Joint Center for Satellite Data Assimilation

Office Note (unassigned)

CRTM: GOES-14 and -15 Sounder Spectral Response Functions

Paul van Delst[a]
JCSDA/EMC/SAIC

David Groff[b]
JCSDA/EMC/SAIC

September, 2008

---

[a] paul.vandelst@noaa.gov
[b] david.groff@noaa.gov

1 Introduction

This document displays the spectral response functions (SRFs) of the GOES-O(14) and -P(15) sounder instrument, obtained from http://cimss.ssec.wisc.edu/goes/calibration/SRF. These SRFs will be used to generate instrument resolution transmtitances and, from those, transmittance model coefficients for use in the CRTM.

2 GOES-O(14) Sounder SRFs

2.1 Nominal SRF plots

Plots of the SRF data for each channel detector, along with the detector average, are shown in appendix A. SRF plots for channels 1-6 are shown in figure A.1, channels 7-12 in figure A.2, and channels 13-18 in figure A.3.

2.2 Anomalous Features

Closer inspection of the GOES-0(14) sounder SRFs showed both ambiguous and clear anomalies for several channels. Magnifications of the SRF plots for the suspect channels are shown in figure 2.1. The anomalies are

Ch.5 The begin point of this channel is unlike any others in that it starts at a relatively large value. Was the begin point of the actual measurements somehow truncated, or is this feature an artifact of fitting the measurements?

Ch.6 The negative values for the low-frequency beginning portions of this SRF have been truncated. The shape of the remaining positive data begs the question: are these data real or an artifact of the fitting algorithm (high order polynomial or spline)?

Ch.9 There are clear, and for 1030cm^{-1} quite large, discontinuities in the data.

Ch.10 Again, discontinuities in the SRFs are evident. Here they clearly occur every 10cm^{-1}.

Ch.11 Discontinuities at 10cm^{-1} intervals.

Ch.12 Discontinuities at 10cm^{-1} intervals.

3 GOES-P(15) Sounder SRFs

3.1 Nominal SRF plots

Plots of the SRF data for each channel detector, along with the detector average, are shown in appendix B. SRF plots for channels 1-6 are shown in figure B.1, channels 7-12 in figure B.2, and channels 13-18 in figure B.3.

3.2 Anomalous Features

Closer inspection of the GOES-P(15) sounder SRFs showed some possible anomalies for several channels. Magnifications of the SRF plots for the suspect channels are shown in figure 3.1. The anomalies in question here are,

Ch.9 This is not so much an anomaly as an apparent overfit to noisy data using a spline (or high order polynomial). If the high frequency undulations are a fitting artifact, the radiometric impact is likely negligible, but they are cause for suspicion.

Ch.11 Similarly to channel 9, there appear to be fit artifacts in the data.

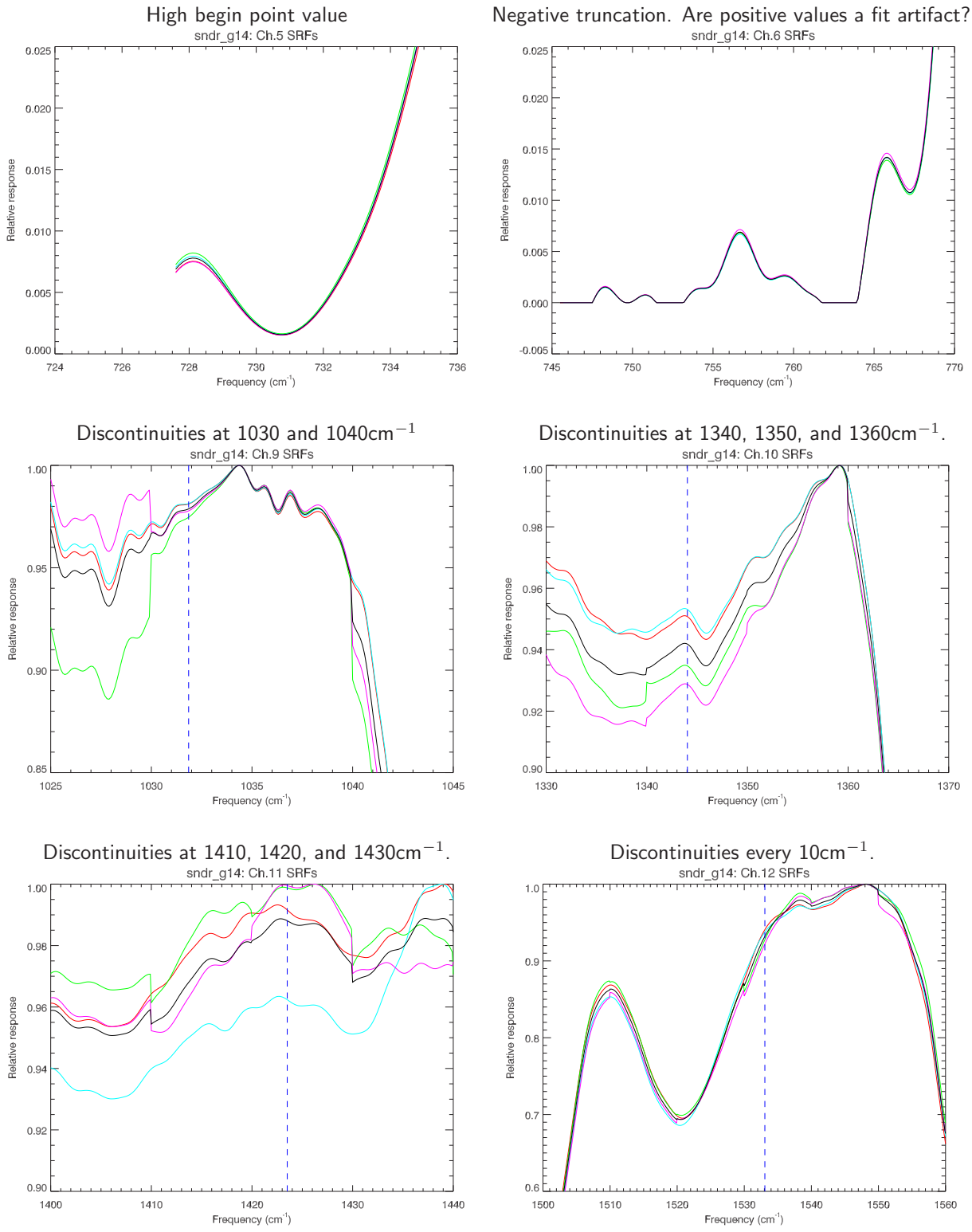

Figure 2.1: Magnification of GOES-O(14) Sounder individual detector and average SRFs for channels 5, 6, 9, 10, 11, and 12; indicating possible data anomalies. The detector average is plotted in black. The vertical dashed line represents the first moment (central frequency) of the average SRF.

Ch.13 The detector plots are different. Does the GOES-P(15) sounder use different shortwave detector technology from the other sounder? Previously the InSb detector channels showed no difference between detectors. It may be a normalisation of fitted data issue, but it needs to be confirmed.

Ch.17 Similarly to channel 13, we see significant differences between detector SRFs for InSb detectors.

Ch.18 Again, we see significant differences between detector SRFs for InSb detectors.

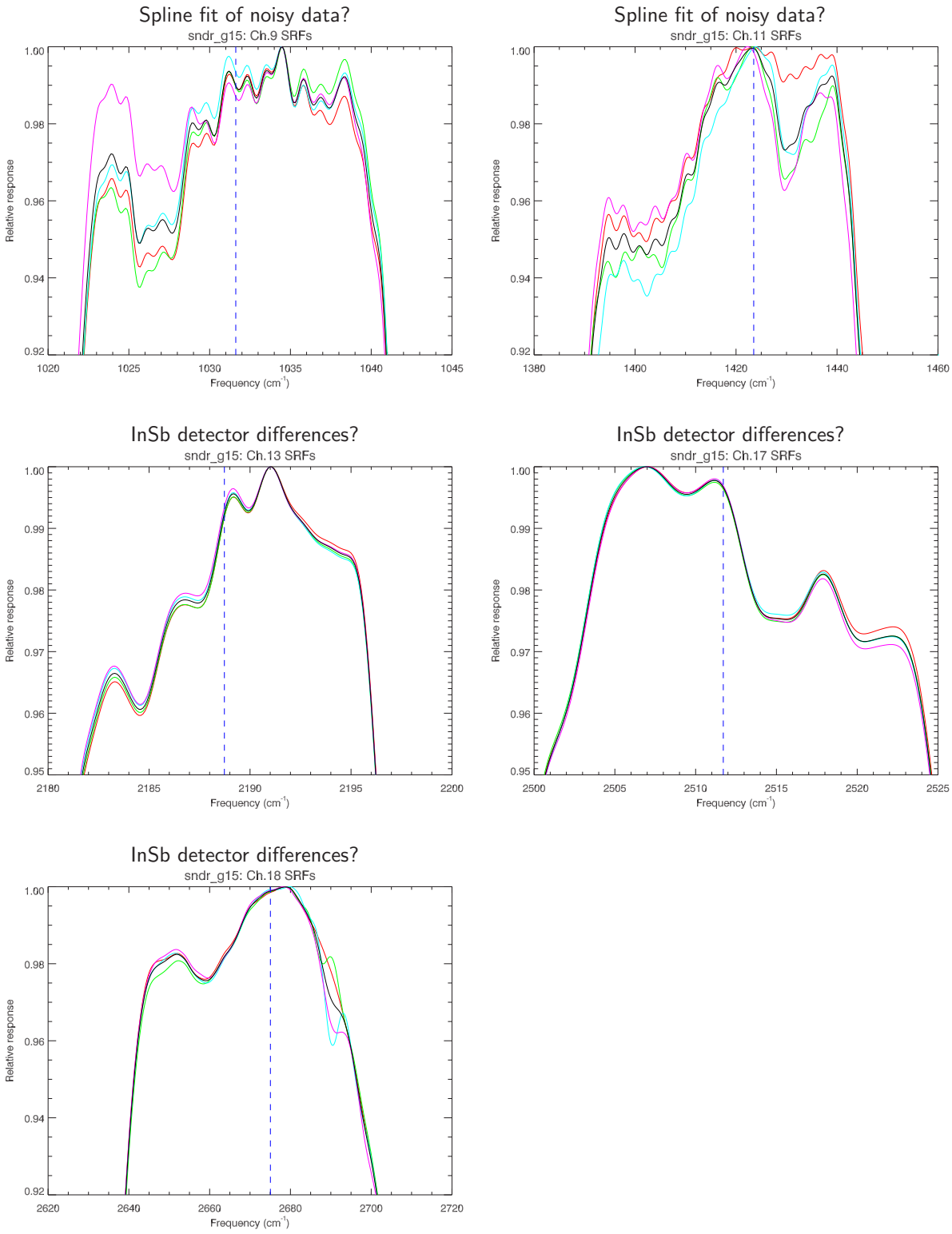

Figure 3.1: Magnification of GOES-P(15) Sounder individual detector and average SRFs for channels 9, 11, 13, 17, and 18; indicating possible data anomalies. The detector average is plotted in black. The vertical dashed line represents the first moment (central frequency) of the average SRF.

A GOES-O(14) Sounder SRF plots

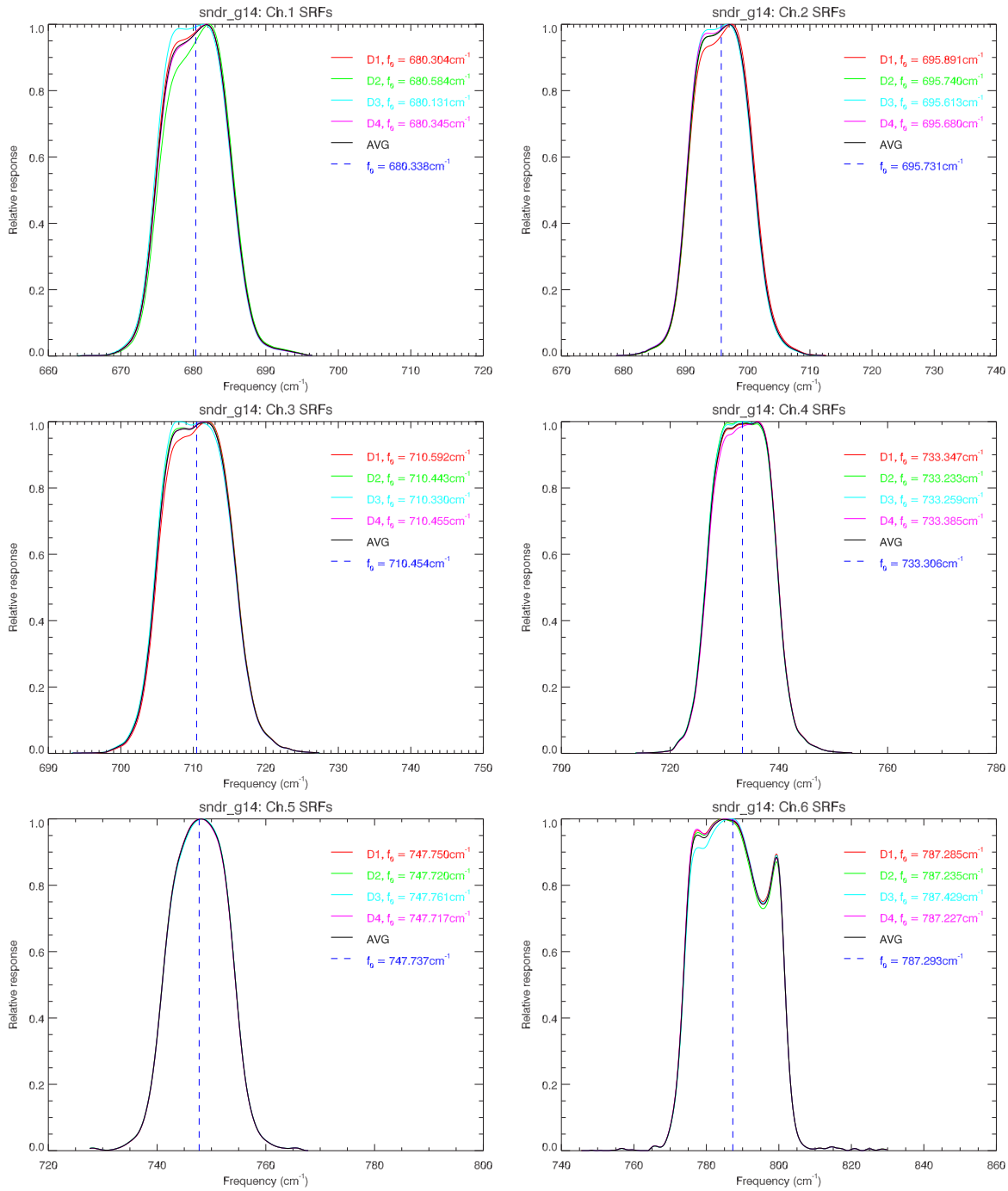

Figure A.1: GOES-O(14) Sounder SRF for channels 1 to 6.

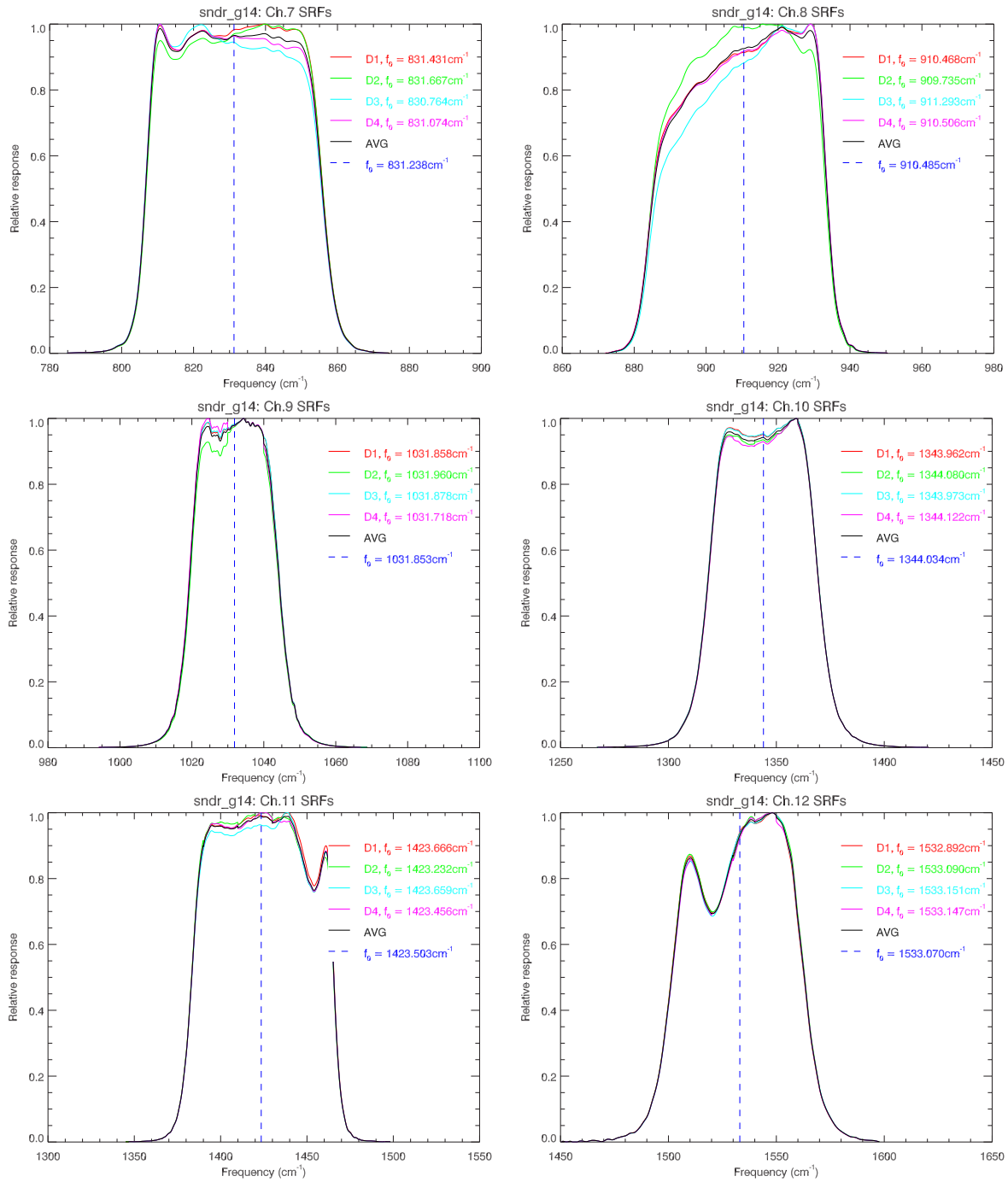

Figure A.2: GOES-O(14) Sounder SRF for channels 7 to 12.

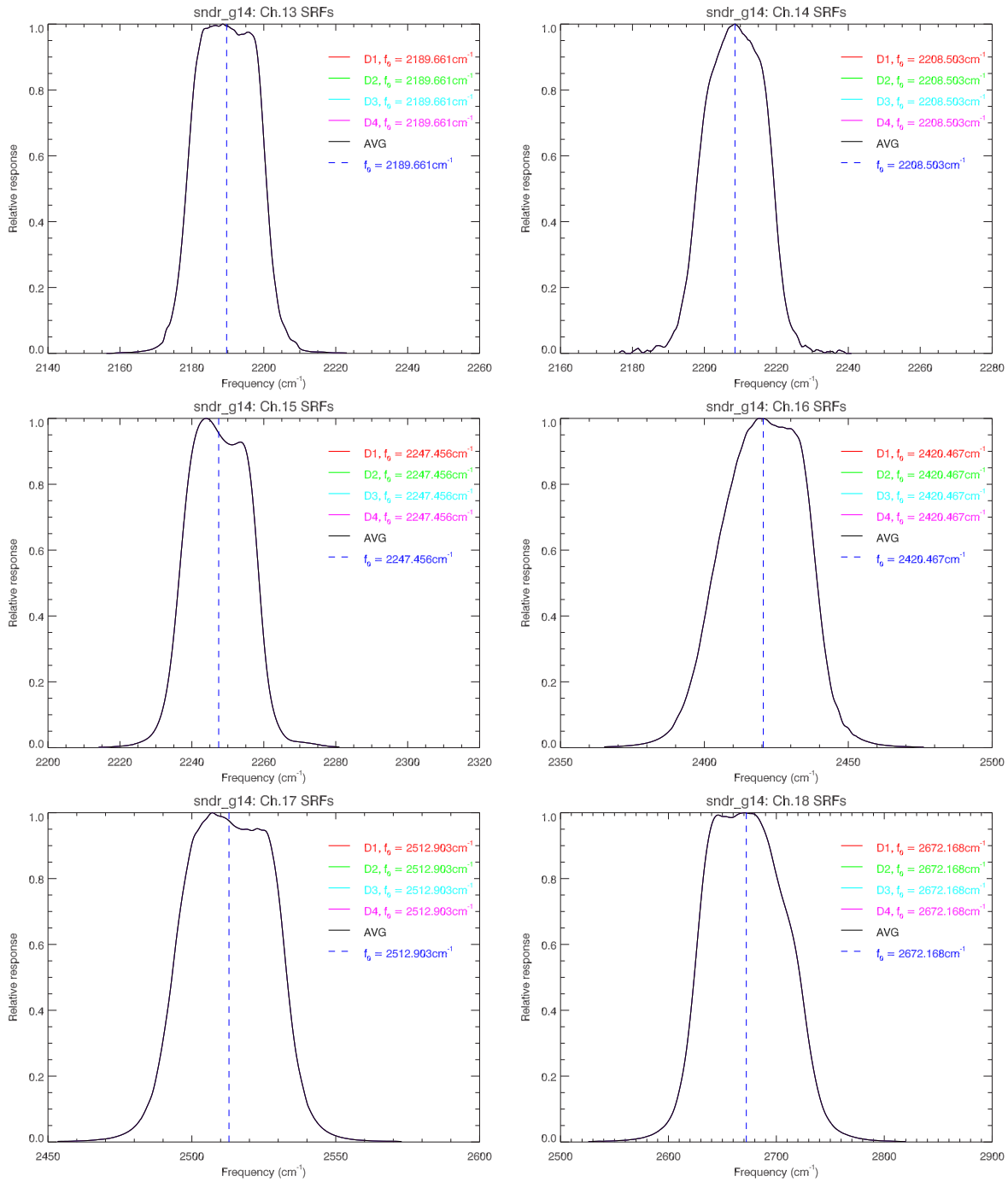

Figure A.3: GOES-O(14) Sounder SRF for channels 13 to 18.

B GOES-P(15) Sounder SRF plots

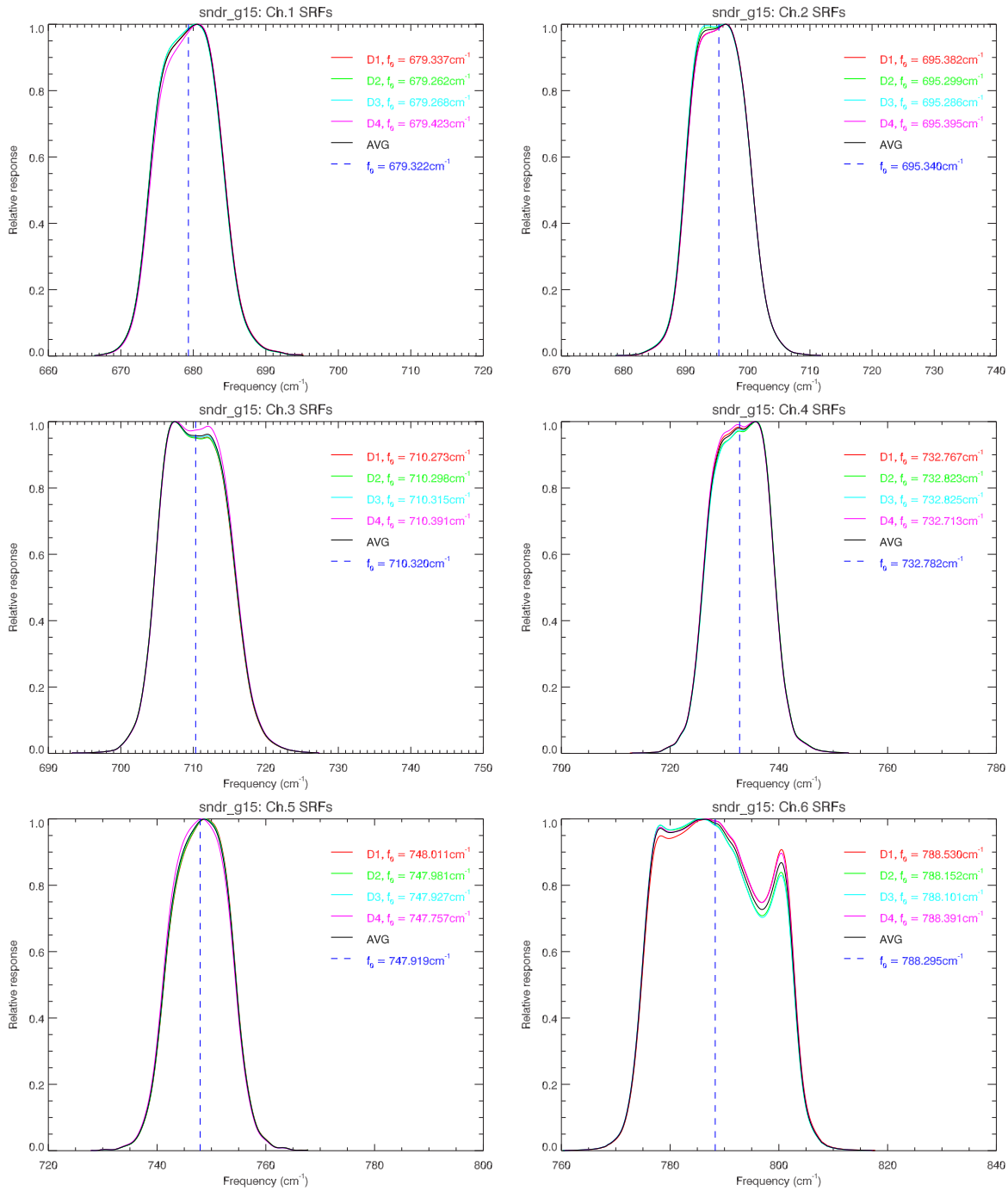

Figure B.1: GOES-P(15) Sounder SRF for channels 1 to 6.

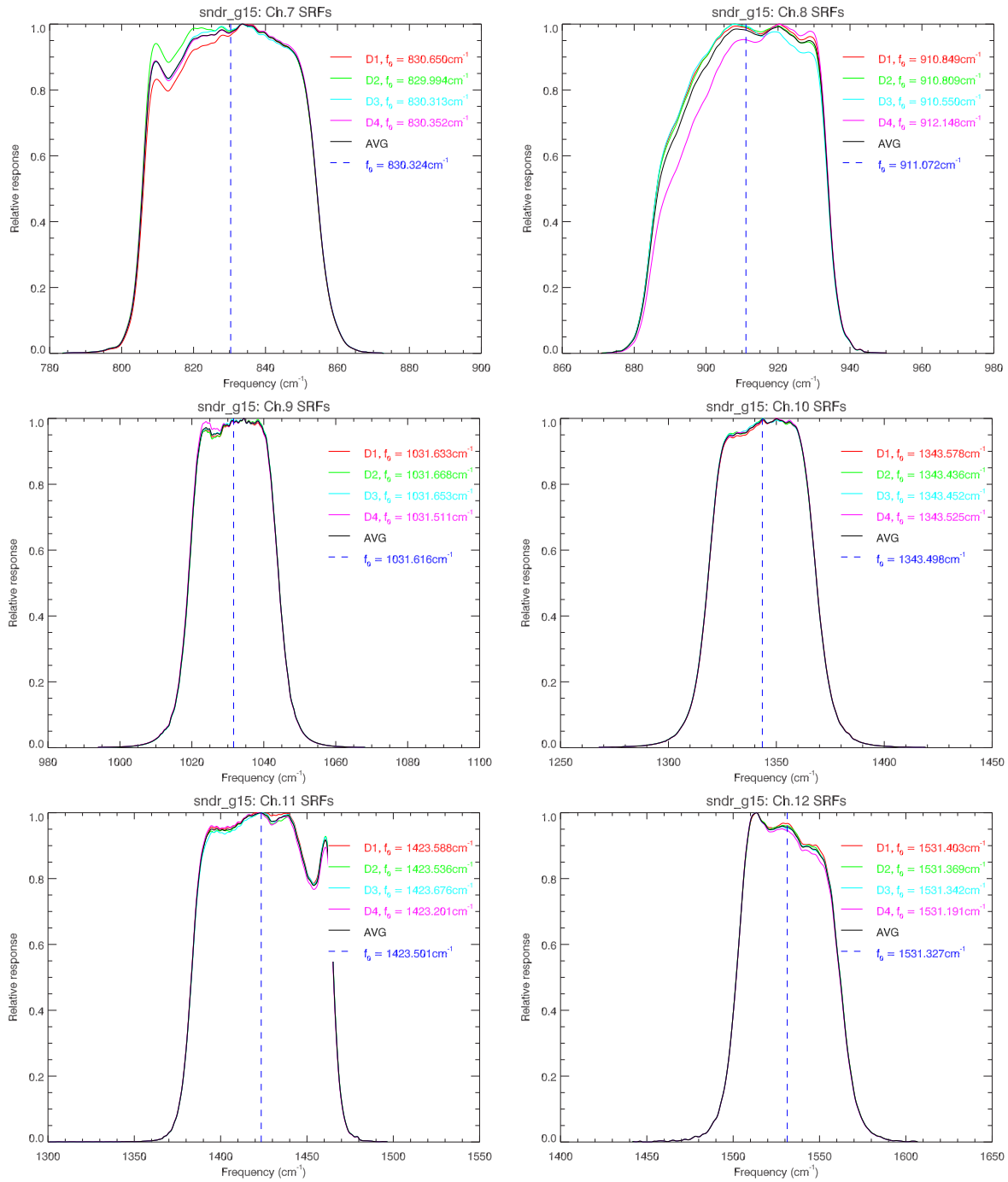

Figure B.2: GOES-P(15) Sounder SRF for channels 7 to 12.

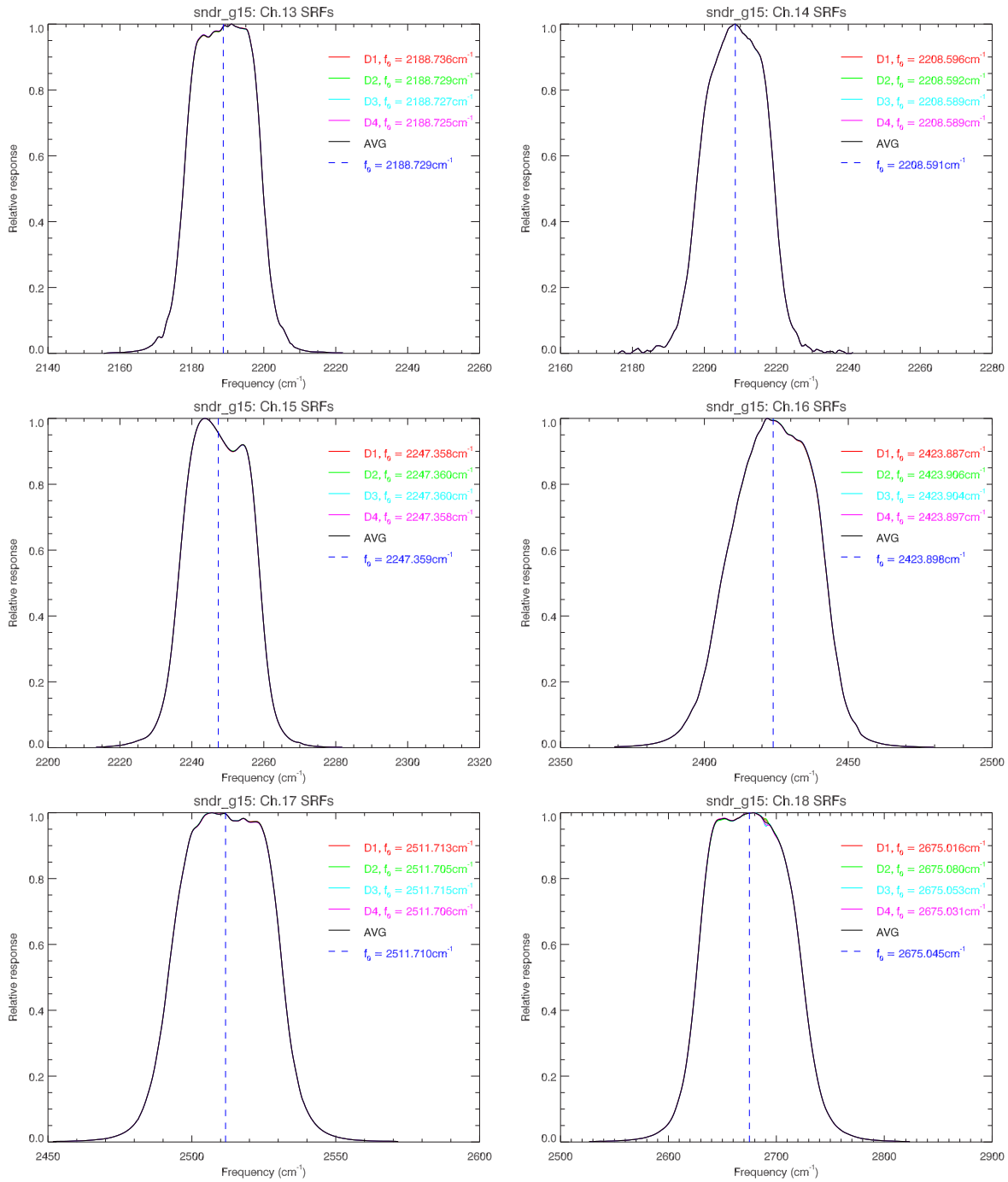

Figure B.3: GOES-P(15) Sounder SRF for channels 13 to 18.