CERES/Terra ERBE-like Edition2 TOA Fluxes (CERES ES-4 And ES-9 Data Products)

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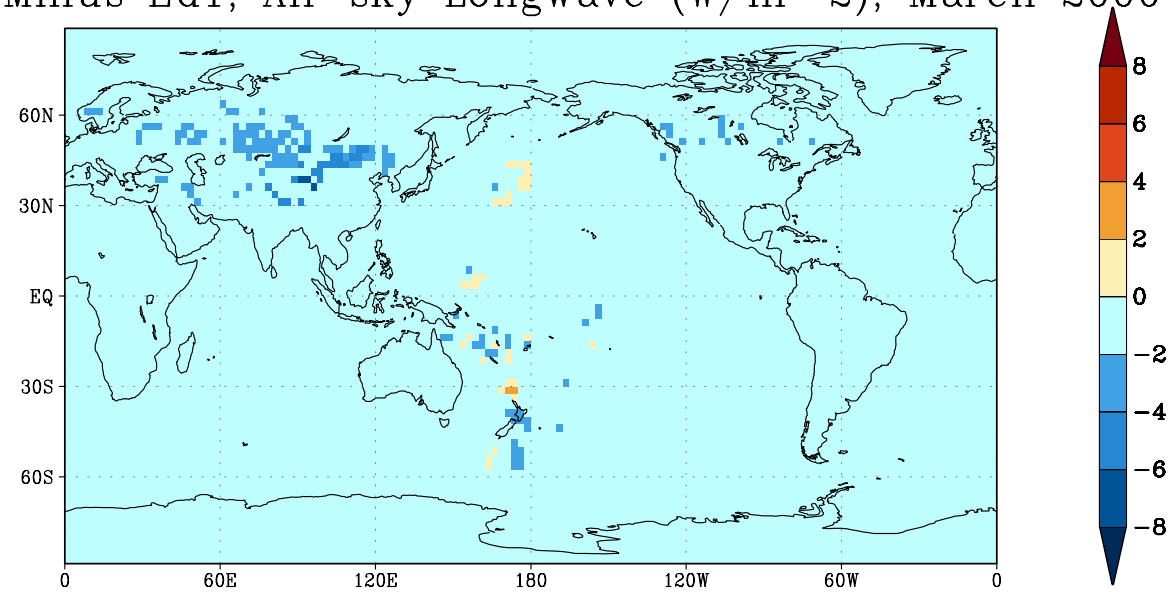
What Are The Edition2 Changes

- Update Instrument Calibrations To Address Instrument Drift Problems Found In Edition1 Data; Especially For CERES/Terra FM2 Instrument.
- Fix Bug Found In ERBE-like Snow Map Algorithm
- Restore Missing Radiation Data Due To Incomplete Satellite Ephemeris/Navigation Information.

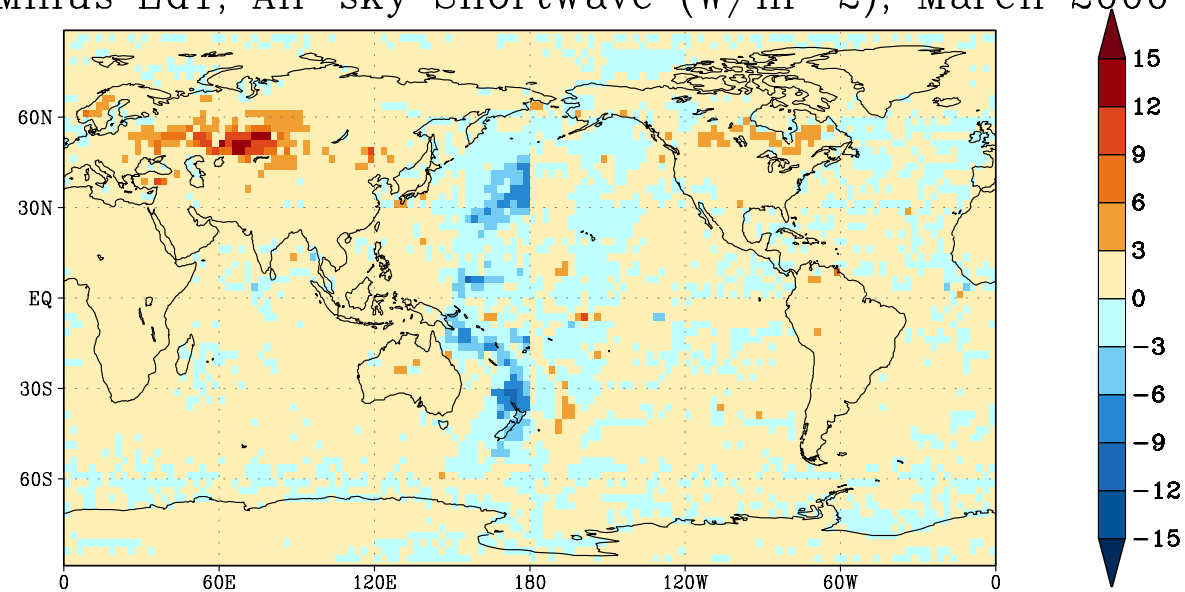
Missing Edition1 Data Restoration

- Edition1 ERBE-like Monthly Mean Data May Contain Up To 5% Of Missing Orbits Due To Incomplete Satellite Navigation Information, Especially During The First Year Of CERES/Terra Operation.
- Affect Edition1 All-sky Fluxes; Especially For Shortwave.
- No Effect On Clear-Sky Fluxes.
- Introduce Small Bias Into Edition1 ERBE-like Monthly Mean All-sky Fluxes.

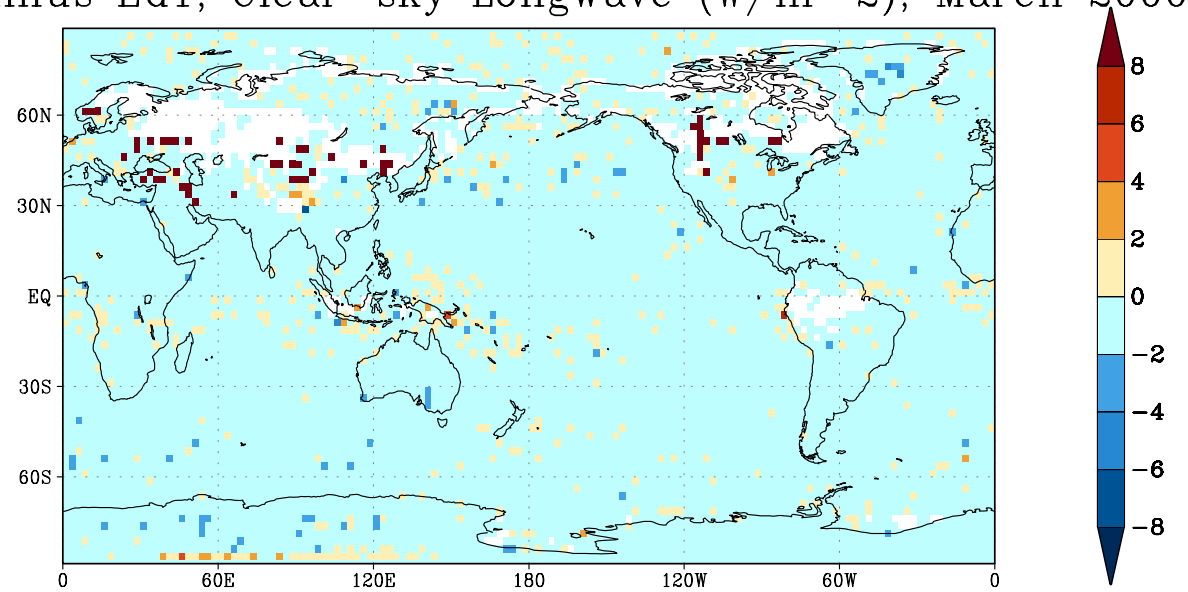
Ed2 Minus Ed1, All-sky Longwave (W/m**2), March 2000



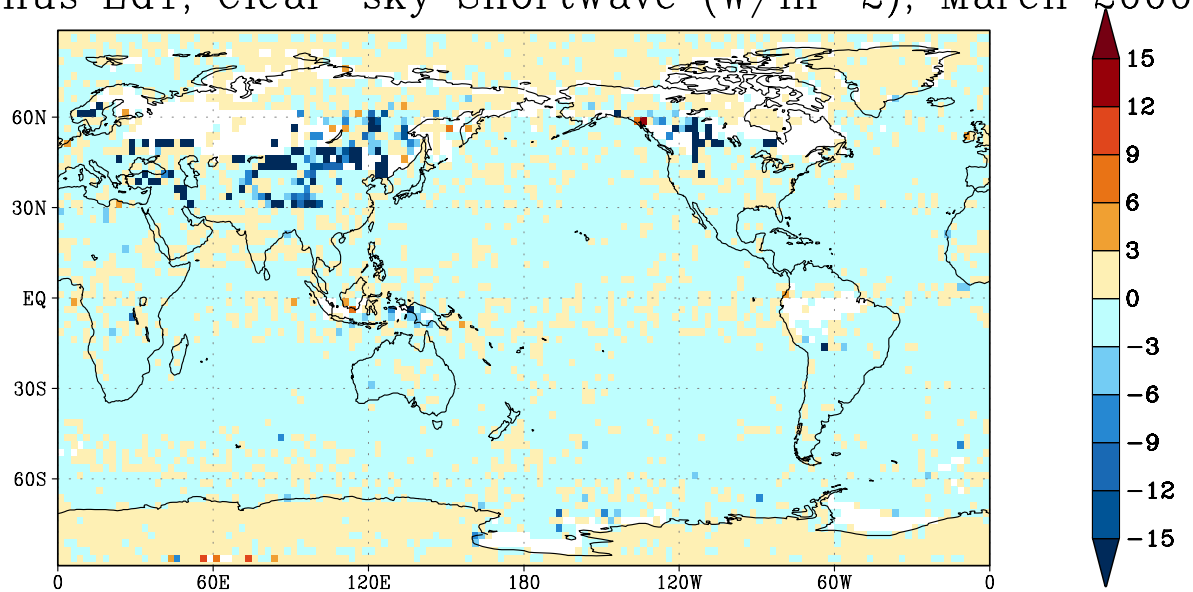
Ed2 Minus Ed1, All-sky Shortwave (W/m**2), March 2000



Ed2 Minus Ed1, Clear-sky Longwave (W/m**2), March 2000



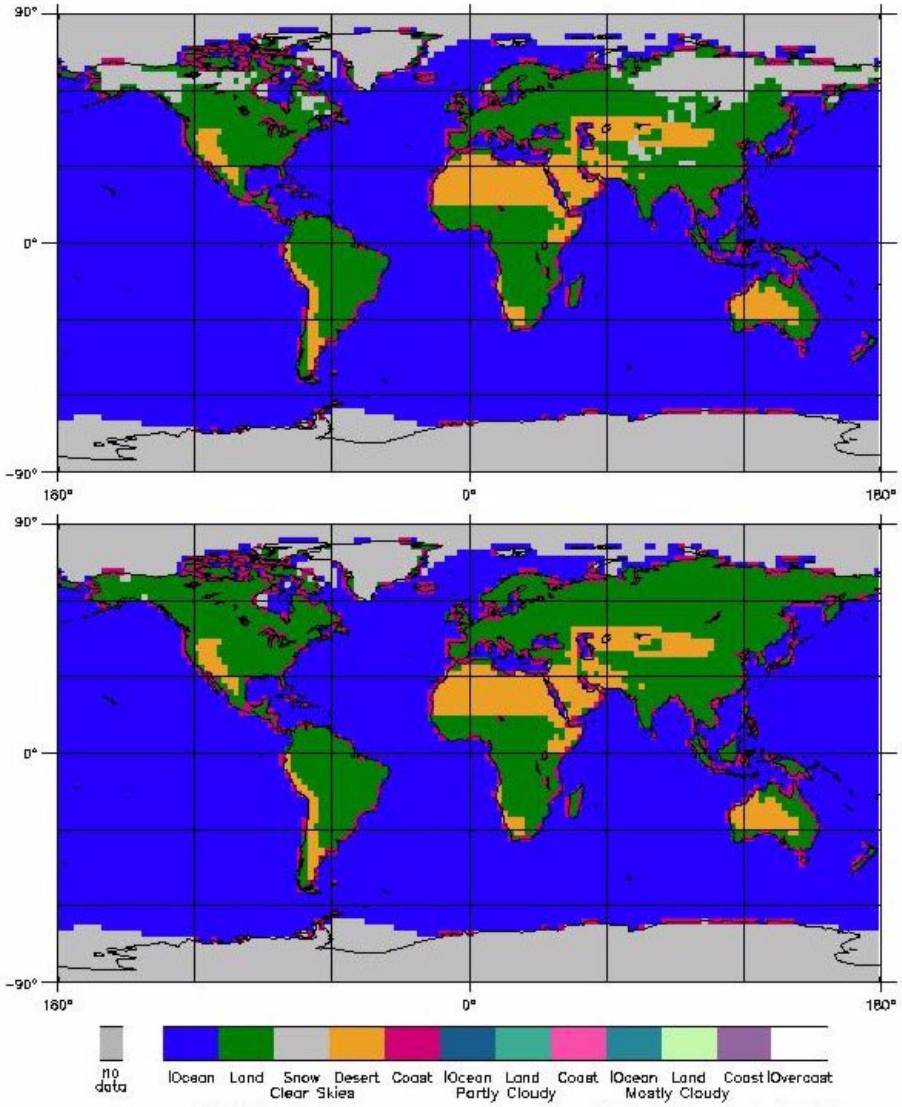
Ed2 Minus Ed1, Clear-sky Shortwave (W/m**2), March 2000



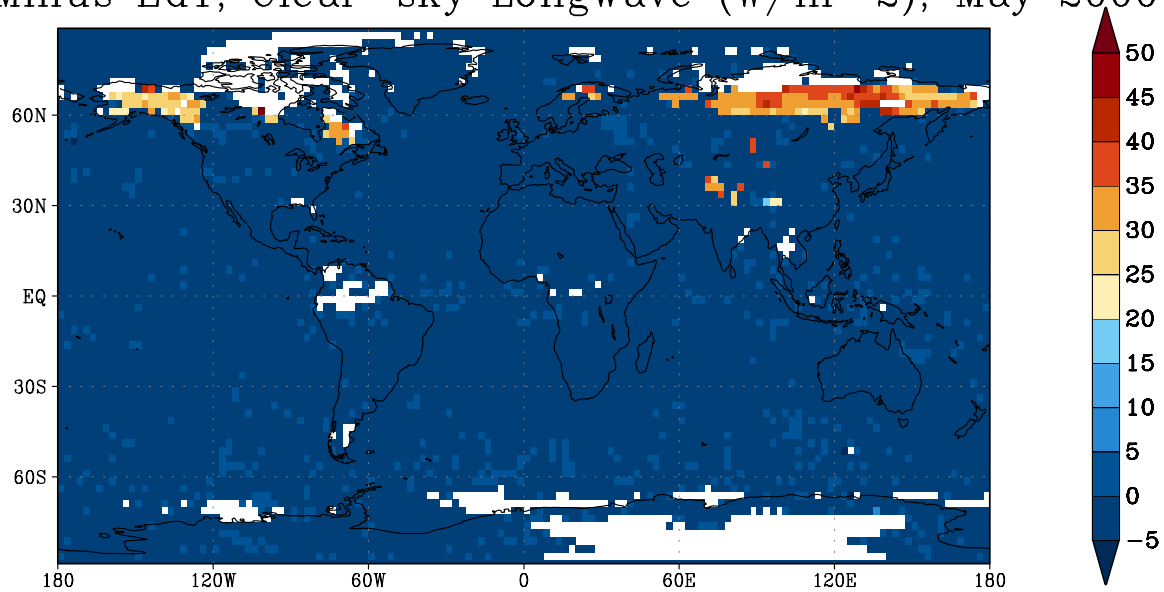
Snow Map Algorithm Correction

- An Error In Array Initialization Caused Regional Snow Assignment Decision To Be Based Only On Snow Information From The First Day Of Each Month, Instead Of Information From The Entire Month.
- Cause Excessive Assignment Of Snow Regions During The Spring Time When Snow Coverage Can Decrease Significantly Over The Month Period.
- Large Effect On Edition1 Regional Clear-sky Fluxes Over The Affected Regions; Especially For Clear-sky SW Fluxes.
- Smaller But Noticeable Effect On Edition1 Regional All-sky Fluxes.
- Small Effect On Global Mean All-sky Fluxes and Clear-sky LW Fluxes; But Up To 5% Effect On Global Clear-sky SW Fluxes.

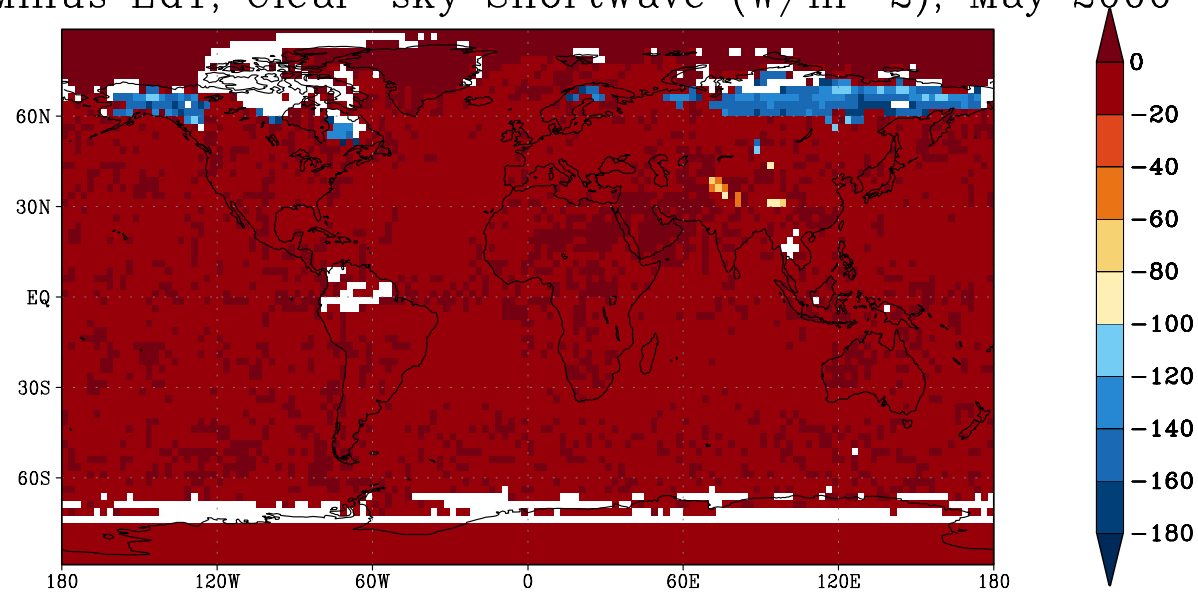
ERBE-like Scene ID, 5/2001, Ed1(top), Ed2 (bottom)



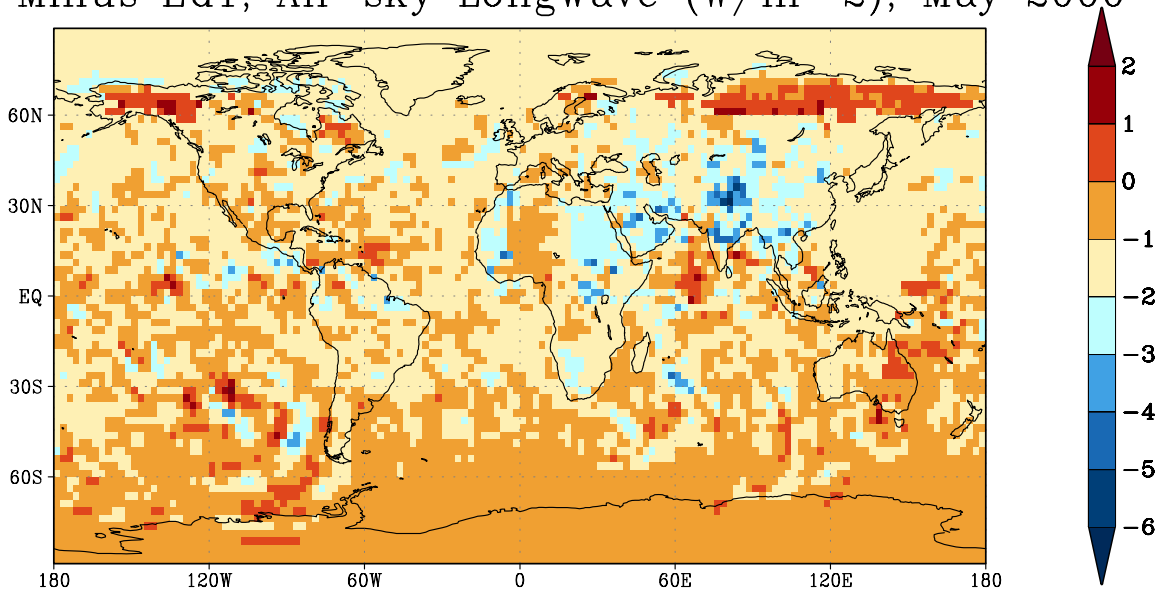
Ed2 Minus Ed1, Clear-sky Longwave (W/m**2), May 2000



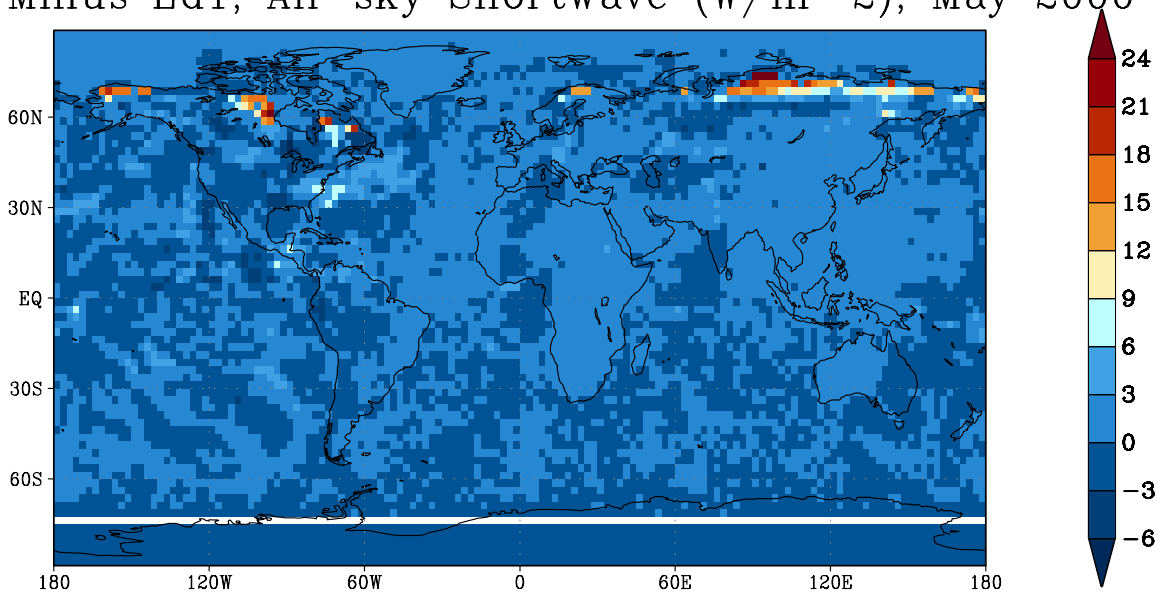
Ed2 Minus Ed1, Clear-sky Shortwave (W/m**2), May 2000



Ed2 Minus Ed1, All-sky Longwave (W/m**2), May 2000



Ed2 Minus Ed1, All-sky Shortwave (W/m**2), May 2000



Calibration Corrections

Ground To Flight Changes In Sensor Radiometric Gains

	FM1 (%)	FM2 (%)
Total	0.200	0.120
Window	0.480	1.300
Shortwave	0.170	-0.010

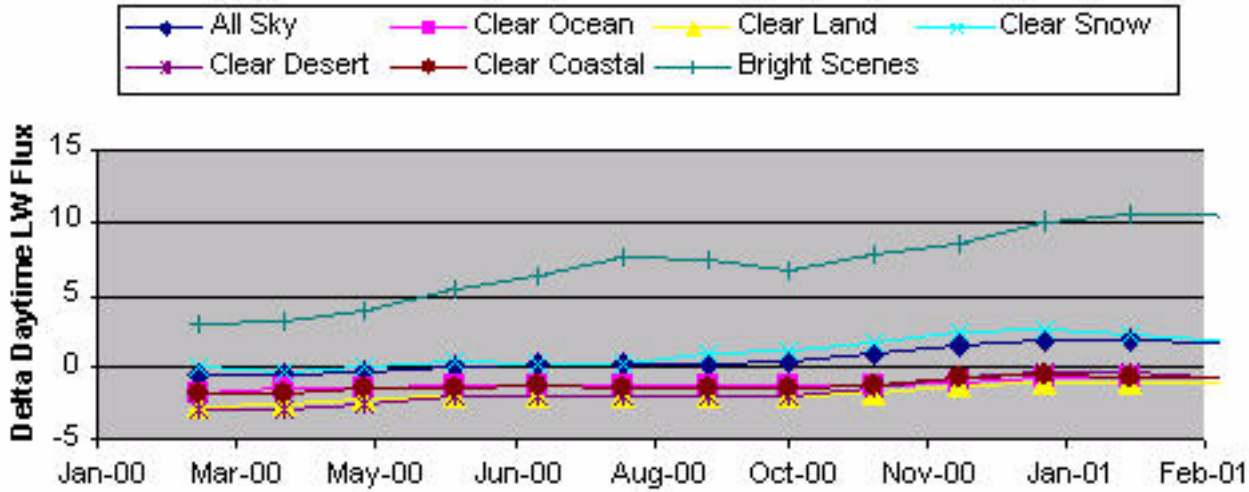
On-orbit Drifts In Sensor Gains During The First Year

	FM1 (%/yr)	FM2 (%/yr)
Total	0.125	0.280

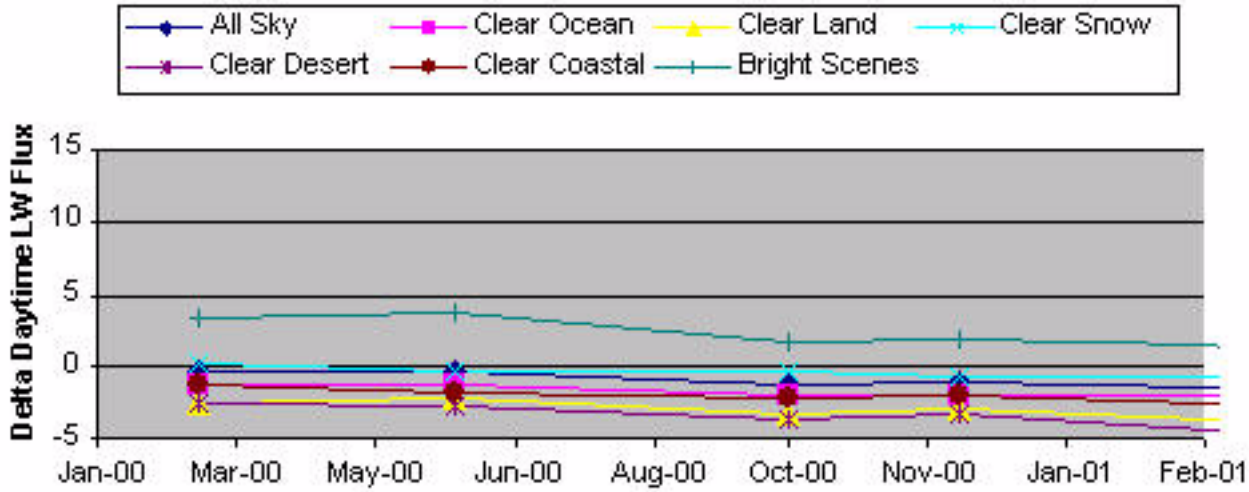
On-orbit Drifts In Spectral Response Function During The First Year

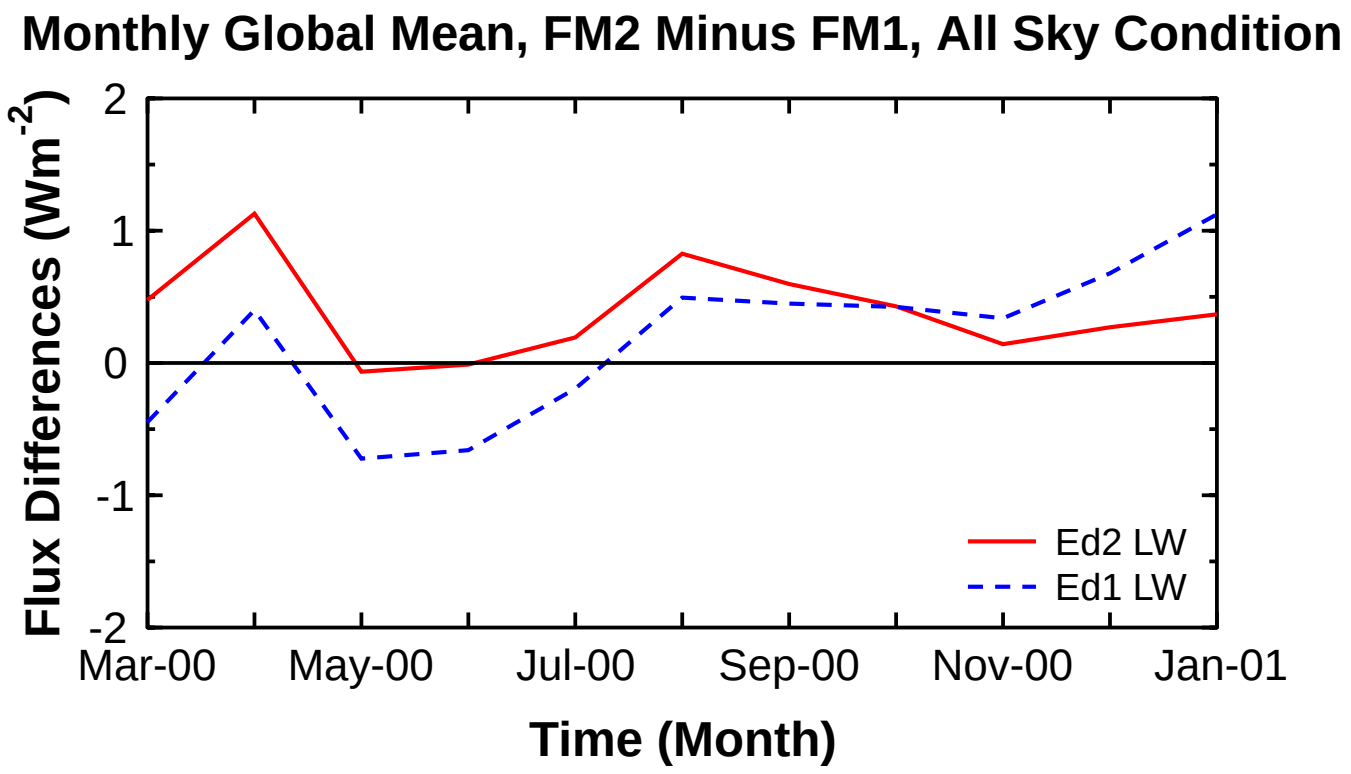
	FM1 (%/yr)	FM2 (%/yr)
Total (SW)	-----	1.000

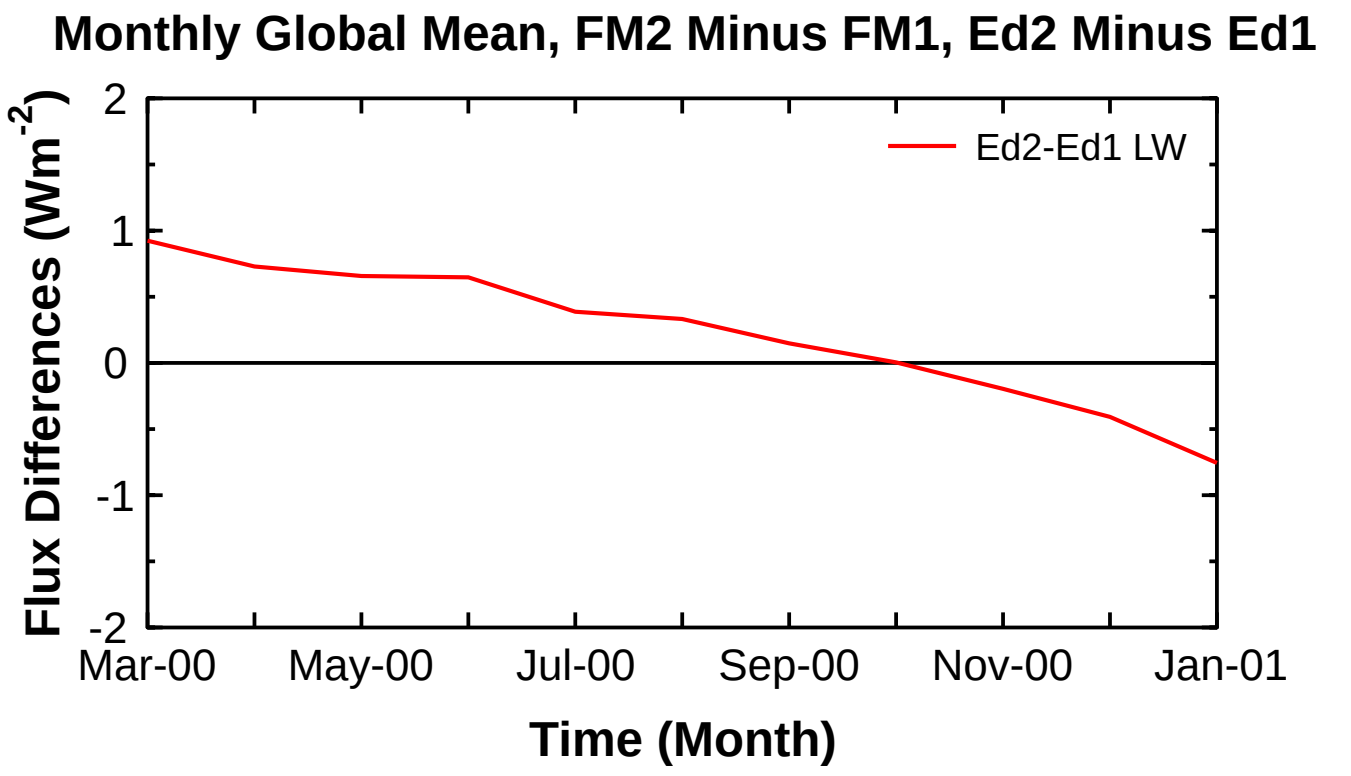
Edition1 FM2-FM1 Instantaneous Nadir-only Results

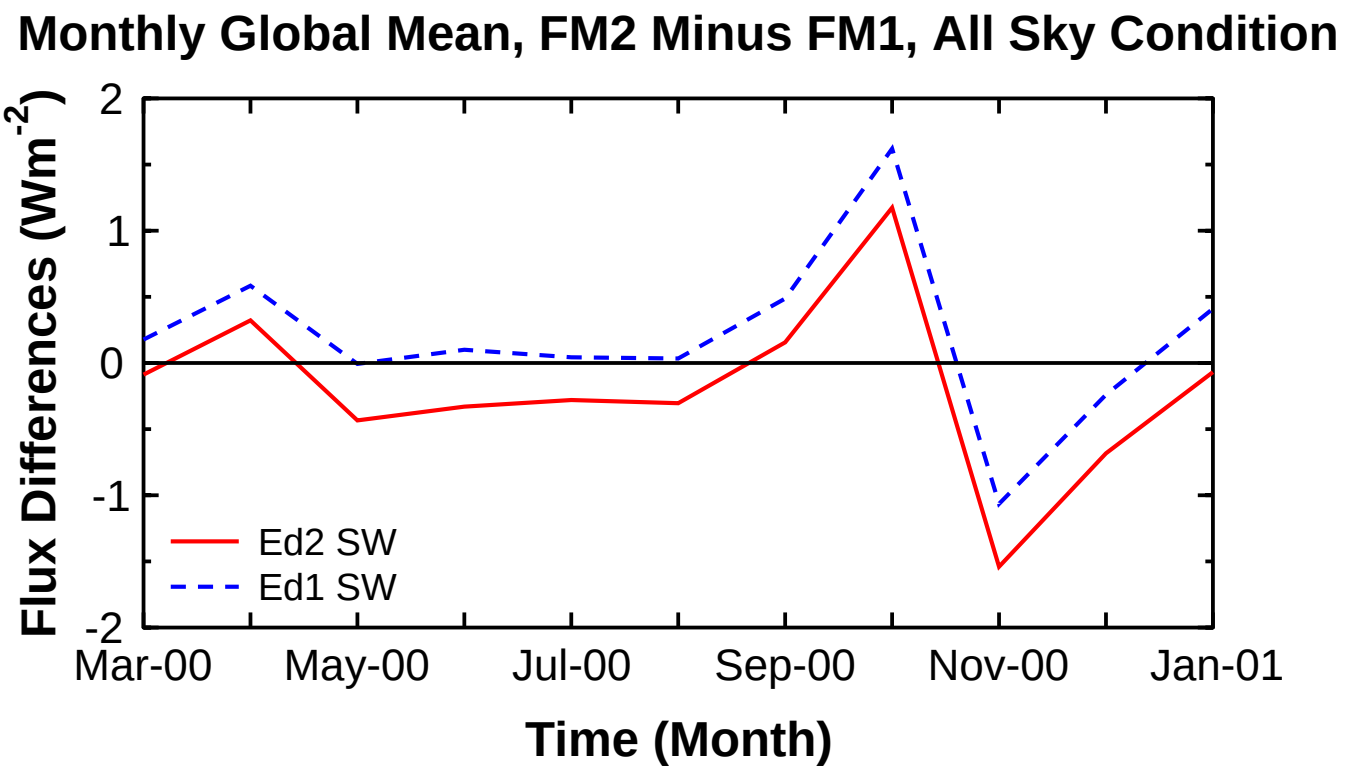


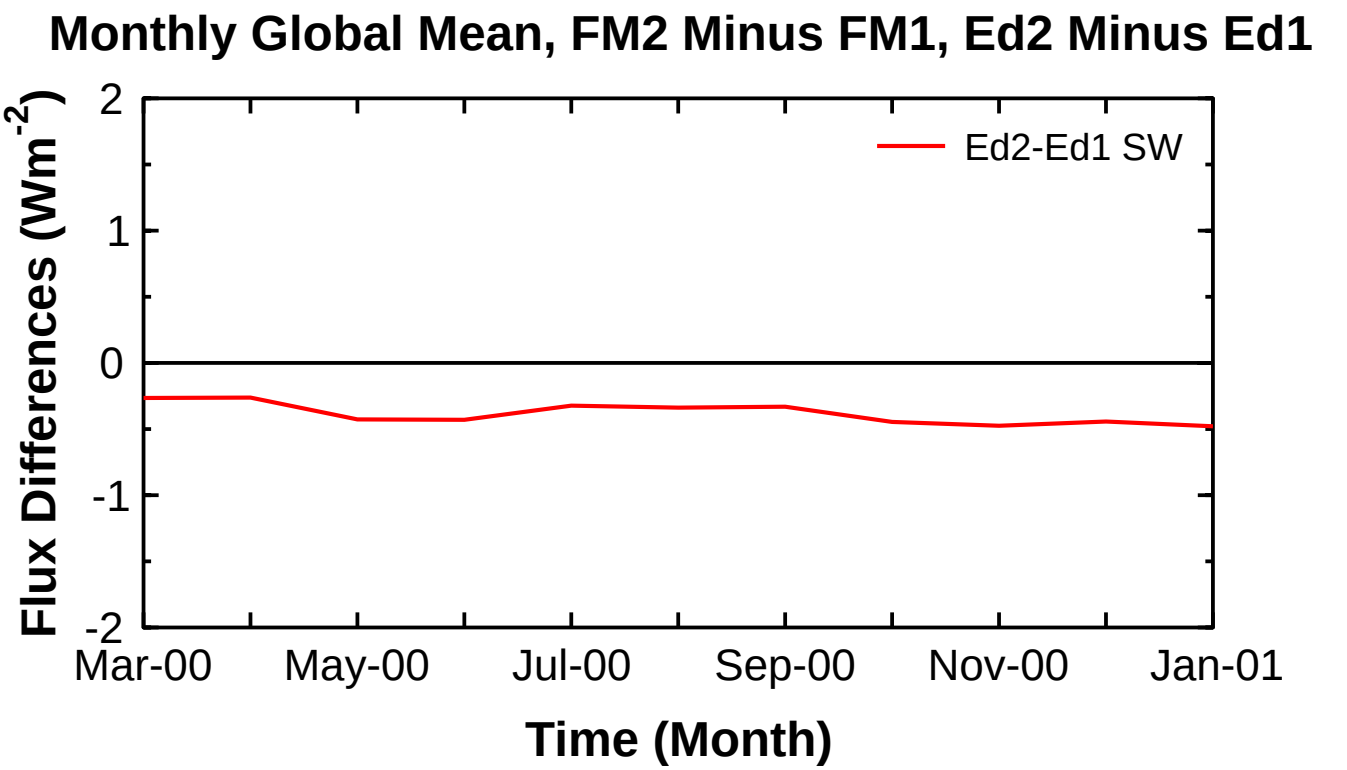
Edition2 FM2-FM1 Instantaneous Nadir-only Results



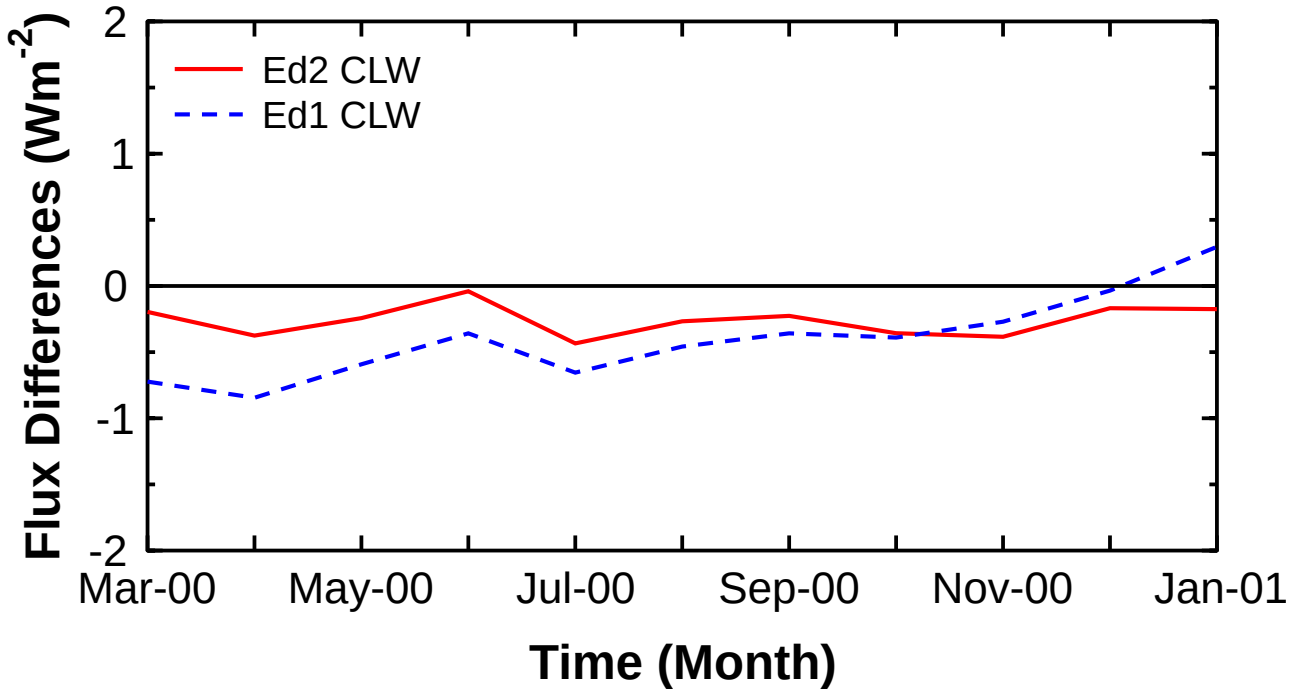

Monthly Global Mean, FM2 Minus FM1, All Sky Condition
Flux Differences (Wm-2)
2
1
0
-1
-2
Mar-00
May-00
Jul-00
Sep-00
Nov-00
Jan-01
Time (Month)
Ed2 LW
Ed1 LW


Monthly Global Mean, FM2 Minus FM1, Ed2 Minus Ed1
Flux Differences (Wm-2)
2
1
0
-1
-2
Mar-00
May-00
Jul-00
Sep-00
Nov-00
Jan-01
Time (Month)
Ed2-Ed1 LW

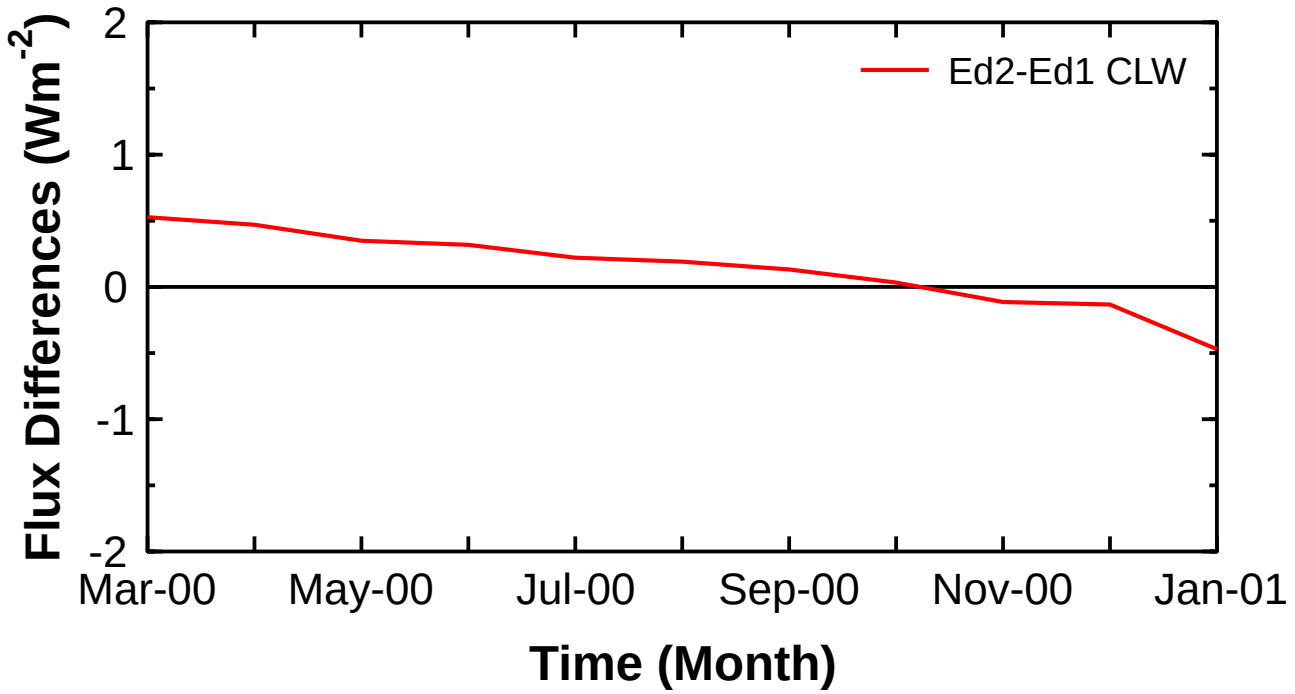

Monthly Global Mean, FM2 Minus FM1, All Sky Condition
Flux Differences (Wm-2)
2
1
0
-1
-2
Ed2 SW
Ed1 SW
Mar-00
May-00
Jul-00
Sep-00
Nov-00
Jan-01
Time (Month)


Monthly Global Mean, FM2 Minus FM1, Ed2 Minus Ed1
Flux Differences (Wm-2)
2
1
0
-1
-2
Ed2-Ed1 SW
Mar-00
May-00
Jul-00
Sep-00
Nov-00
Jan-01
Time (Month)

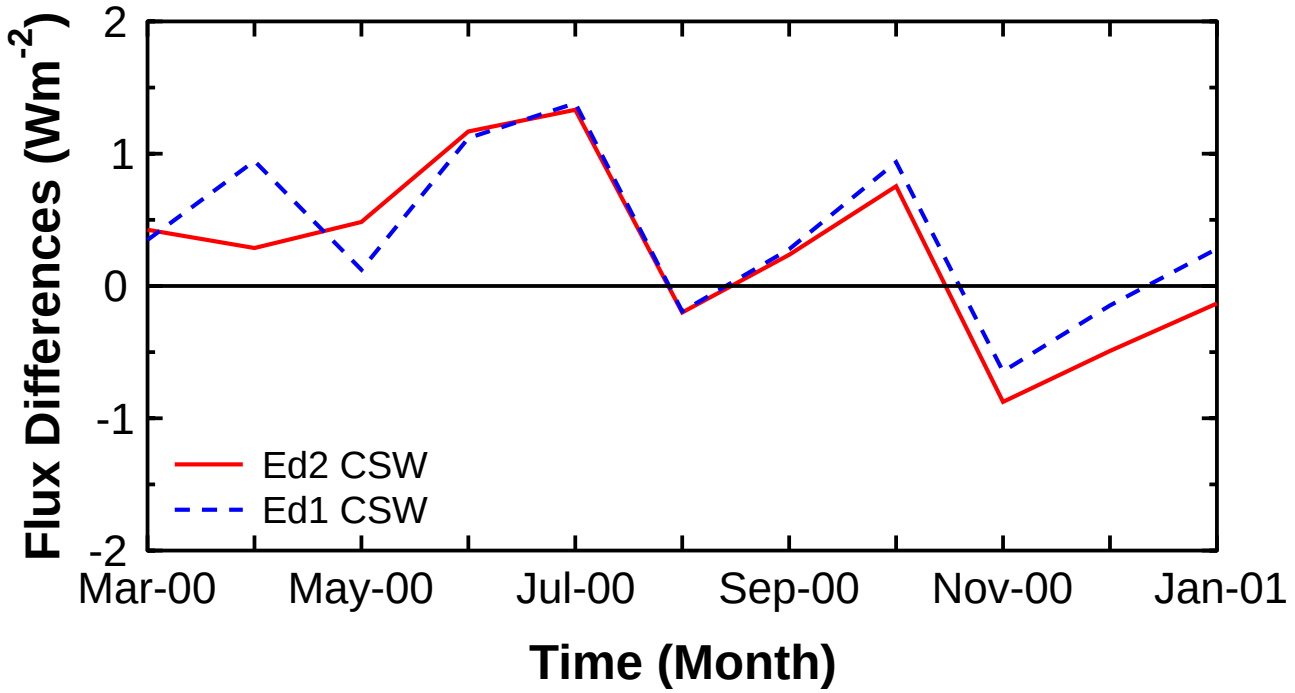
Monthly Global Mean, FM2 Minus FM1, Clear Sky Condition



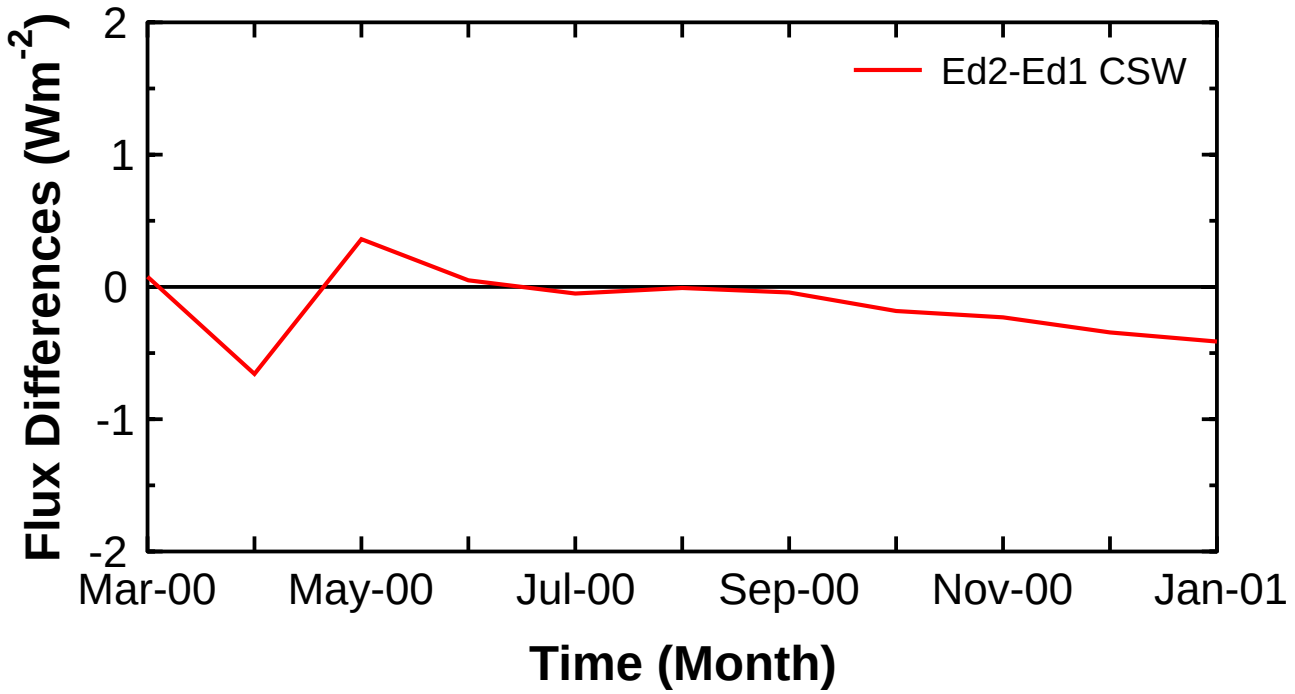
Monthly Global Mean, FM2 Minus FM1, Ed2 Minus Ed1

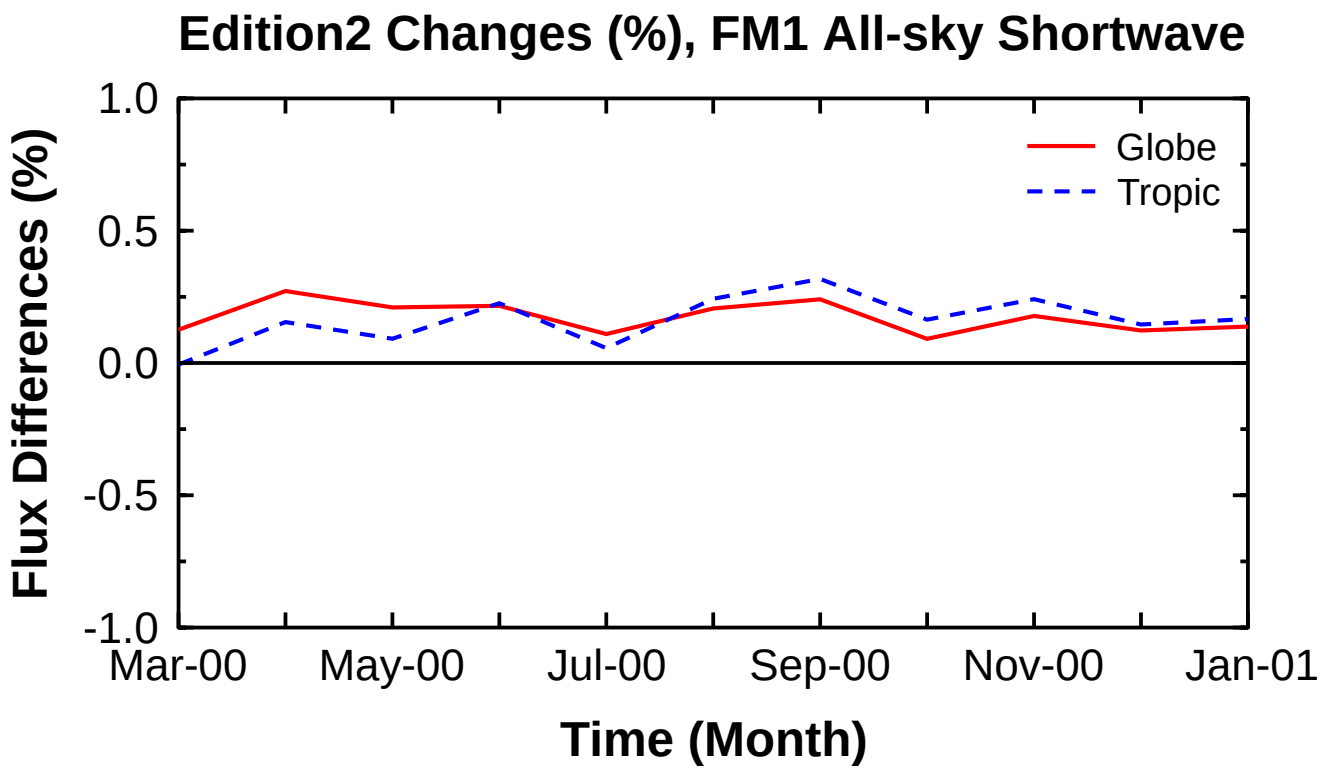


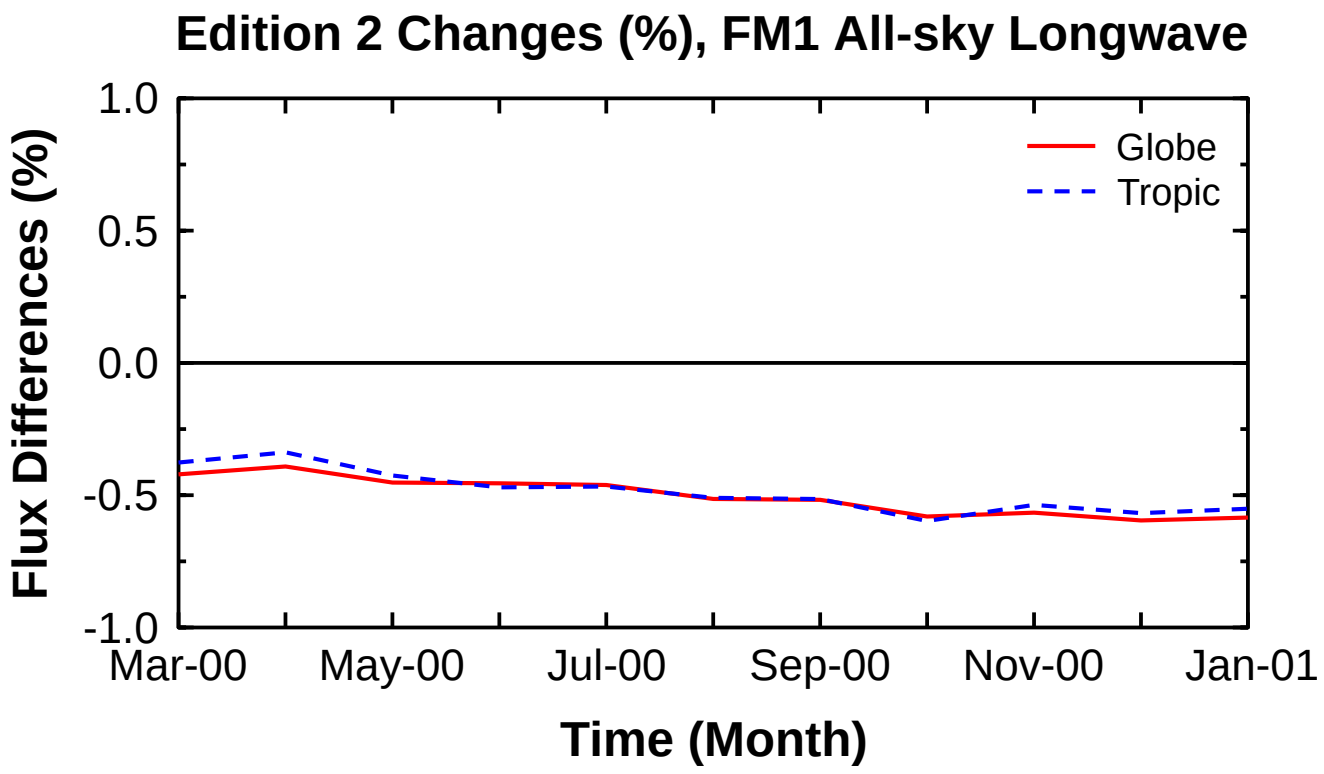
Monthly Global Mean, FM2 Minus FM1, Clear Sky Condition

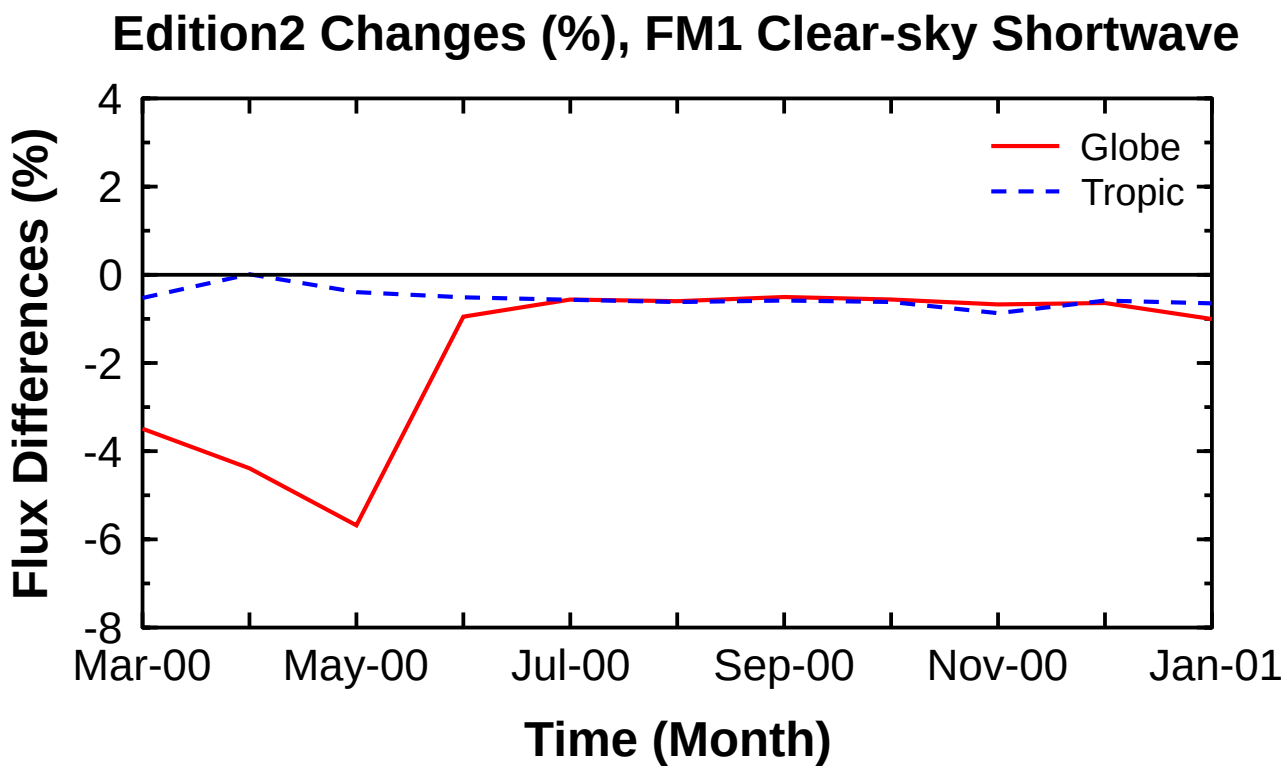


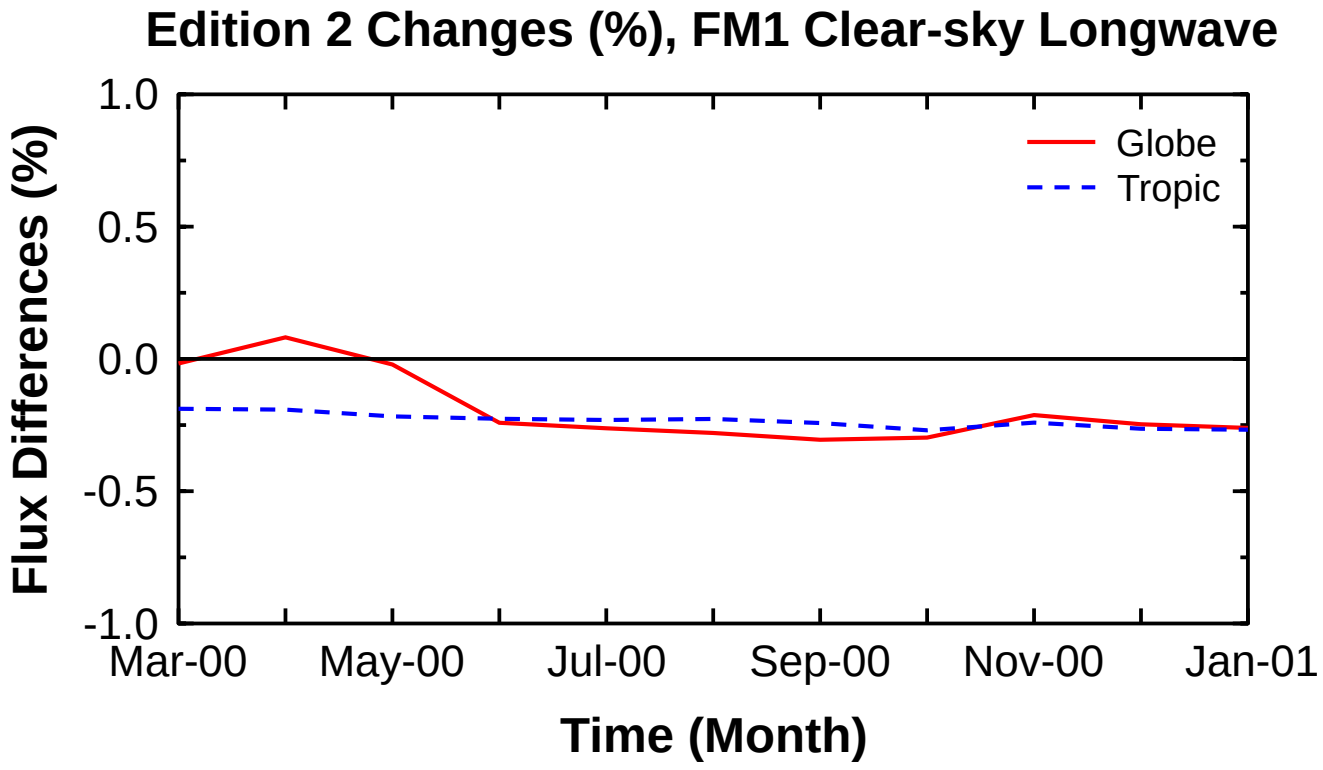
Monthly Global Mean, FM2 Minus FM1, Ed2 Minus Ed1

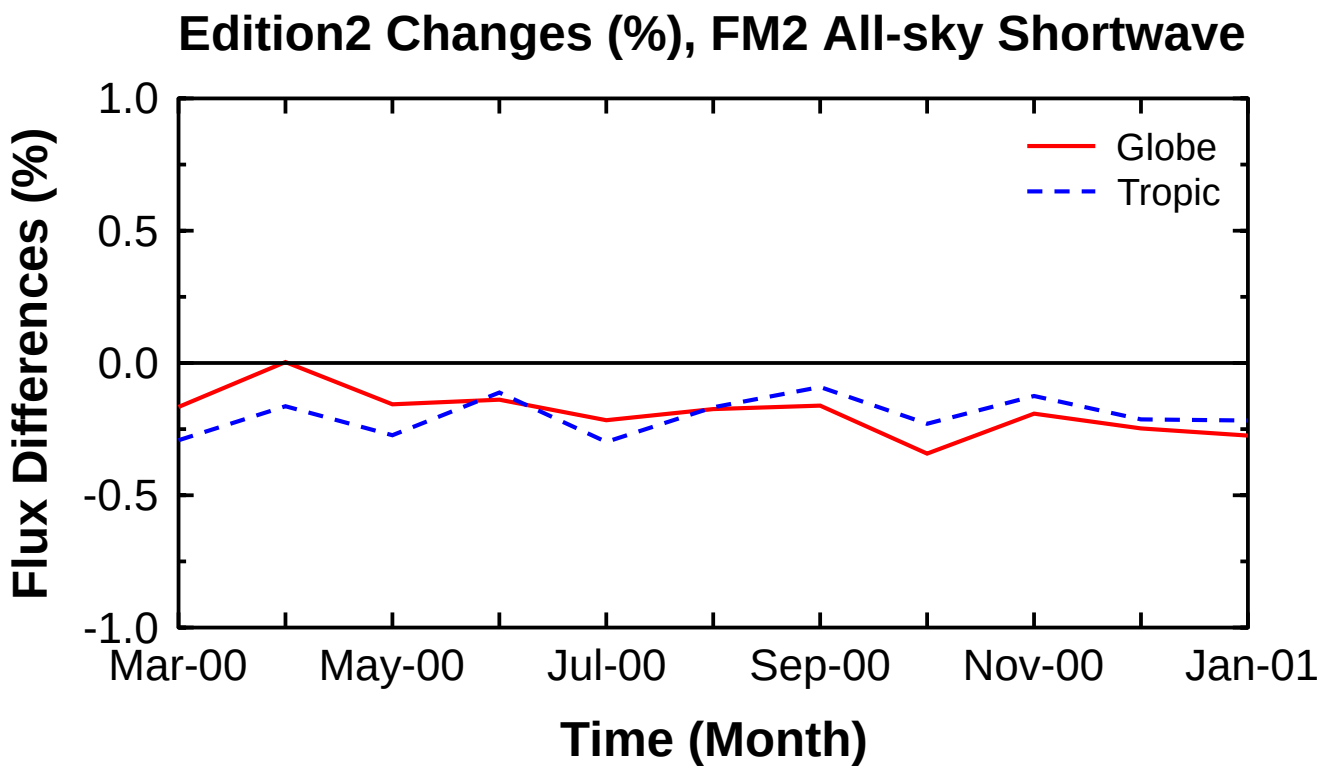


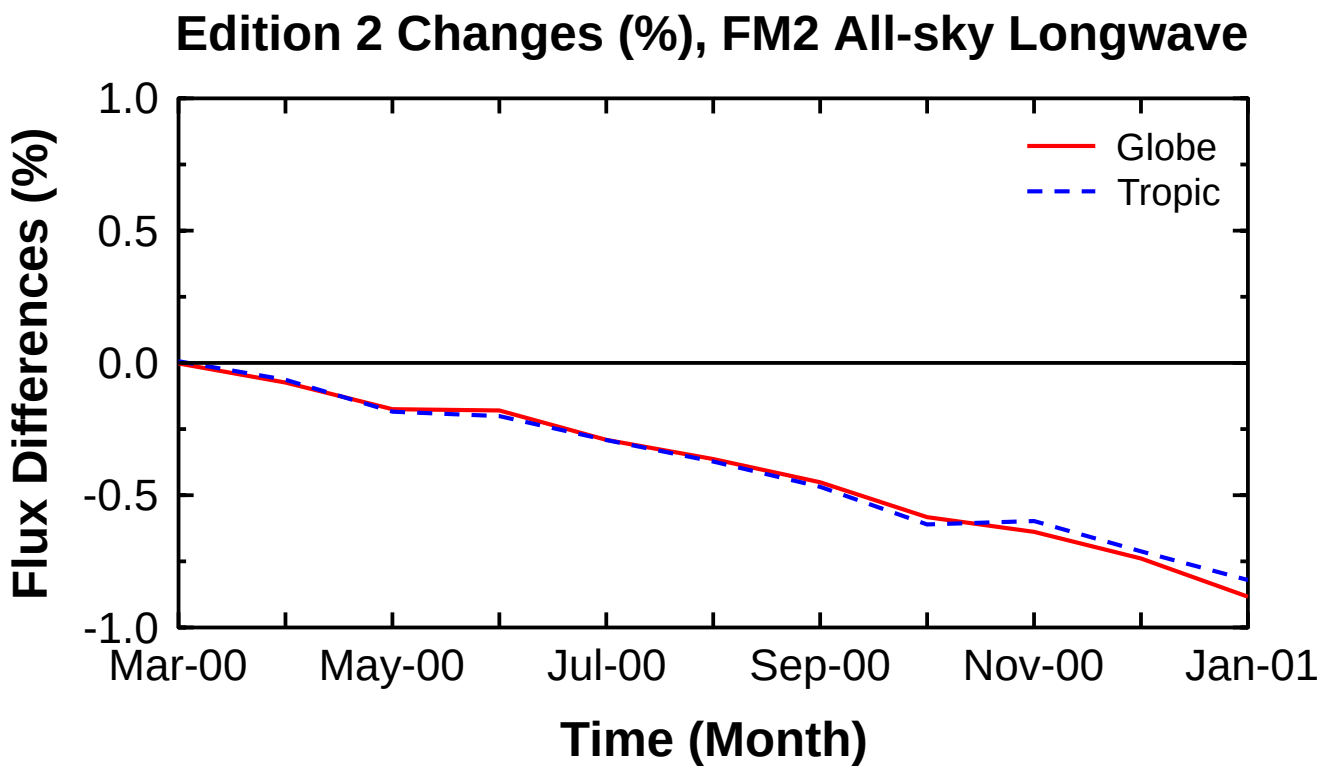

Edition2 Changes (%), FM1 All-sky Shortwave
Flux Differences (%)
1.0
0.5
0.0
-0.5
-1.0
Globe
Tropic
Mar-00
May-00
Jul-00
Sep-00
Nov-00
Jan-01
Time (Month)

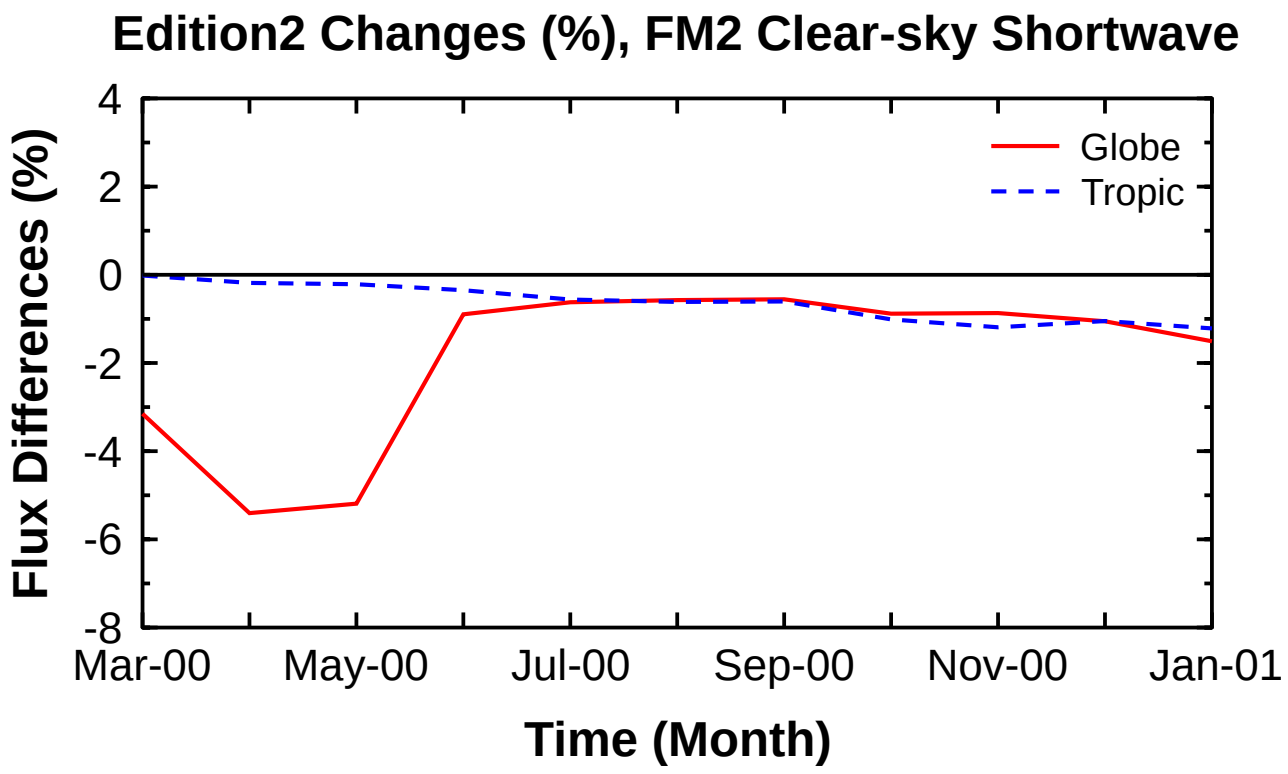

Edition 2 Changes (%), FM1 All-sky Longwave
Flux Differences (%)
1.0
0.5
0.0
-0.5
-1.0
Globe
Tropic
Mar-00
May-00
Jul-00
Sep-00
Nov-00
Jan-01
Time (Month)

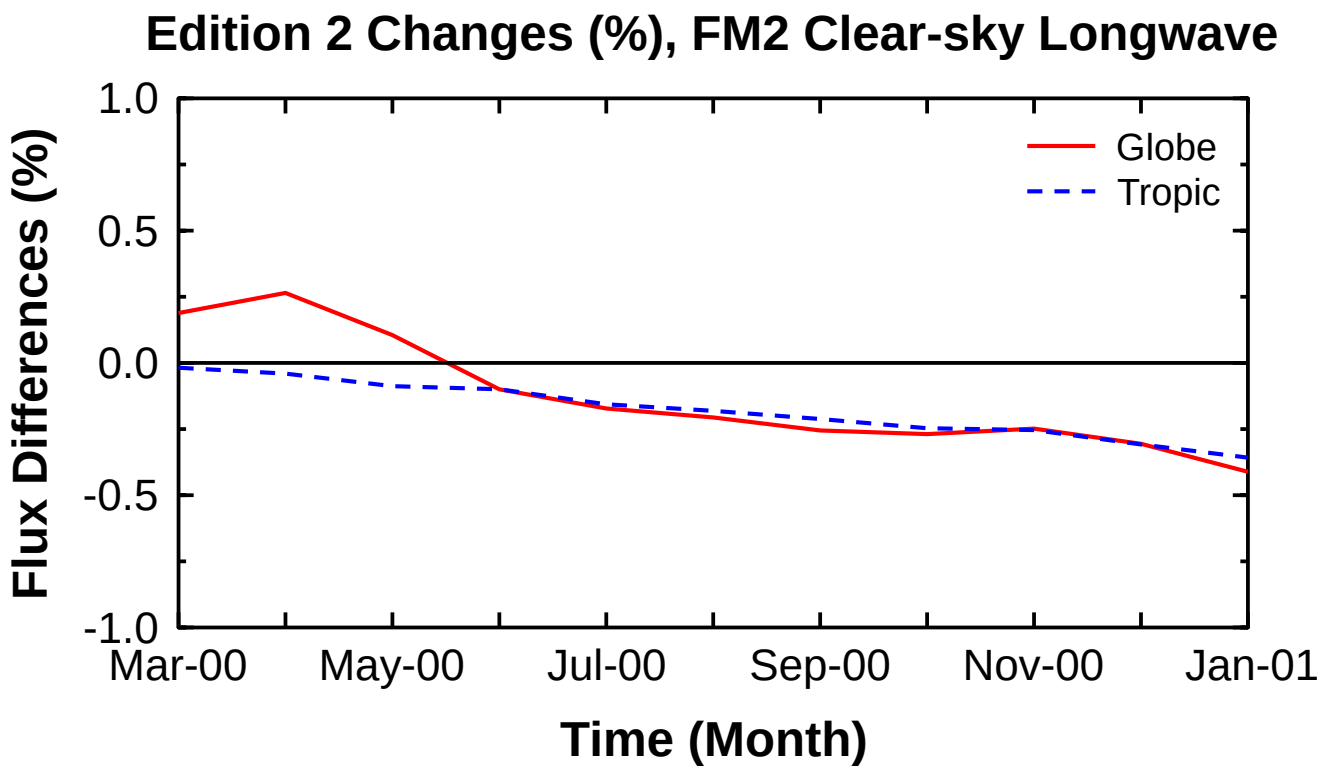

Edition2 Changes (%), FM1 Clear-sky Shortwave
Flux Differences (%)
4
2
0
-2
-4
-6
-8
Globe
Tropic
Mar-00
May-00
Jul-00
Sep-00
Nov-00
Jan-01
Time (Month)


Edition 2 Changes (%), FM1 Clear-sky Longwave
Flux Differences (%)
1.0
0.5
0.0
-0.5
-1.0
Globe
Tropic
Mar-00
May-00
Jul-00
Sep-00
Nov-00
Jan-01
Time (Month)


Edition2 Changes (%), FM2 All-sky Shortwave
Flux Differences (%)
1.0
0.5
0.0
-0.5
-1.0
Globe
Tropic
Mar-00
May-00
Jul-00
Sep-00
Nov-00
Jan-01
Time (Month)


Edition 2 Changes (%), FM2 All-sky Longwave
Flux Differences (%)
1.0
0.5
0.0
-0.5
-1.0
Globe
Tropic
Mar-00
May-00
Jul-00
Sep-00
Nov-00
Jan-01
Time (Month)


Edition2 Changes (%), FM2 Clear-sky Shortwave
Flux Differences (%)
4
2
0
-2
-4
-6
-8
Mar-00
May-00
Jul-00
Sep-00
Nov-00
Jan-01
Time (Month)
Globe
Tropic


Edition 2 Changes (%), FM2 Clear-sky Longwave
Flux Differences (%)
1.0
0.5
0.0
-0.5
-1.0
Mar-00
May-00
Jul-00
Sep-00
Nov-00
Jan-01
Time (Month)
Globe
Tropic

SUMMARY

- Edition2 Calibration Corrections Were Applied To Both CERES/ Terra FM1 And FM2 Instrument.
- These Calibrations Remove On-orbit Drifts Problems In The Terra Edition1 Data; Especially In The FM2 Instrument.
- Clean-up Bug In Snow Map Assignment Algorithm; This Bug Can Significantly Affect Edition1 Clear-sky Shortwave Fluxes Over The Mis-classified Snow Regions; Up to 5% Effect On Global Mean Clear-sky Shortwave Fluxes During Spring Time.
- Restore Missing Edition1 Data Due To Incomplete Satellite Navigation Information; These Missing Data Can Add Small Bias To The Edition1 All-sky Fluxes.
- The ERBE-like Edition2 FM1 And FM2 Data Are Now Ready For Use By Science Users.