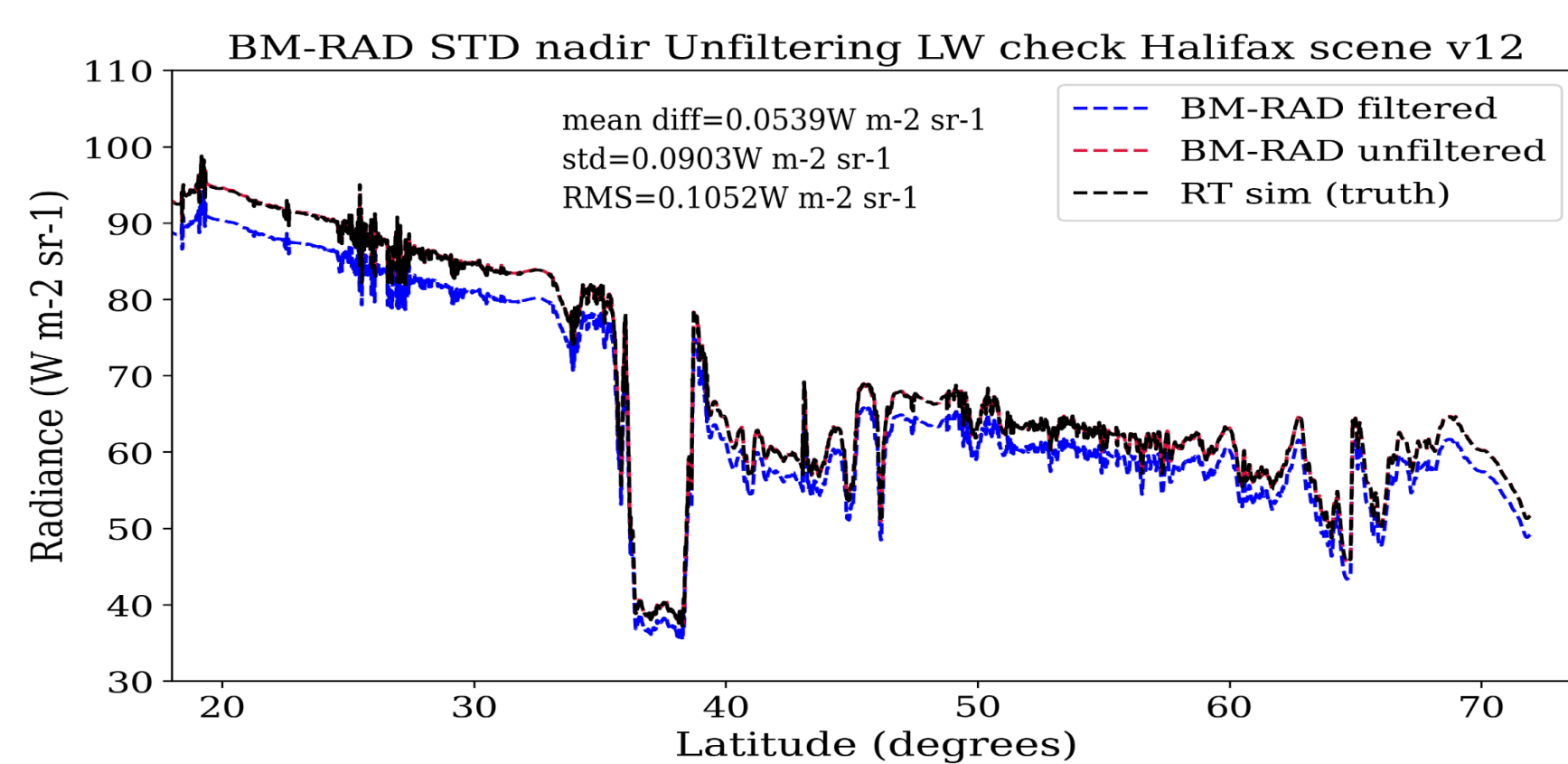
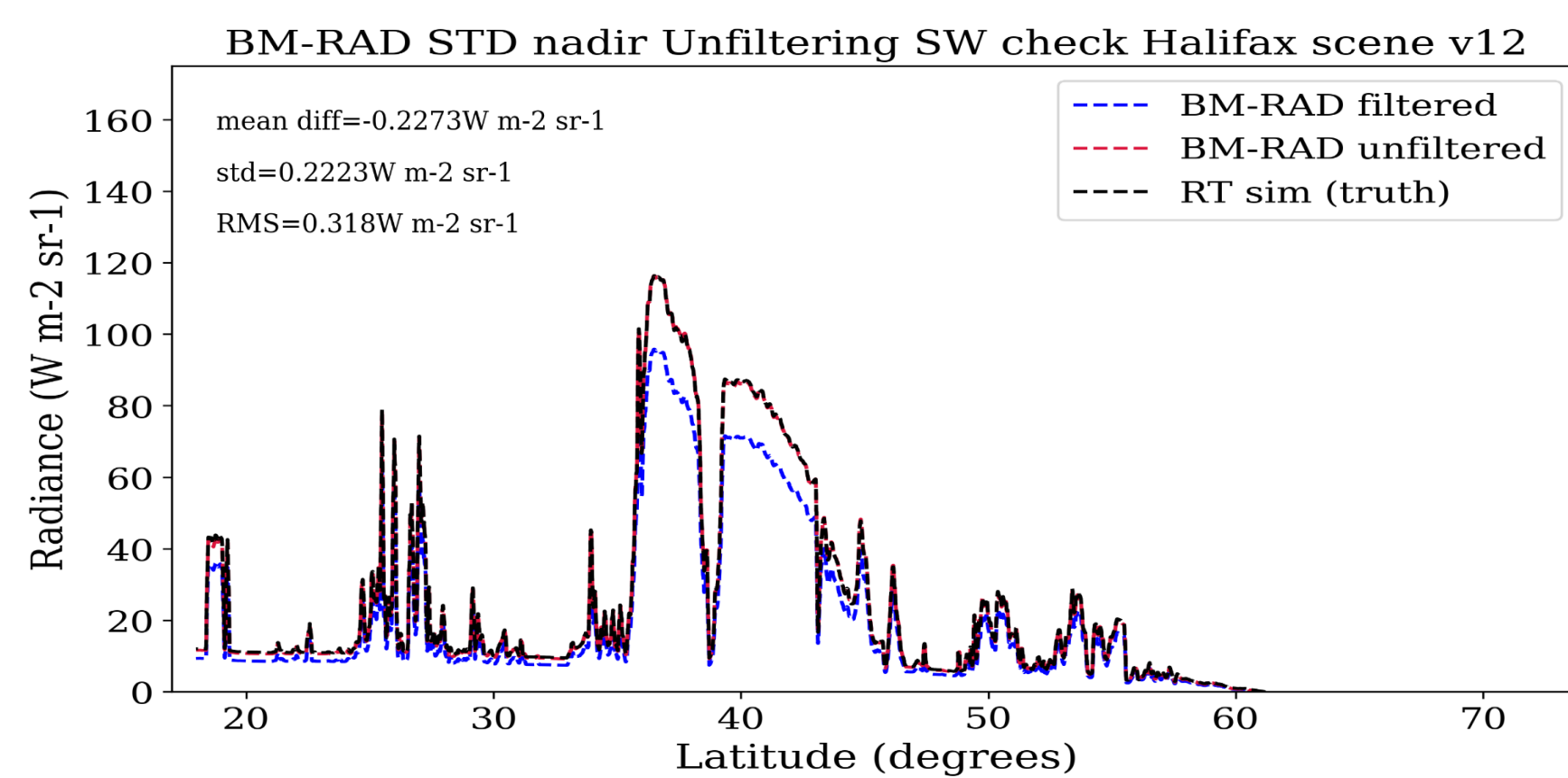
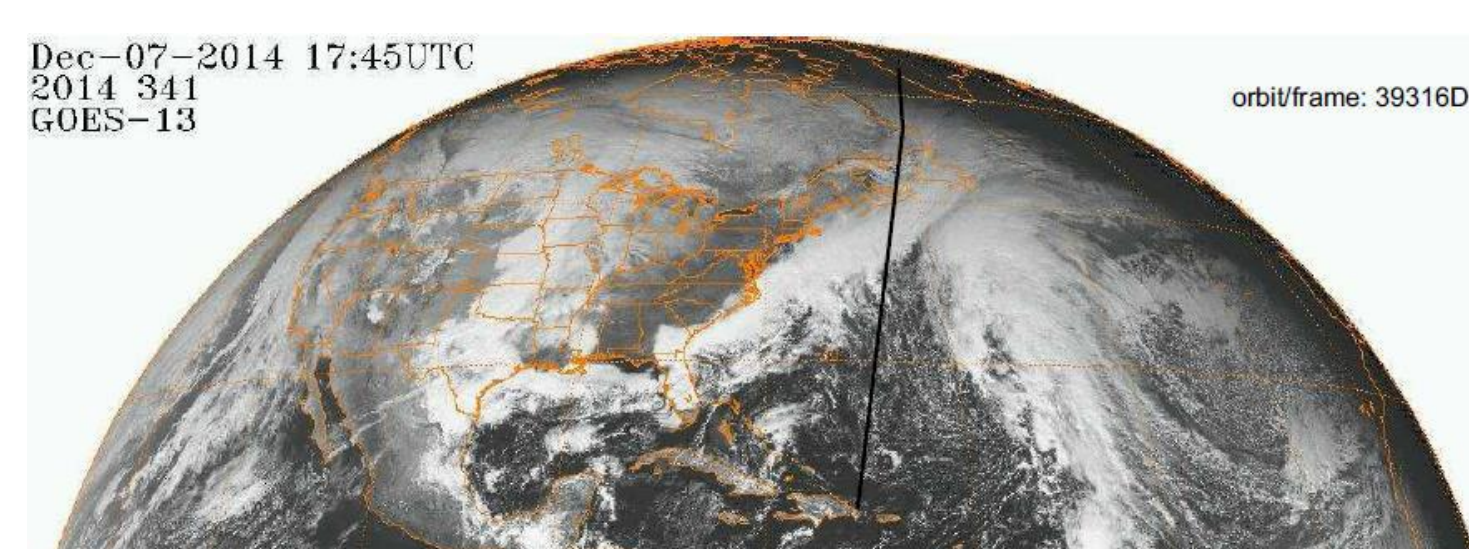
SW unfiltering

$$\text{Surface type dependent Hyperbolic fit} \quad \alpha_{sw} = a + b/L_{sw,sol}$$



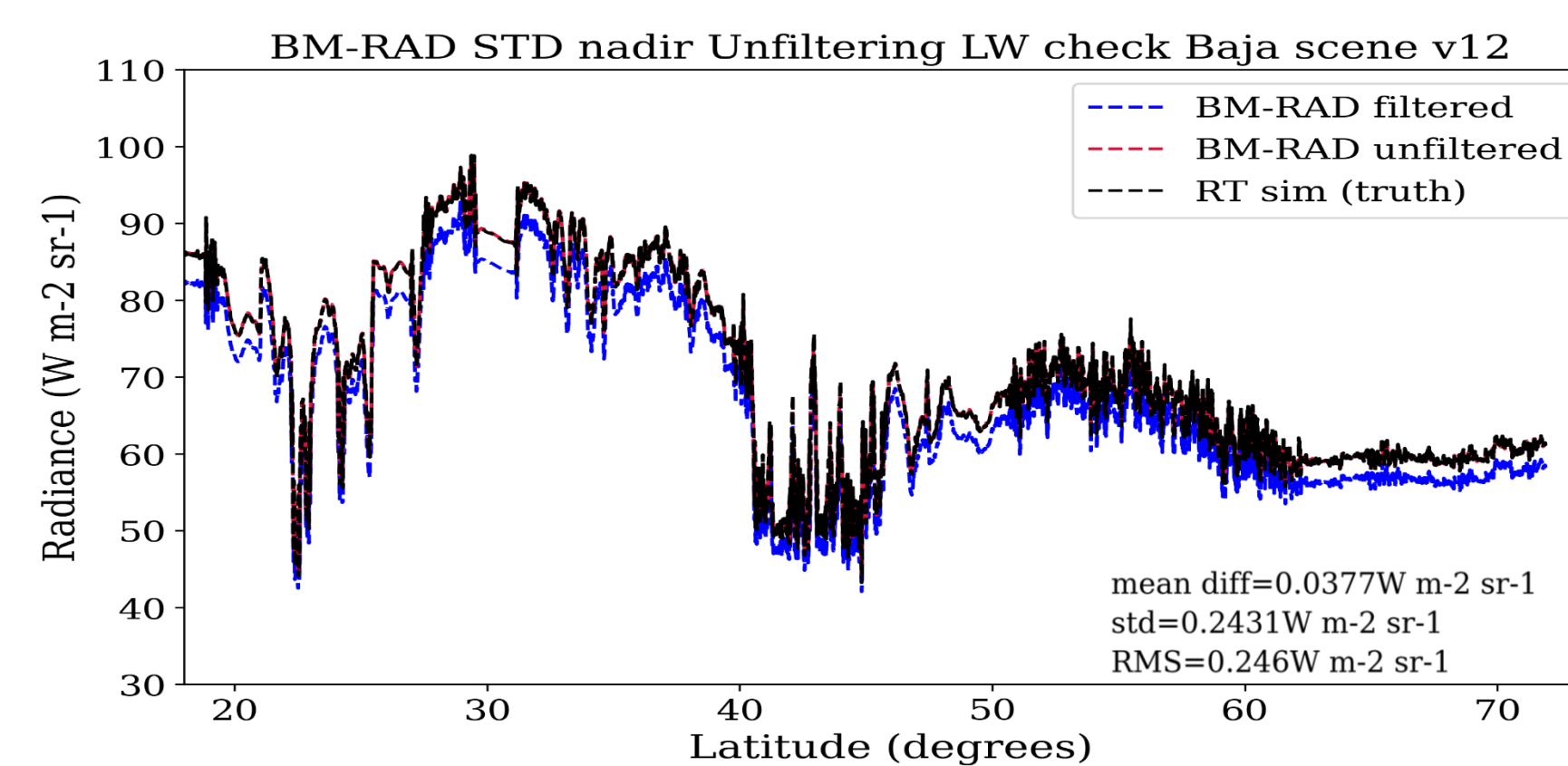
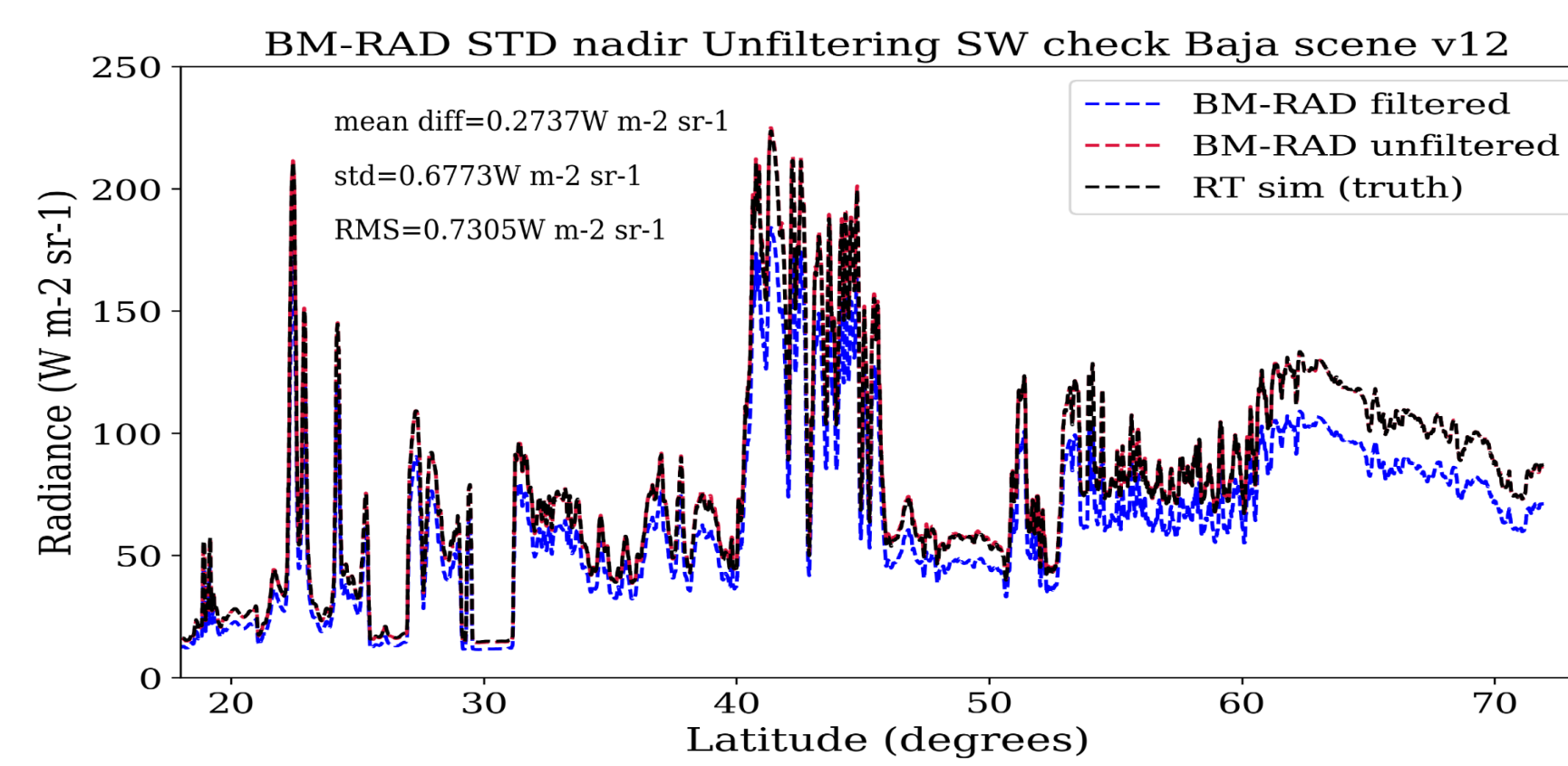
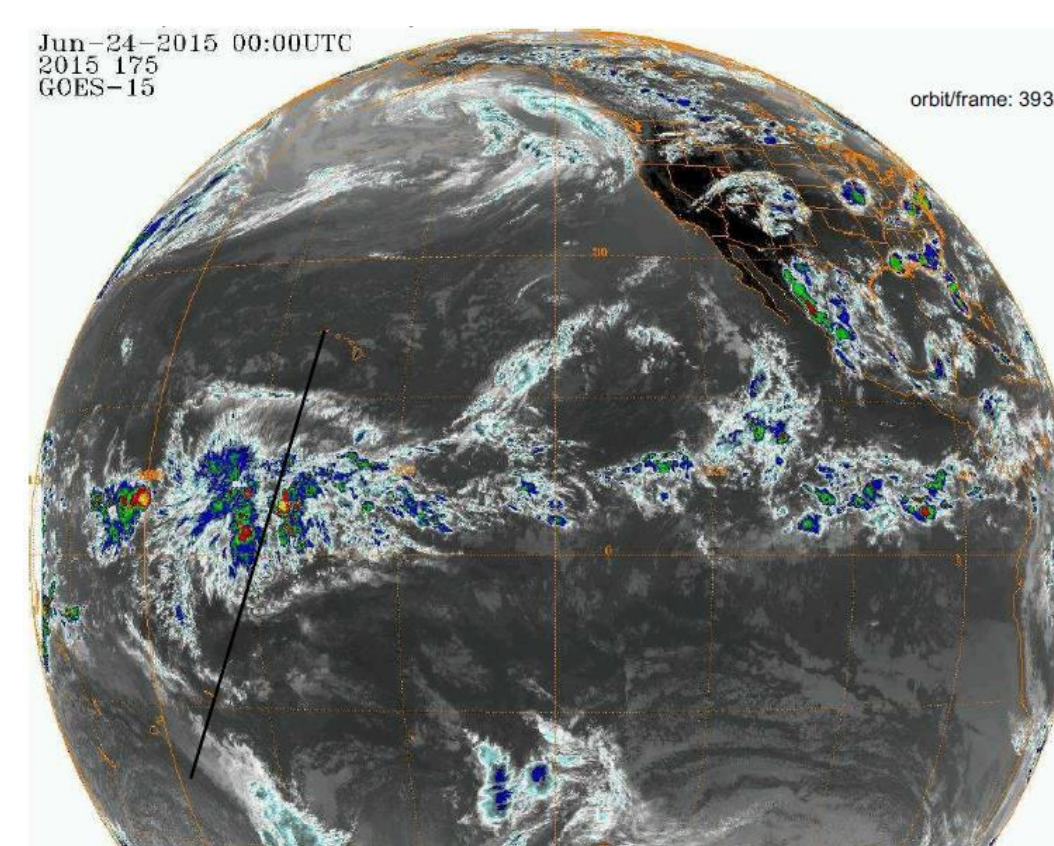
EXAMPLE OF PRODUCTS

39316D - HALIFAX



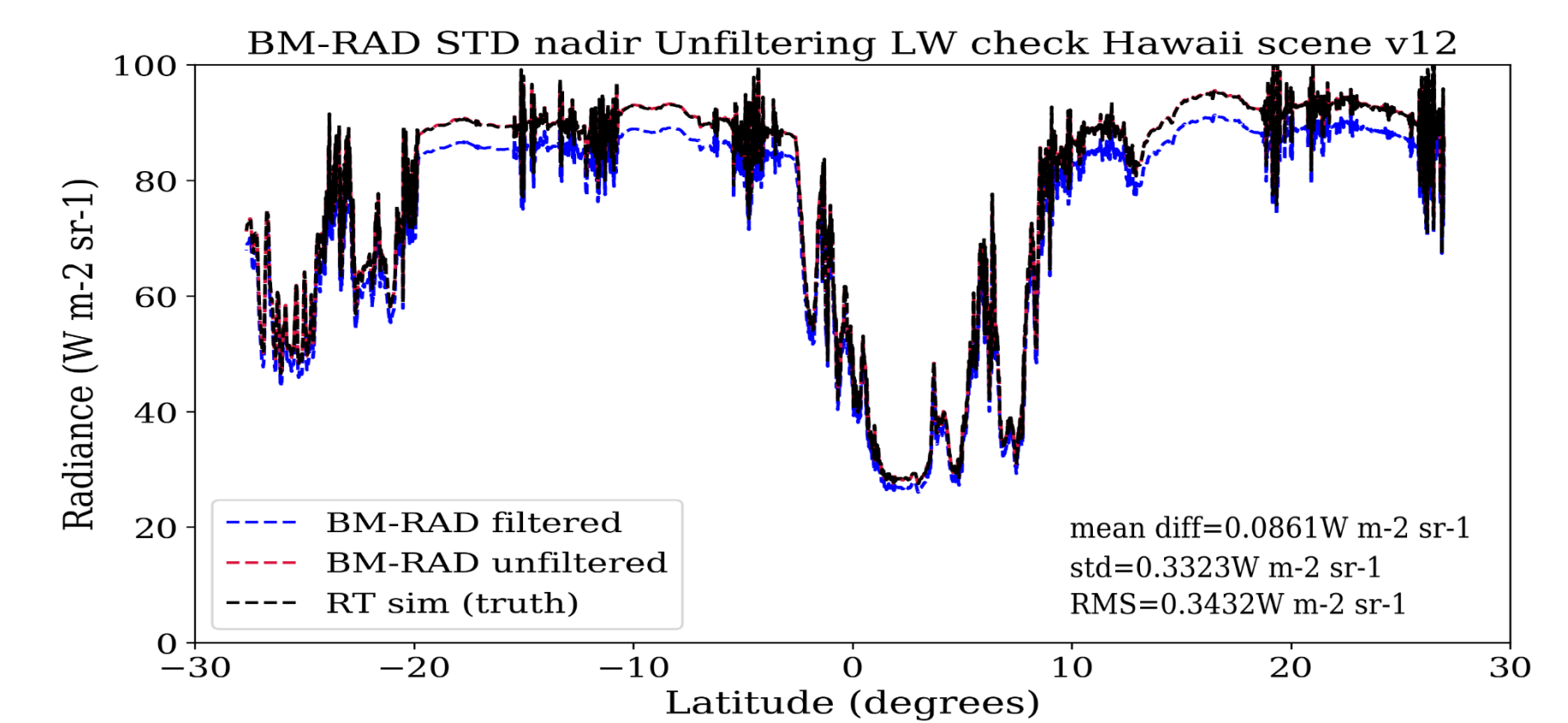
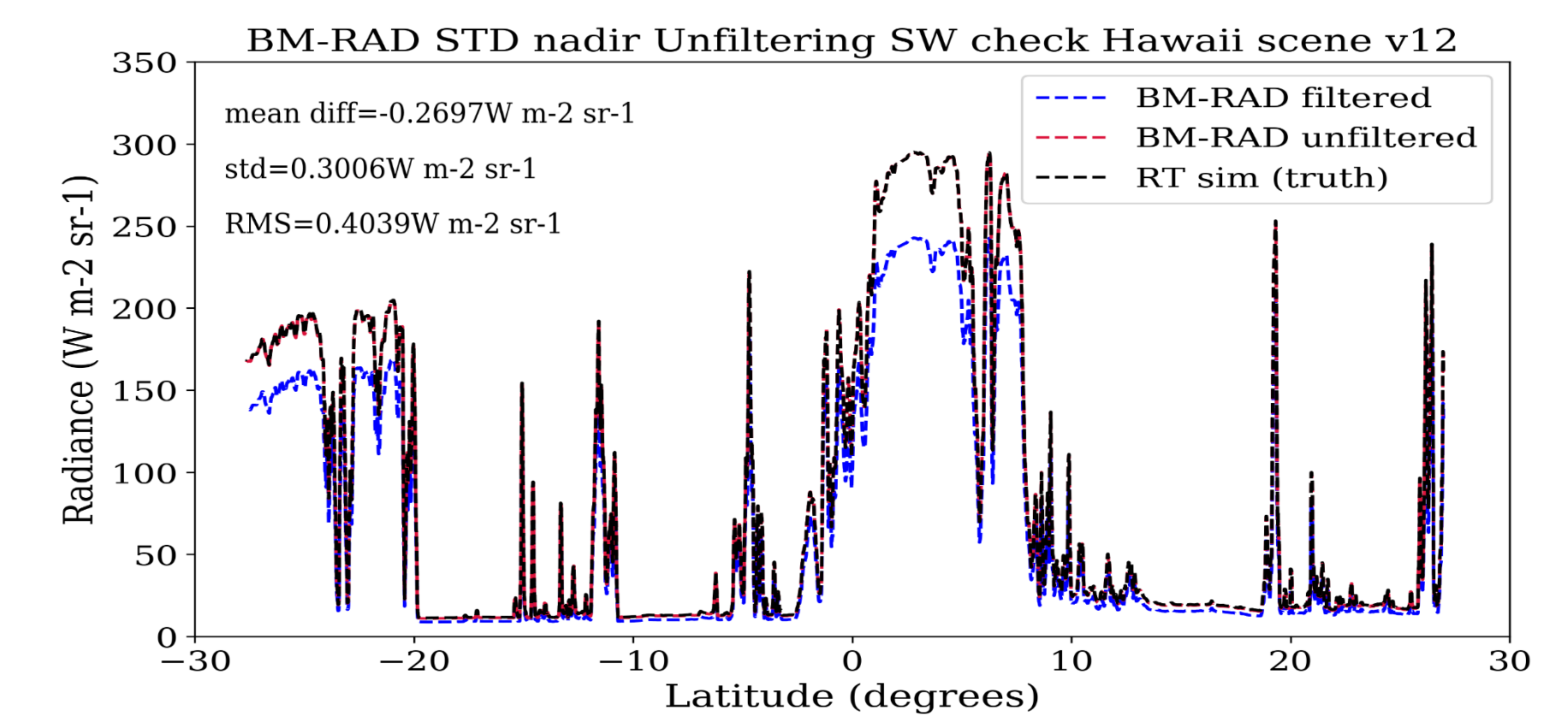
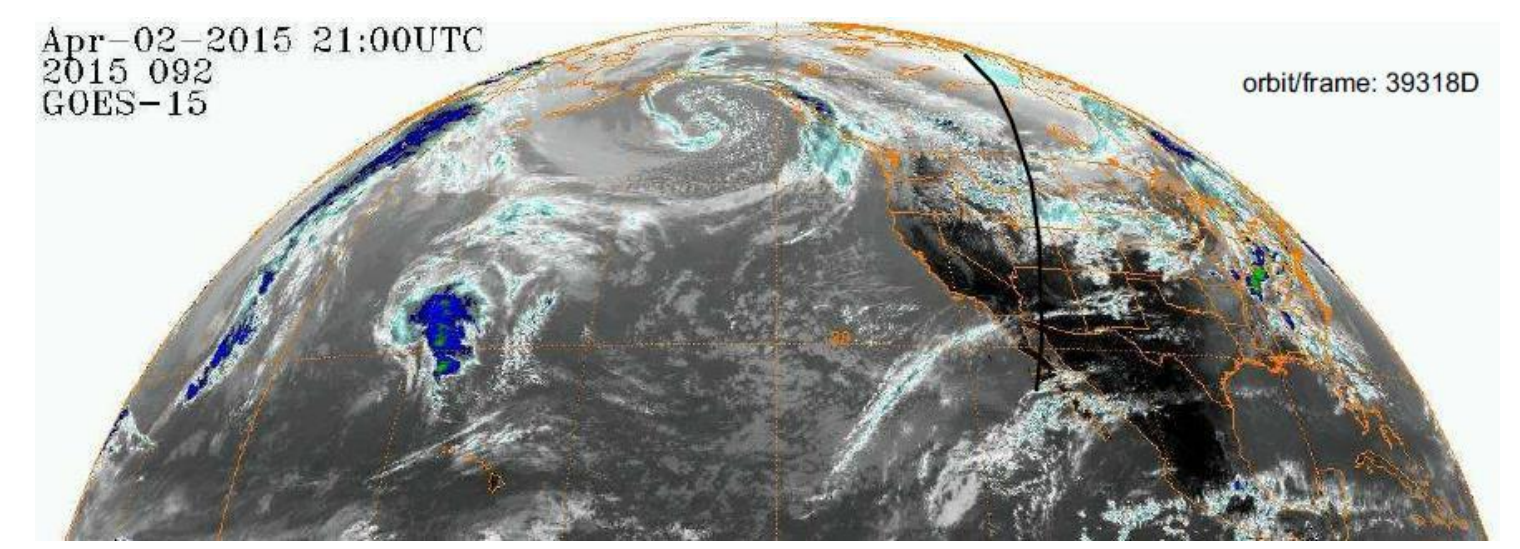
Orbit crossing Canada and USA in Dec 2014. This case includes Sun just below the horizon over Greenland, cold air over Labrador, a cold-front near Halifax, dense overcast south of Halifax, and scattered shallow convection south of Bermuda.

42043E - HAWAII



The orbit is going through the Pacific Ocean and passing near the Hawaiian Islands in June 24th June 2015. Central portion of the frame is bisected by a mesoscale convective system.

40874D - BAJA



Orbit crossing Canada and USA in April 2, 2015. This case includes clear and cold conditions at the northern extremity, scattered cloud through the Canadian Prairies, overcast over the Rocky Mountains, clear through Utah, and cirrus in Arizona and Mexico.

