

Making SSFM Dataset

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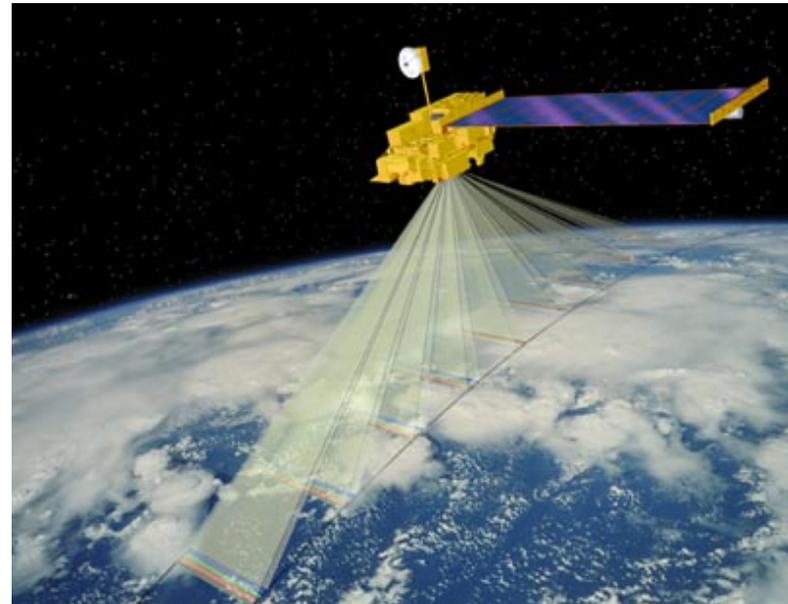
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1. Introduction

- Installed on the EOS flagship Terra, viewing the sunlit earth simultaneously at nine widely-spaced angles, MISR provides radiances in four spectral bands at each of the nine angles. The multidirectional measurements of MISR offer an opportunity to study the radiation anisotropy of each scene along-track.



- A dataset with coincident measurements of spectral and broadband short wave radiances from MISR, CERES, and MODIS on Terra satellite will not only improve the study of CERES ADMs of different scene types, but also enhance the applications of the MISR, CERES, and MODIS data on various atmospheric remote-sensing aspects.

2. Ordering MISR HDF Files

The MISR L1B2 Ellipsoid-projected data are ordered through the website of LaASDC. Three kinds of HDF files need to be ordered:

- ARP
Radiance/RQDI data for each channel and each camera are stored in the files. The measurement time for each block are also stored in these HDF files. Each camera has its individual HDF file.
- GMP
The solar and viewing geometry data for each camera are stored in these HDF files.
- AGP
The geolocation data are stored in these HDF files.

FtpPull is an appropriate tool for transferring these HDF to working machines. Each order of data takes ~2 to 5 days for ASDC to prepare. They will stay in ASDC's FtpPull directory for up to 72 hours.

3. Sub-setting MISR HDF Files into MISR Binary Files

The convolution of MISR data with SSF requires input MISR binary files which stores Time, Lat, Lon, SZA, SAZ, VZA, VAZ, Radiances(1-4) of each pixel. The programs to process the ARP, GMP and AGP HDF files into the MISR binary files are developed and stored at:

`/CERES/inversion/home/wsun/MISR`

Under this directory, there are 4 subdirectories:

(1) Scripts

Under this subdirectory, there is one code `csh.misrbin`, which is the cshell to run core program `brfdump` and `Make_MISR`.

(2) processing

Under this subdirectory, there is a `bld.brfdump` which makes the core code `brfdump.f` into executive `brfdump`.

The core code brfdump.f contains: Main program HDF2BIN

The input parameters to this program are the orbit number for that day (1 up to 15), the camera numbers (DA ...DF) (1 up to 9). The input file names are read in from the file list_of_files. In list_of_files, the GRP file names are listed in the order of Camera and in the order of path number. When there are some camera files lost, other camera files of the same path must not be included.

The GMP and AGP file names are derived from the GRP file names in this code. The path to these HDF files are shown in this main code. The output of the main code is the binary file for single cameras. These are temporary files and after using by the Make_MISR code (see next section), these files will be removed in next run. The user should be careful to paths to the HDF files while using HDF2BIN.

There are dozen of subroutines in brfdump.f for reading and interpolating Time, Lat, Lon, SZA, SAZ, VZA, VAZ, Radiances(1-4) and many temporary files in the directory, which should not be changed and not need to be visited by a common user. If one really wants to know them, email to: w.sun@larc.nasa.gov

To build brfdump, under prompt\$, directly run bld.brfdump. If this is the first time it is run under this directory, the user must run it again --- the first run is for building the modules only!

(3) InputMISR

Under this directory, there is a code MISR_Scan.f90. This code reads the binary files for single cameras and combine them in one binary file which will be used by the MISR-SSF convolution program.

The match of the pixels from different cameras and calculation of relative viewing geometric angles and co-latitude values is performed here.

A common user need only to care about the output file path and names in this code. All other things should not be changed if possible.

To make the executive Make_MISR from MISR_Scan.f90, under the prompt\$ of the same directory, run `make -f Makefile`

The user should note that, where some camera HDF file is corrupt, Make_MISR will not produce an output for that orbit. It is not surprised that after the run for 15 orbits of data, one can only get 13 output files.

4. Convolution of MISR Data with SSF Dataset to make SSFM

The MISR binary files are inputs to the program which converts the pixel-level radiances into the CERES-footprint-level data by use of the CERES PSF. This processing produces the hourly unsorted SSFM data.

The code to read the hourly unsorted SSFM data files is stored at /CERES/inversion/home/wsun/MISR/ReadMISR. Under this directory, read_ssfm.f90 is the main code. ceres_misr_match.f90 is the subroutine to match CERES or MODIS data with MISR data for the same solar and viewing geometries. To make read_ssfm.exe, under the prompt\$ of the same directory, run make -f read_ssfm.mak

The SSFM data are sorted in the order of footprints in CERES SSF.

S. Kato

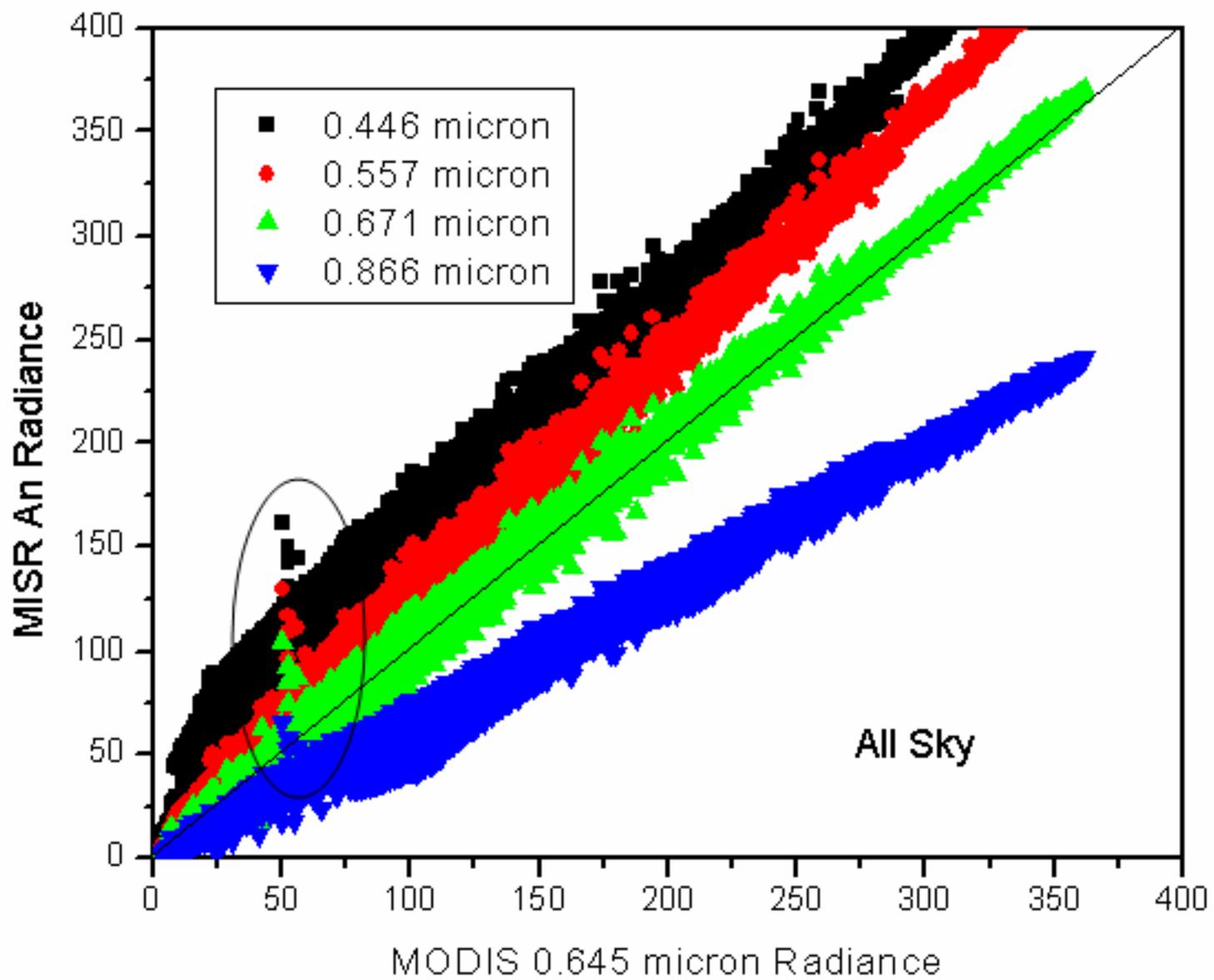
The SSFM dataset is under operational processing for Terra along-track days.

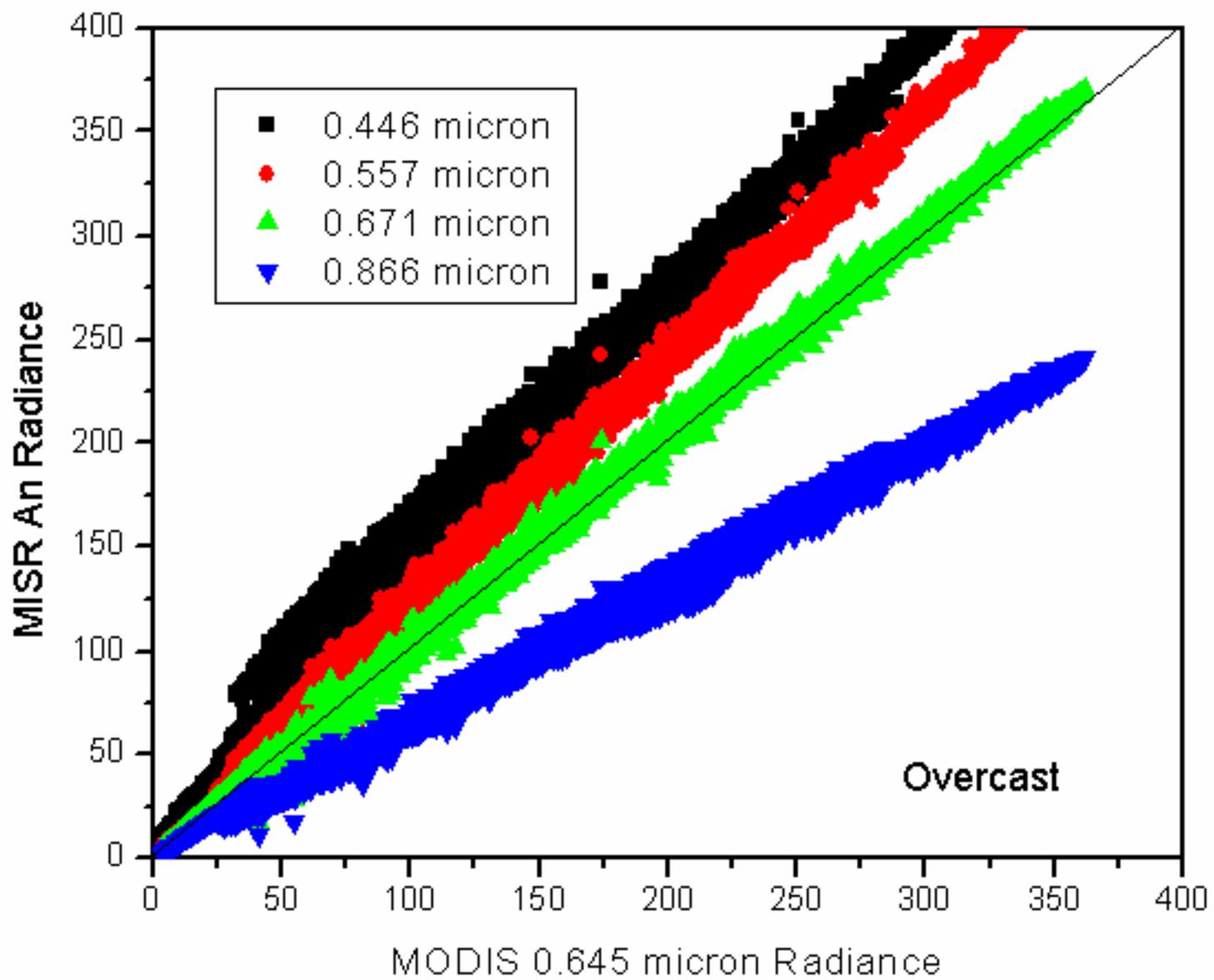
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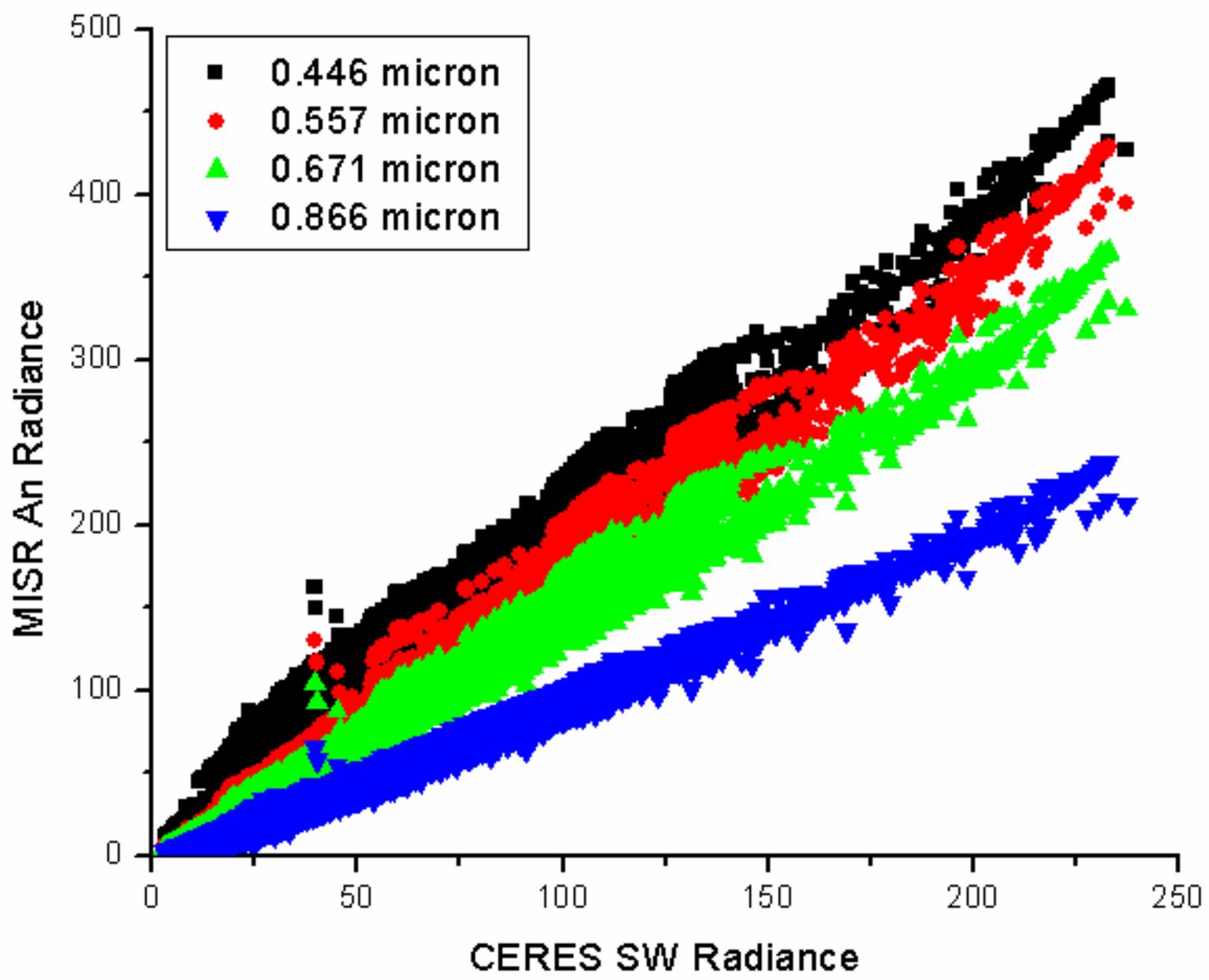
5. SSFM Data Examples

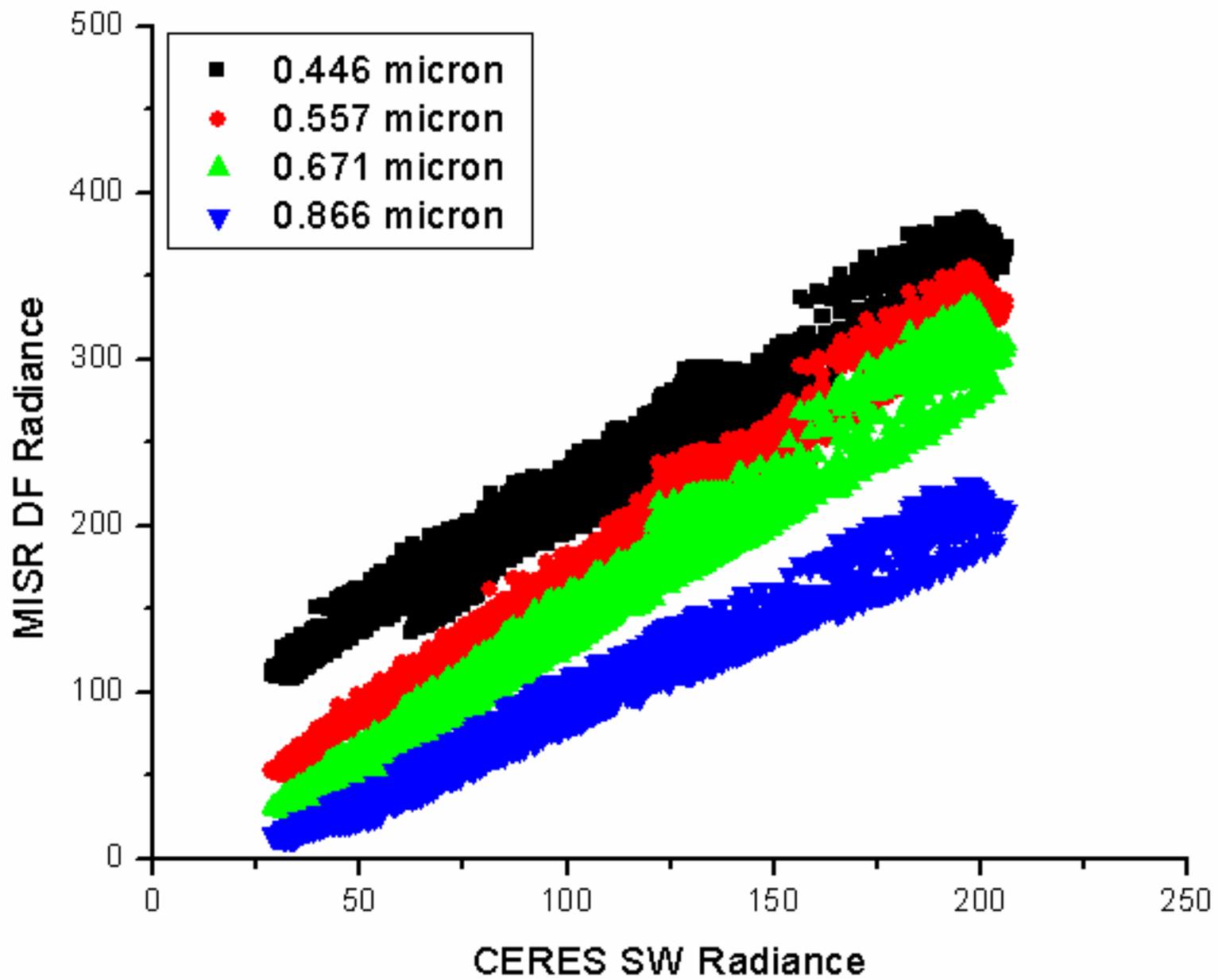
MISR radiances from SSFM are shown against MODIS and CERES SW radiances for various CERES footprints.

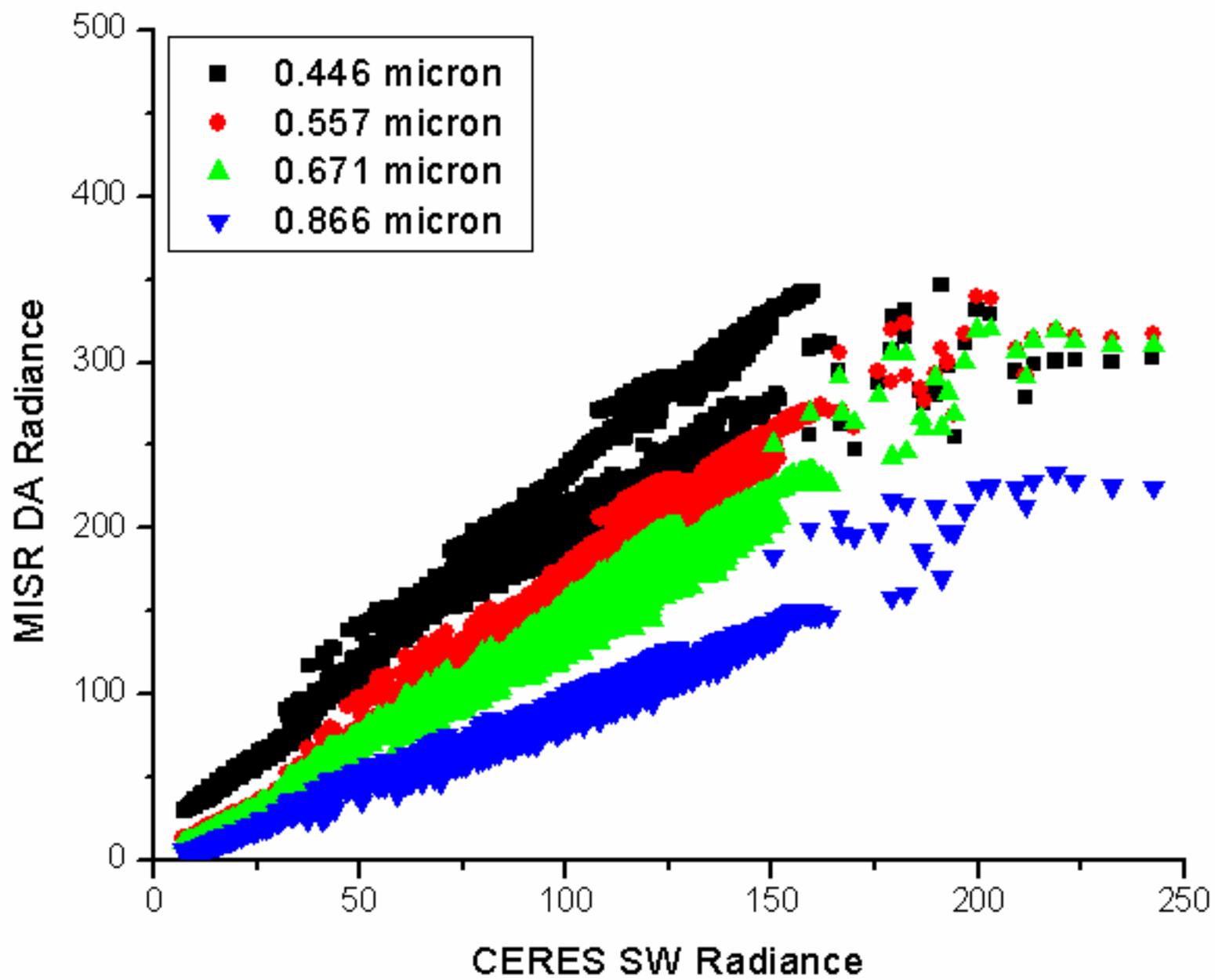
The viewing angle difference between MISR and MODIS, or MISR and CERES are smaller than 5 degree in the following figures.

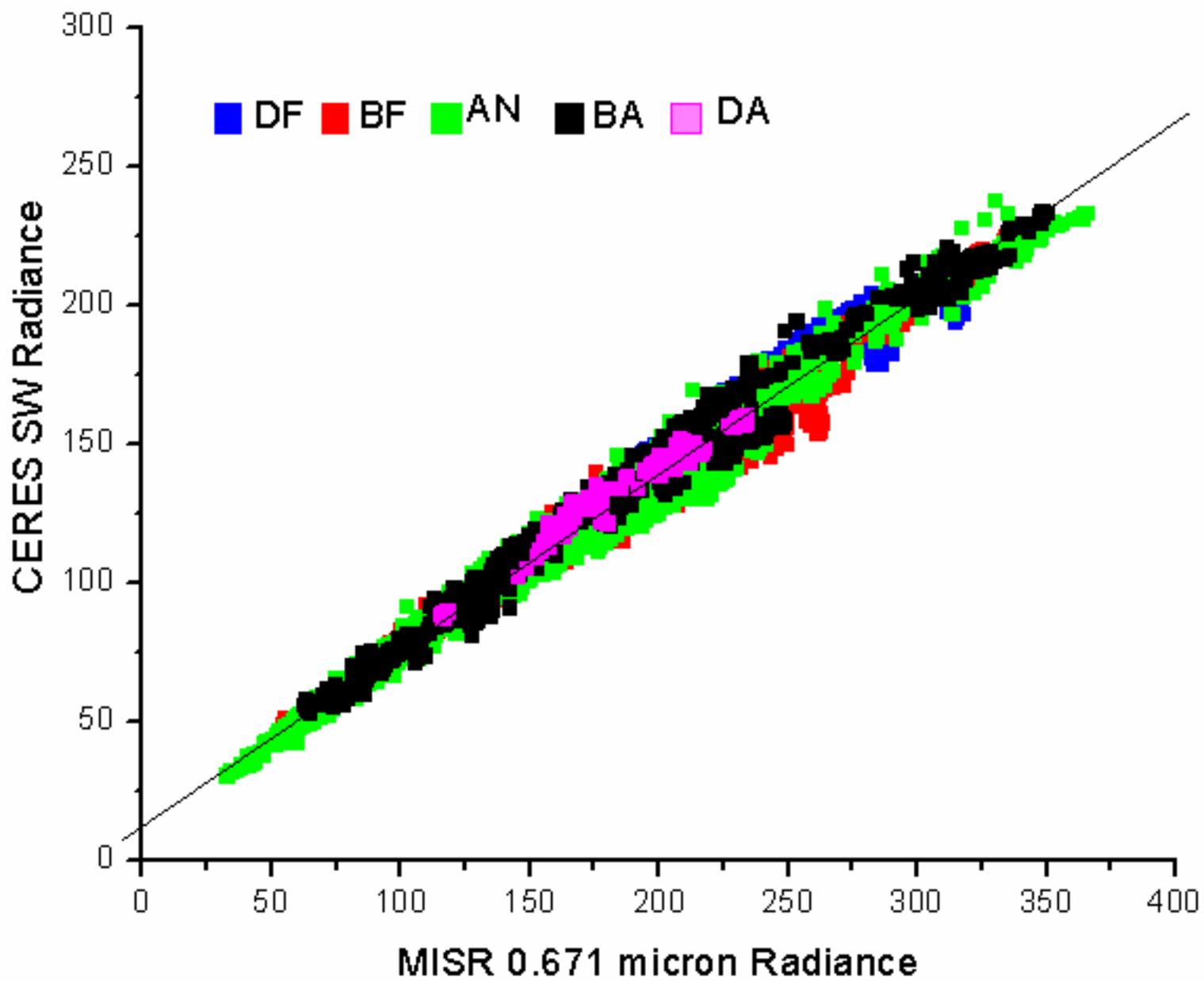












6. Conclusions

1. The MISR radiance in SSFM dataset match MODIS radiance well, which means the MISR radiances, viewing geometries, and geo-locations are correct in the SSFM dataset.
2. The MISR spectral radiances show linear regression to CERES SW radiances.
3. The regression of MISR spectral radiance to CERES SW radiance does not show strong dependence on viewing angles. This may be a start point for derivation of the NB-BB conversion at angular bins where there is no MISR measurements.
4. There are exceptional footprints which do not follow the overall MODIS-MISR-CERES radiance relationships, the reason should be studied.