

Land Surface Emissivity of SURFRAD sites from UW-Madison Baseline Fit Emissivity Database

This global database of infrared land surface emissivity is derived using input from the Moderate Resolution Imaging Spectroradiometer (MODIS) operational land surface emissivity product (MOD11). The baseline fit method (Seemann et al., 2007), based on a conceptual model developed from laboratory measurements of surface emissivity, is applied to fill in the spectral gaps between the six emissivity wavelengths available in MOD11. The six available MOD11 wavelengths span only three spectral regions (3.8-4, 8.6, and 11-12 microns). Emissivity in the baseline fit database is available globally at ten wavelengths (3.6, 4.3, 5.0, 5.8, 7.6, 8.3, 9.3, 10.8, 12.1, and 14.3 microns) with 0.05 degree spatial resolution. The wavelengths in the database were chosen as hinge points to capture as much of the shape of the higher resolution emissivity spectra as possible between 3.6 and 14.3 microns.

Modis Channels (microns)

Ch29 8.4 – 8.7 Ch30 9.58 – 9.88
Ch31 10.78 – 11.28 Ch32 11.77 – 12.27

Baseline Fit Channels (3.6, 4.3, 5.0, 5.8, 7.6, 8.3, 9.3, 10.8, 12.1, and 14.3 microns)

Narrow-band to Broad-band Algorithms:

1. [2 Channels Average](#)

$$\varepsilon = a\varepsilon_{10.8} + b\varepsilon_{12.1}$$

a=0.5, b=0.5

2. [Wang's regression](#)

$$\varepsilon = a\varepsilon_{8.3} + b\varepsilon_{10.8} + c\varepsilon_{12.1}$$

a=0.2122, b=0.3859, c=0.4029

3. [Modis Channels Regression](#)

$$\varepsilon = a + b[\max(\varepsilon_{8.3}, \varepsilon_{10.8}, \varepsilon_{12.1}) - \min(\varepsilon_{8.3}, \varepsilon_{10.8}, \varepsilon_{12.1})] + c\rho_{2.13}$$

a=0.986, b=-0.226, c=-0.0757

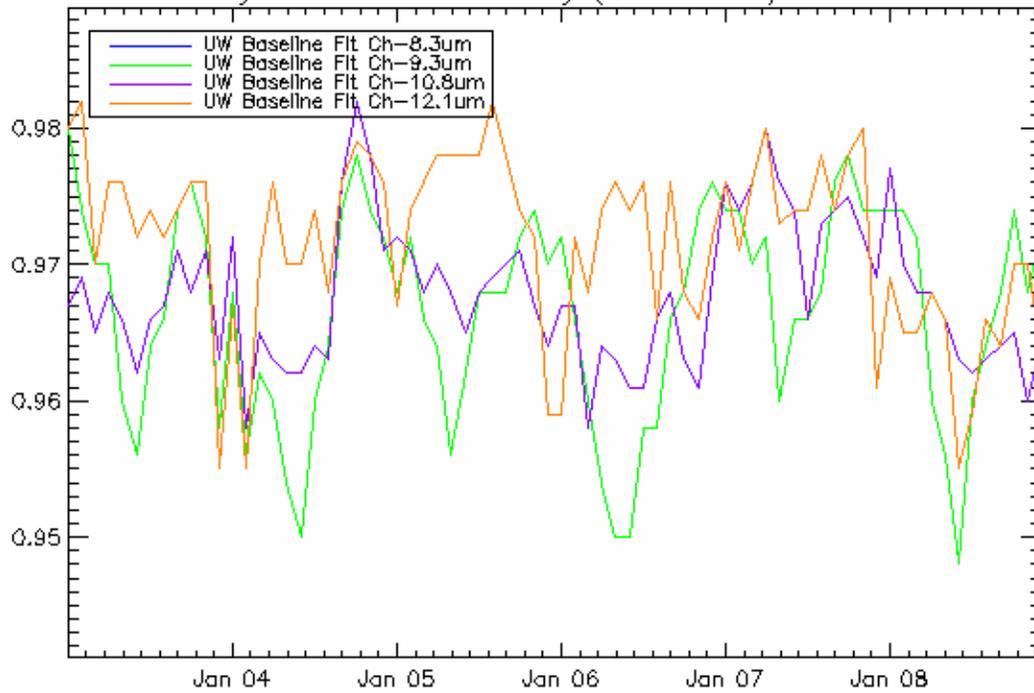
*A constant -0.015 is used instead of the term $c\rho_{2.13}$ in the following figures

4. [Aster Channels Regression](#)

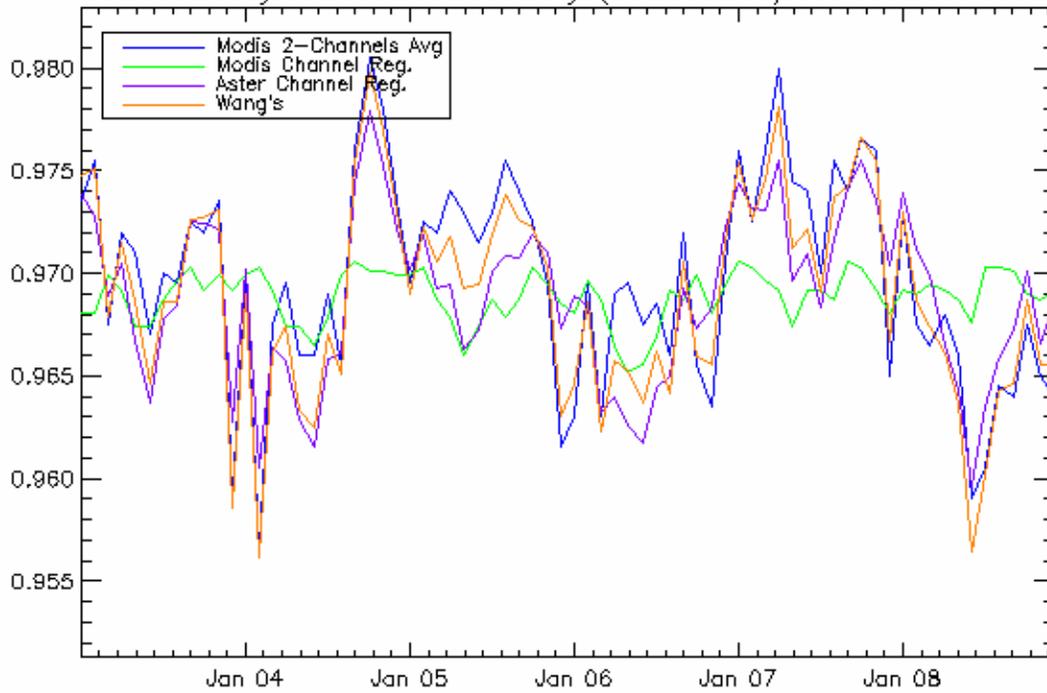
$$\varepsilon = a\varepsilon_{8.3} + b\varepsilon_{9.3} + c\varepsilon_{10.8} + d\varepsilon_{12.1} + e$$

a=0.121, b=0.194, c=0.323, d=0.113, e=0.242

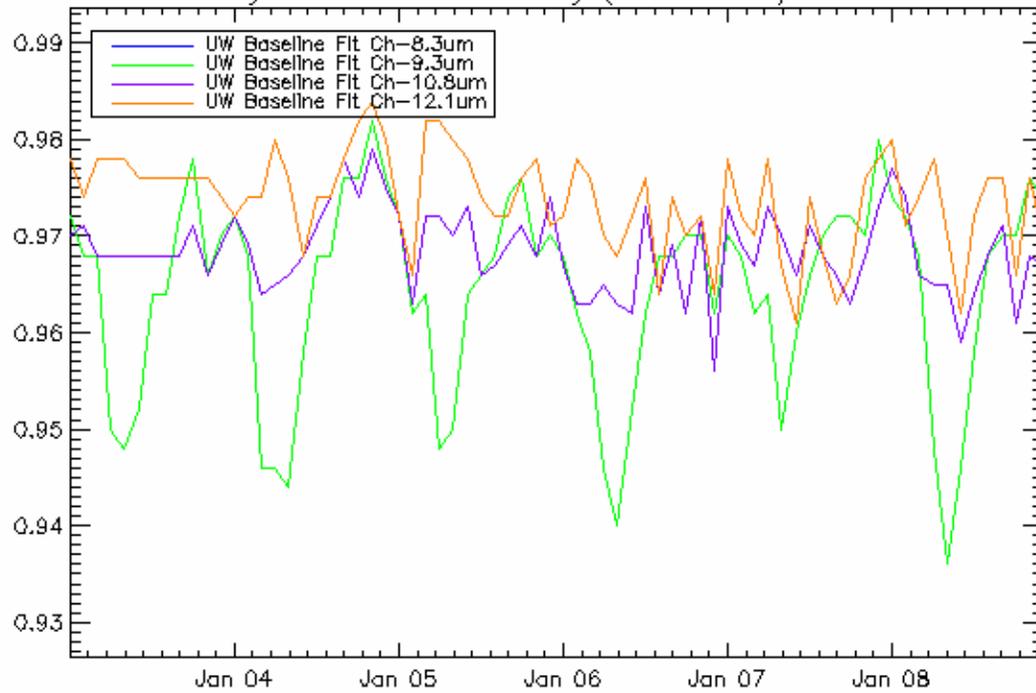
Monthly Narrowband Emissivity (2003–2008) Sioux Falls



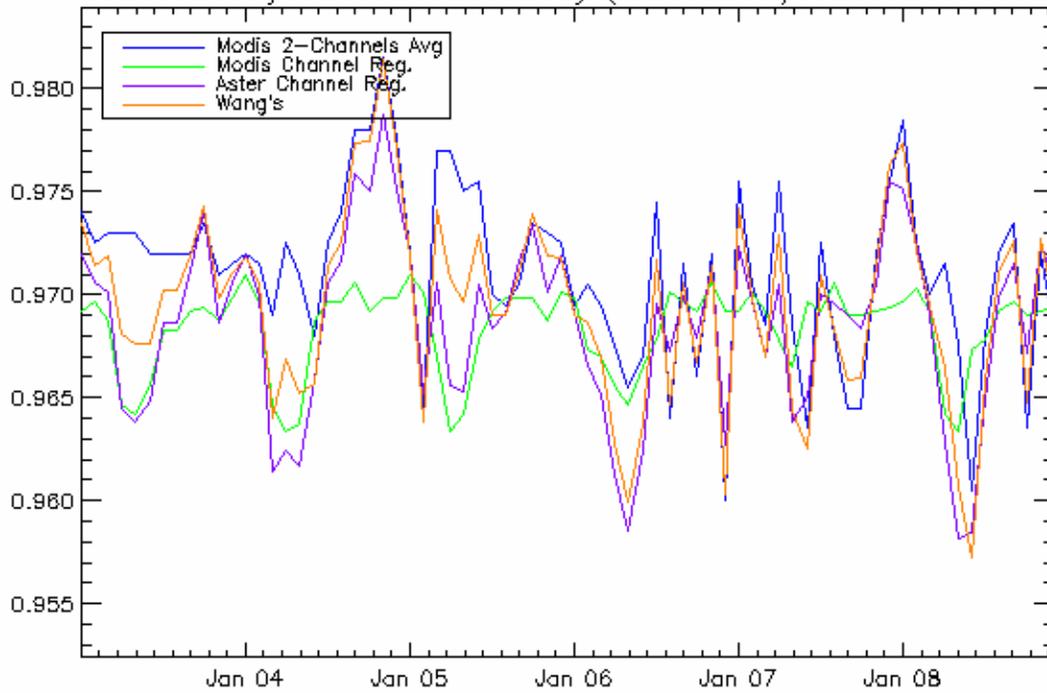
Monthly Broadband Emissivity (2003–2008) Sioux Falls



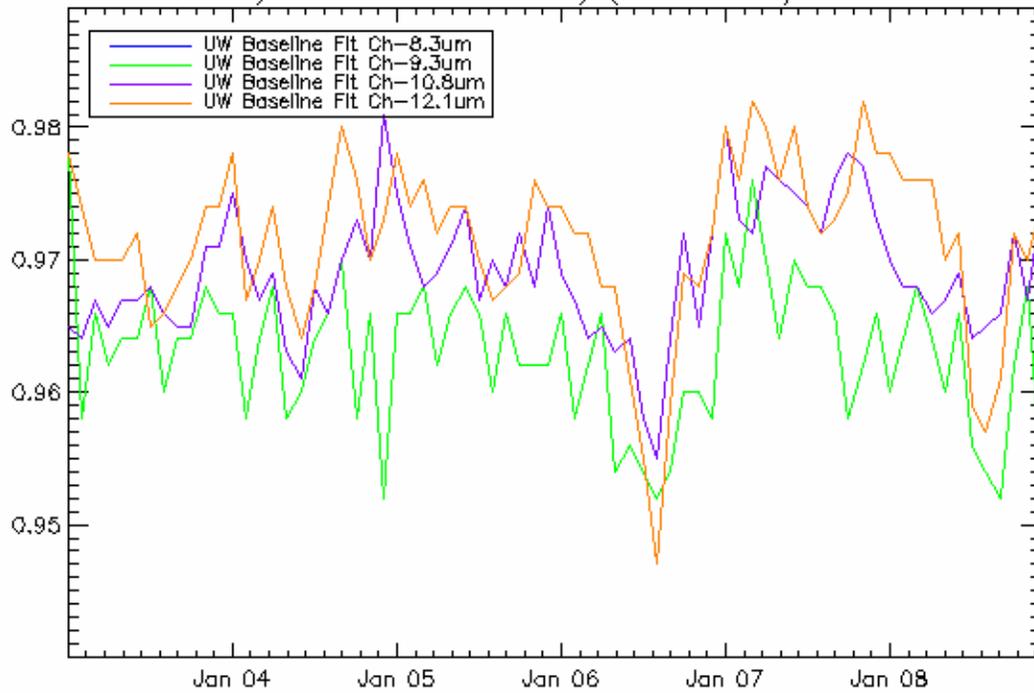
Monthly Narrowband Emissivity (2003–2008) Bondville



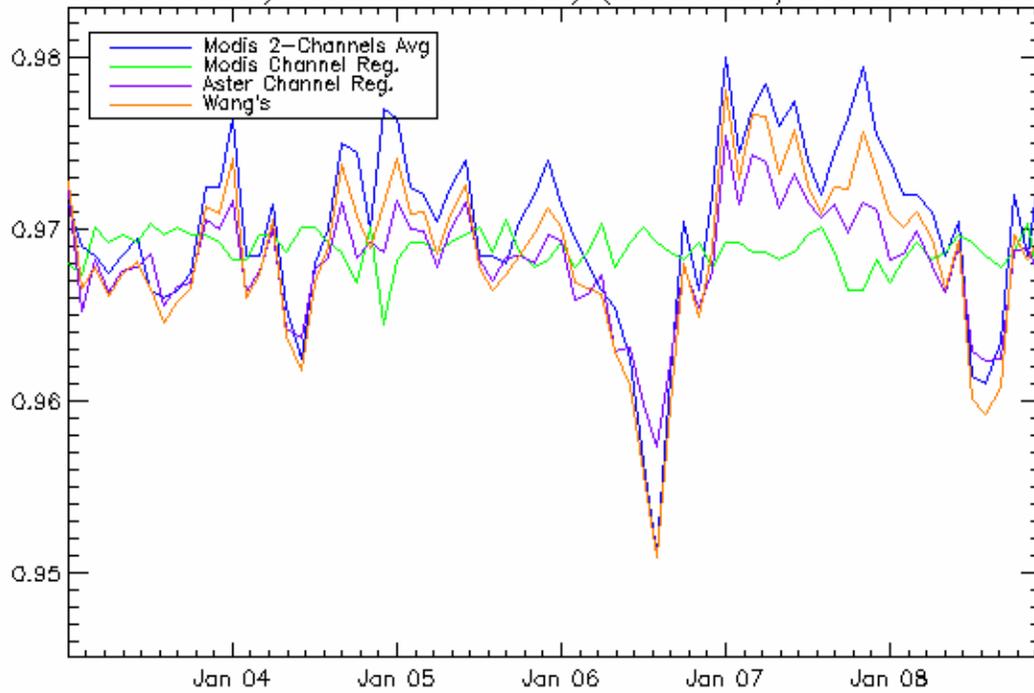
Monthly Broadband Emissivity (2003–2008) Bondville

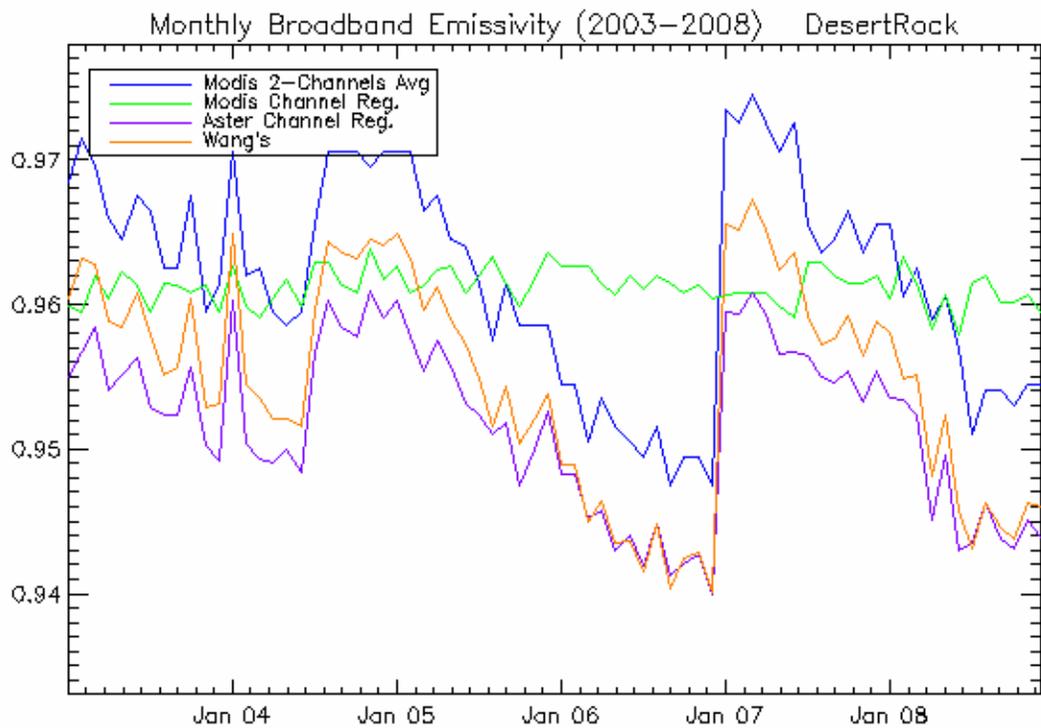
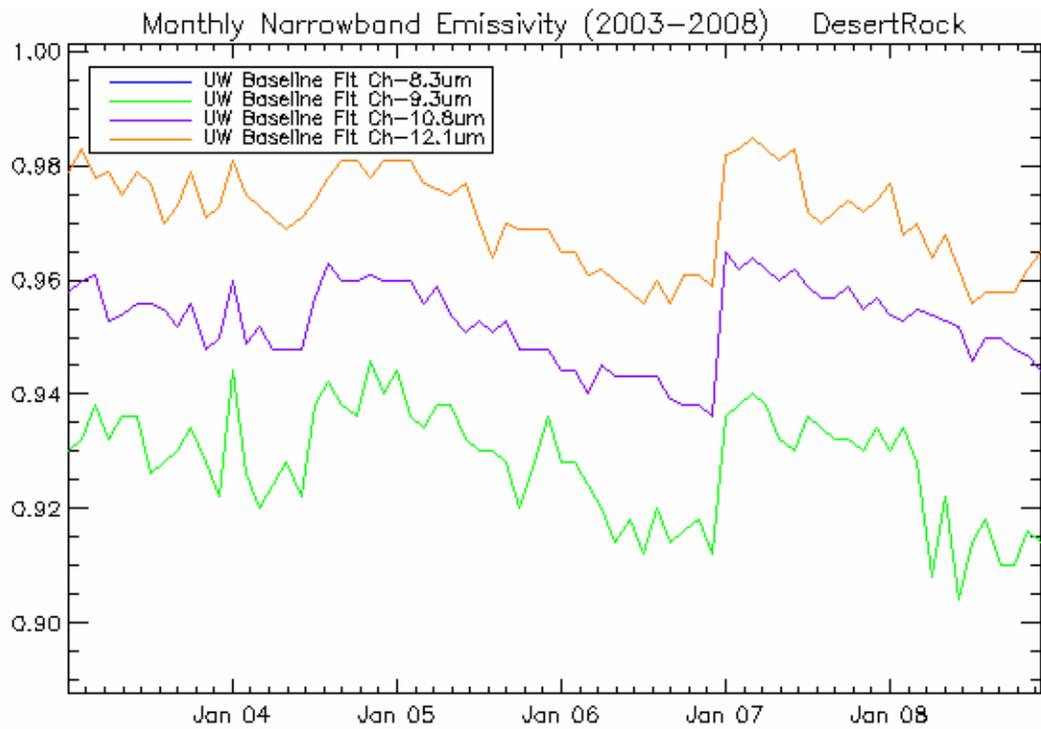


Monthly Narrowband Emissivity (2003–2008) Boulder

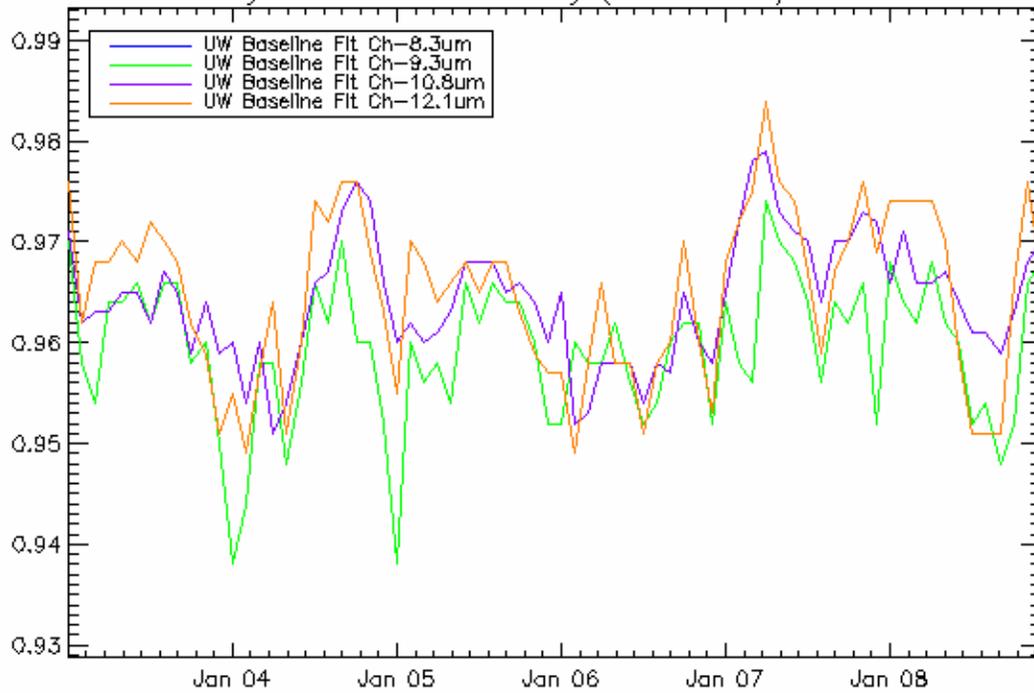


Monthly Broadband Emissivity (2003–2008) Boulder

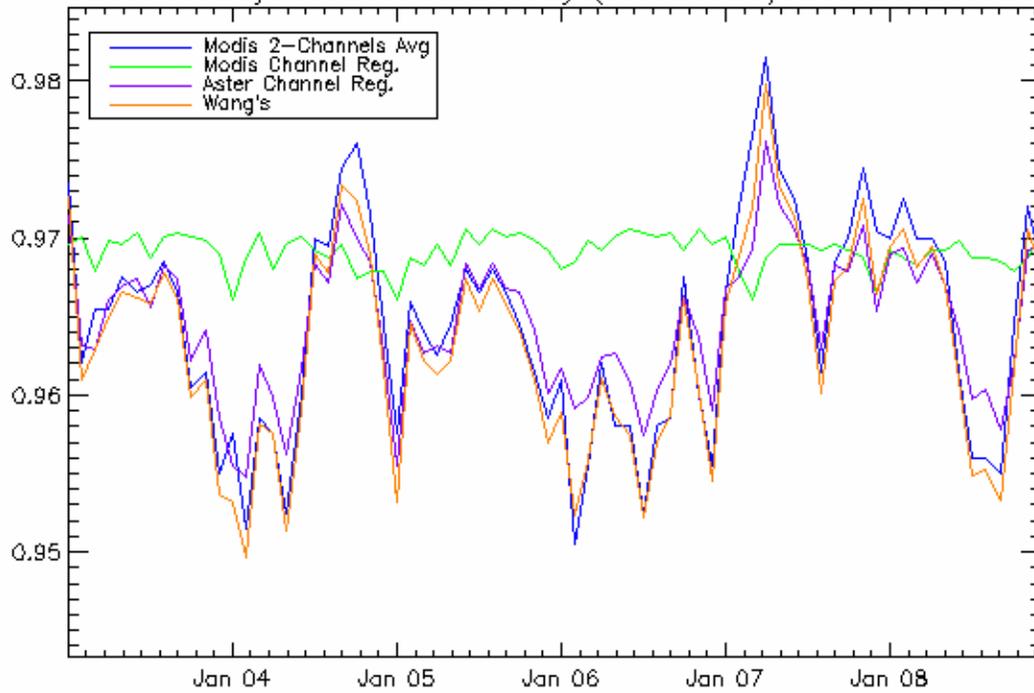




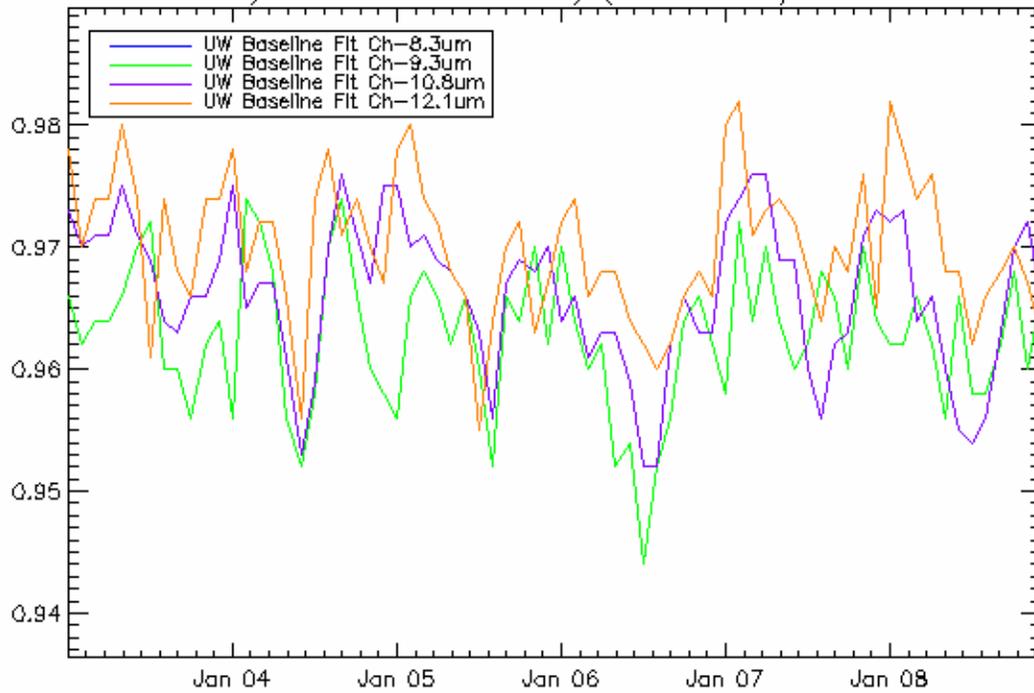
Monthly Narrowband Emissivity (2003–2008) FortPeck



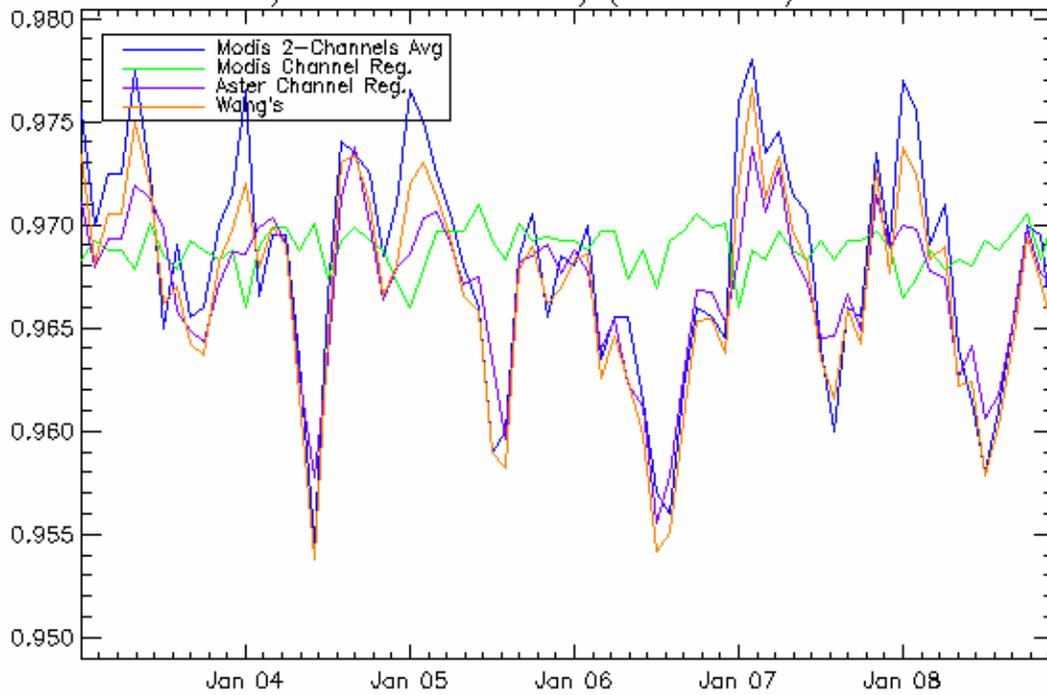
Monthly Broadband Emissivity (2003–2008) FortPeck



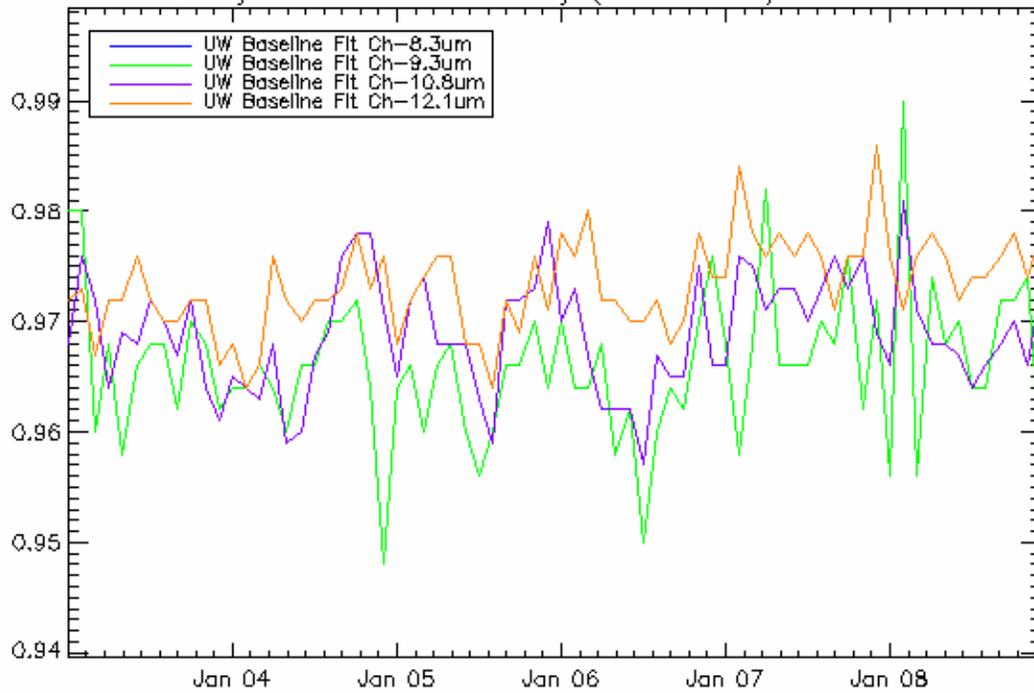
Monthly Narrowband Emissivity (2003–2008) GoodWin



Monthly Broadband Emissivity (2003–2008) GoodWin



Monthly Narrowband Emissivity (2003–2008) PennState



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