MODIS TEB Performance

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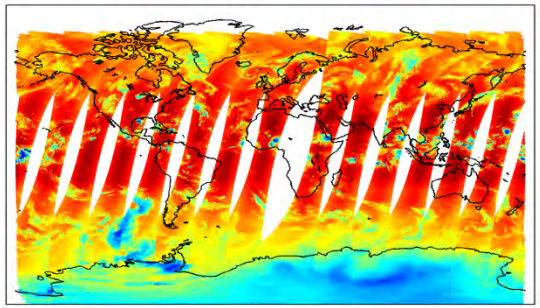
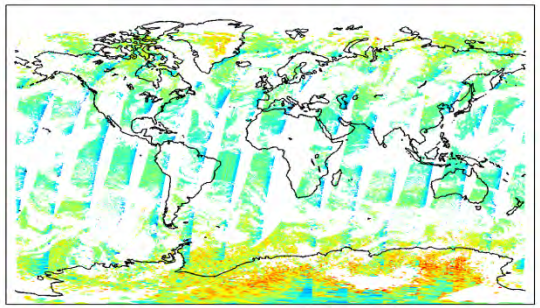
Univ. Wisconsin
MODIS Calibration mtg
April 17, 2013

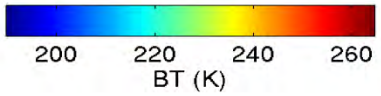
Today's Items

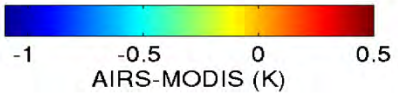
- Aqua MODIS TEB Response vs Scan (RVS)
  - Measured during pre-launch test program
  - Waived option for on-orbit Deep Space Maneuver
  - AIRS-MODIS comparisons provide on-orbit insight
- Terra MODIS TEB radiometric performance
  - IASI-MODIS SNO comparisons
  - Simon Hook's Lake Tahoe Validation Network has indicated drift in Terra MODIS Band 29 calibration

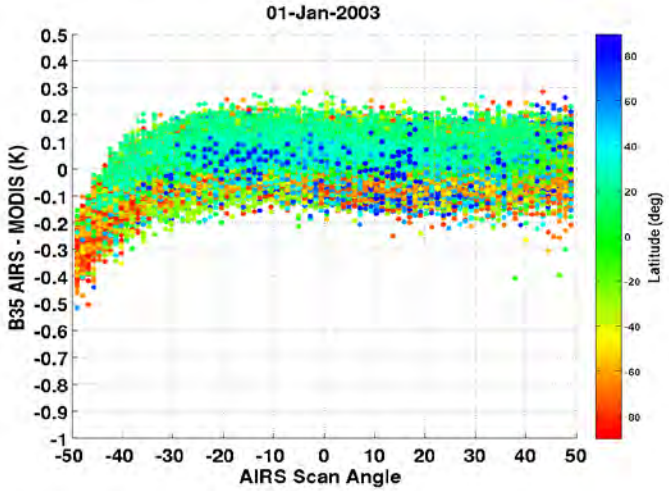


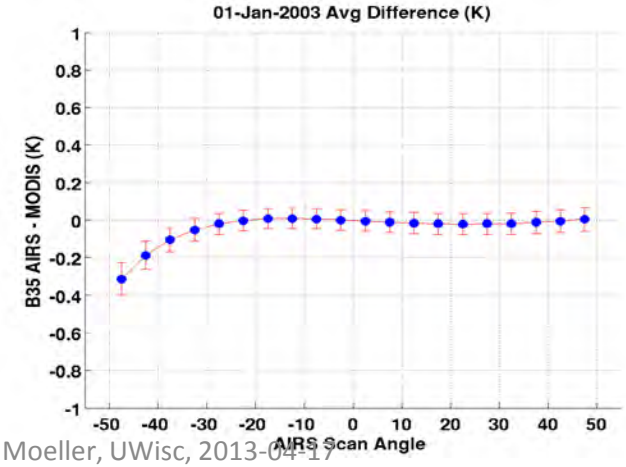


Aqua MODIS RVS: AIRS-MODIS Comparisons



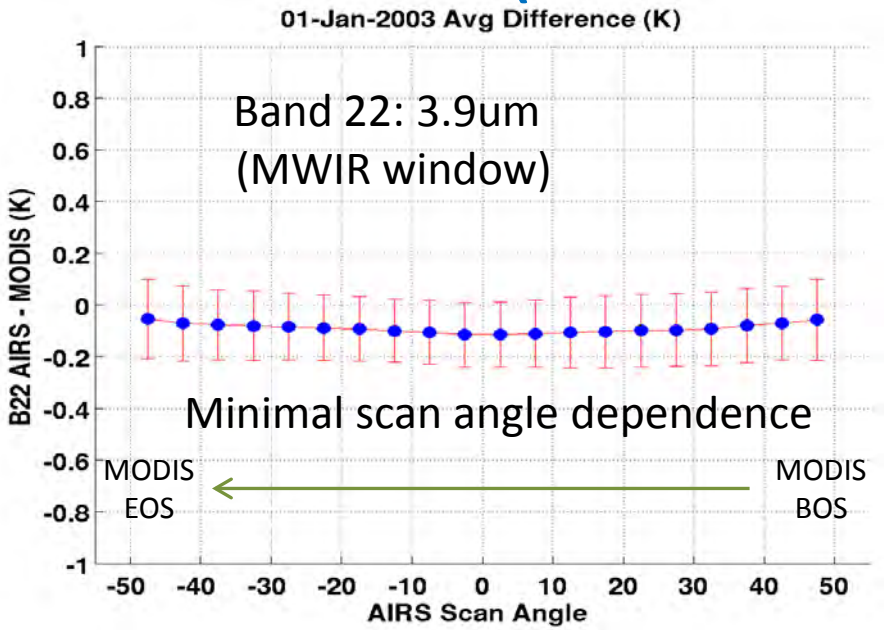


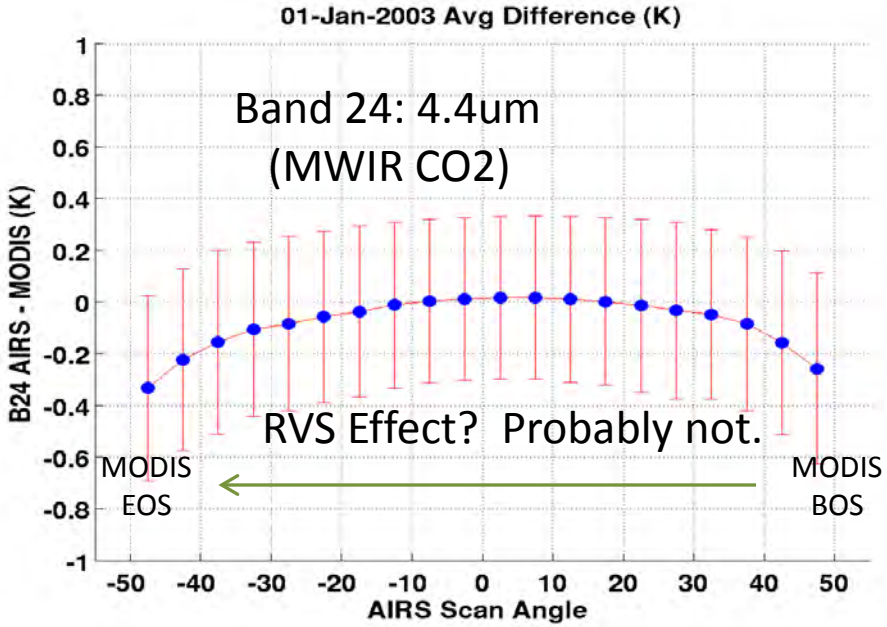


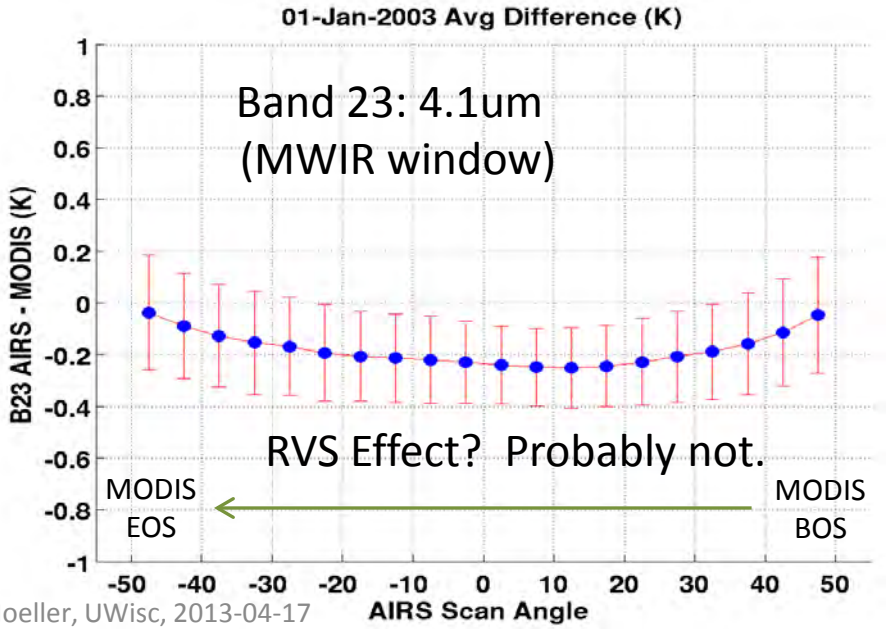


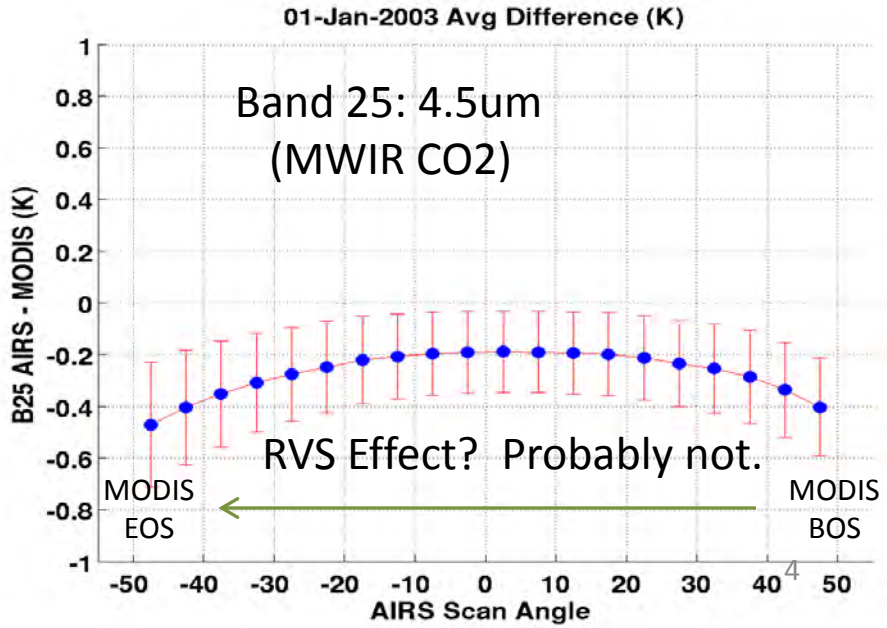
- Global data sets, available for nearly every day of on-orbit operations
- Rich data sample allows aggressive filtering to remove structured scenes
- AIRS-MODIS differences as a function of scan angle
- Both MODIS and AIRS used Denton coating on scene mirror.
- Examine one day per year to reveal RVS baseline and any change over time.

Aqua MODIS RVS Performance: Baseline (Our knowledge of RVS at-launch)

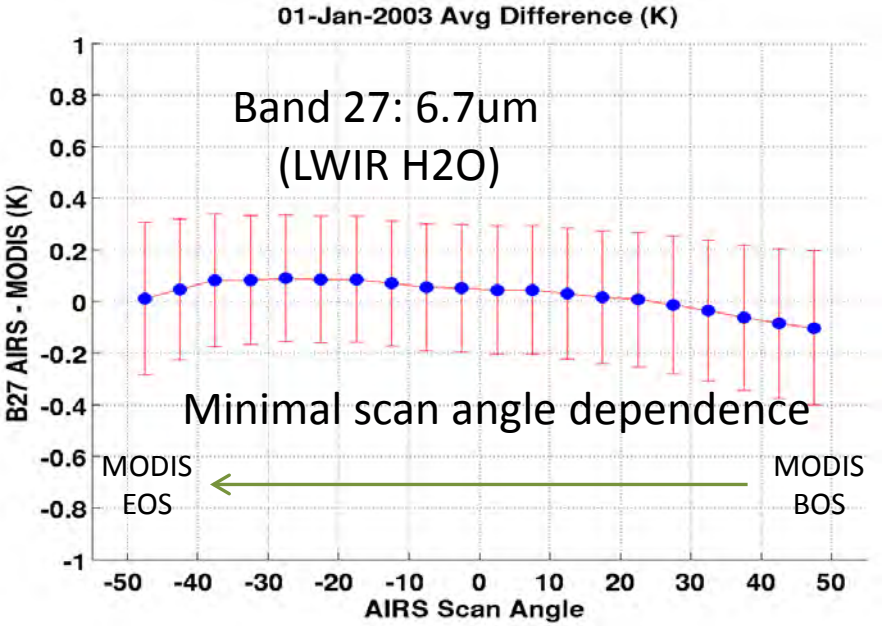


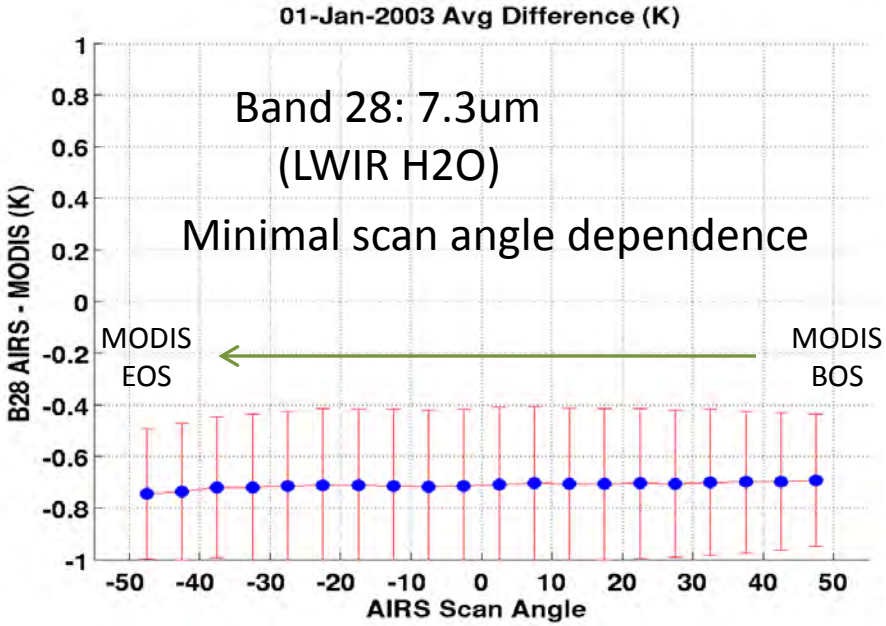






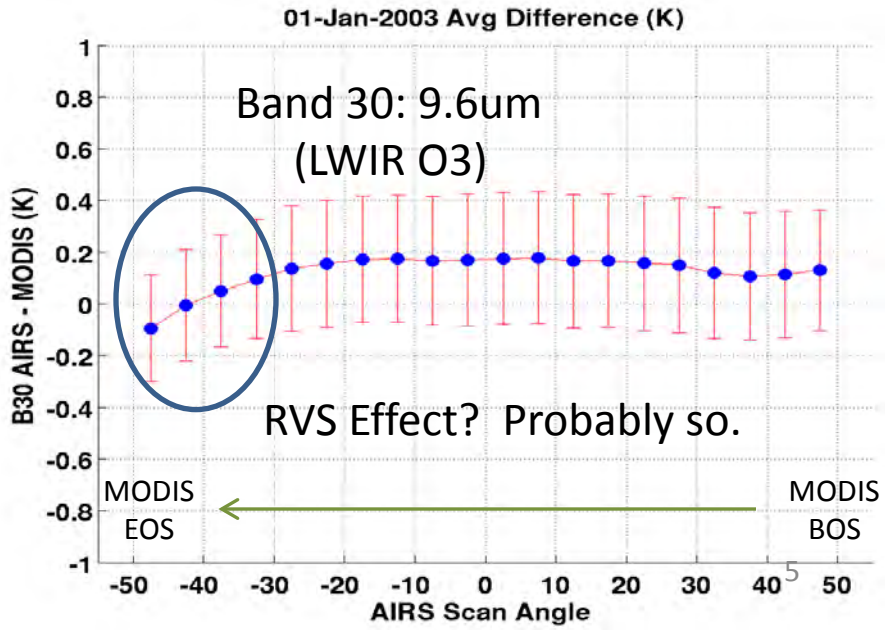
Aqua MODIS RVS Performance: Baseline (Our knowledge of RVS at-launch)



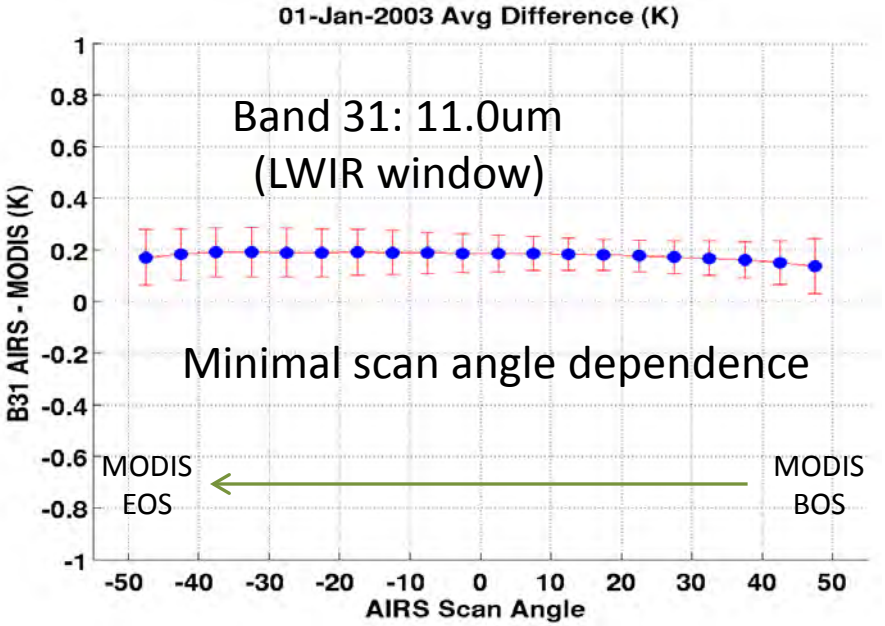


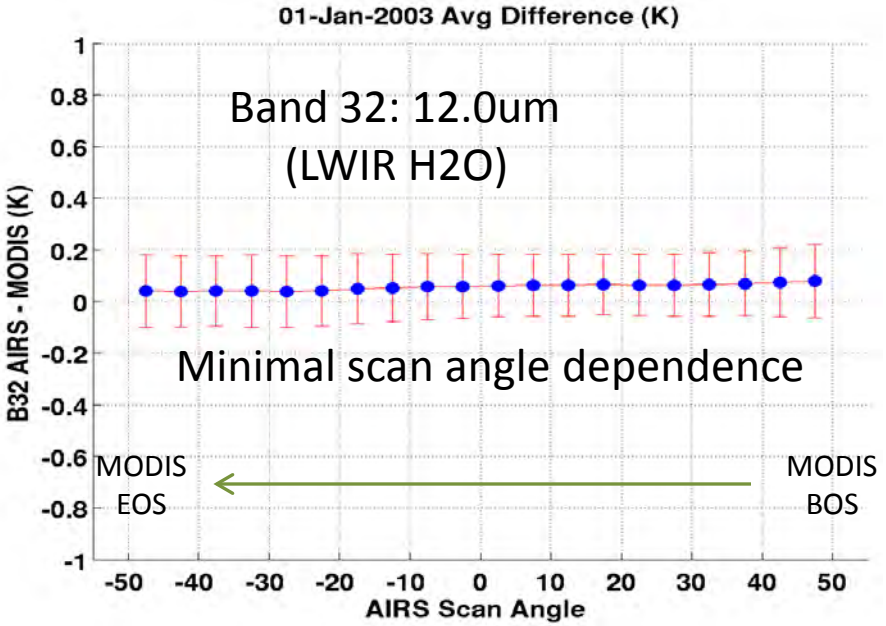
Band 29: 8.6um
(LWIR window)

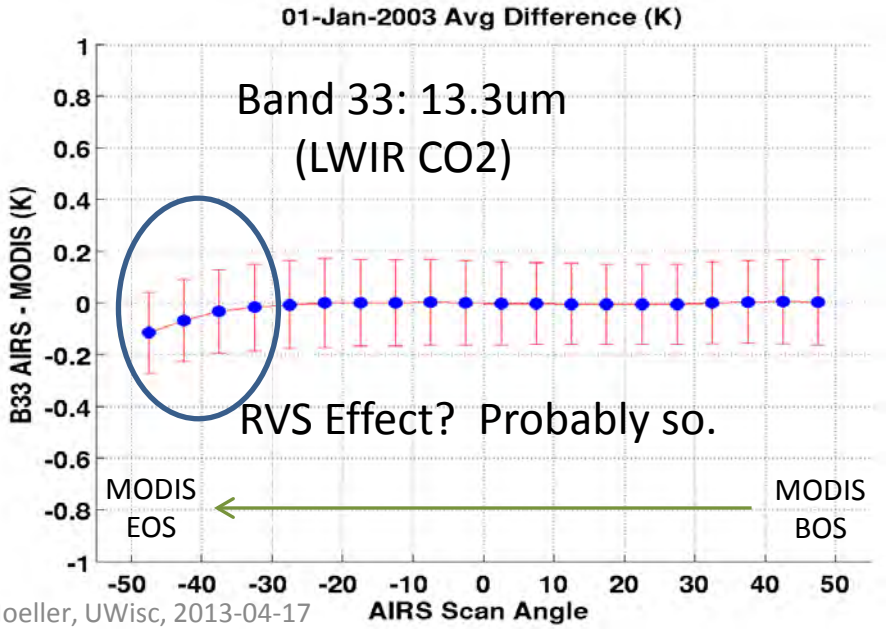
No spectral coverage in AIRS

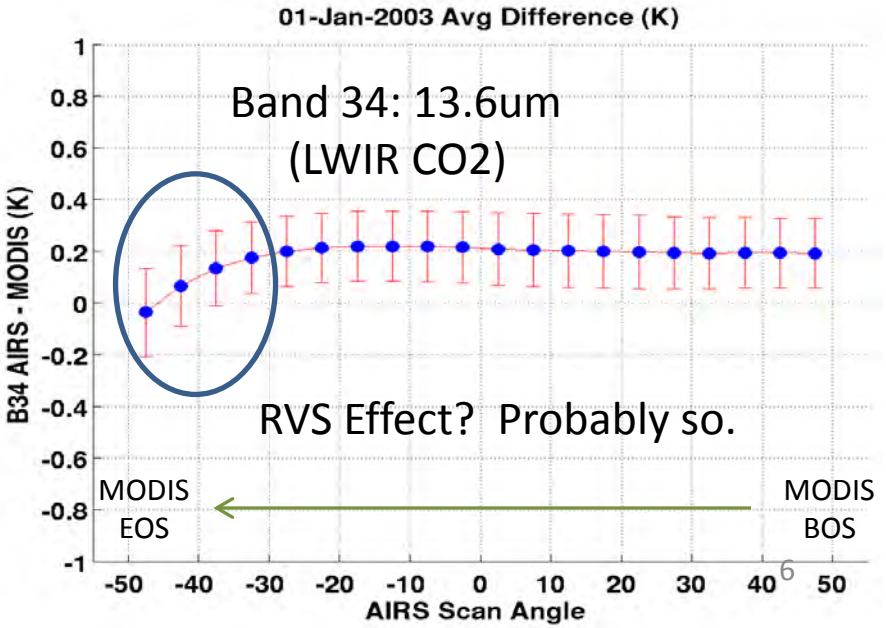


Aqua MODIS RVS Performance: Baseline (Our knowledge of RVS at-launch)

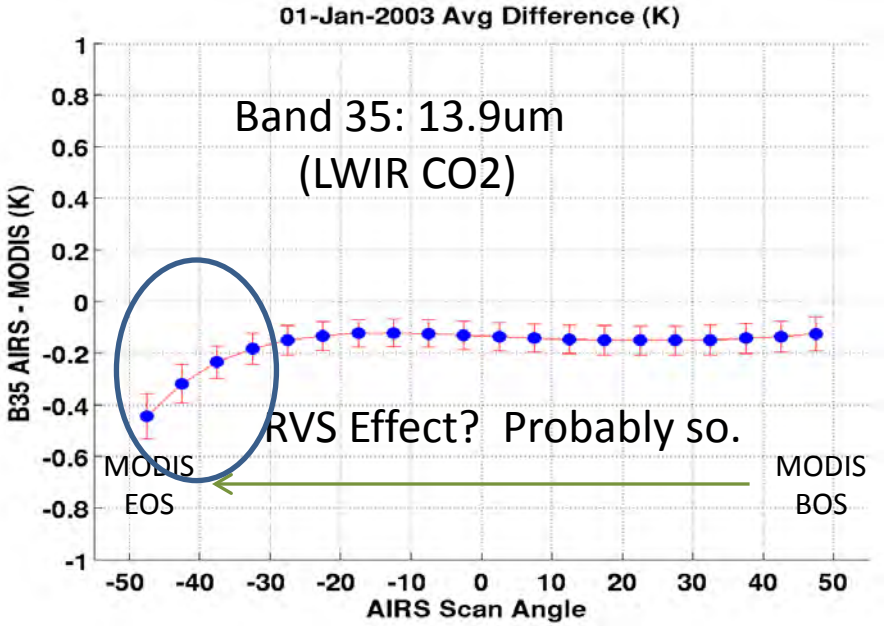


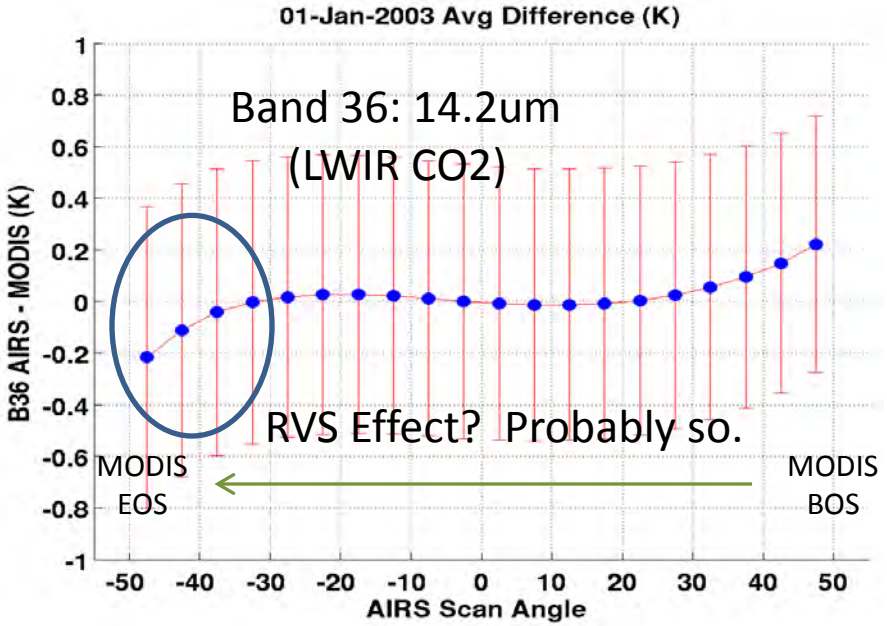


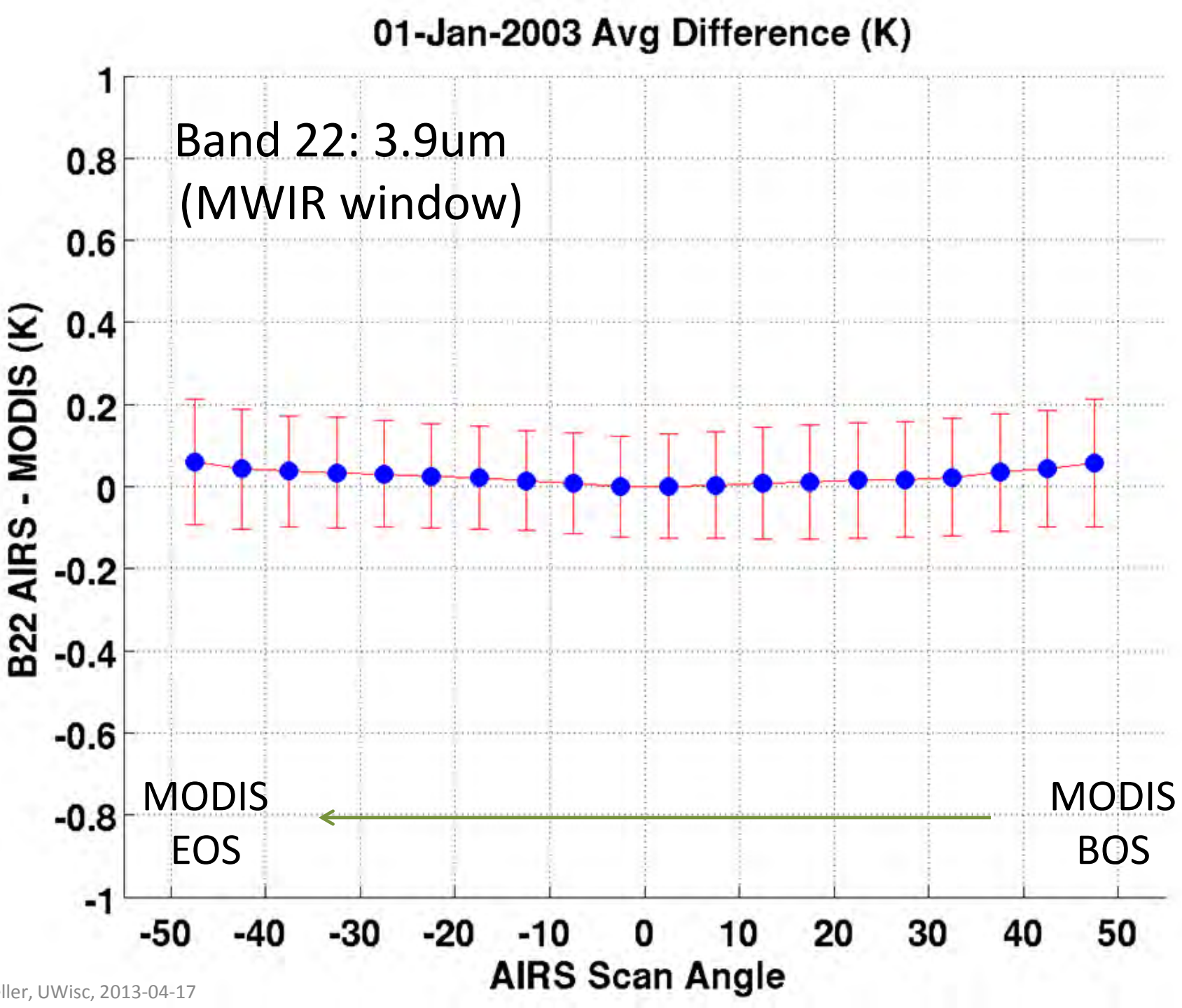


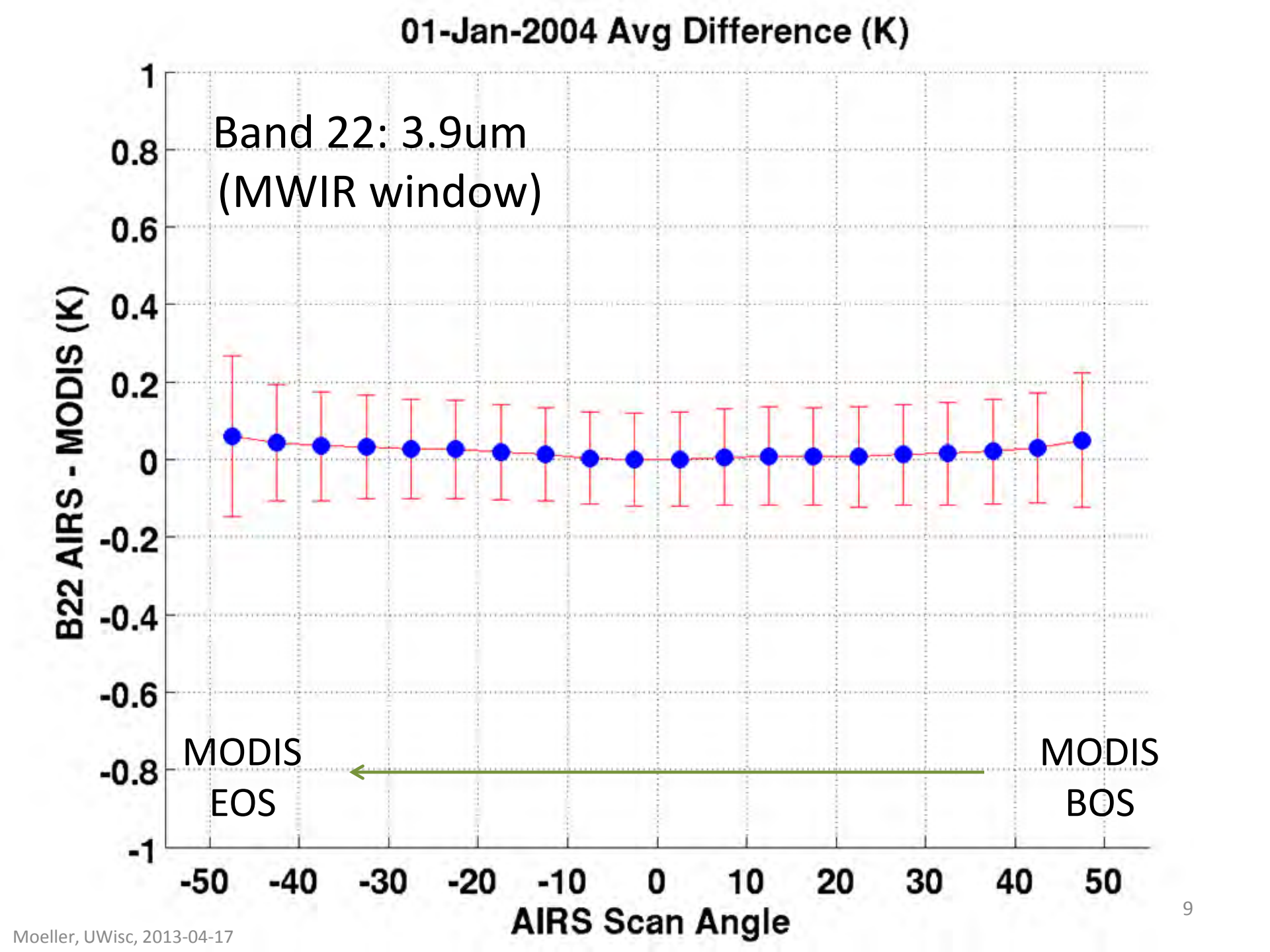


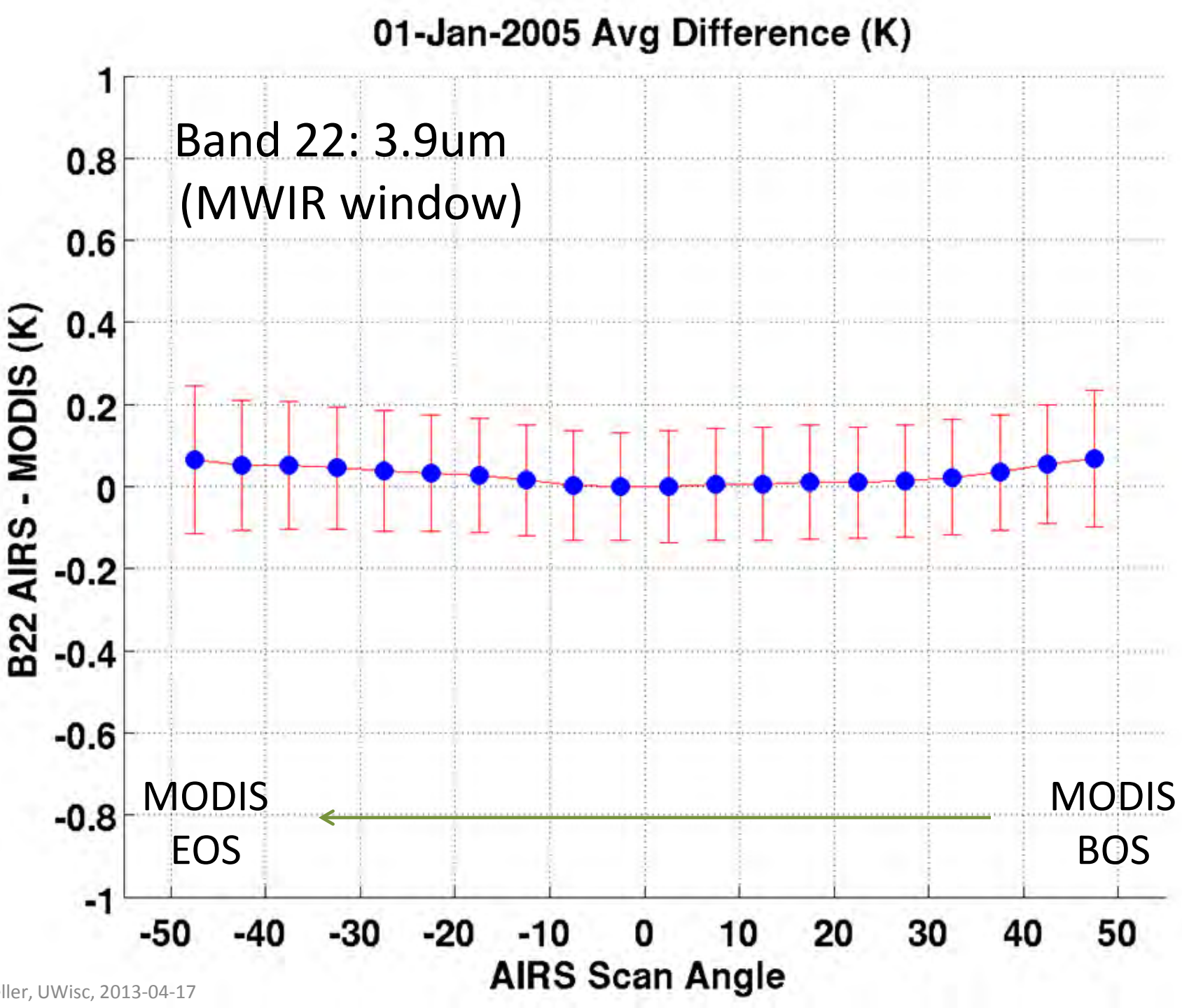
Aqua MODIS RVS Performance: Baseline (Our knowledge of RVS at-launch)

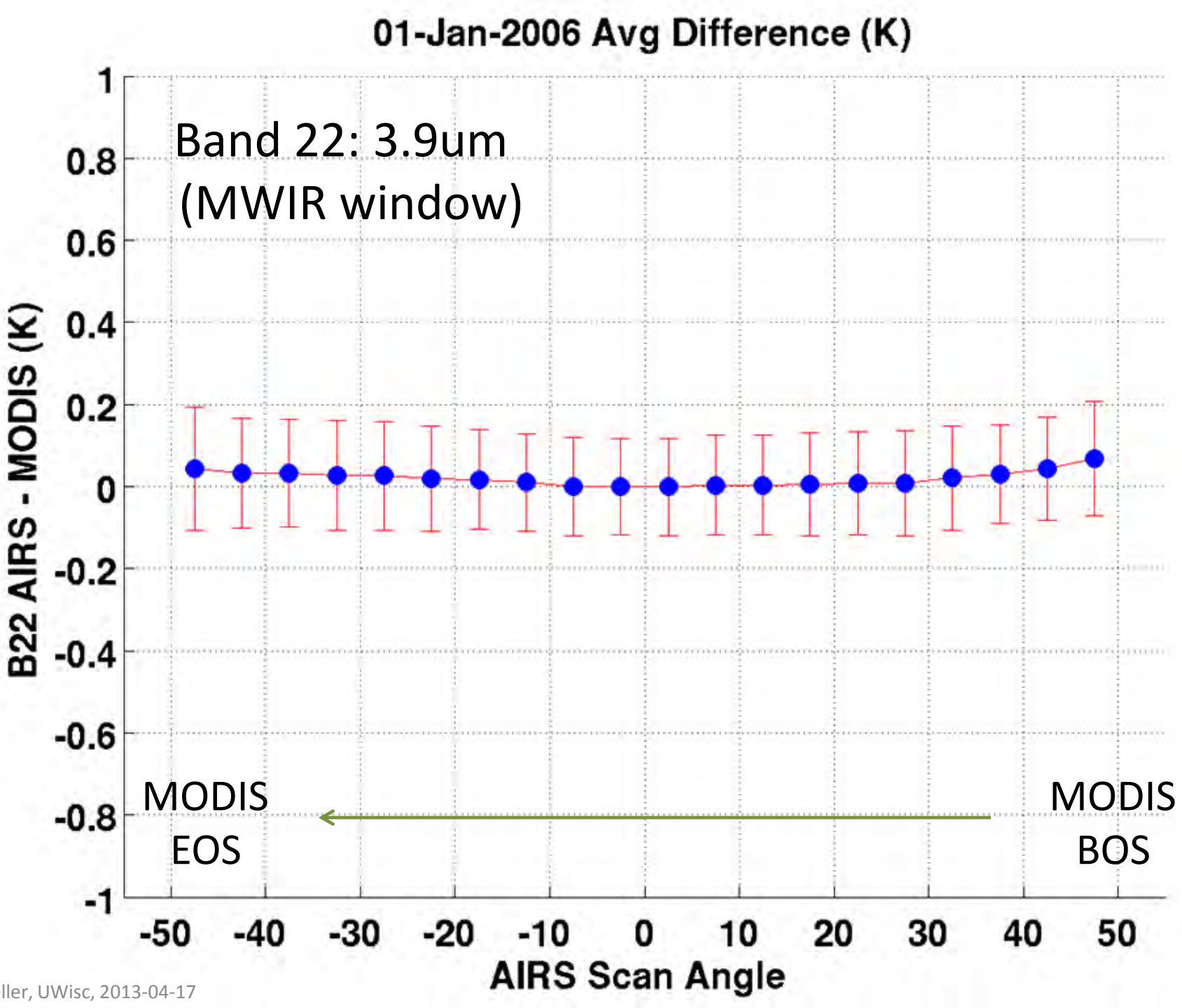


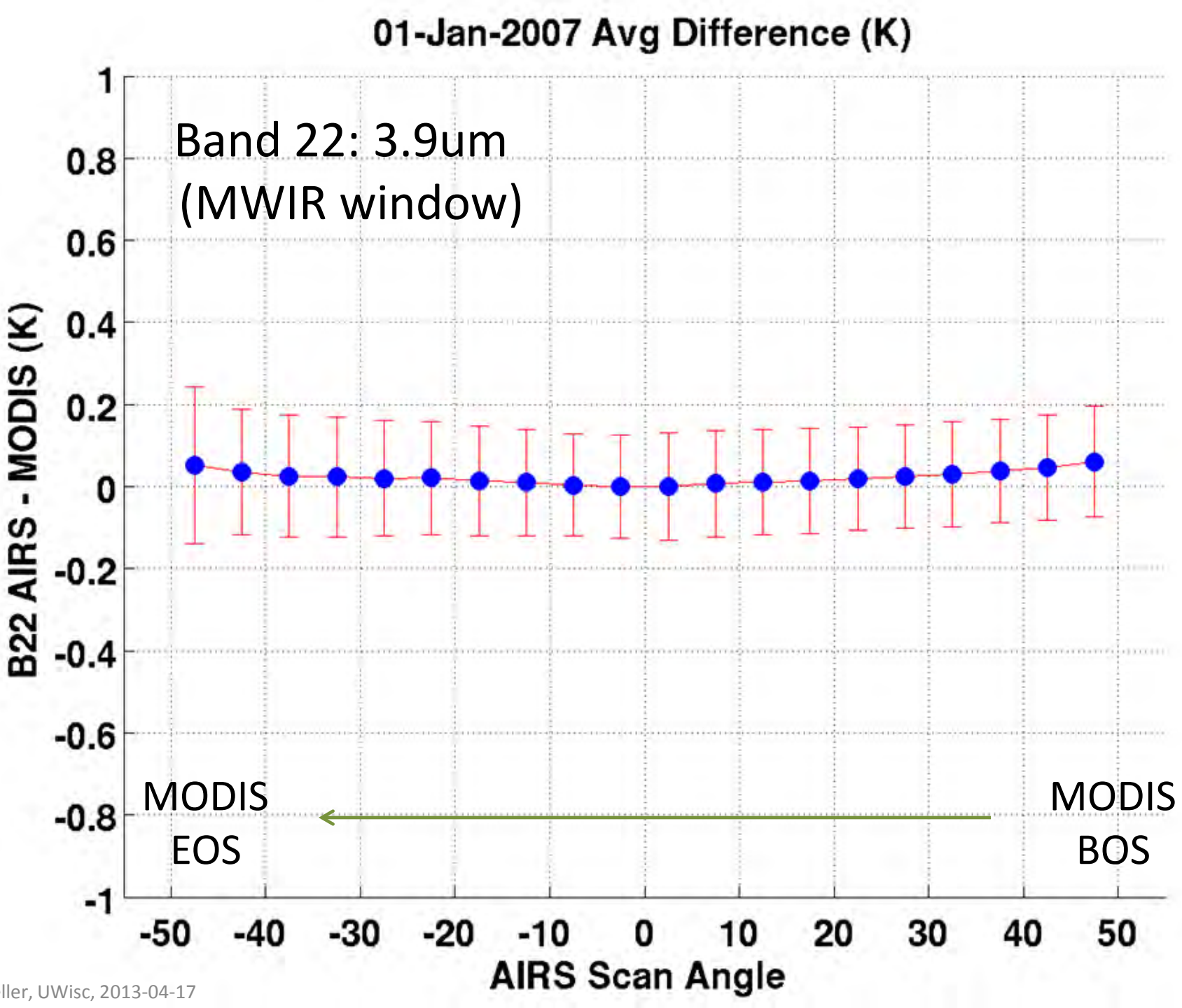


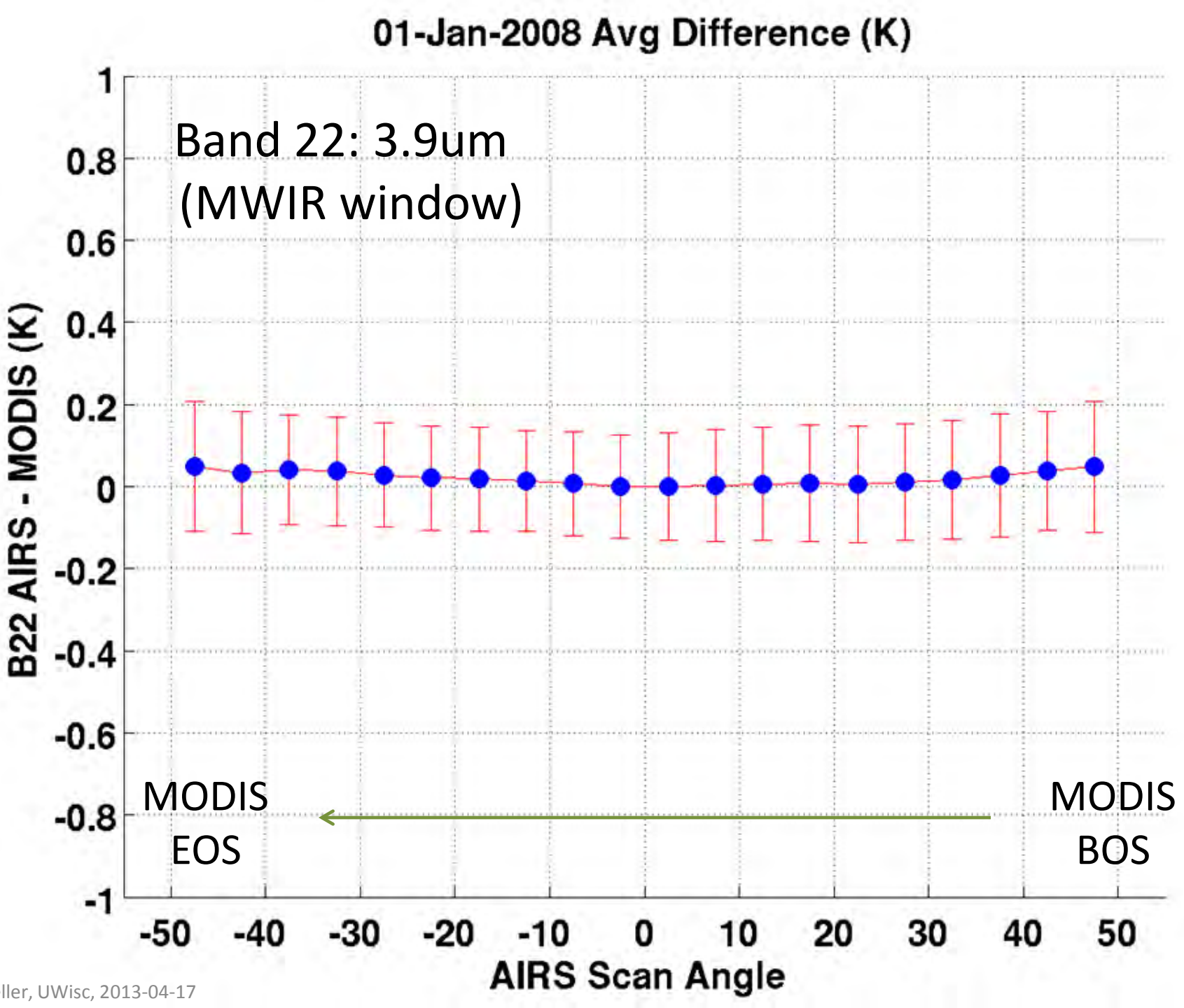

01-Jan-2003 Avg Difference (K)
Band 22: 3.9um
(MWIR window)
B22 AIRS - MODIS (K)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-50
-40
-30
-20
-10
0
10
20
30
40
50
AIRS Scan Angle
MODIS
EOS
MODIS
BOS

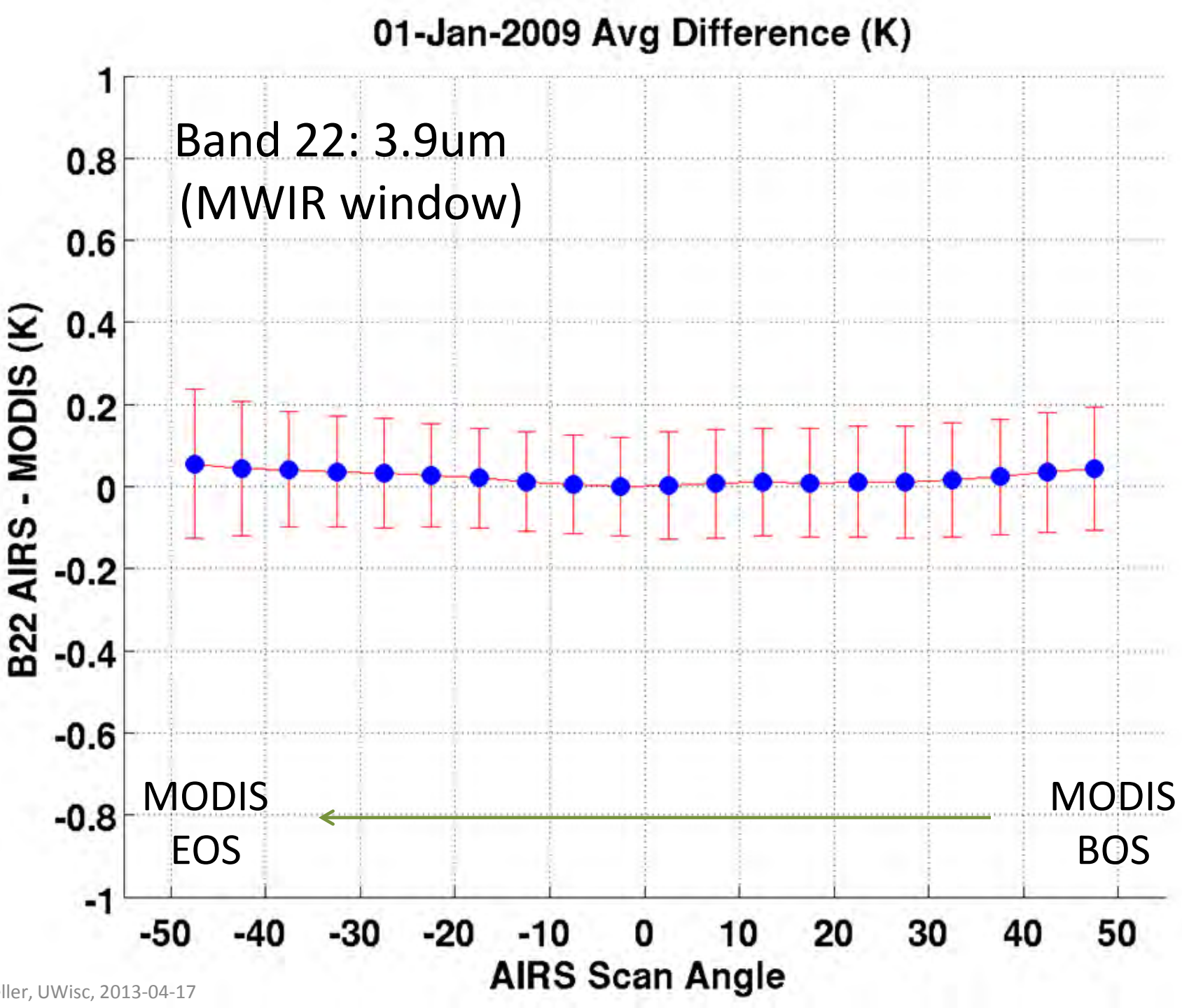

01-Jan-2004 Avg Difference (K)
Band 22: 3.9um
(MWIR window)
B22 AIRS - MODIS (K)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
MODIS
EOS
MODIS
BOS
-50
-40
-30
-20
-10
0
10
20
30
40
50
AIRS Scan Angle

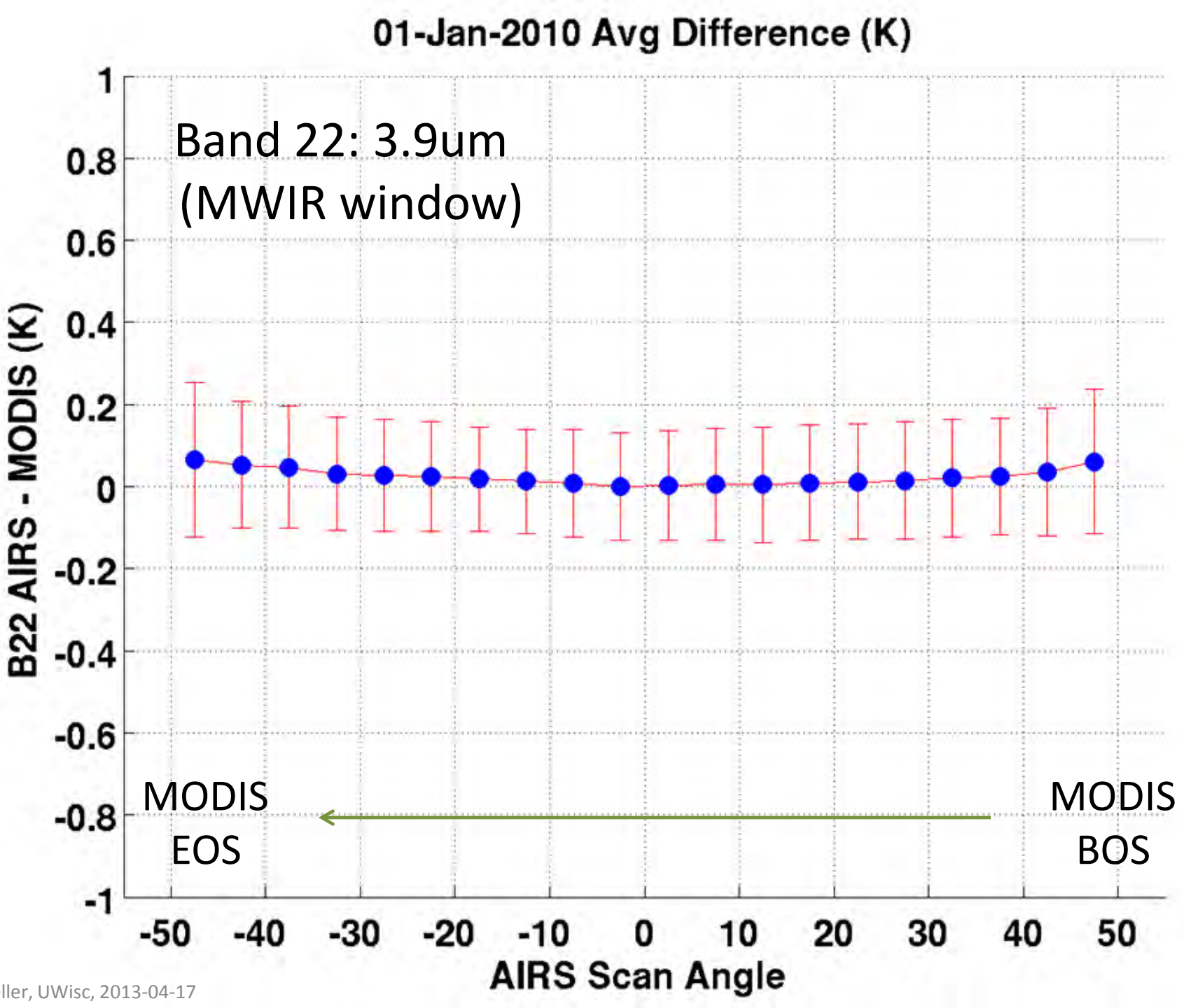

01-Jan-2005 Avg Difference (K)
Band 22: 3.9um
(MWIR window)
B22 AIRS - MODIS (K)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
MODIS
EOS
MODIS
BOS
-50
-40
-30
-20
-10
0
10
20
30
40
50
AIRS Scan Angle

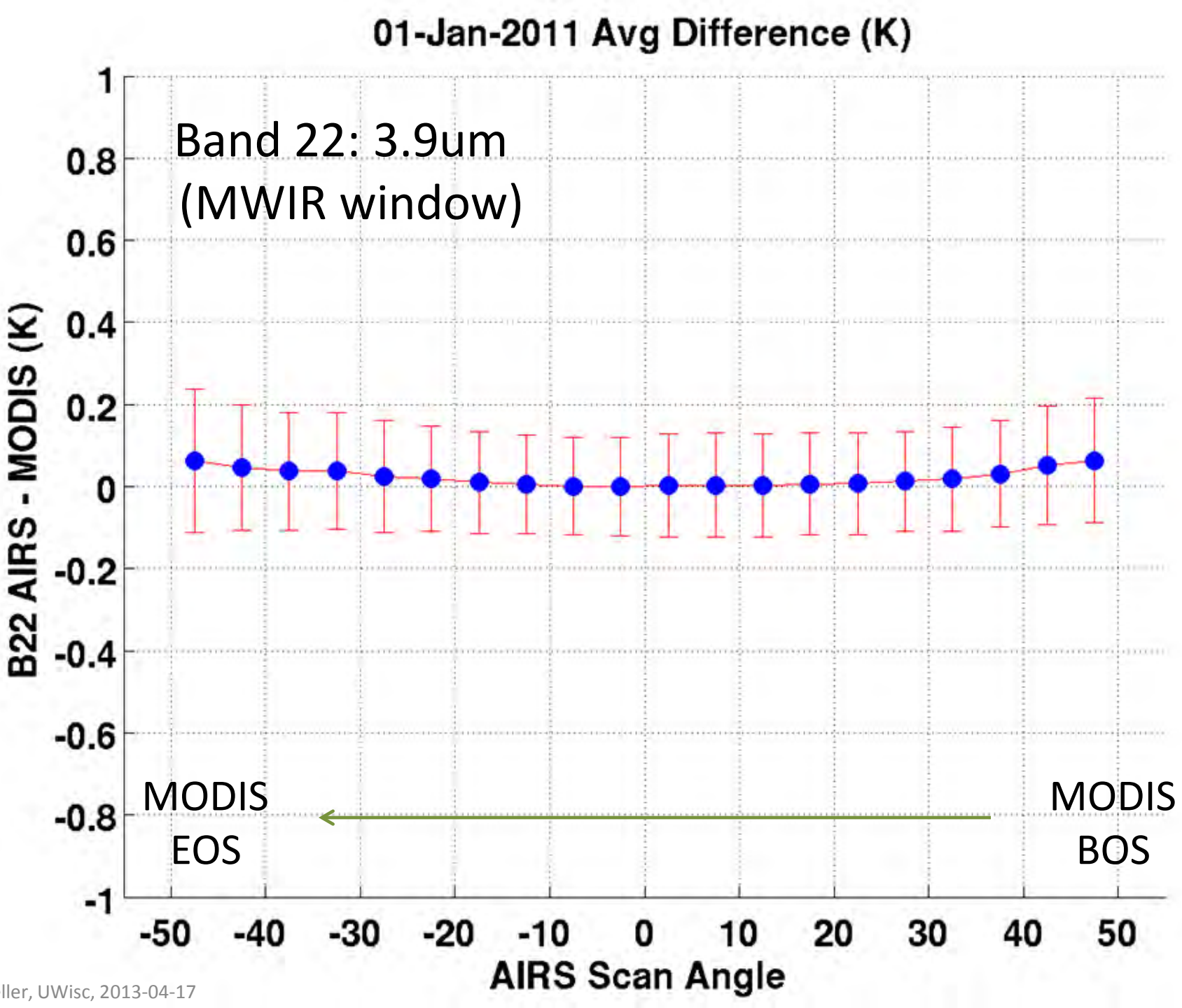

01-Jan-2006 Avg Difference (K)
Band 22: 3.9um
(MWIR window)
B22 AIRS - MODIS (K)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
MODIS
EOS
MODIS
BOS
-50
-40
-30
-20
-10
0
10
20
30
40
50
AIRS Scan Angle

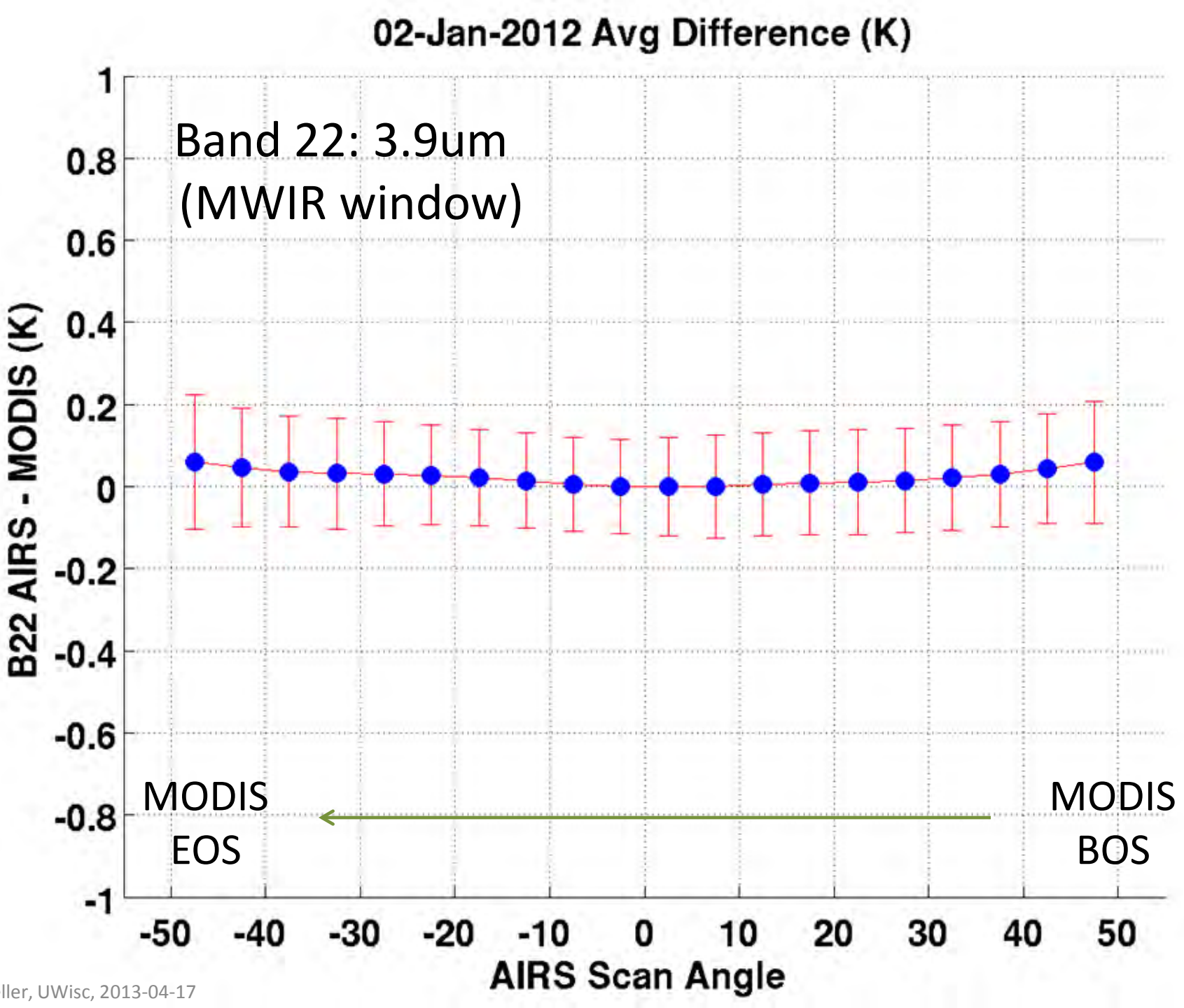

01-Jan-2007 Avg Difference (K)
Band 22: 3.9um
(MWIR window)
B22 AIRS - MODIS (K)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-50
-40
-30
-20
-10
0
10
20
30
40
50
AIRS Scan Angle
MODIS
EOS
MODIS
BOS

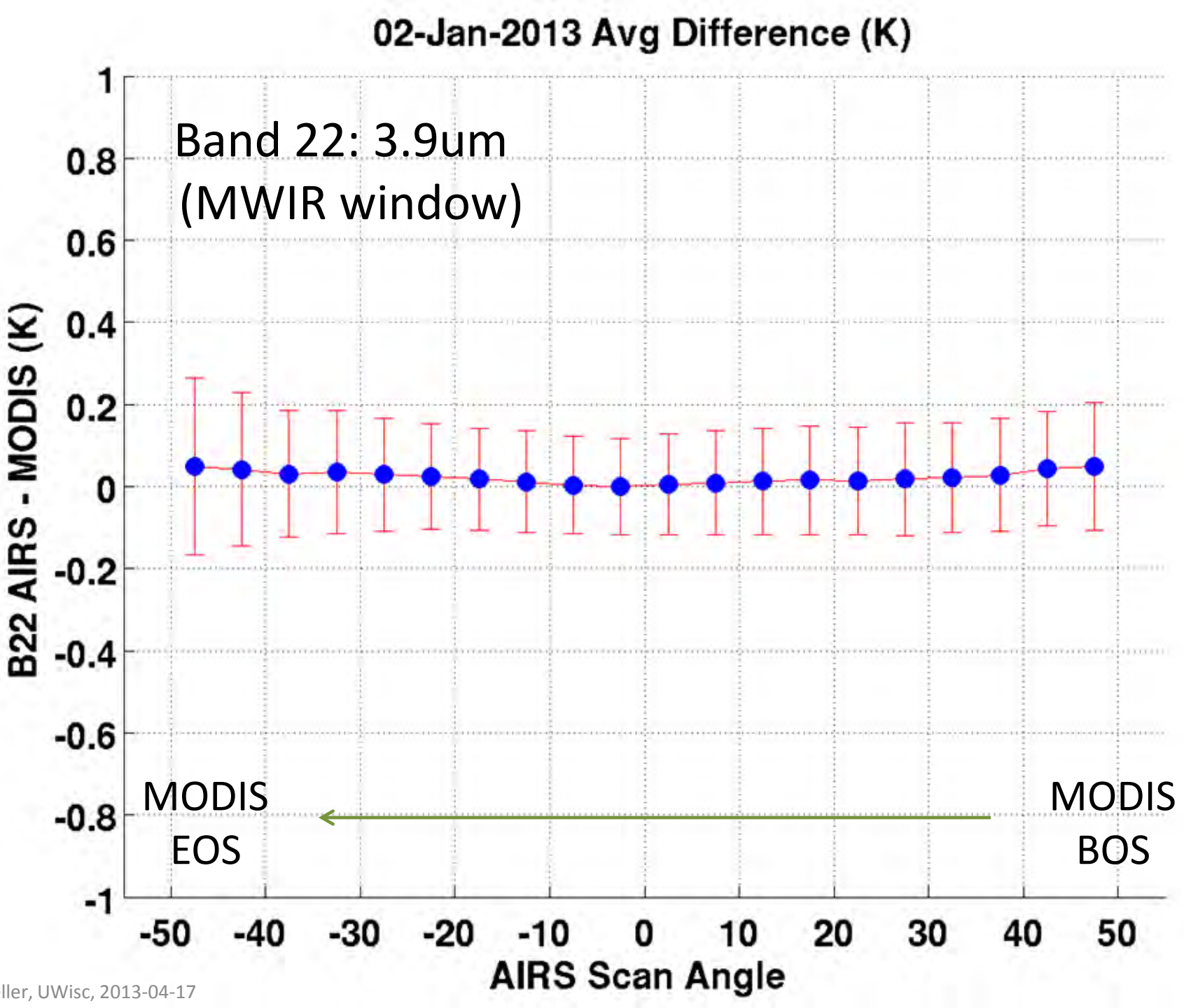

01-Jan-2008 Avg Difference (K)
Band 22: 3.9um
(MWIR window)
B22 AIRS - MODIS (K)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-50
-40
-30
-20
-10
0
10
20
30
40
50
AIRS Scan Angle
MODIS
EOS
MODIS
BOS

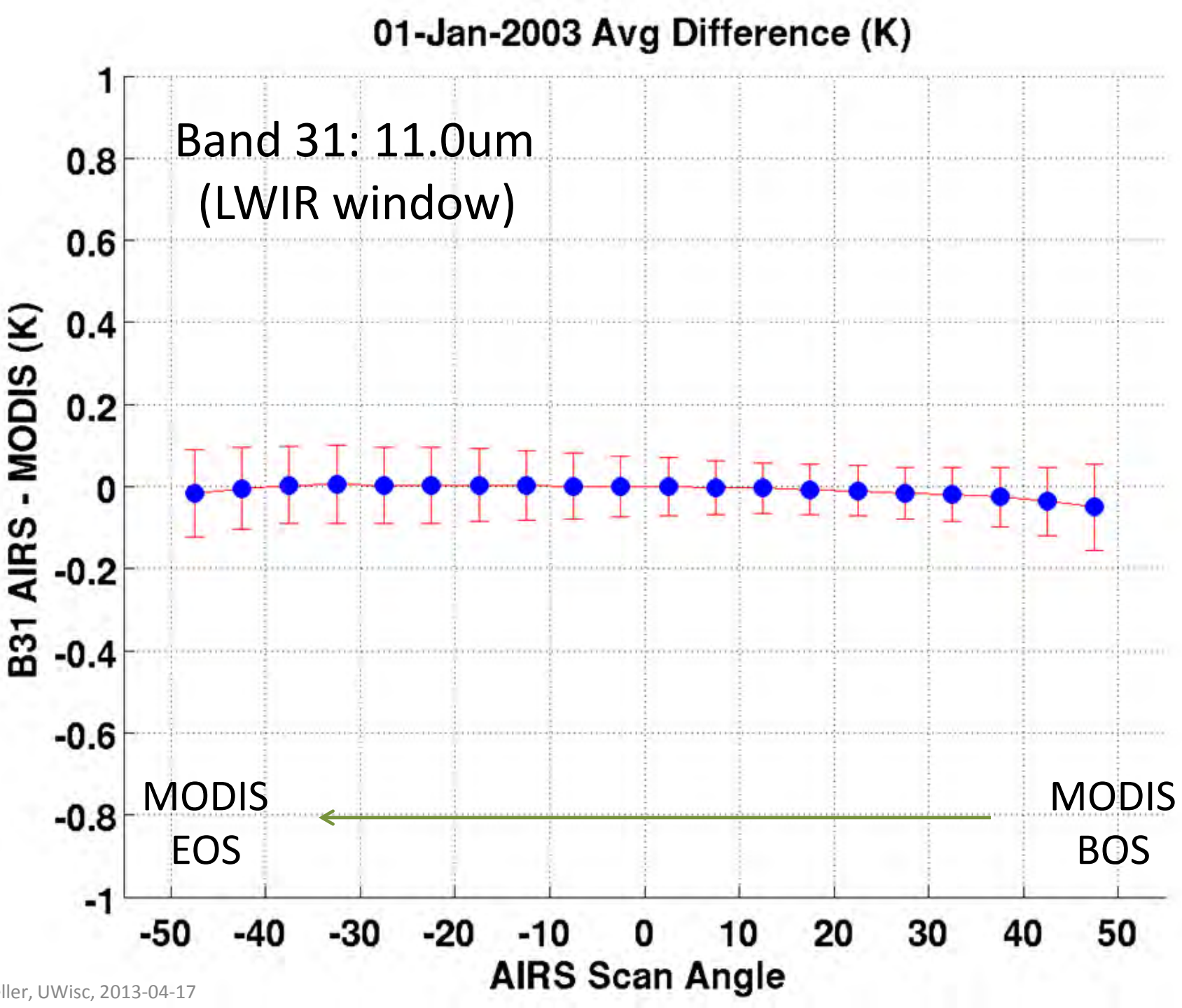

01-Jan-2009 Avg Difference (K)
Band 22: 3.9um
(MWIR window)
B22 AIRS - MODIS (K)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
MODIS
EOS
MODIS
BOS
-50
-40
-30
-20
-10
0
10
20
30
40
50
AIRS Scan Angle

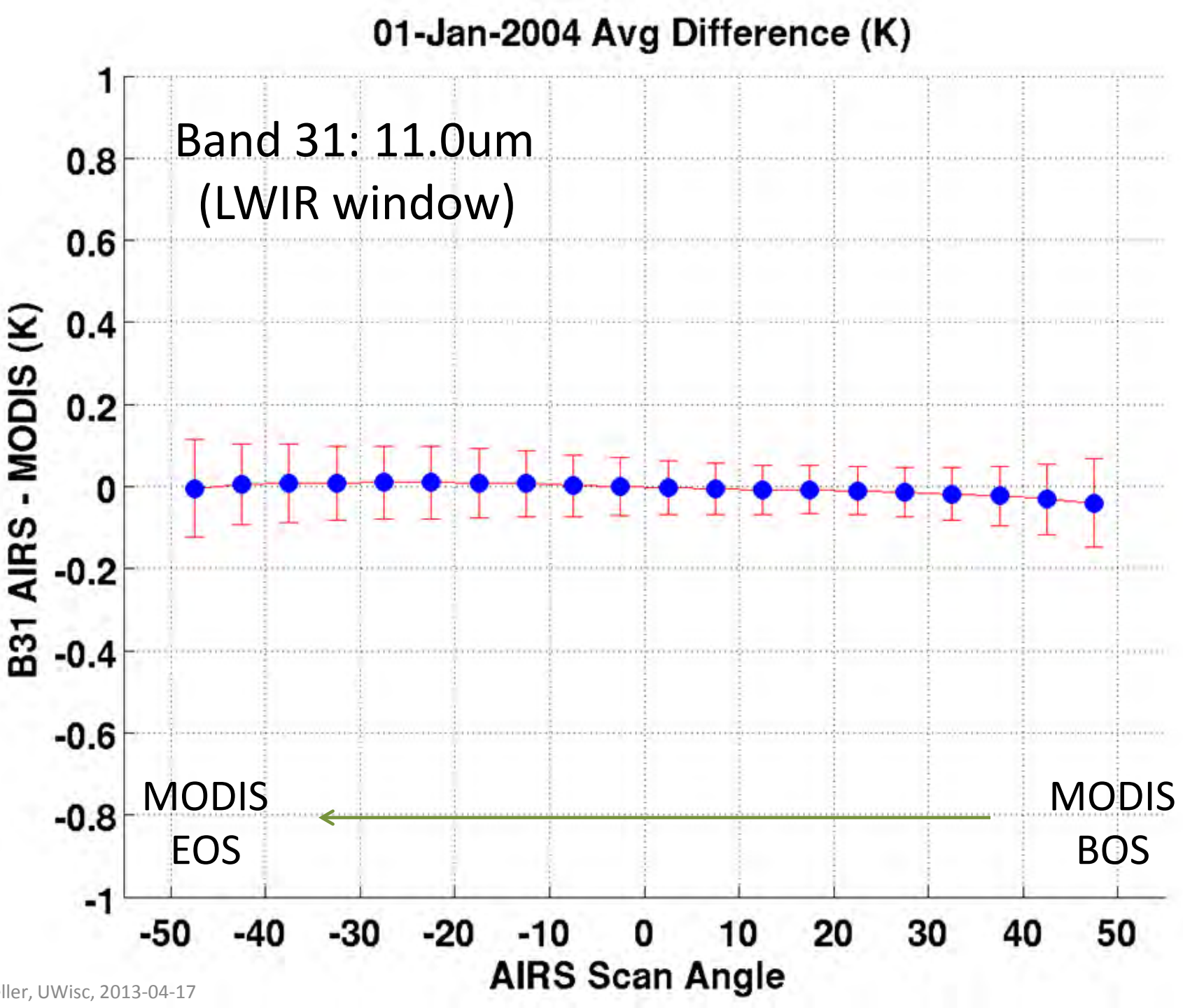

01-Jan-2010 Avg Difference (K)
Band 22: 3.9um
(MWIR window)
B22 AIRS - MODIS (K)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-50
-40
-30
-20
-10
0
10
20
30
40
50
AIRS Scan Angle
MODIS
EOS
MODIS
BOS

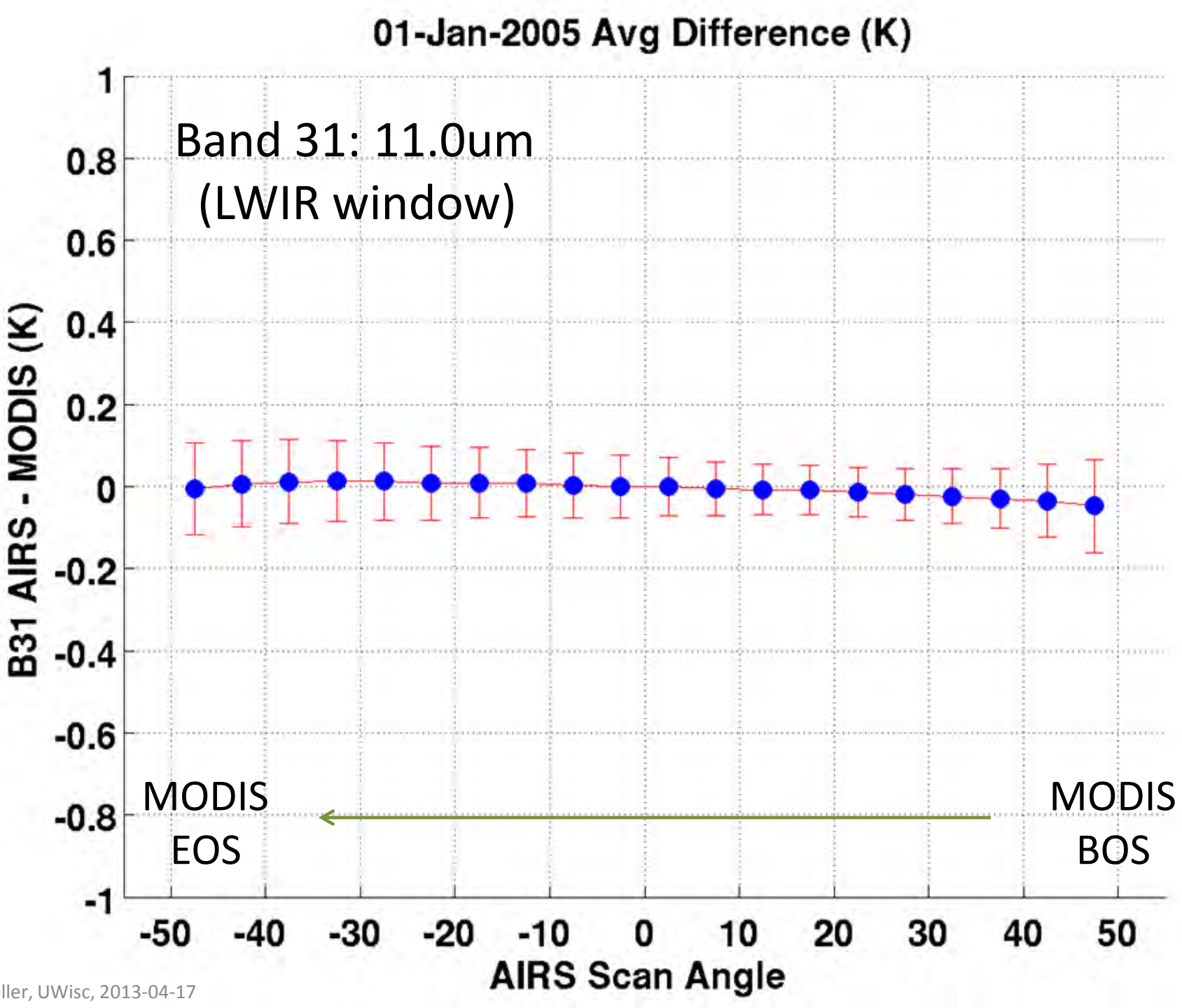

01-Jan-2011 Avg Difference (K)
Band 22: 3.9um
(MWIR window)
B22 AIRS - MODIS (K)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-50
-40
-30
-20
-10
0
10
20
30
40
50
AIRS Scan Angle
MODIS
EOS
MODIS
BOS

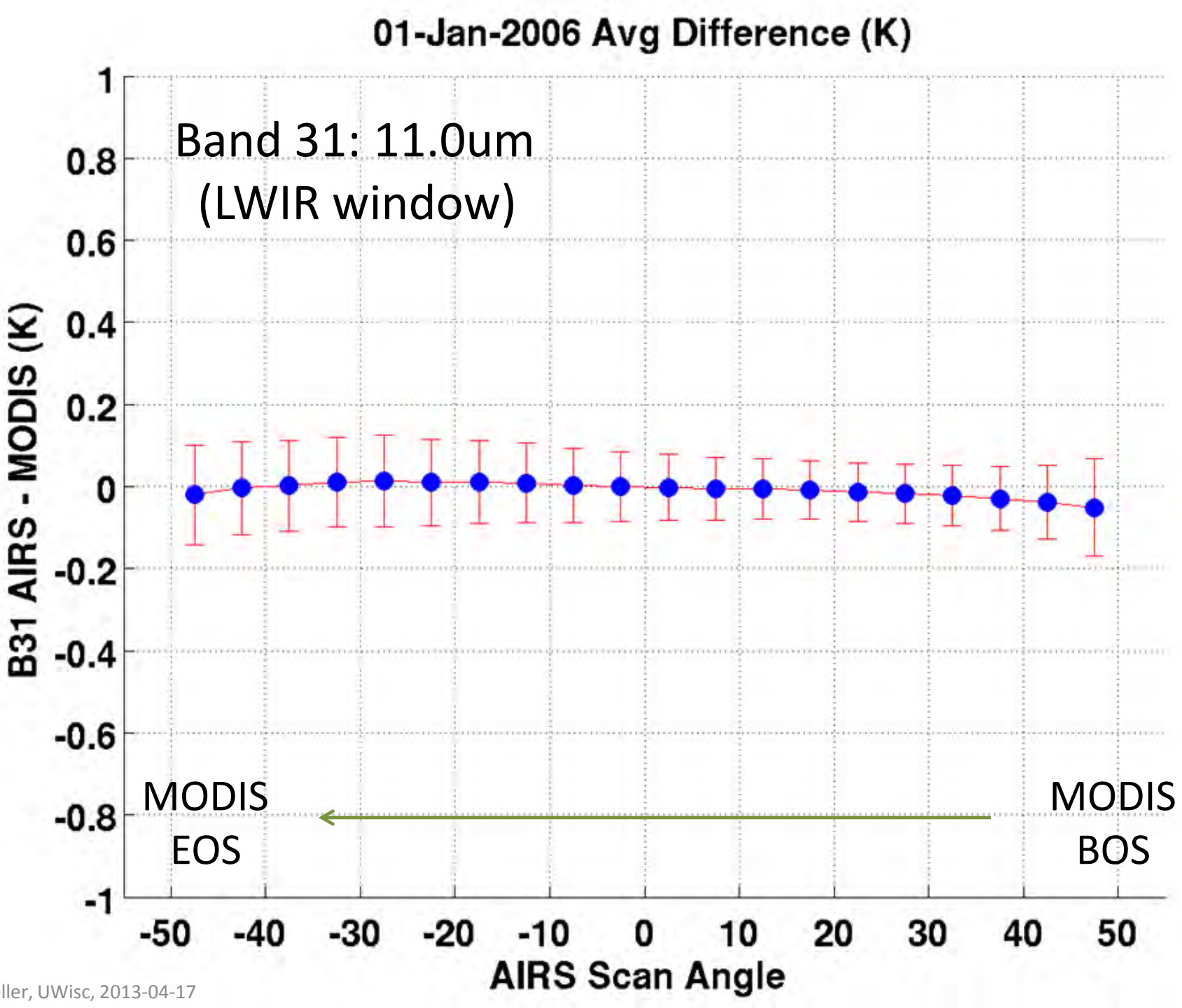

02-Jan-2012 Avg Difference (K)
Band 22: 3.9um
(MWIR window)
B22 AIRS - MODIS (K)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
MODIS
EOS
MODIS
BOS
-50
-40
-30
-20
-10
0
10
20
30
40
50
AIRS Scan Angle

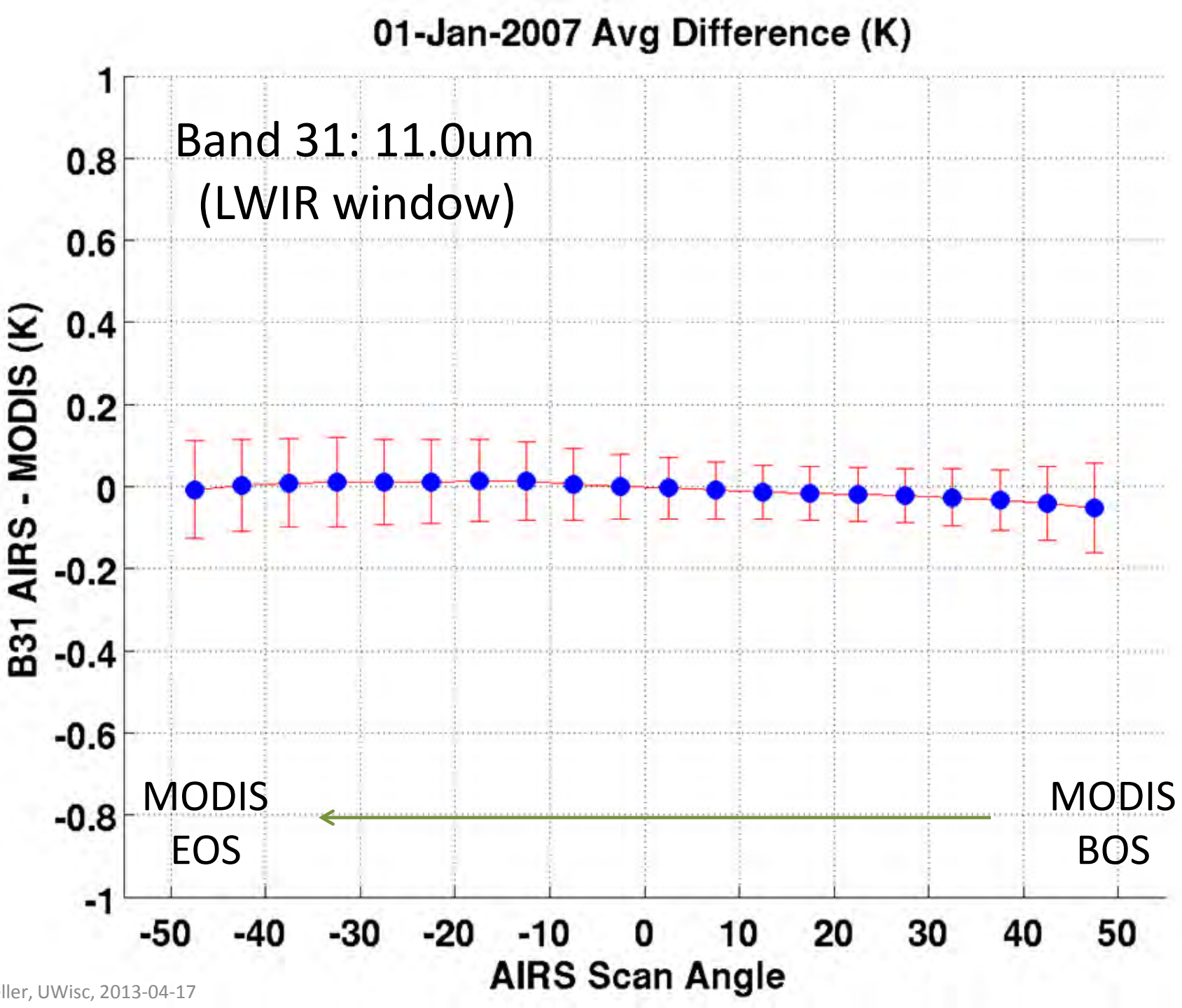

02-Jan-2013 Avg Difference (K)
Band 22: 3.9um
(MWIR window)
B22 AIRS - MODIS (K)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-50
-40
-30
-20
-10
0
10
20
30
40
50
AIRS Scan Angle
MODIS
EOS
MODIS
BOS

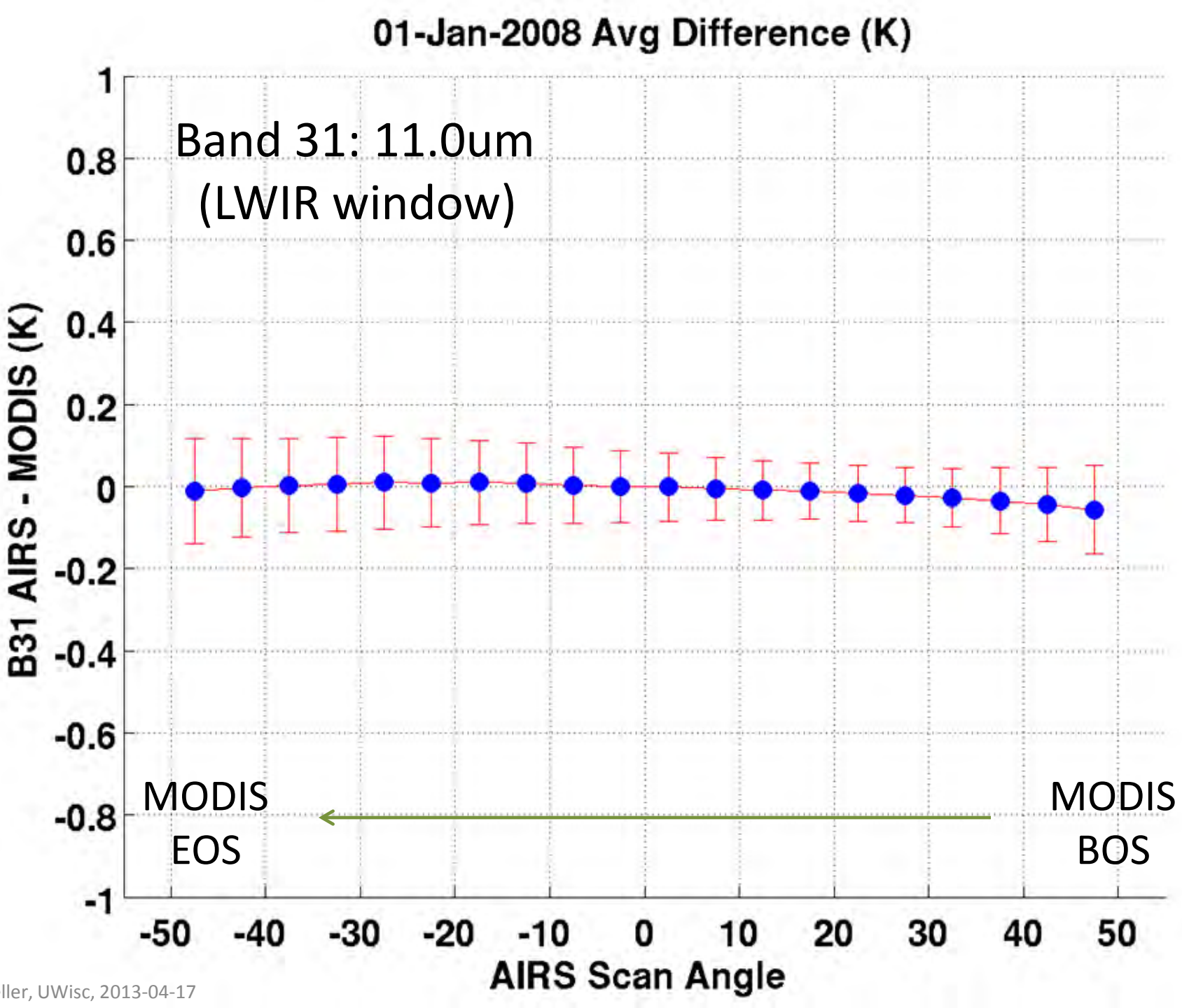

01-Jan-2003 Avg Difference (K)
Band 31: 11.0um
(LWIR window)
B31 AIRS - MODIS (K)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-50
-40
-30
-20
-10
0
10
20
30
40
50
AIRS Scan Angle
MODIS
EOS
MODIS
BOS

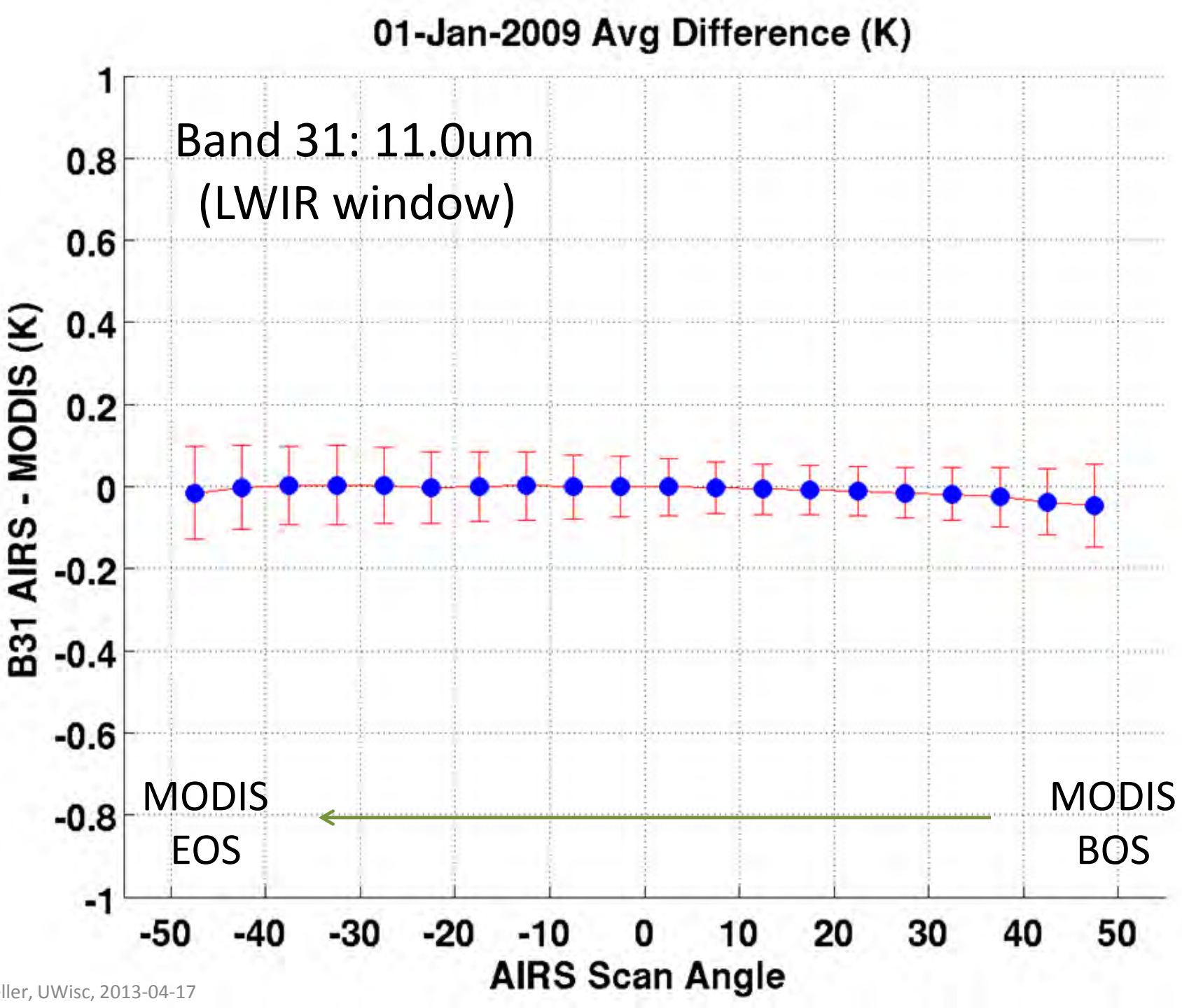

01-Jan-2004 Avg Difference (K)
Band 31: 11.0um
(LWIR window)
B31 AIRS - MODIS (K)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
MODIS
EOS
MODIS
BOS
-50
-40
-30
-20
-10
0
10
20
30
40
50
AIRS Scan Angle

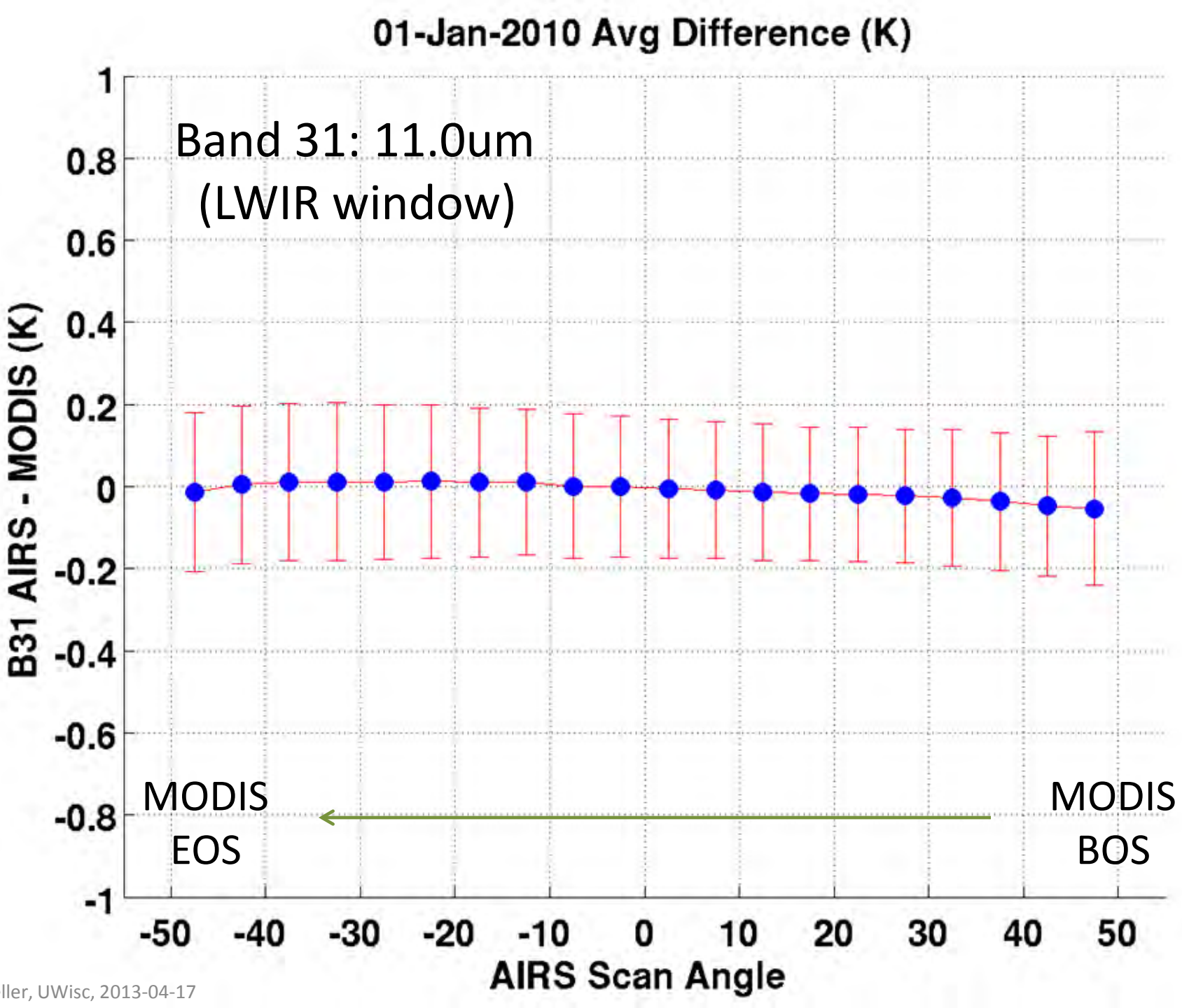

01-Jan-2005 Avg Difference (K)
Band 31: 11.0um
(LWIR window)
B31 AIRS - MODIS (K)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-50
-40
-30
-20
-10
0
10
20
30
40
50
AIRS Scan Angle
MODIS
EOS
MODIS
BOS

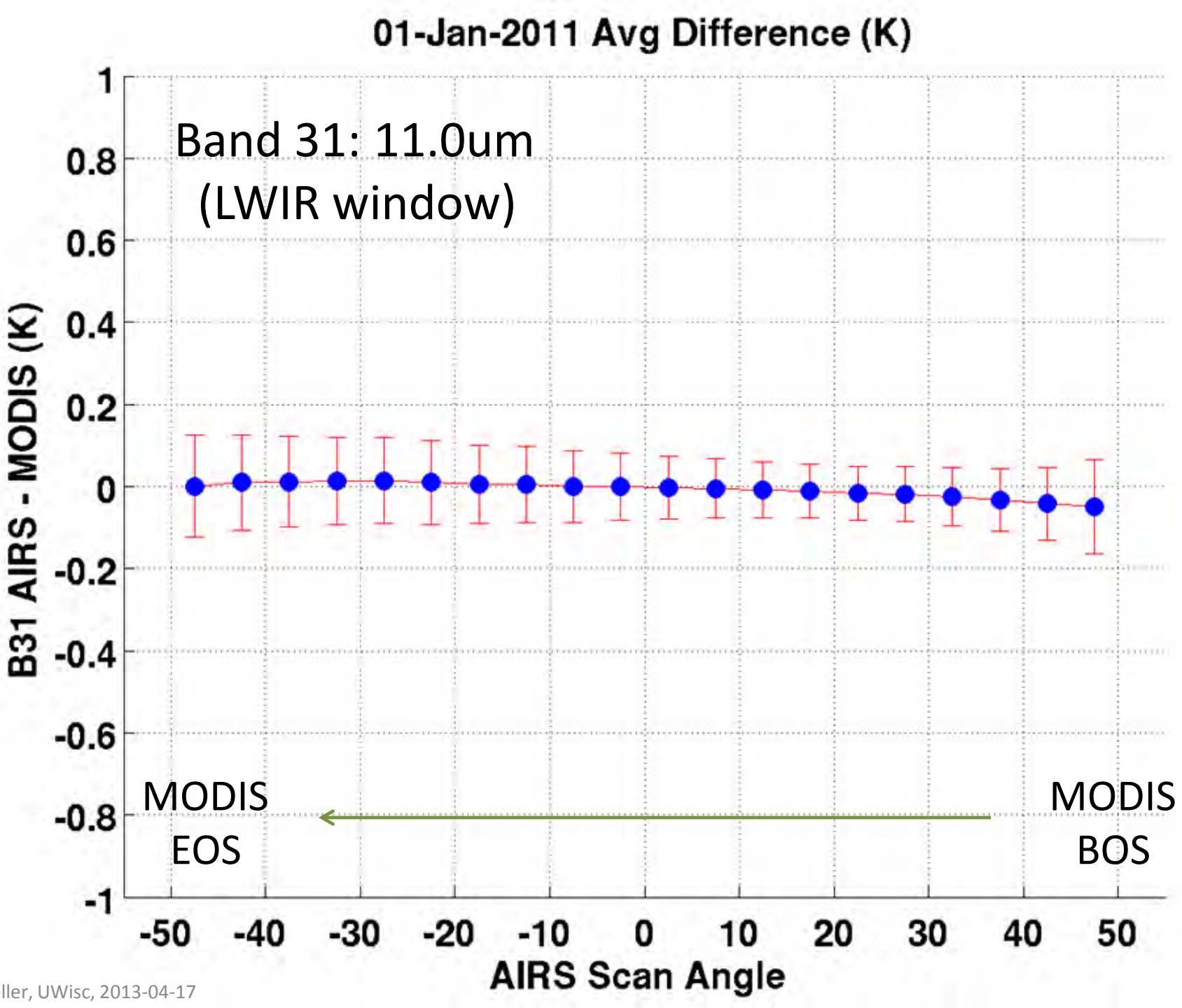

01-Jan-2006 Avg Difference (K)
Band 31: 11.0um
(LWIR window)
B31 AIRS - MODIS (K)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-50
-40
-30
-20
-10
0
10
20
30
40
50
AIRS Scan Angle
MODIS
EOS
MODIS
BOS

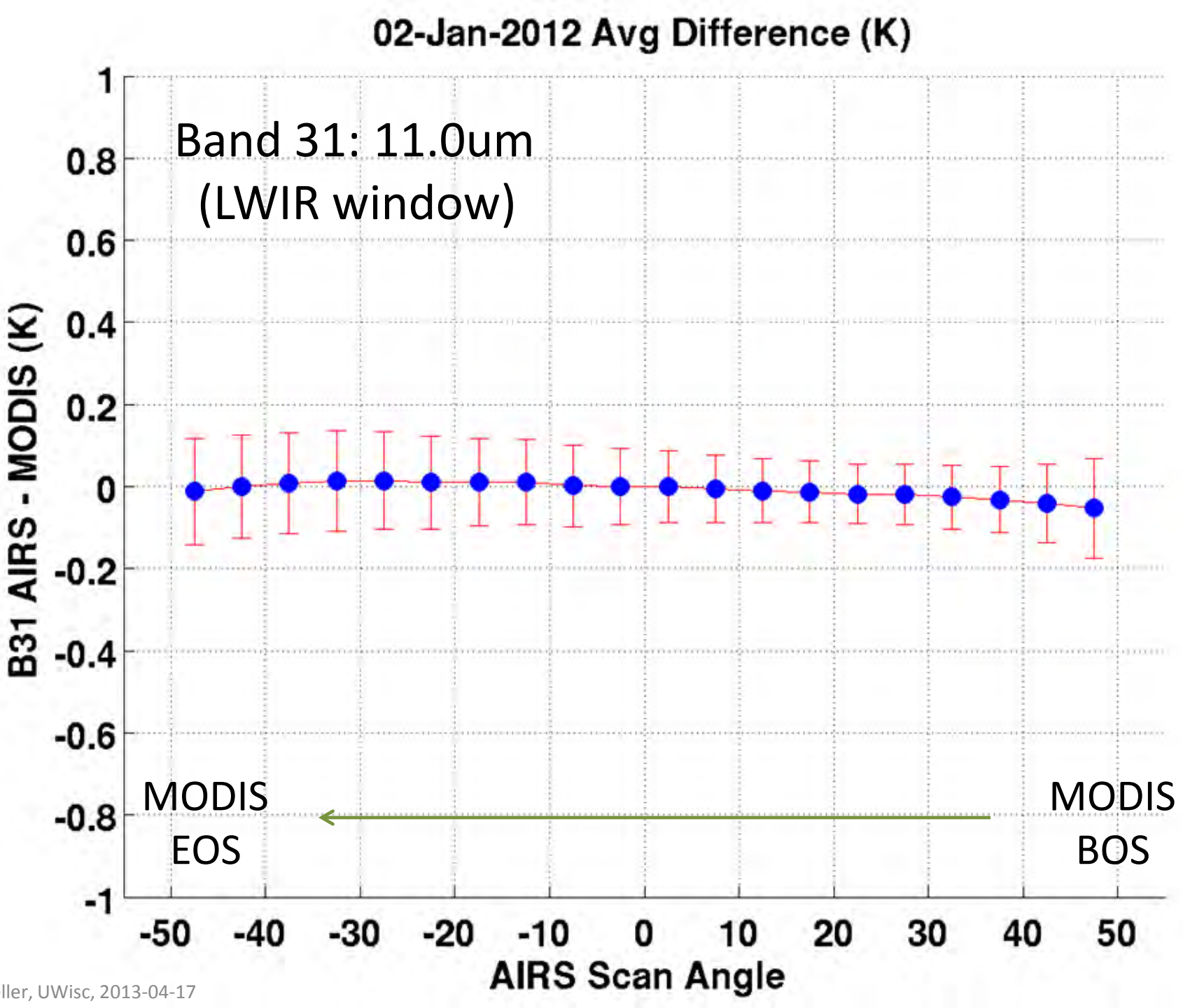

01-Jan-2007 Avg Difference (K)
Band 31: 11.0um
(LWIR window)
B31 AIRS - MODIS (K)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
MODIS
EOS
MODIS
BOS
-50
-40
-30
-20
-10
0
10
20
30
40
50
AIRS Scan Angle

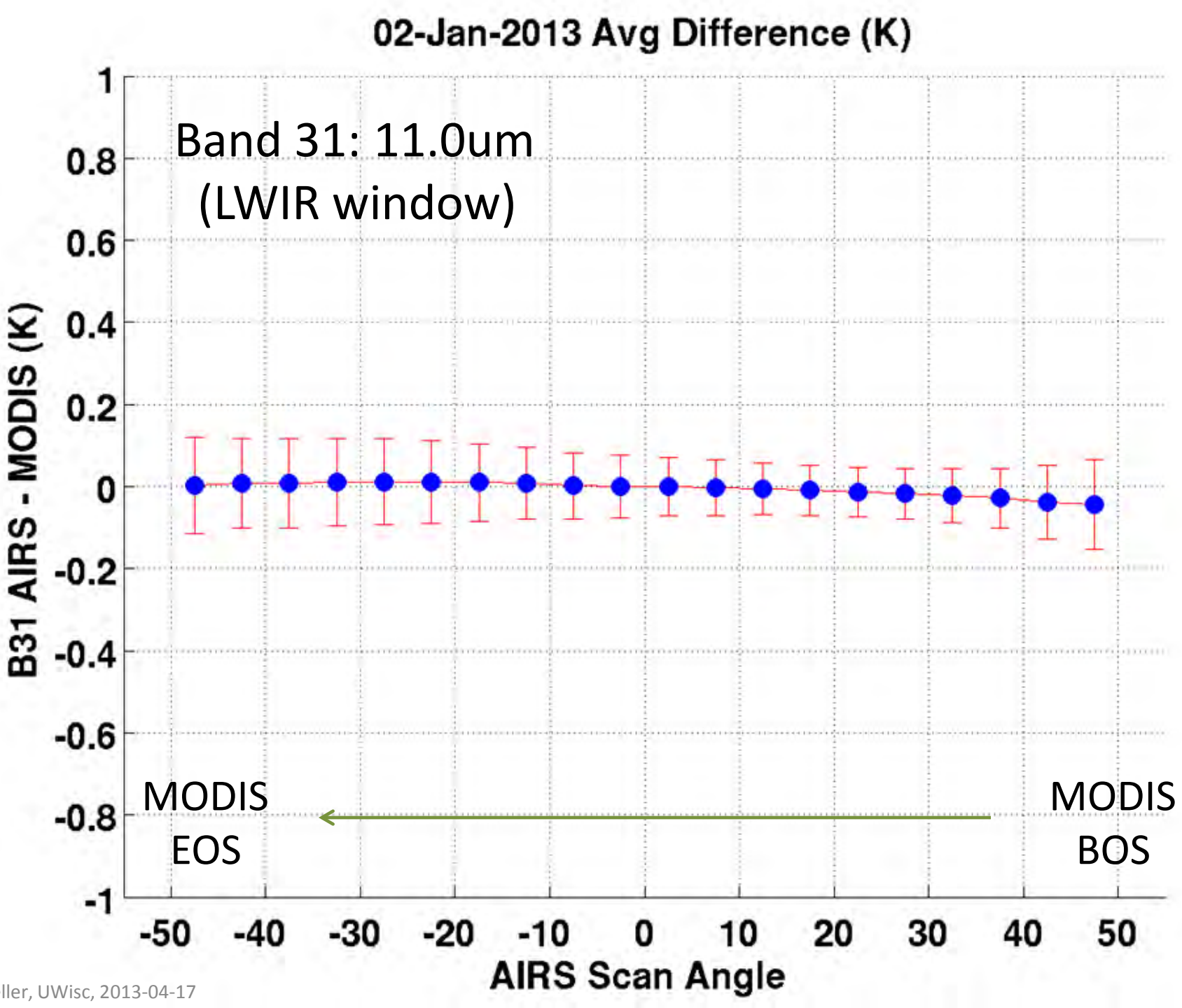

01-Jan-2008 Avg Difference (K)
Band 31: 11.0um
(LWIR window)
B31 AIRS - MODIS (K)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-50
-40
-30
-20
-10
0
10
20
30
40
50
AIRS Scan Angle
MODIS
EOS
MODIS
BOS

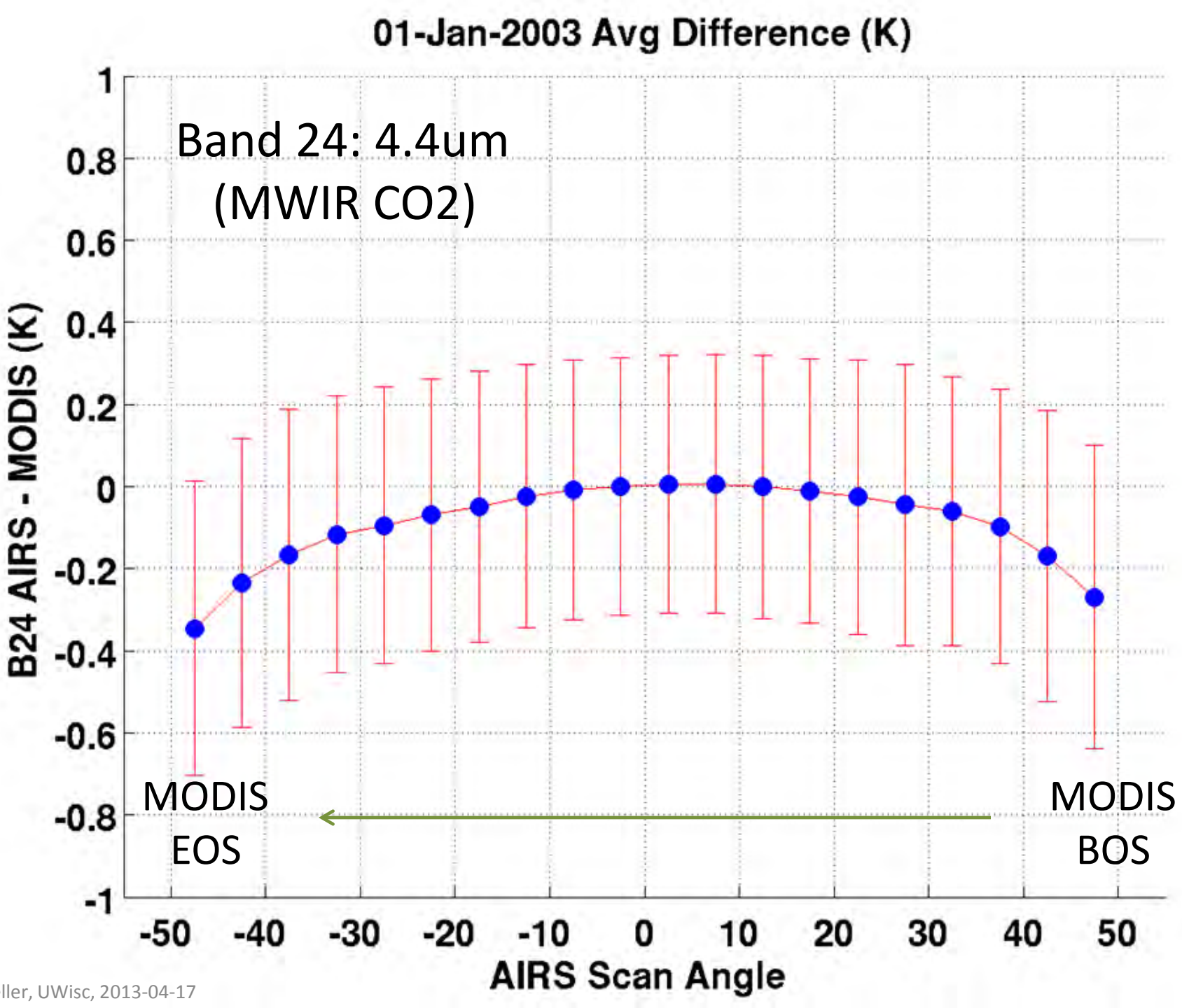

01-Jan-2009 Avg Difference (K)
Band 31: 11.0um
(LWIR window)
B31 AIRS - MODIS (K)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-50
-40
-30
-20
-10
0
10
20
30
40
50
AIRS Scan Angle
MODIS
EOS
MODIS
BOS

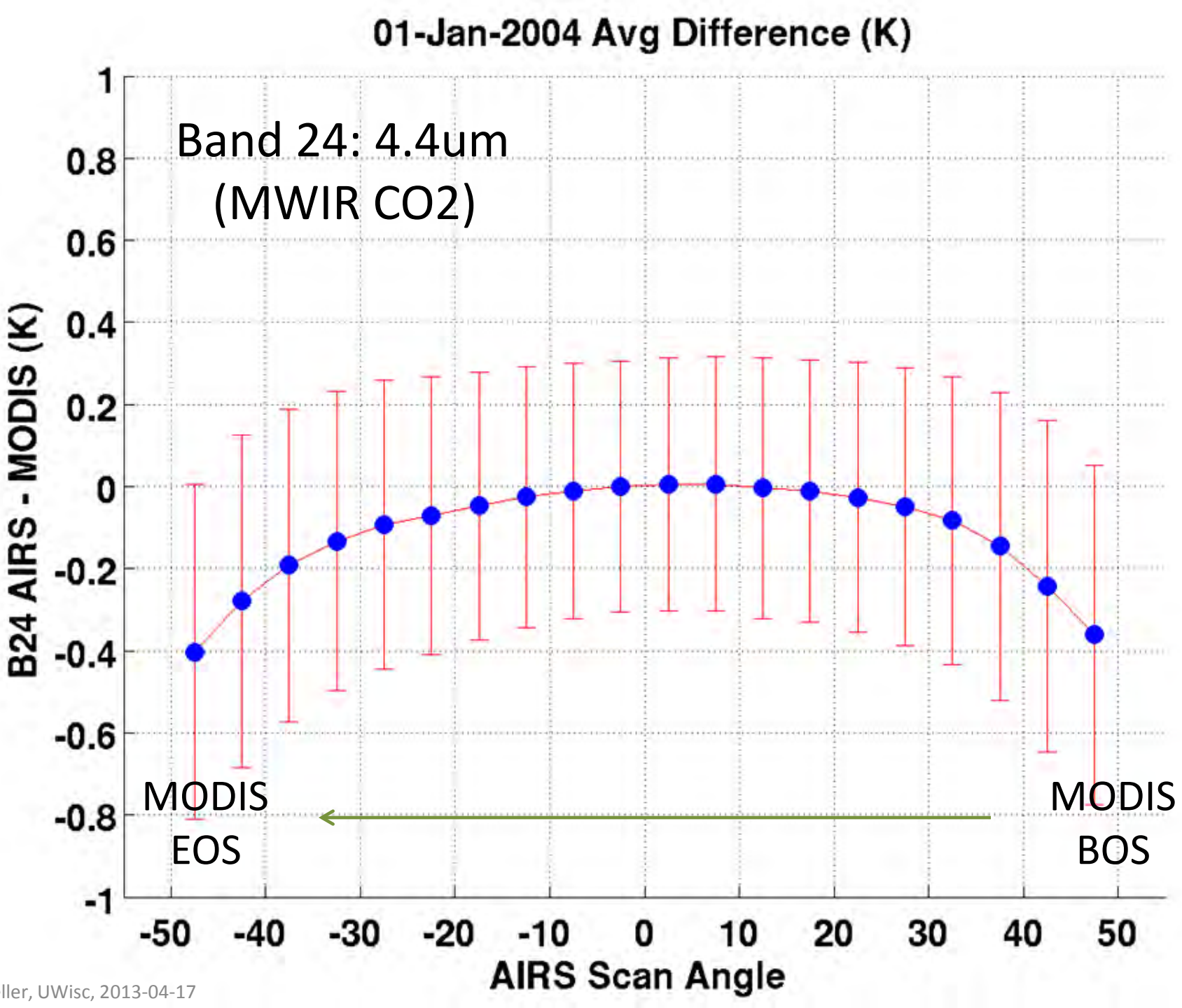

01-Jan-2010 Avg Difference (K)
Band 31: 11.0um
(LWIR window)
B31 AIRS - MODIS (K)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-50
-40
-30
-20
-10
0
10
20
30
40
50
AIRS Scan Angle
MODIS
EOS
MODIS
BOS

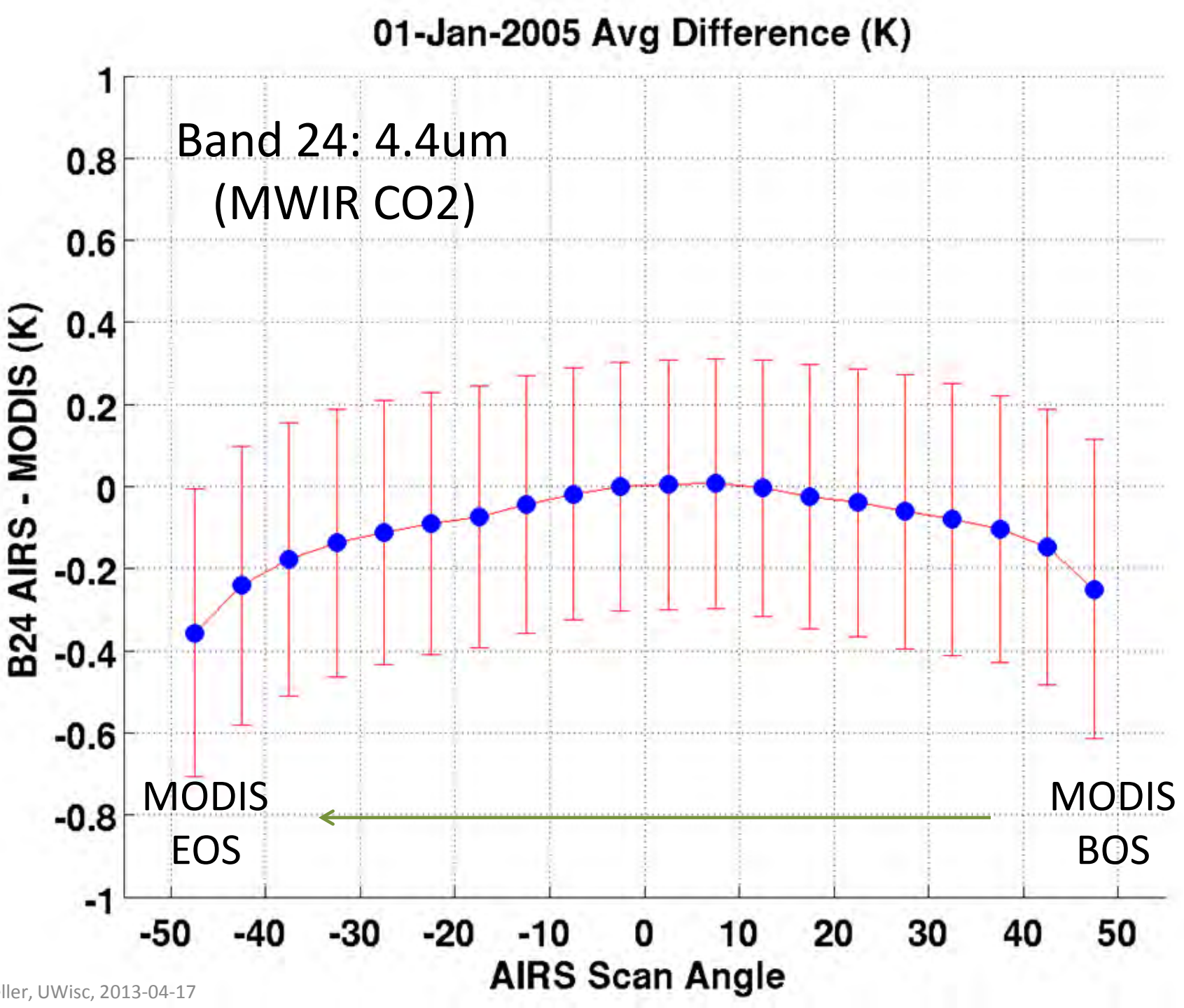

01-Jan-2011 Avg Difference (K)
Band 31: 11.0um
(LWIR window)
B31 AIRS - MODIS (K)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-50
-40
-30
-20
-10
0
10
20
30
40
50
AIRS Scan Angle
MODIS
EOS
MODIS
BOS

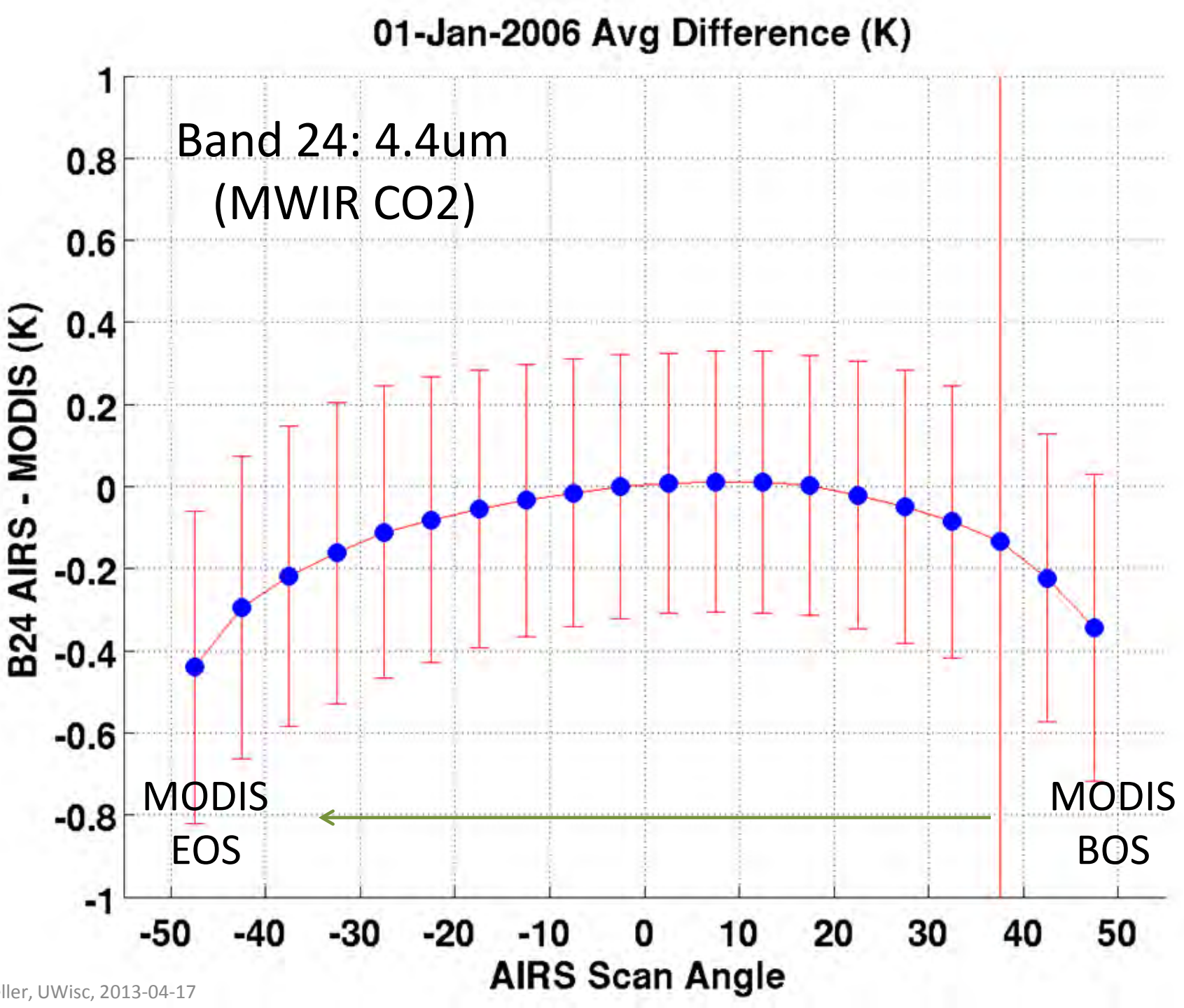

02-Jan-2012 Avg Difference (K)
Band 31: 11.0um
(LWIR window)
B31 AIRS - MODIS (K)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
MODIS
EOS
MODIS
BOS
-50
-40
-30
-20
-10
0
10
20
30
40
50
AIRS Scan Angle

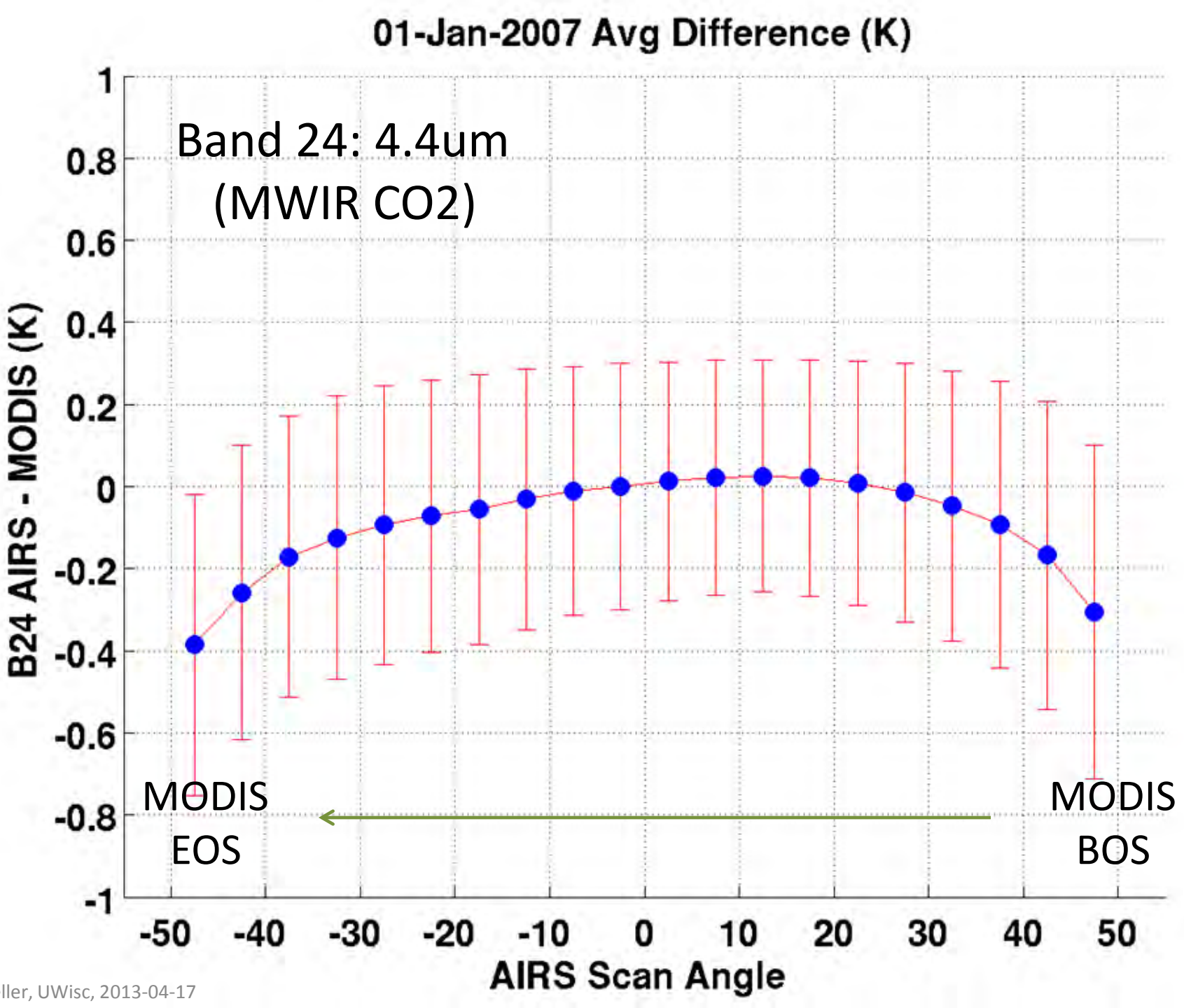

02-Jan-2013 Avg Difference (K)
Band 31: 11.0um
(LWIR window)
B31 AIRS - MODIS (K)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
MODIS
EOS
MODIS
BOS
-50
-40
-30
-20
-10
0
10
20
30
40
50
AIRS Scan Angle

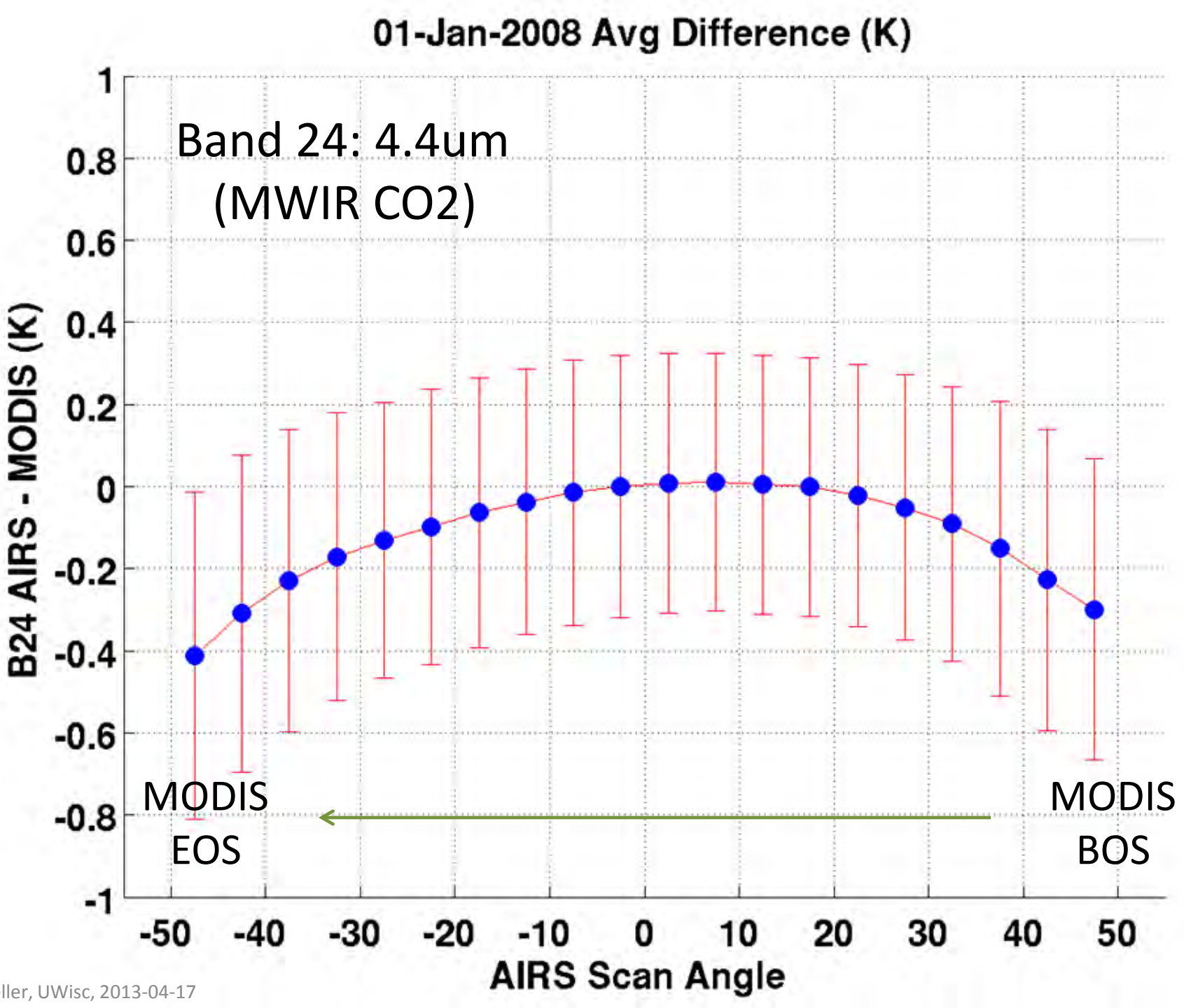

01-Jan-2003 Avg Difference (K)
Band 24: 4.4um
(MWIR CO2)
B24 AIRS - MODIS (K)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-50
-40
-30
-20
-10
0
10
20
30
40
50
AIRS Scan Angle
MODIS
EOS
MODIS
BOS

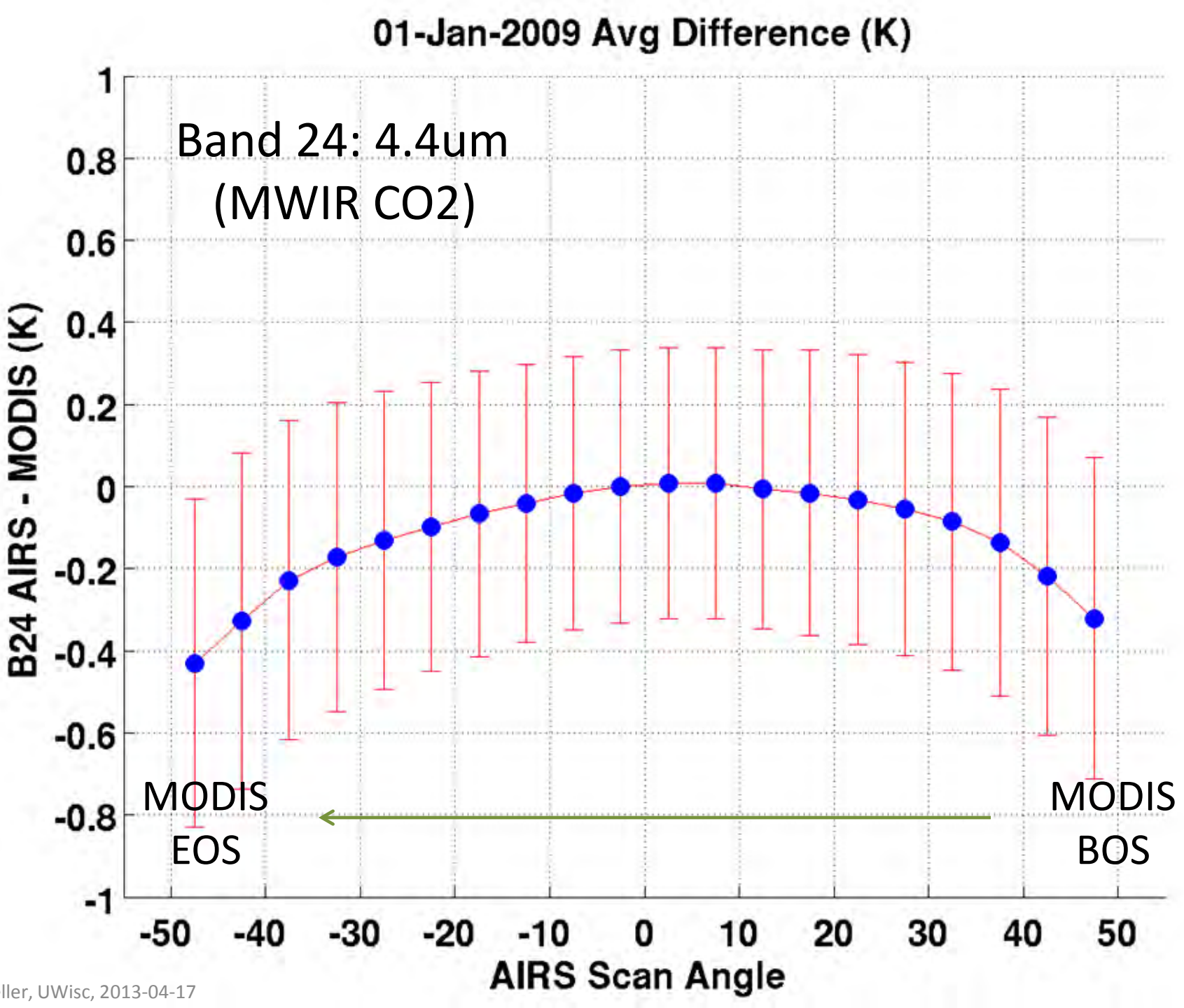

01-Jan-2004 Avg Difference (K)
Band 24: 4.4um
(MWIR CO2)
B24 AIRS - MODIS (K)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-50
-40
-30
-20
-10
0
10
20
30
40
50
AIRS Scan Angle
MODIS
EOS
MODIS
BOS

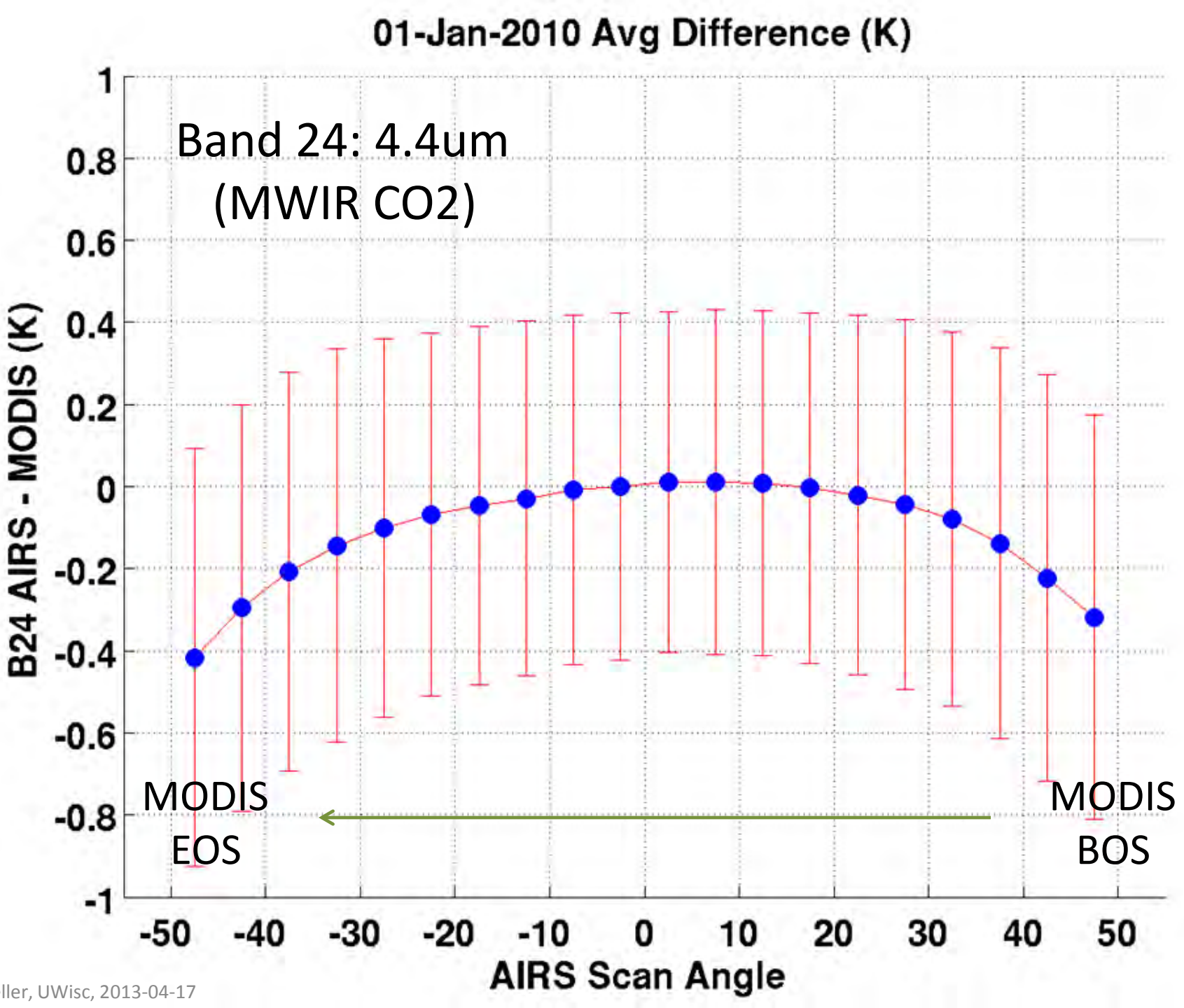

01-Jan-2005 Avg Difference (K)
Band 24: 4.4um
(MWIR CO2)
B24 AIRS - MODIS (K)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-50
-40
-30
-20
-10
0
10
20
30
40
50
AIRS Scan Angle
MODIS
EOS
MODIS
BOS

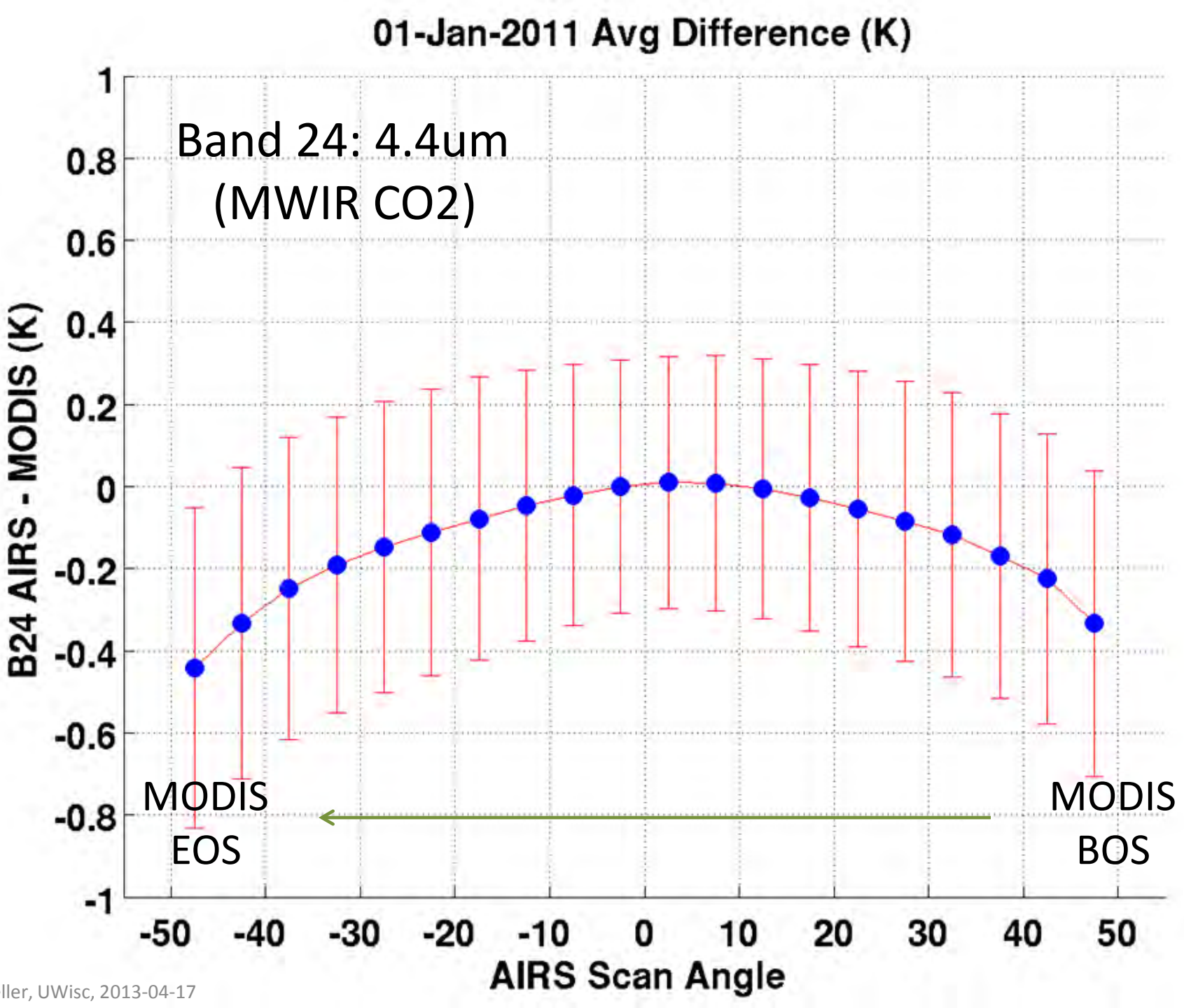

01-Jan-2006 Avg Difference (K)
Band 24: 4.4um
(MWIR CO2)
B24 AIRS - MODIS (K)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-50
-40
-30
-20
-10
0
10
20
30
40
50
AIRS Scan Angle
MODIS
EOS
MODIS
BOS

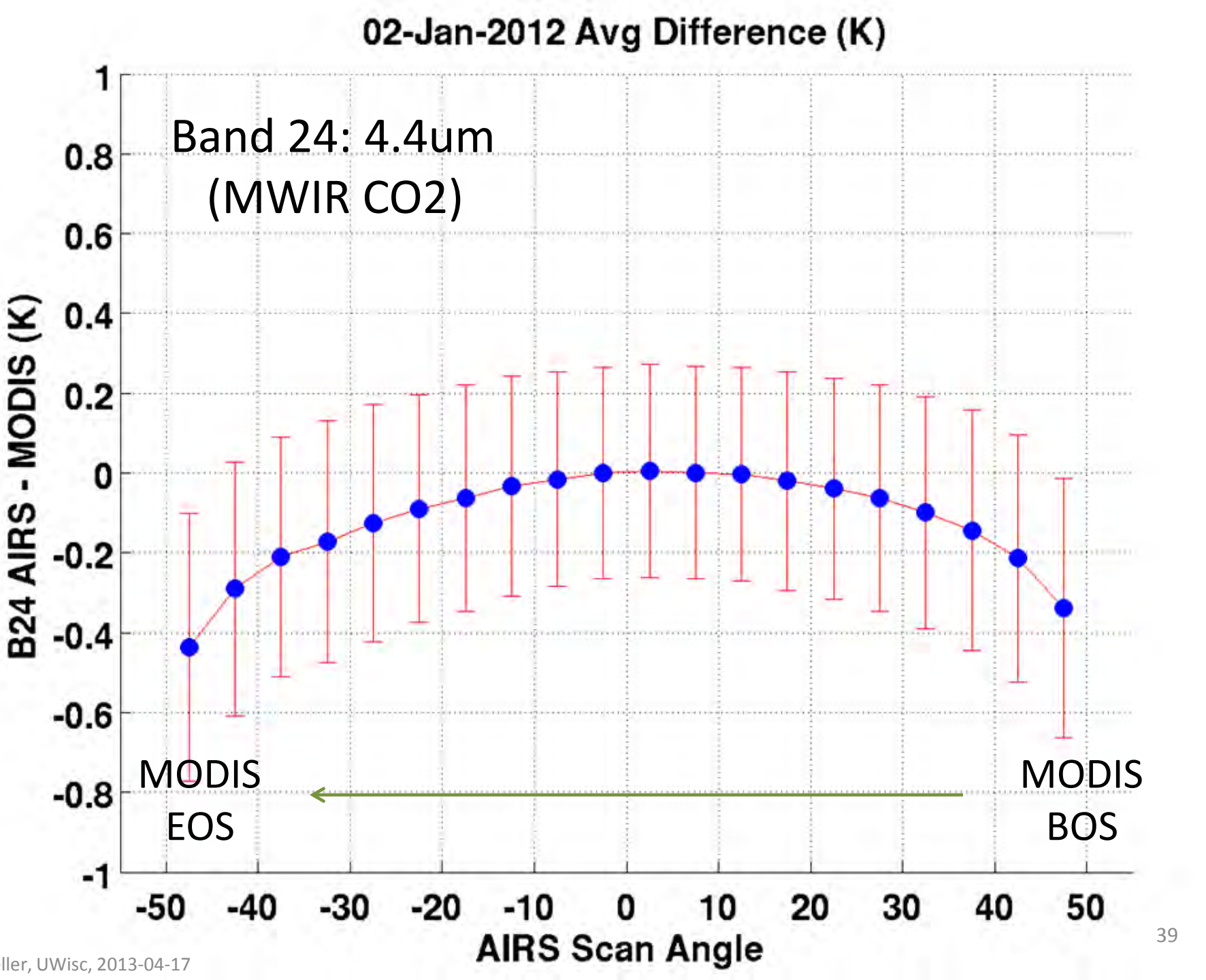

01-Jan-2007 Avg Difference (K)
Band 24: 4.4um
(MWIR CO2)
B24 AIRS - MODIS (K)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-50
-40
-30
-20
-10
0
10
20
30
40
50
AIRS Scan Angle
MODIS
EOS
MODIS
BOS

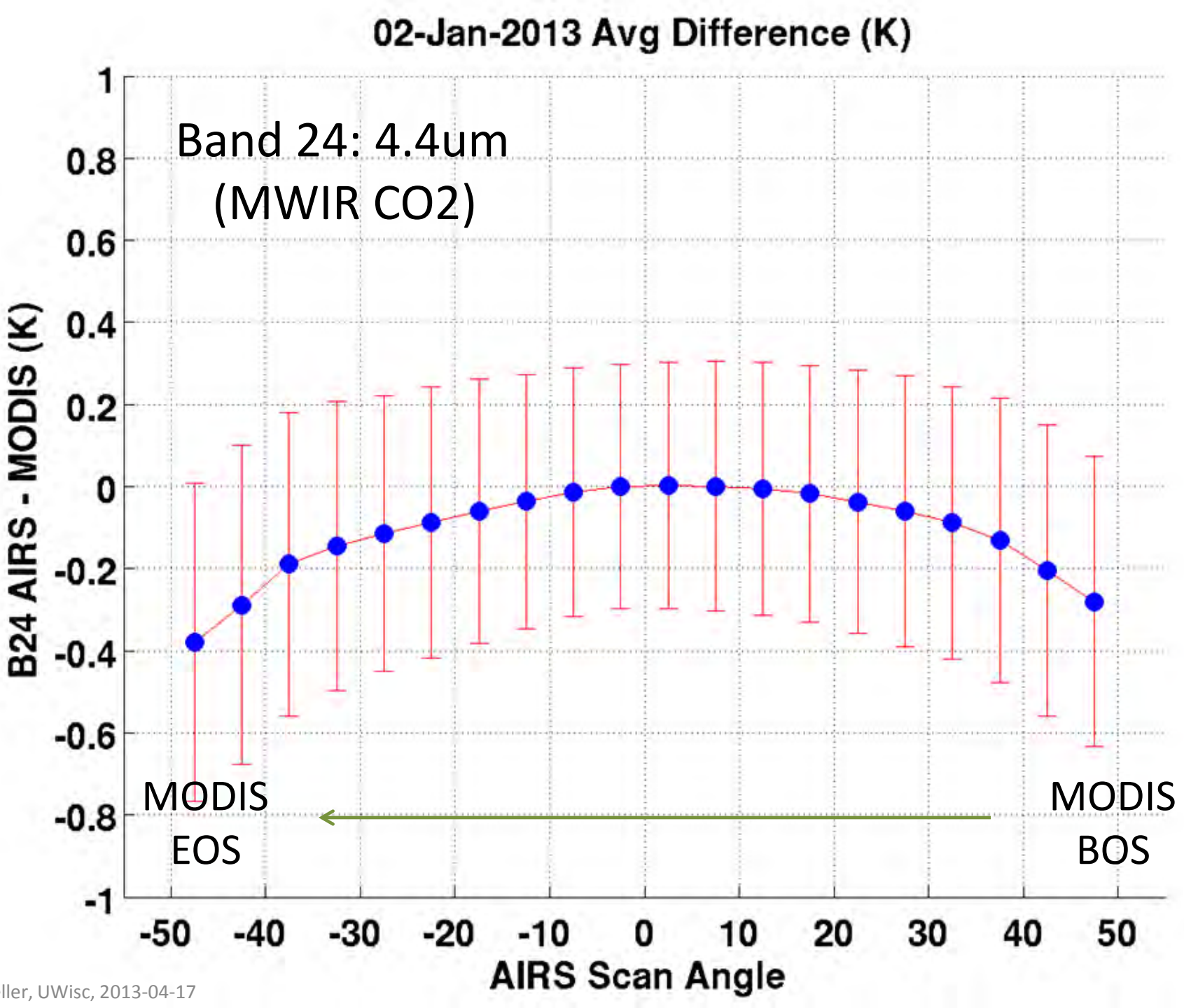

01-Jan-2008 Avg Difference (K)
Band 24: 4.4um
(MWIR CO2)
B24 AIRS - MODIS (K)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-50
-40
-30
-20
-10
0
10
20
30
40
50
AIRS Scan Angle
MODIS
EOS
MODIS
BOS

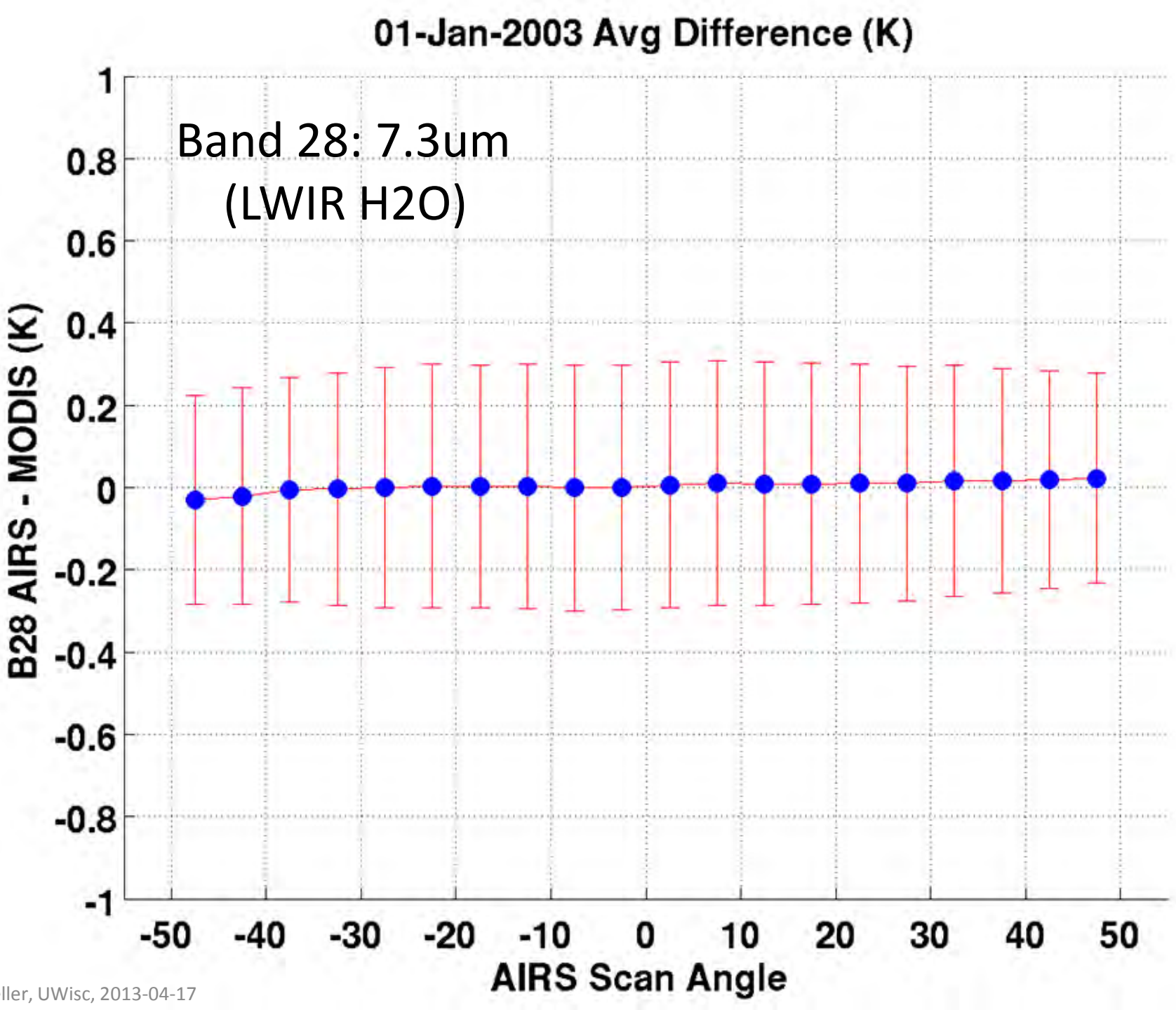

01-Jan-2009 Avg Difference (K)
Band 24: 4.4um
(MWIR CO2)
B24 AIRS - MODIS (K)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-50
-40
-30
-20
-10
0
10
20
30
40
50
AIRS Scan Angle
MODIS
EOS
MODIS
BOS

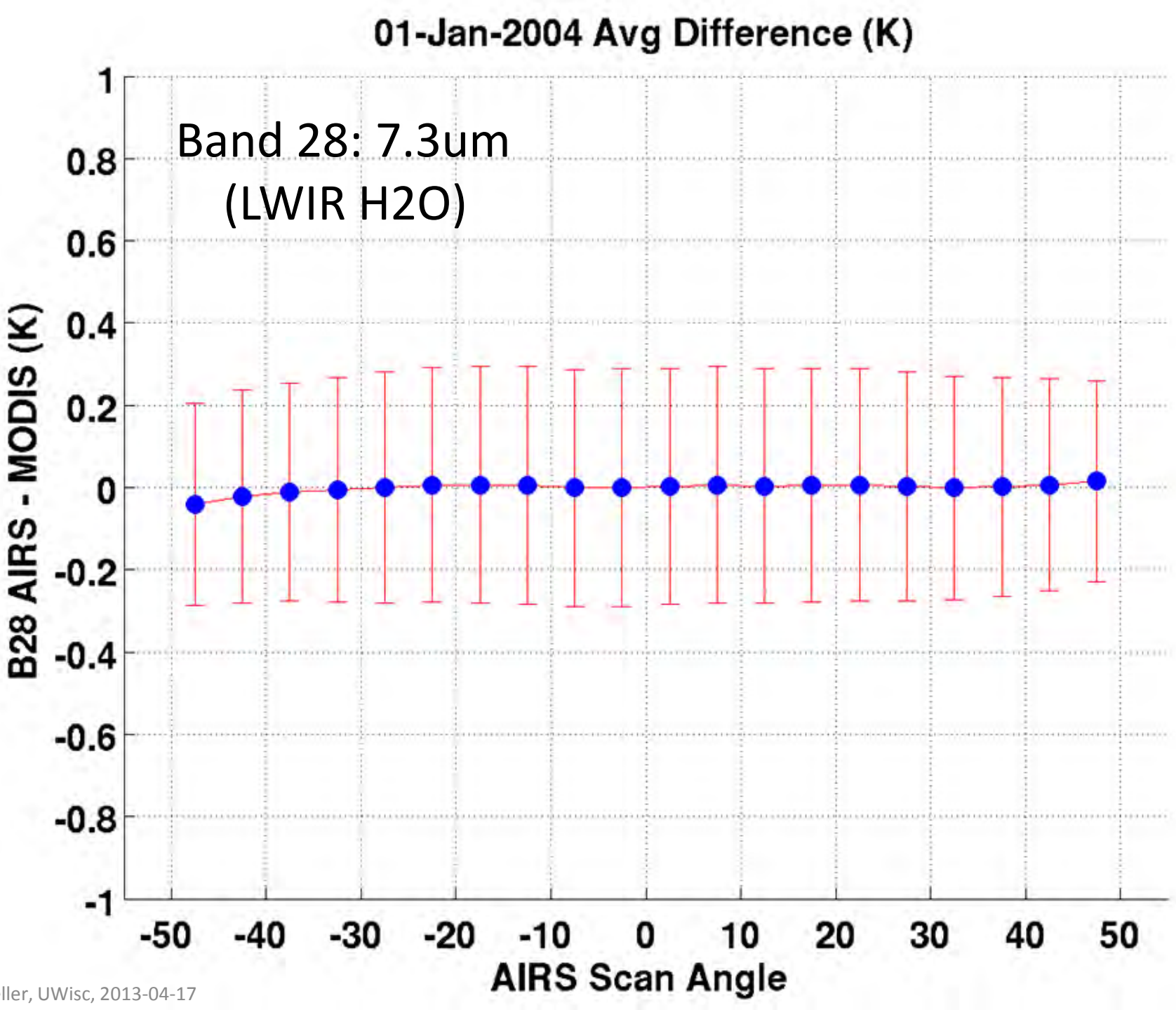

01-Jan-2010 Avg Difference (K)
Band 24: 4.4um
(MWIR CO2)
B24 AIRS - MODIS (K)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-50
-40
-30
-20
-10
0
10
20
30
40
50
AIRS Scan Angle
MODIS
EOS
MODIS
BOS

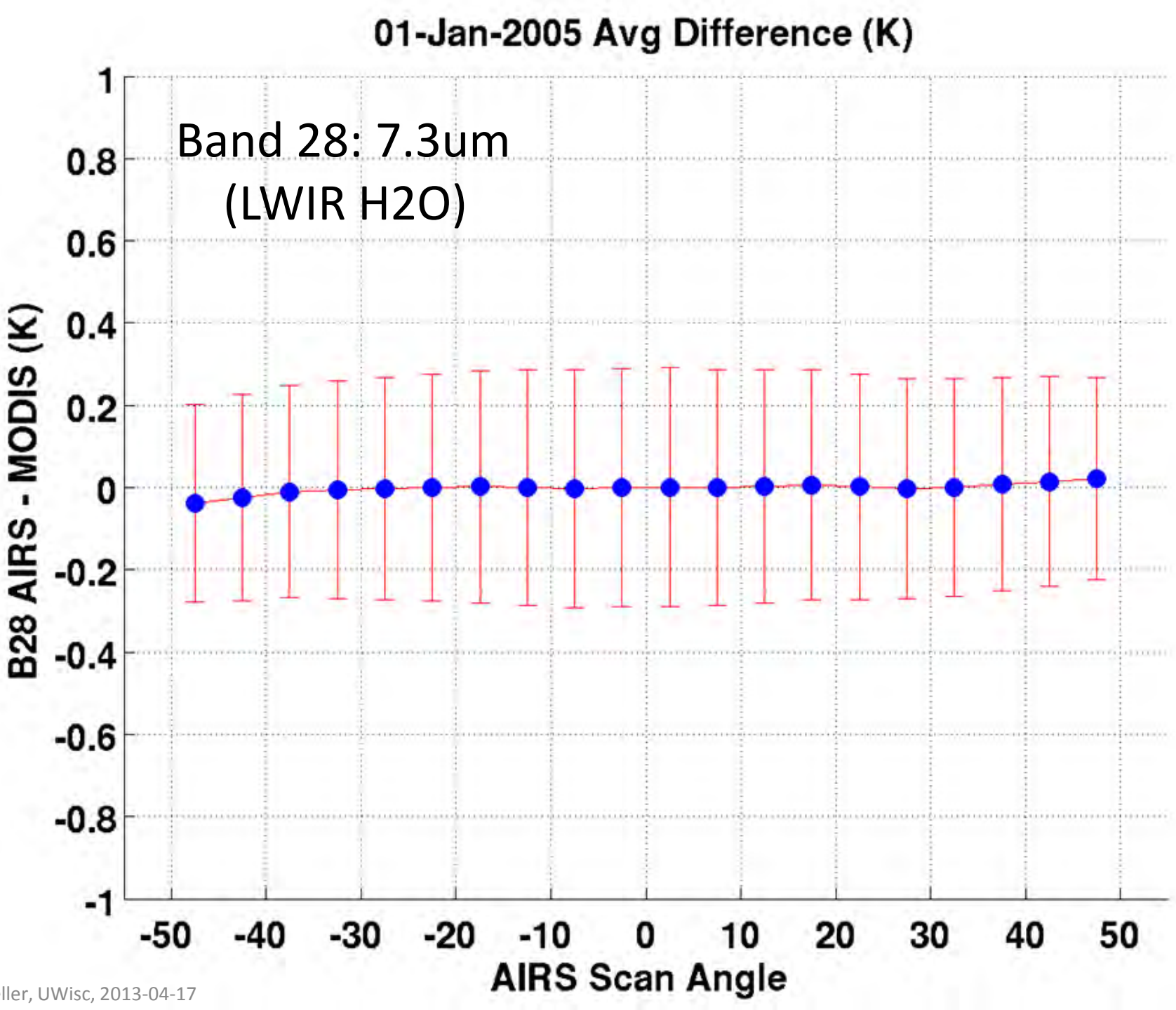

01-Jan-2011 Avg Difference (K)
Band 24: 4.4um
(MWIR CO2)
B24 AIRS - MODIS (K)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-50
-40
-30
-20
-10
0
10
20
30
40
50
AIRS Scan Angle
MODIS
EOS
MODIS
BOS

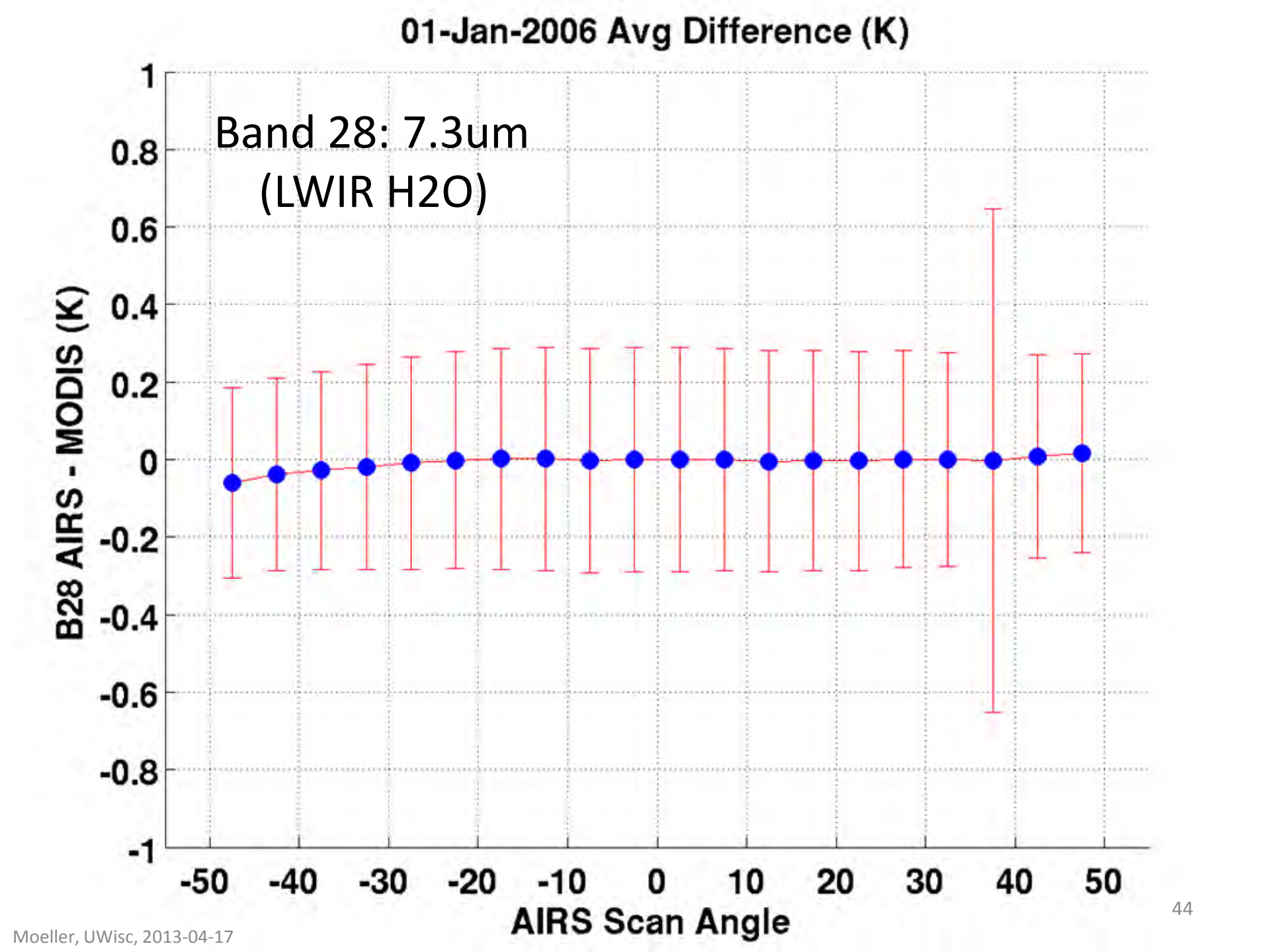

02-Jan-2012 Avg Difference (K)
Band 24: 4.4um
(MWIR CO2)
B24 AIRS - MODIS (K)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-50
-40
-30
-20
-10
0
10
20
30
40
50
AIRS Scan Angle
MODIS
EOS
MODIS
BOS

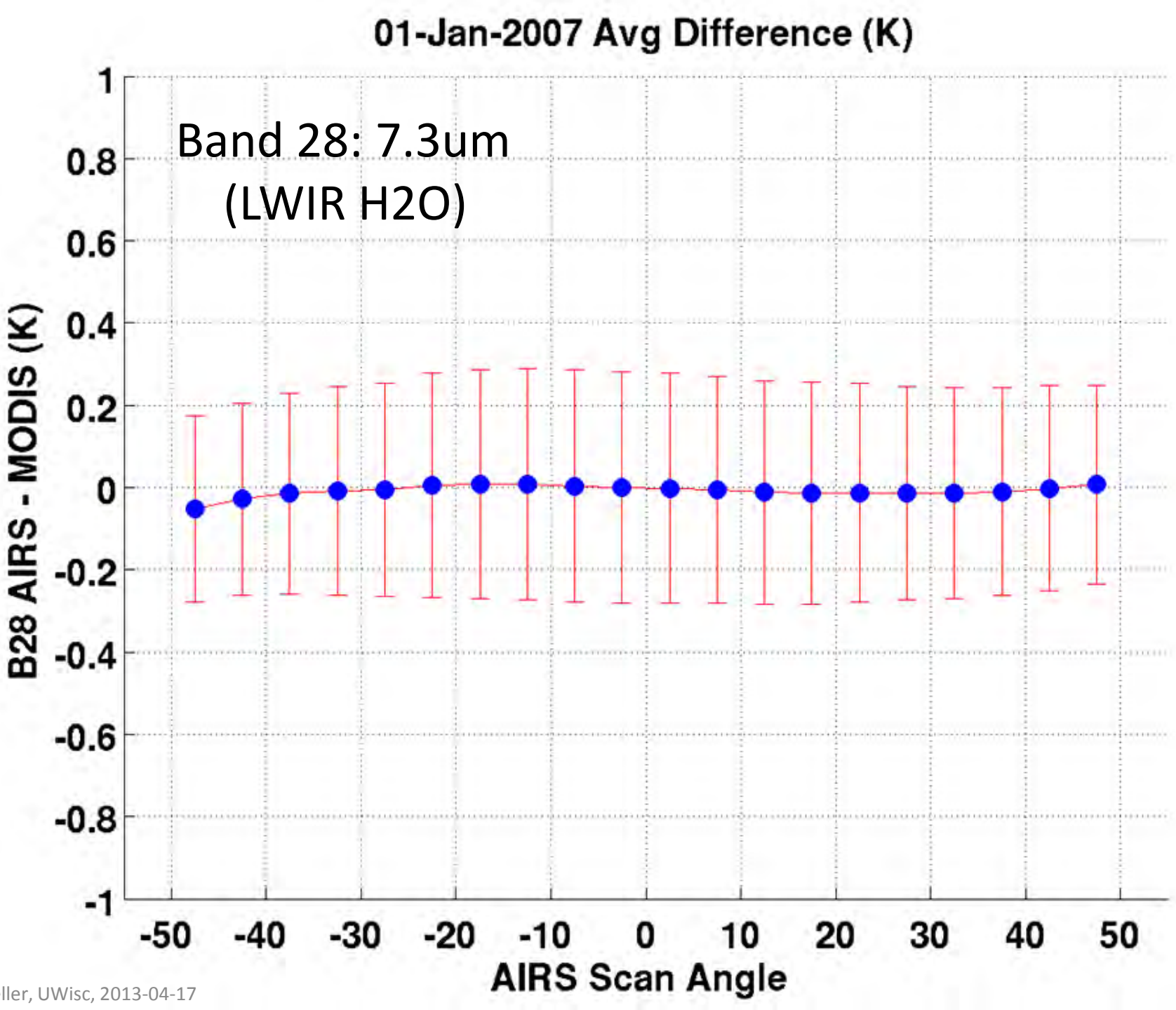

02-Jan-2013 Avg Difference (K)
Band 24: 4.4um
(MWIR CO2)
B24 AIRS - MODIS (K)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-50
-40
-30
-20
-10
0
10
20
30
40
50
AIRS Scan Angle
MODIS
EOS
MODIS
BOS

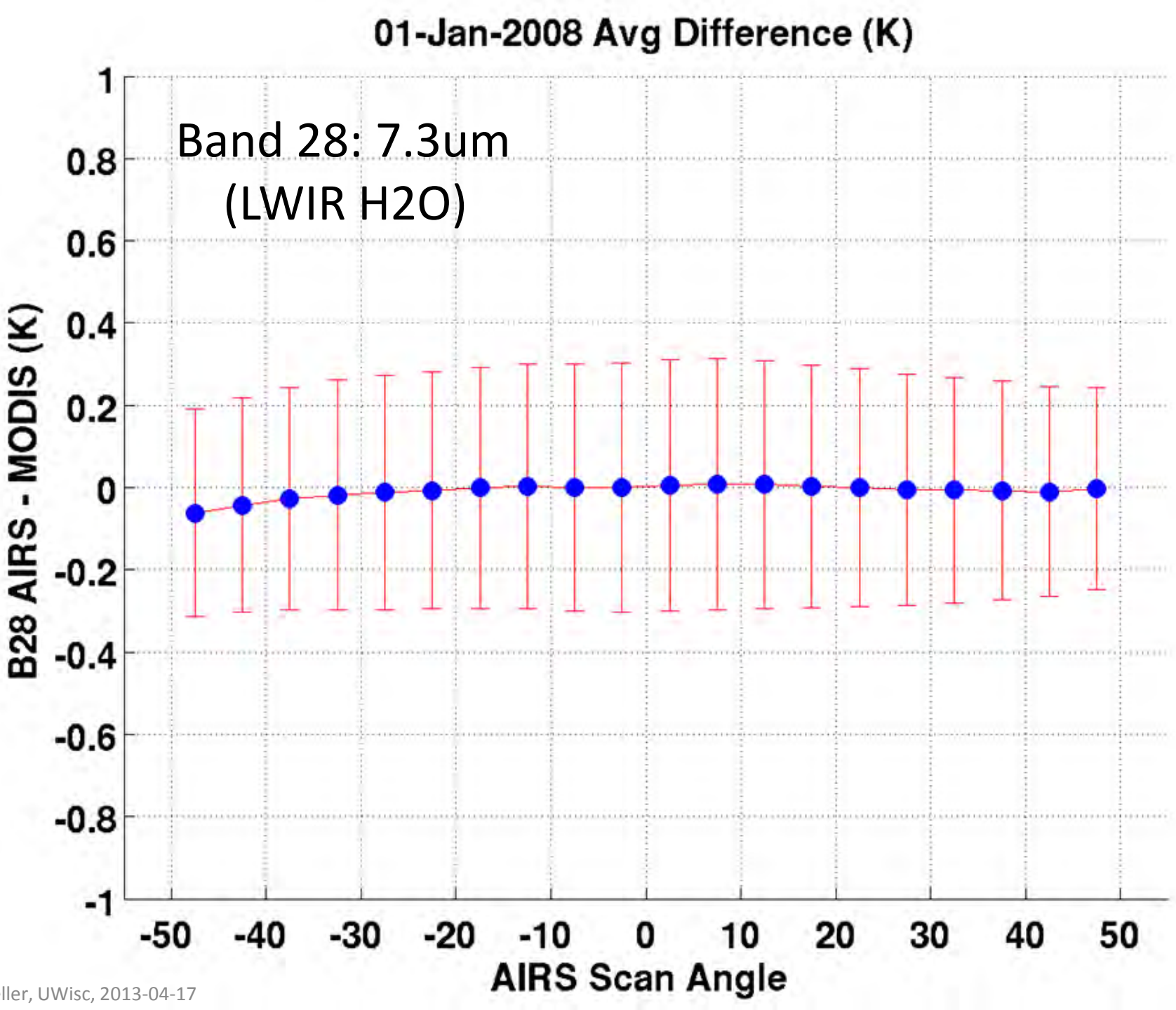

01-Jan-2003 Avg Difference (K)
Band 28: 7.3um
(LWIR H2O)
B28 AIRS - MODIS (K)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-50
-40
-30
-20
-10
0
10
20
30
40
50
AIRS Scan Angle

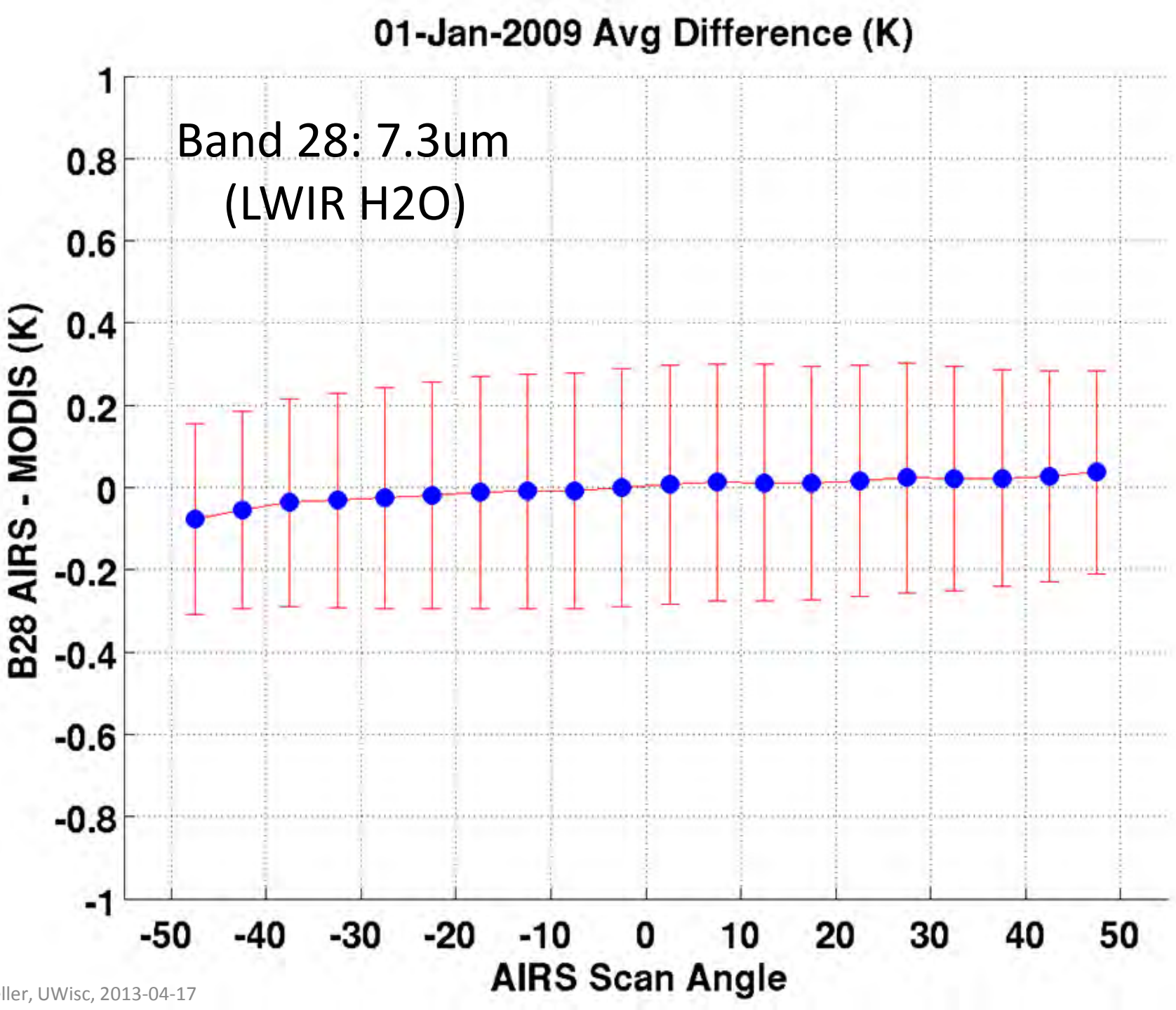

01-Jan-2004 Avg Difference (K)
Band 28: 7.3um
(LWIR H2O)
B28 AIRS - MODIS (K)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-50
-40
-30
-20
-10
0
10
20
30
40
50
AIRS Scan Angle

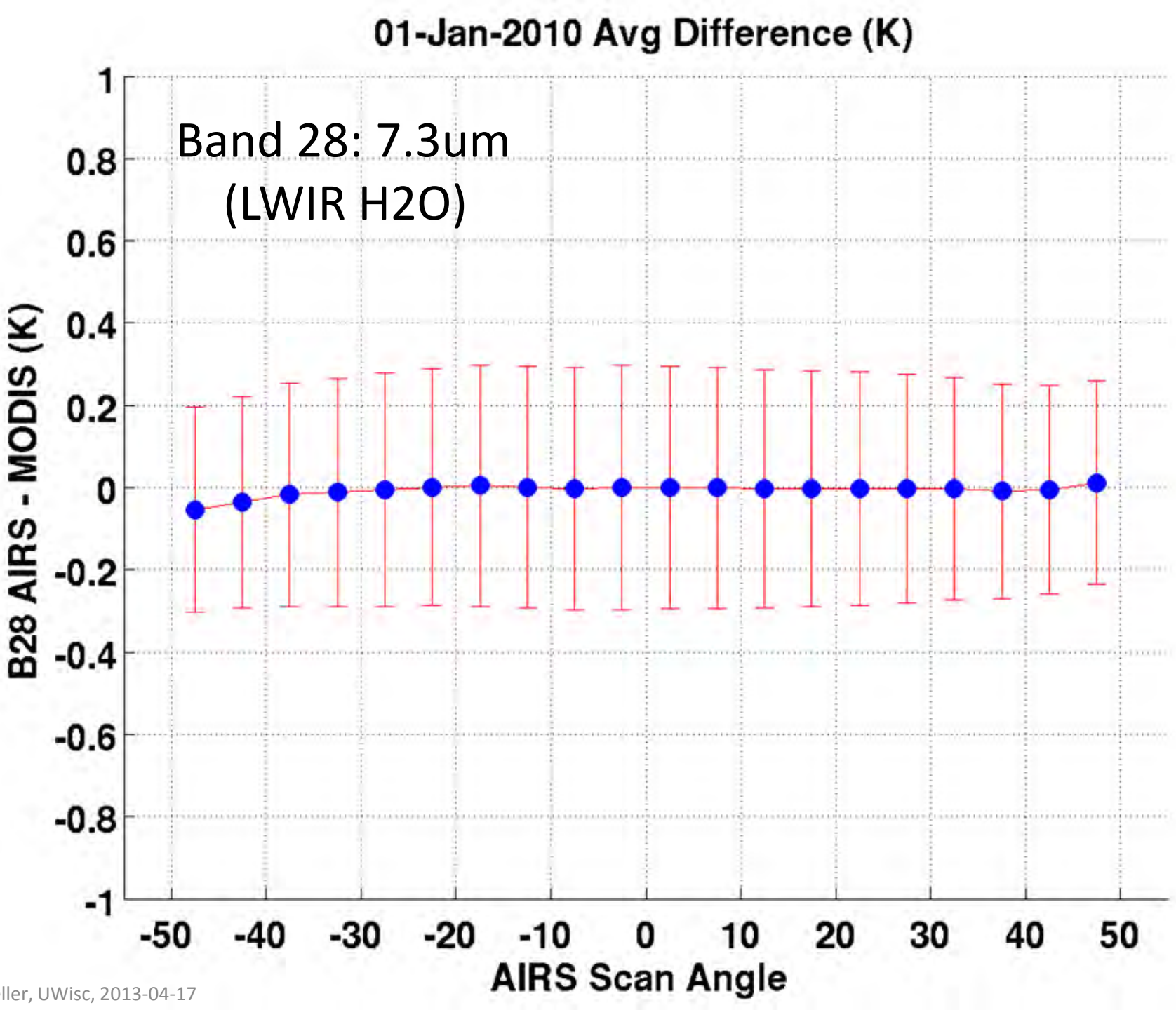

01-Jan-2005 Avg Difference (K)
Band 28: 7.3um
(LWIR H2O)
B28 AIRS - MODIS (K)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-50
-40
-30
-20
-10
0
10
20
30
40
50
AIRS Scan Angle

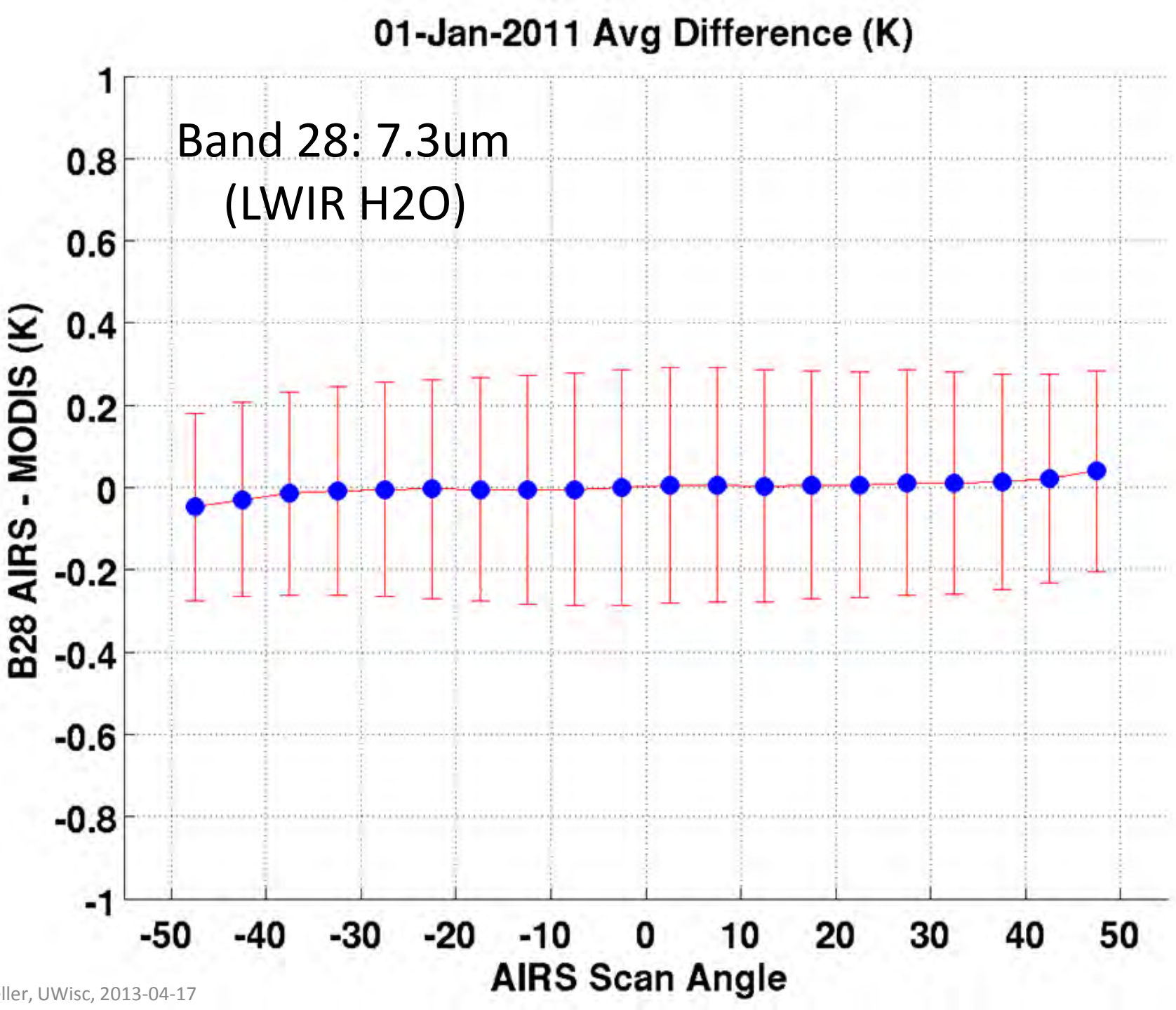

01-Jan-2006 Avg Difference (K)
Band 28: 7.3um
(LWIR H2O)
B28 AIRS - MODIS (K)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-50
-40
-30
-20
-10
0
10
20
30
40
50
AIRS Scan Angle

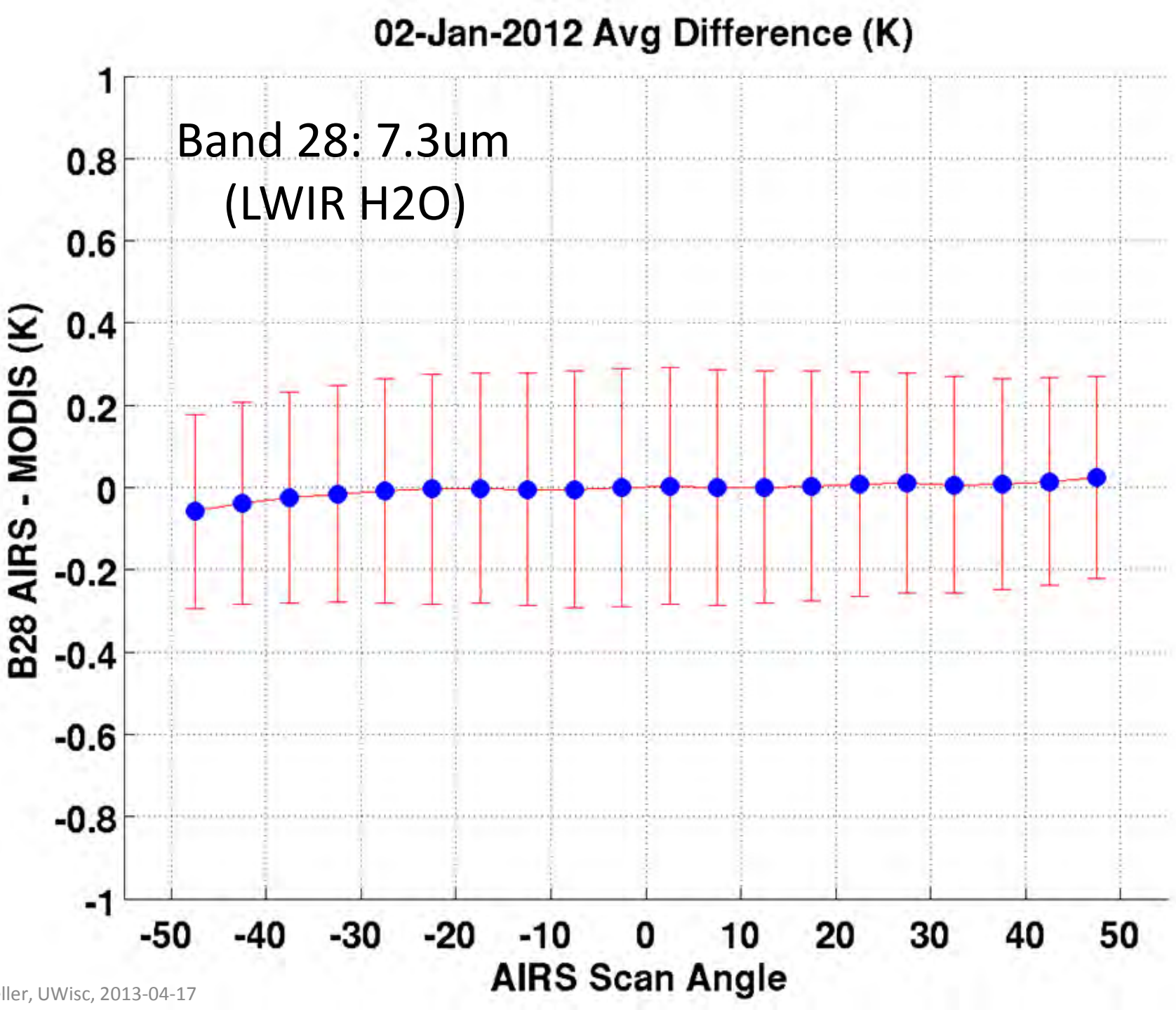

01-Jan-2007 Avg Difference (K)
Band 28: 7.3um
(LWIR H2O)
B28 AIRS - MODIS (K)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-50
-40
-30
-20
-10
0
10
20
30
40
50
AIRS Scan Angle

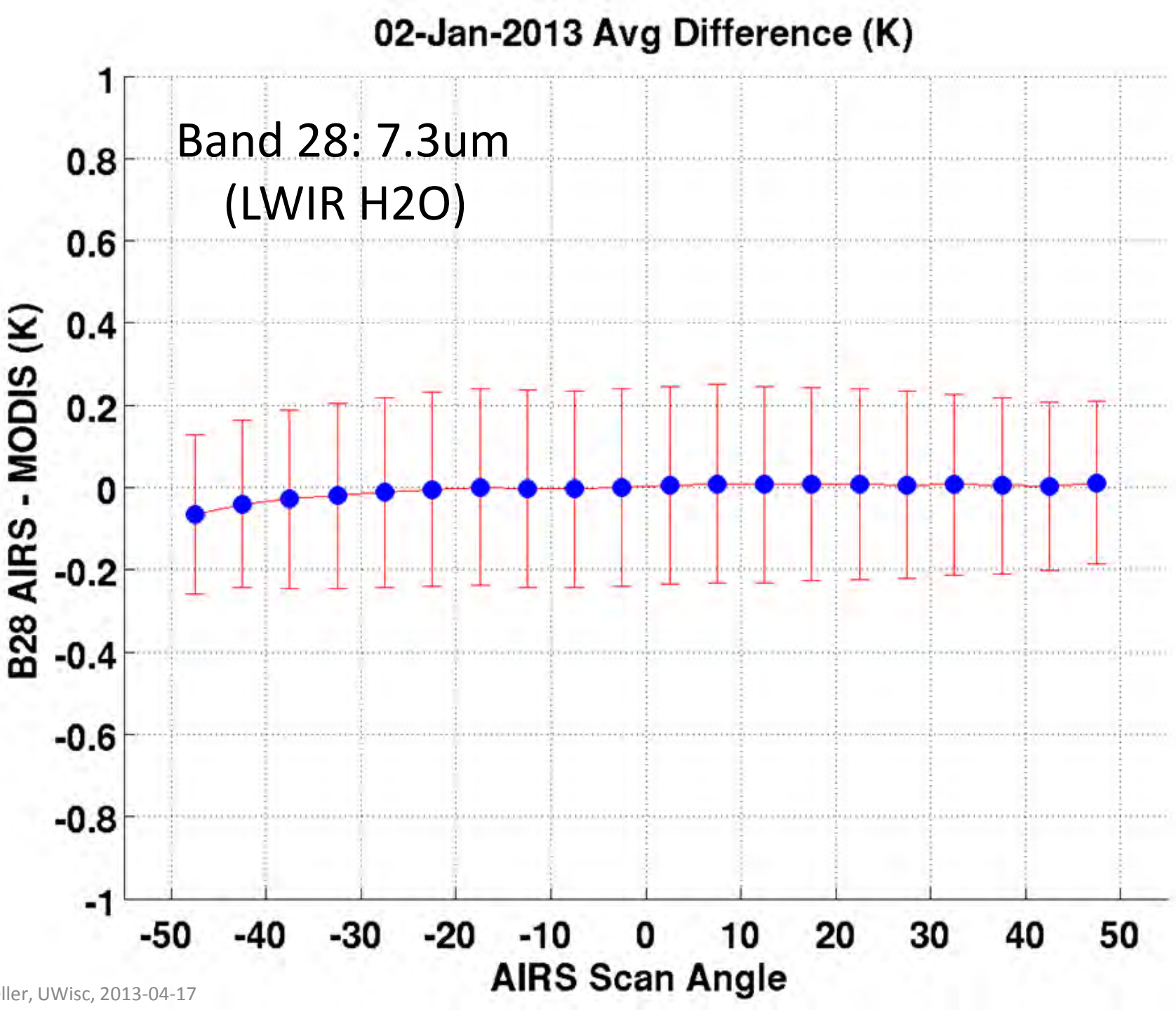

01-Jan-2008 Avg Difference (K)
Band 28: 7.3um
(LWIR H2O)
B28 AIRS - MODIS (K)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-50
-40
-30
-20
-10
0
10
20
30
40
50
AIRS Scan Angle

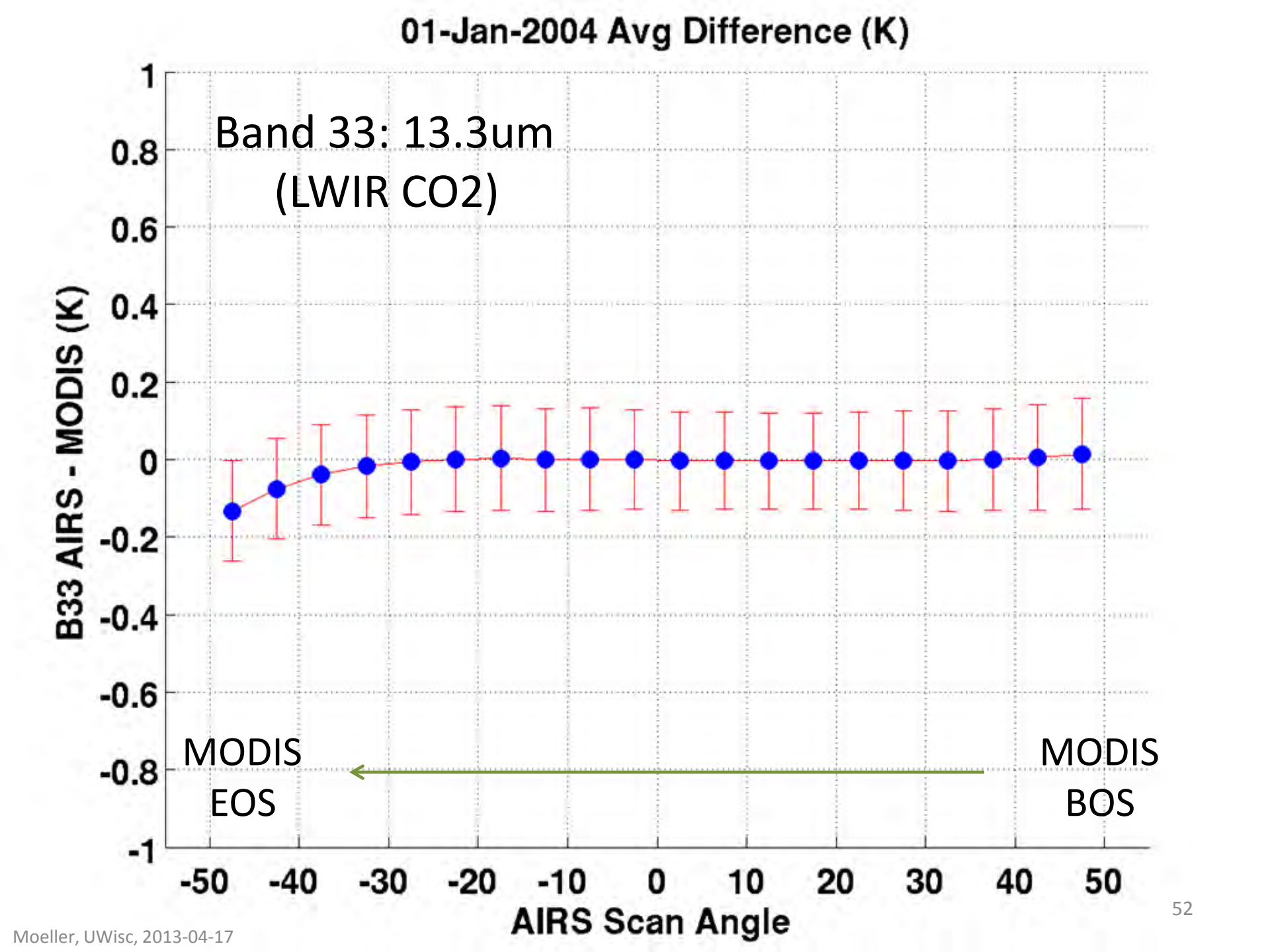

01-Jan-2009 Avg Difference (K)
Band 28: 7.3um
(LWIR H2O)
B28 AIRS - MODIS (K)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-50
-40
-30
-20
-10
0
10
20
30
40
50
AIRS Scan Angle

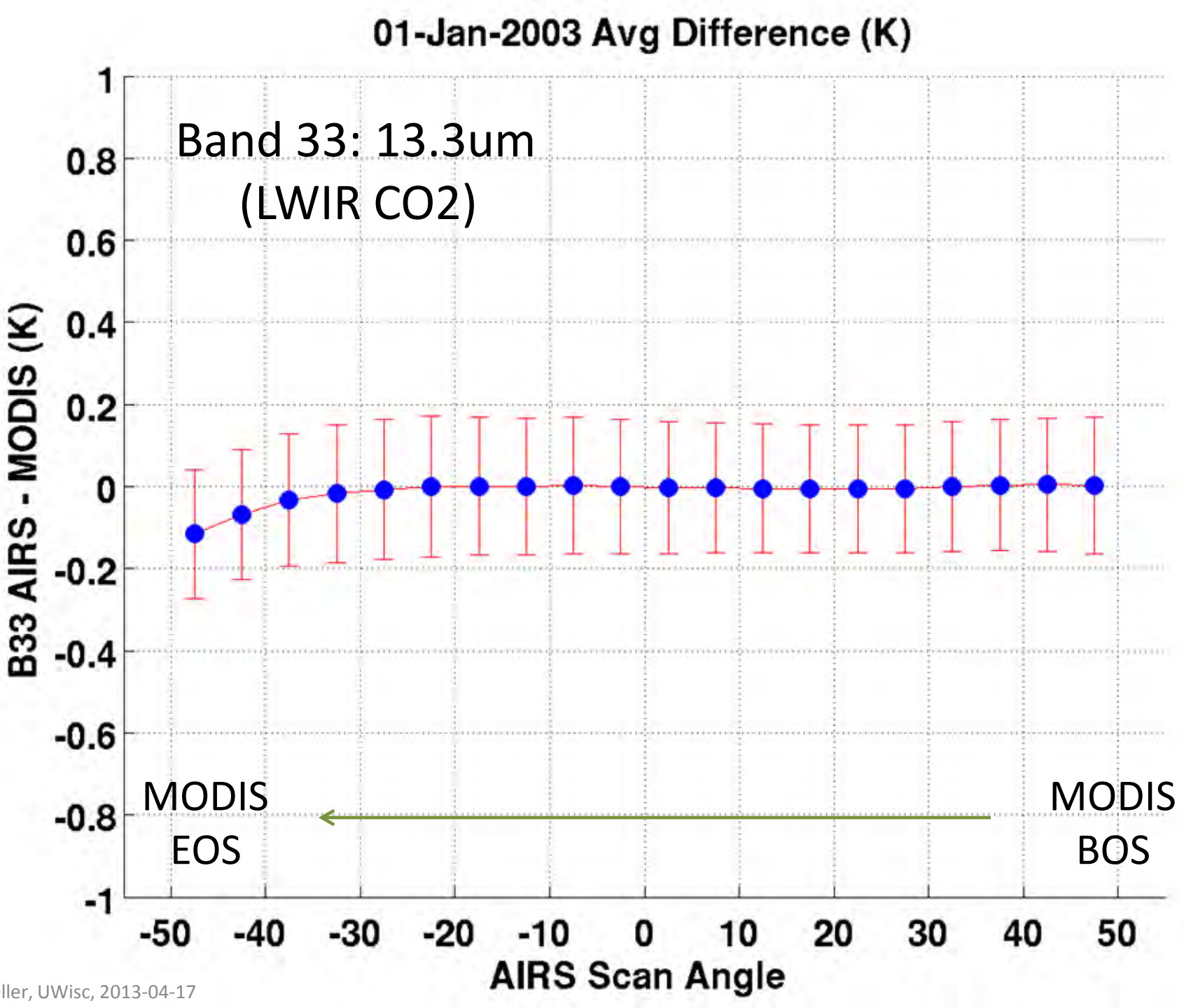

01-Jan-2010 Avg Difference (K)
Band 28: 7.3um
(LWIR H2O)
B28 AIRS - MODIS (K)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-50
-40
-30
-20
-10
0
10
20
30
40
50
AIRS Scan Angle

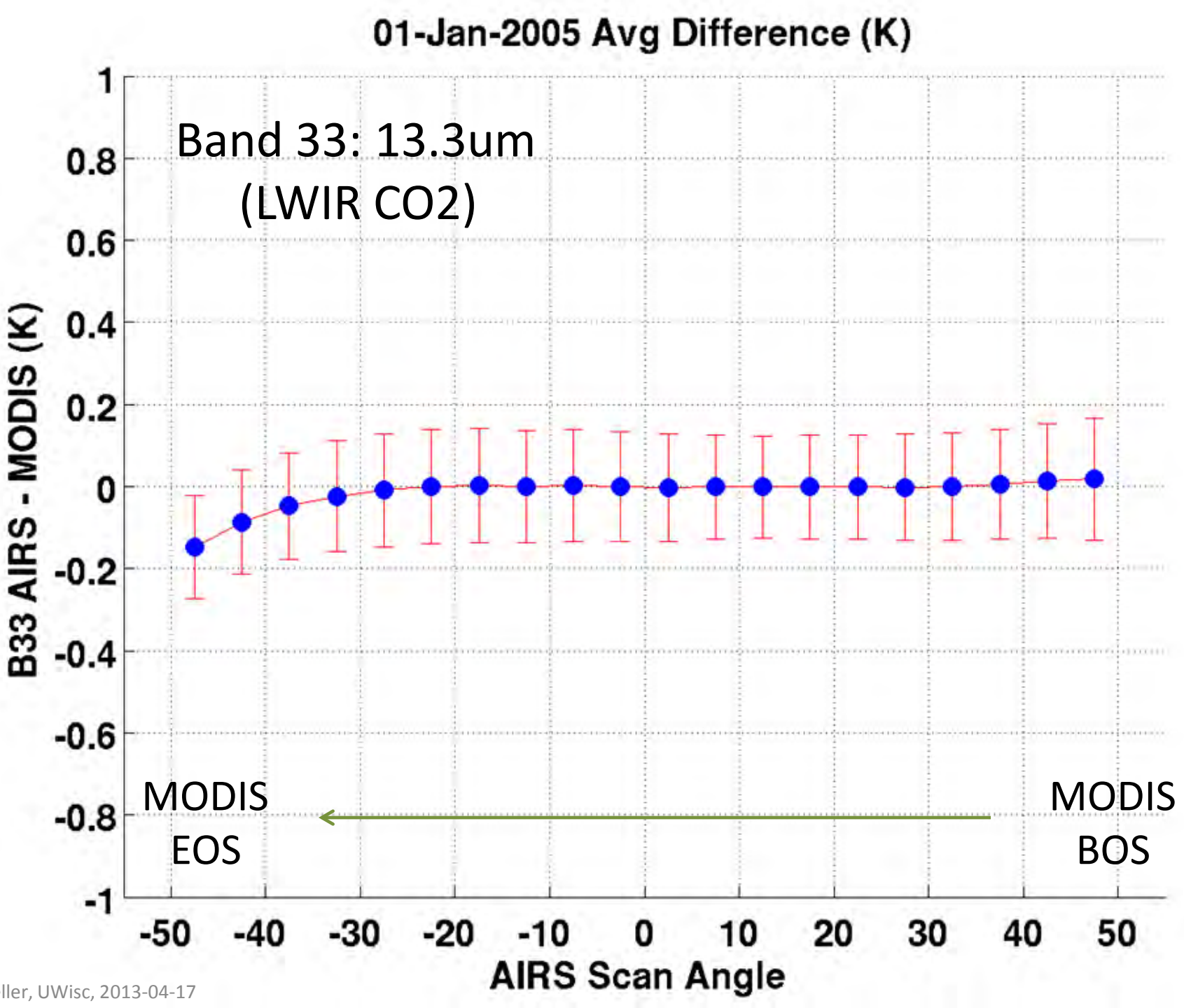

01-Jan-2011 Avg Difference (K)
Band 28: 7.3um
(LWIR H2O)
B28 AIRS - MODIS (K)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-50
-40
-30
-20
-10
0
10
20
30
40
50
AIRS Scan Angle

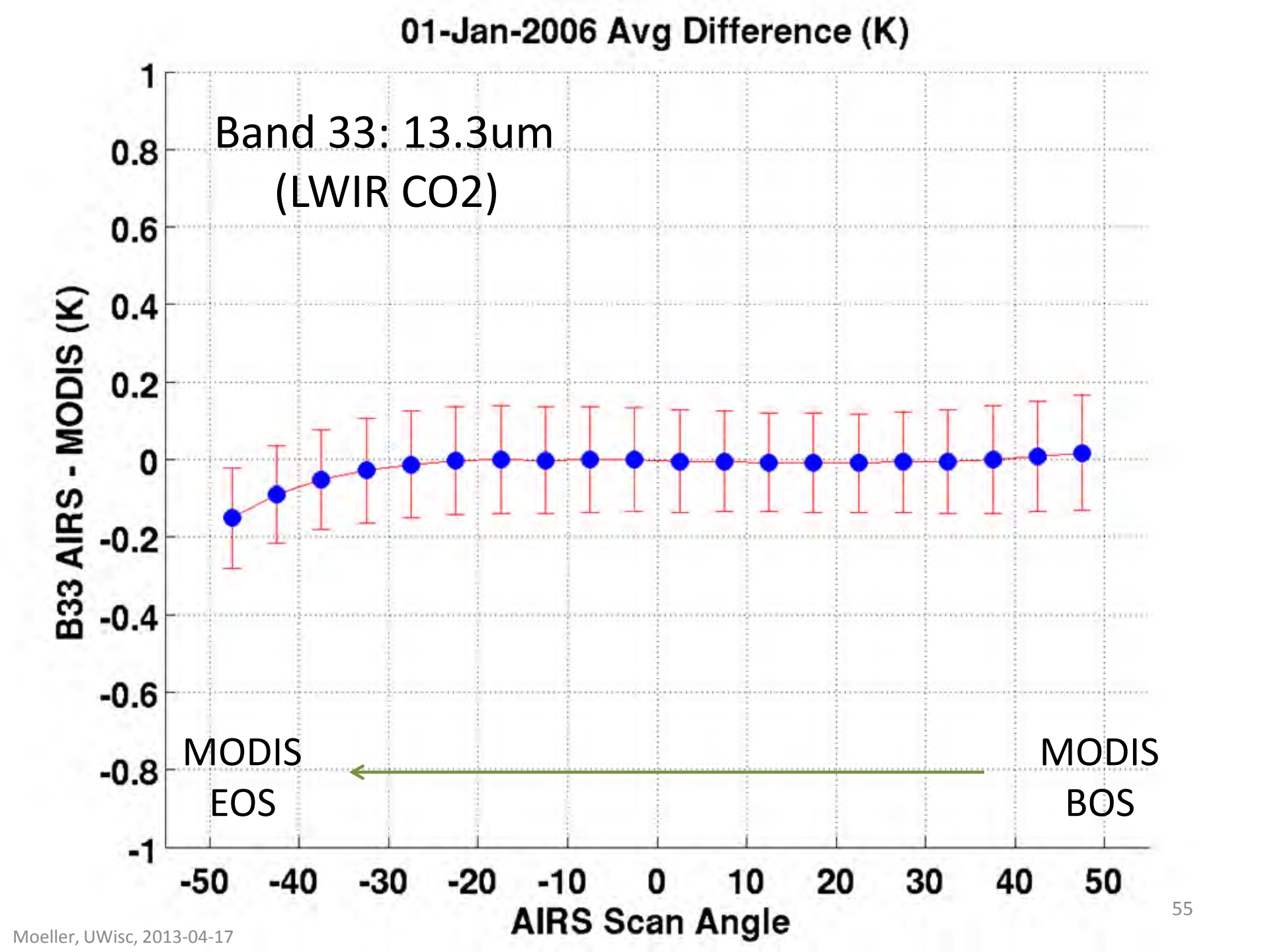

02-Jan-2012 Avg Difference (K)
Band 28: 7.3um
(LWIR H2O)
B28 AIRS - MODIS (K)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-50
-40
-30
-20
-10
0
10
20
30
40
50
AIRS Scan Angle

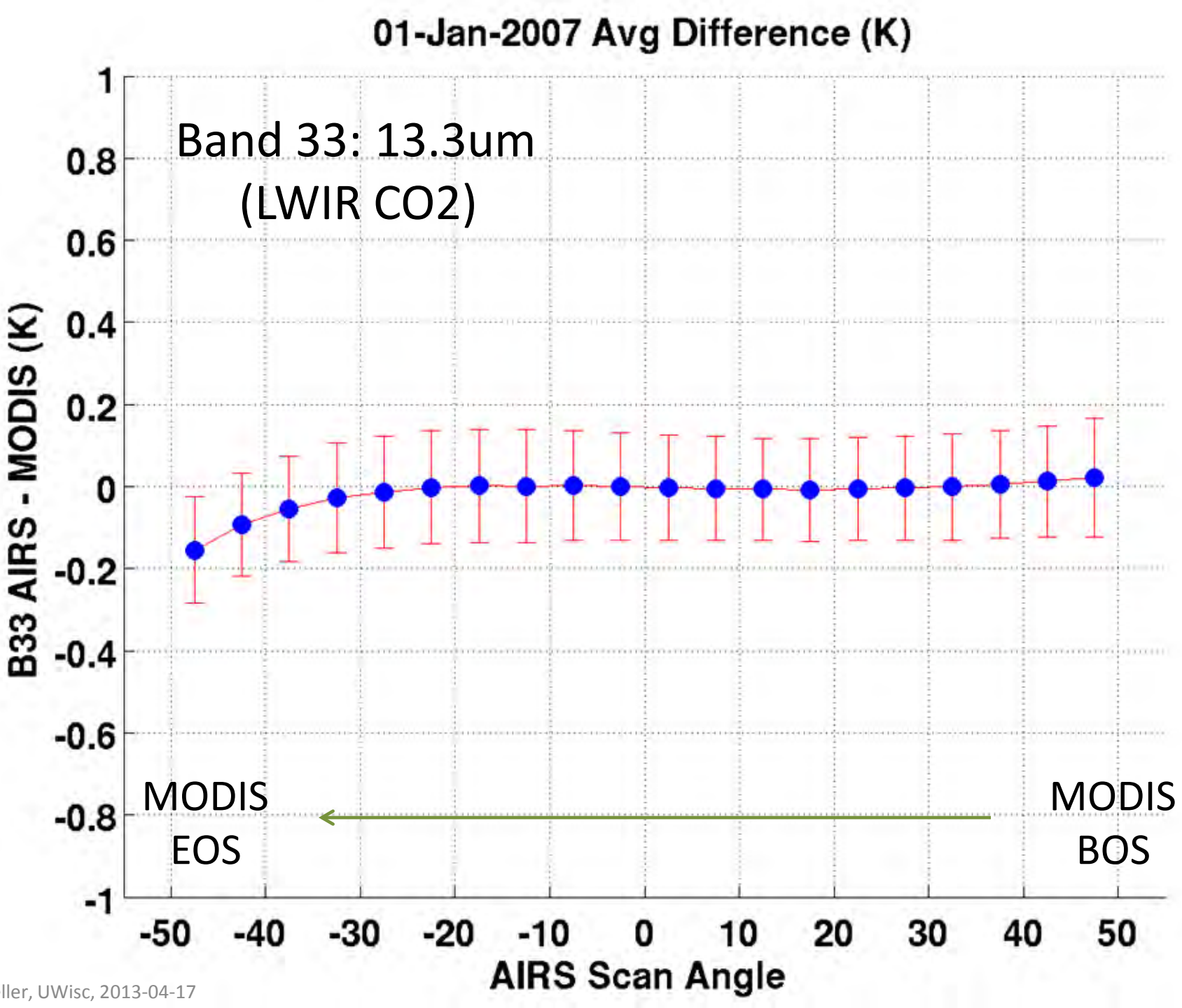

02-Jan-2013 Avg Difference (K)
Band 28: 7.3um
(LWIR H2O)
B28 AIRS - MODIS (K)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-50
-40
-30
-20
-10
0
10
20
30
40
50
AIRS Scan Angle

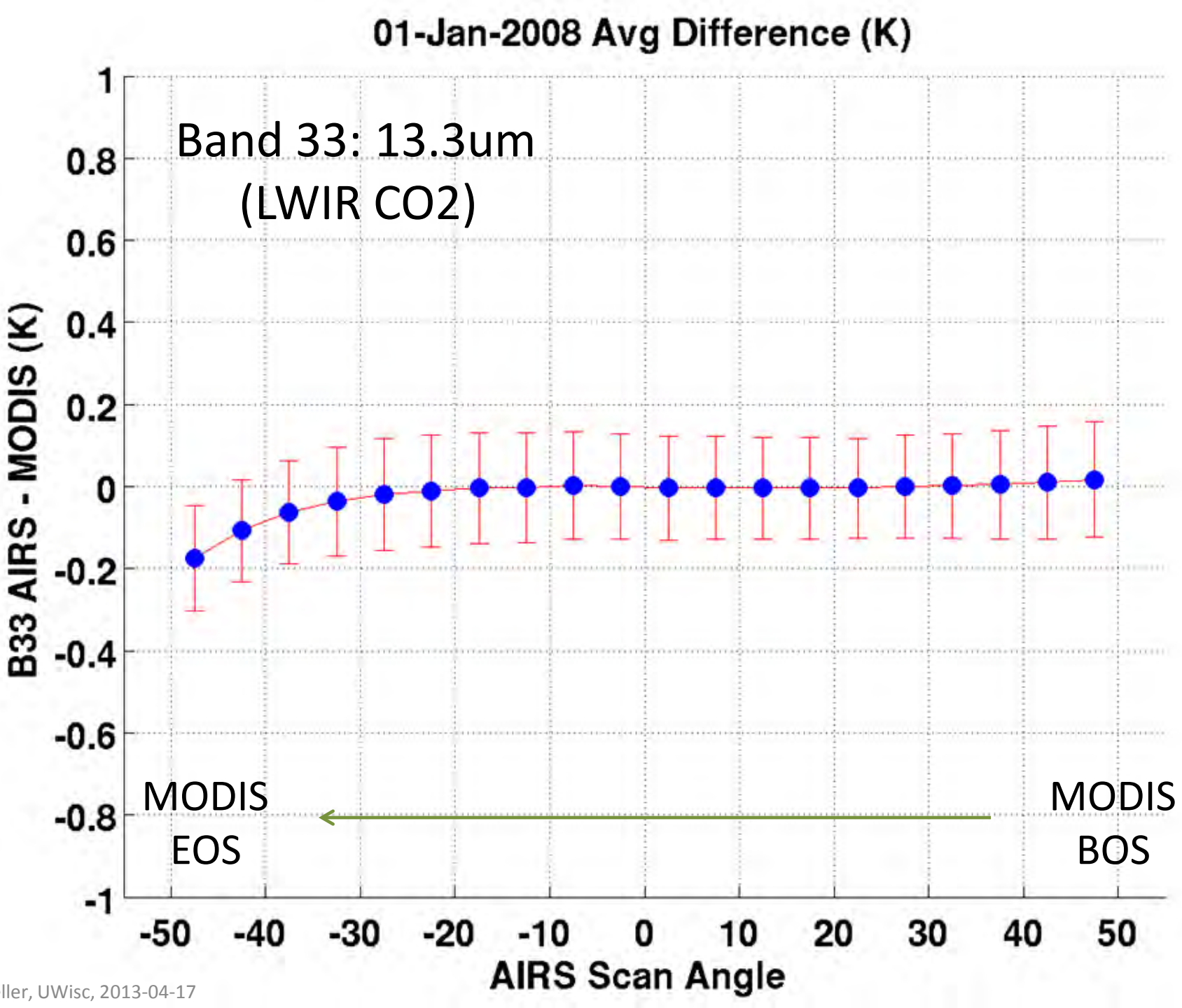

01-Jan-2004 Avg Difference (K)
Band 33: 13.3um
(LWIR CO2)
B33 AIRS - MODIS (K)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-50
-40
-30
-20
-10
0
10
20
30
40
50
AIRS Scan Angle
MODIS
EOS
MODIS
BOS

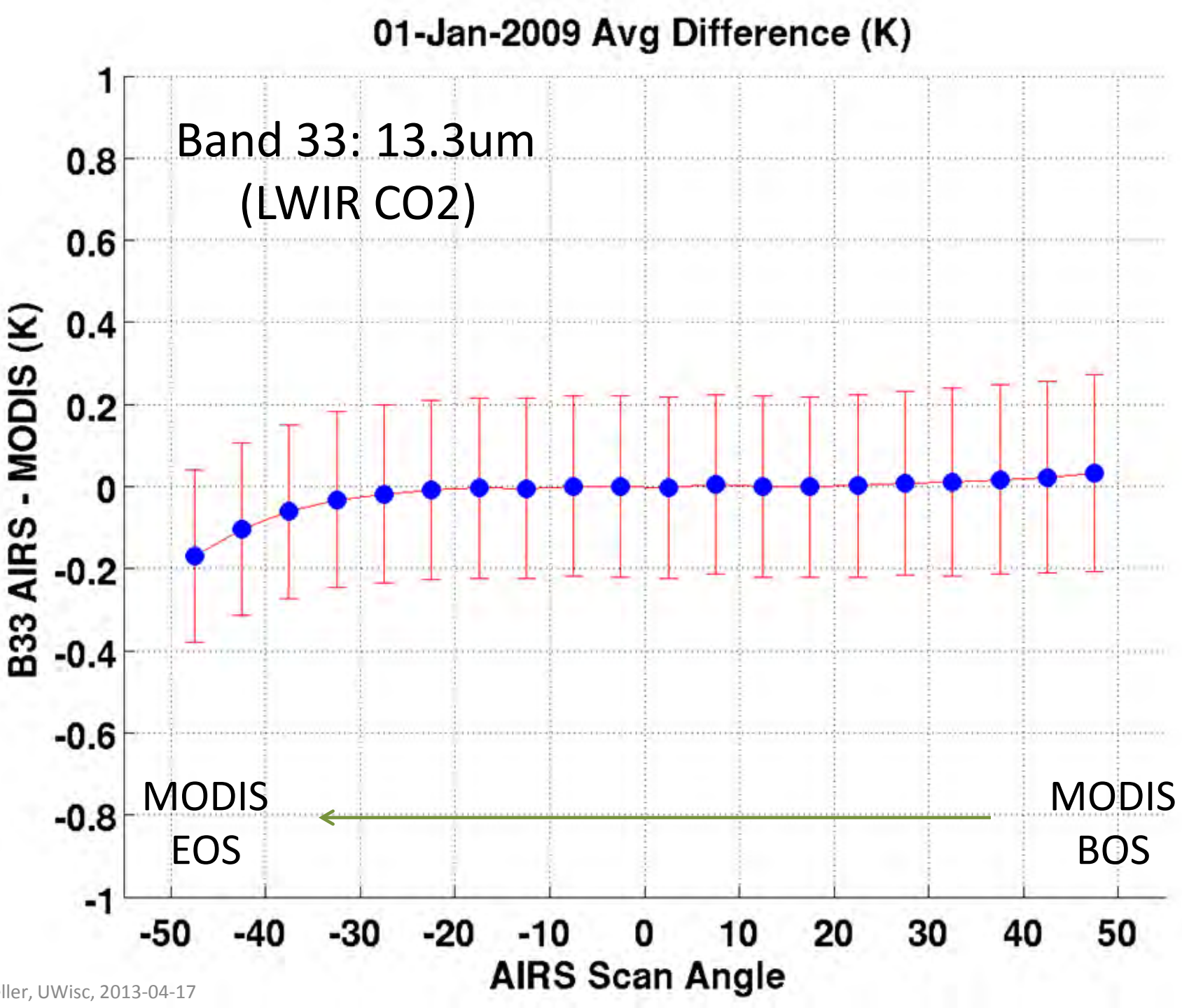

01-Jan-2003 Avg Difference (K)
Band 33: 13.3um
(LWIR CO2)
B33 AIRS - MODIS (K)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-50
-40
-30
-20
-10
0
10
20
30
40
50
AIRS Scan Angle
MODIS
EOS
MODIS
BOS

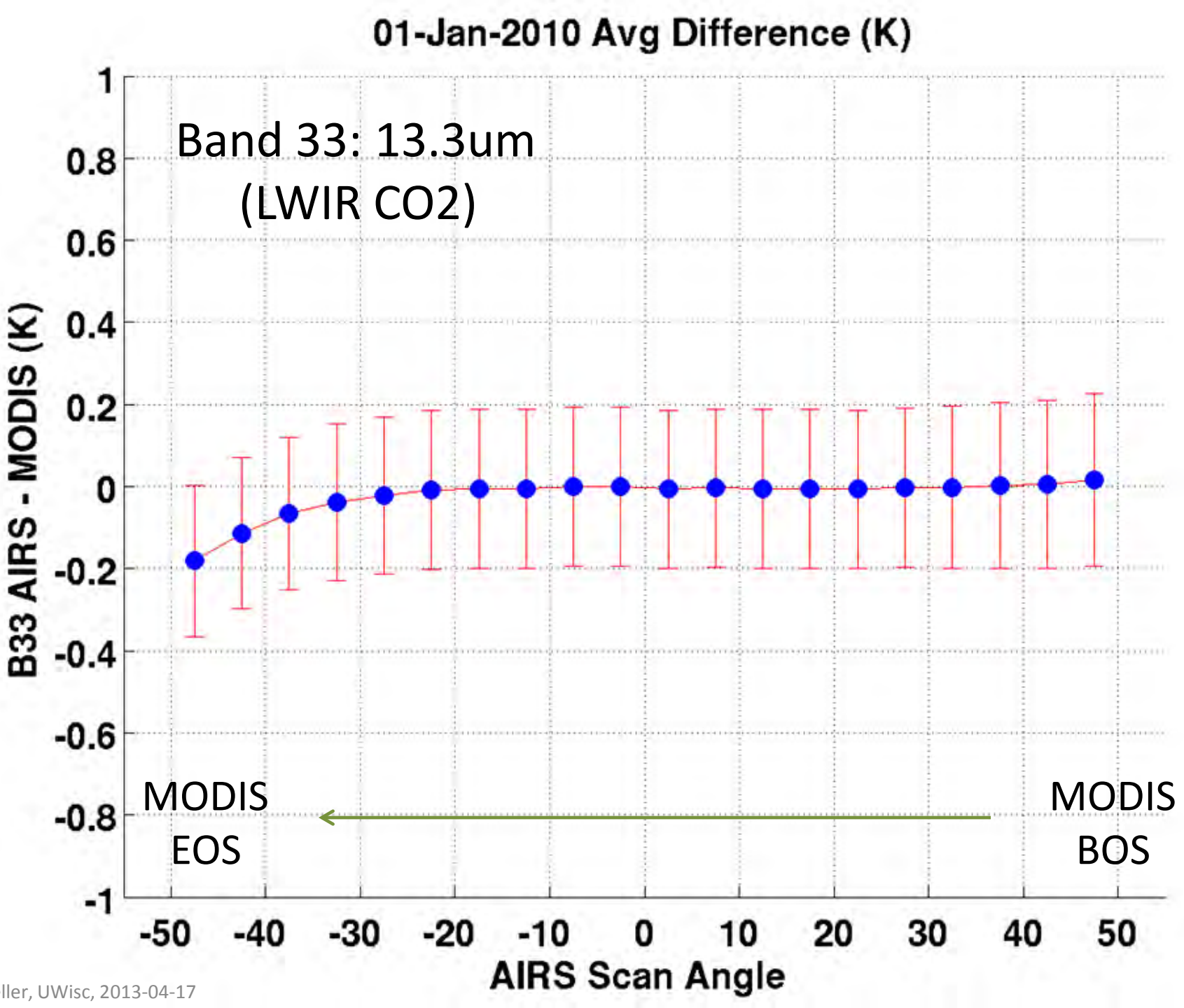

01-Jan-2005 Avg Difference (K)
Band 33: 13.3um
(LWIR CO2)
B33 AIRS - MODIS (K)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-50
-40
-30
-20
-10
0
10
20
30
40
50
AIRS Scan Angle
MODIS
EOS
MODIS
BOS

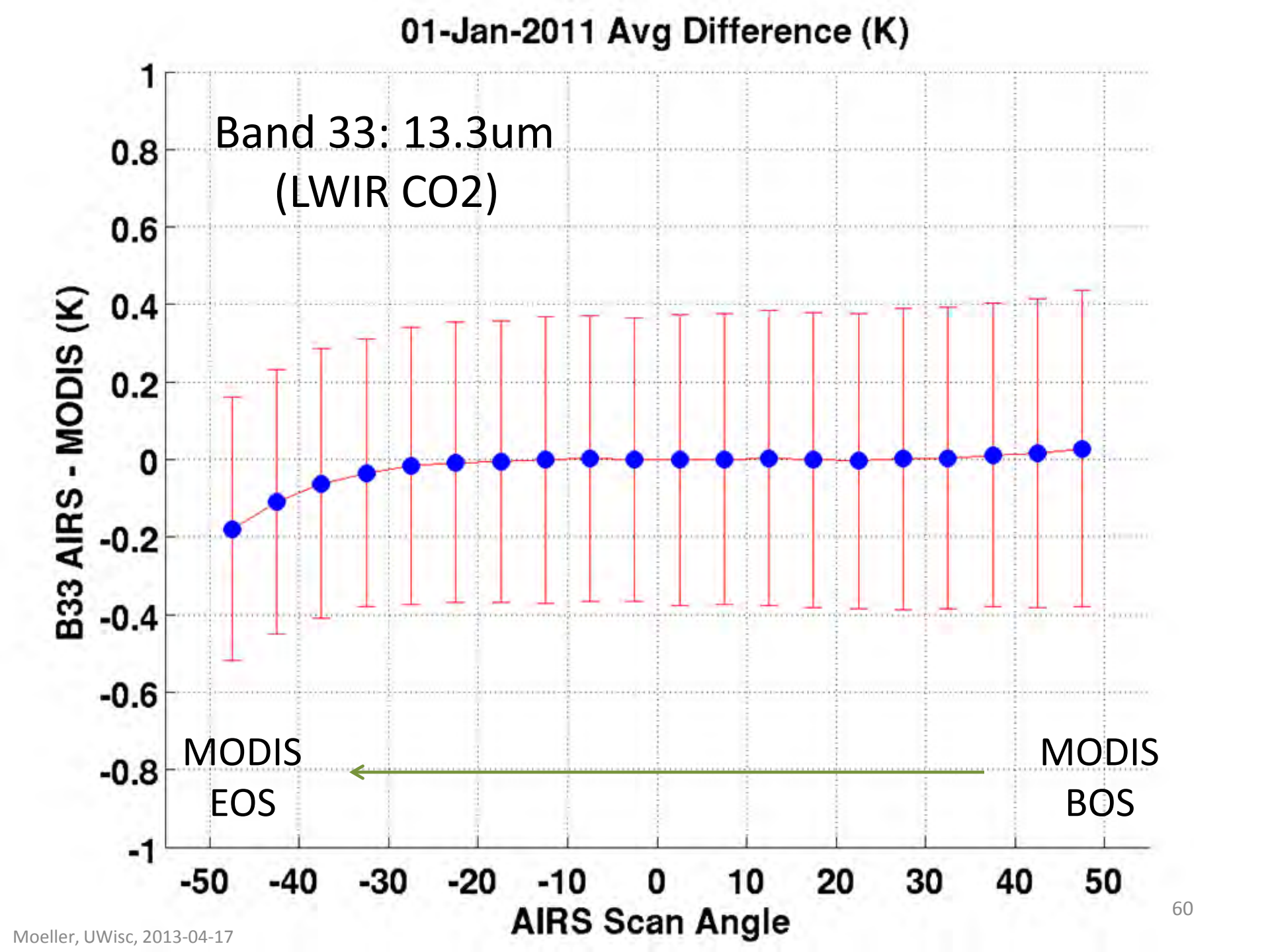

01-Jan-2006 Avg Difference (K)
Band 33: 13.3um
(LWIR CO2)
B33 AIRS - MODIS (K)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-50
-40
-30
-20
-10
0
10
20
30
40
50
AIRS Scan Angle
MODIS
EOS
MODIS
BOS

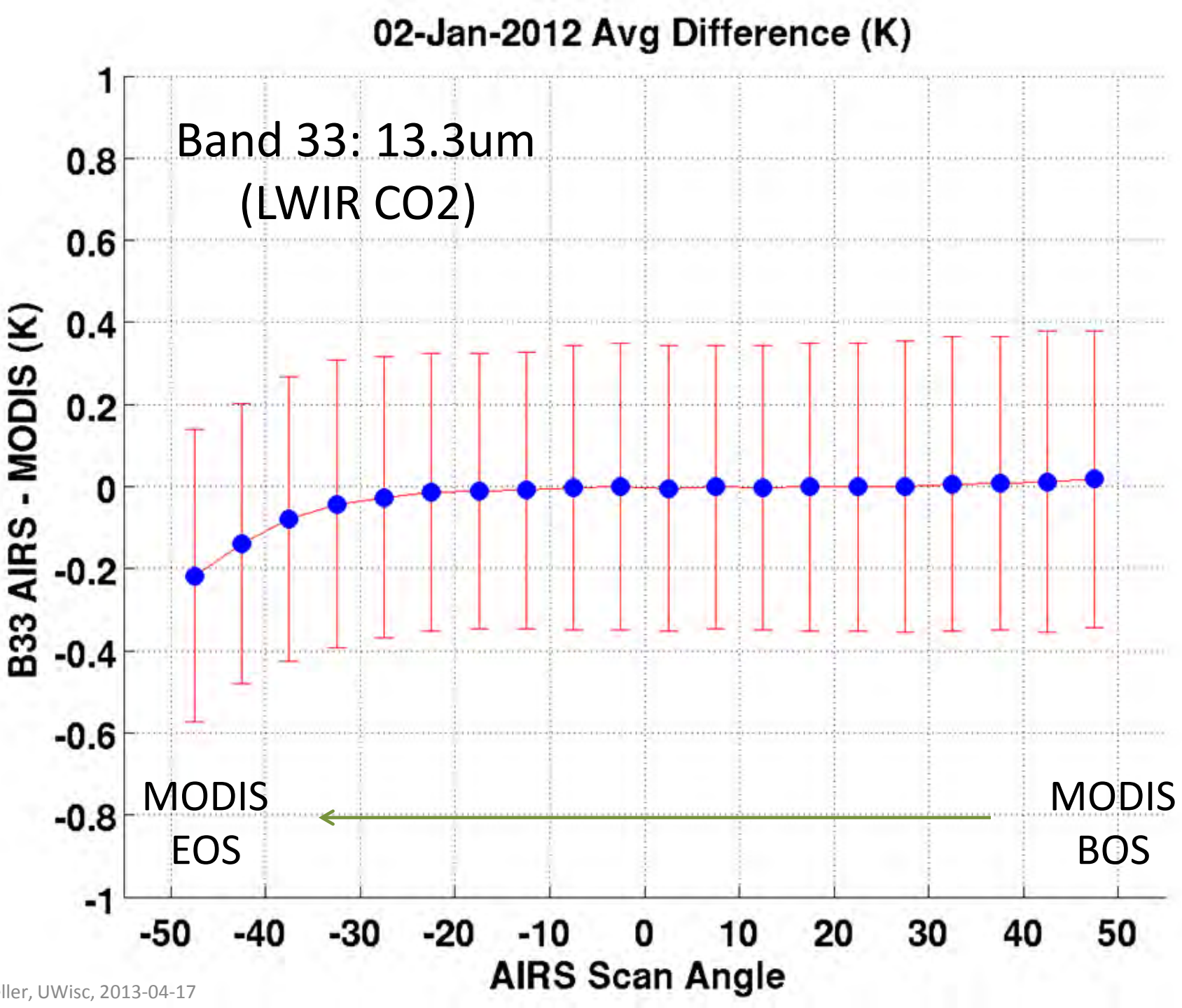

01-Jan-2007 Avg Difference (K)
Band 33: 13.3um
(LWIR CO2)
B33 AIRS - MODIS (K)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-50
-40
-30
-20
-10
0
10
20
30
40
50
AIRS Scan Angle
MODIS
EOS
MODIS
BOS

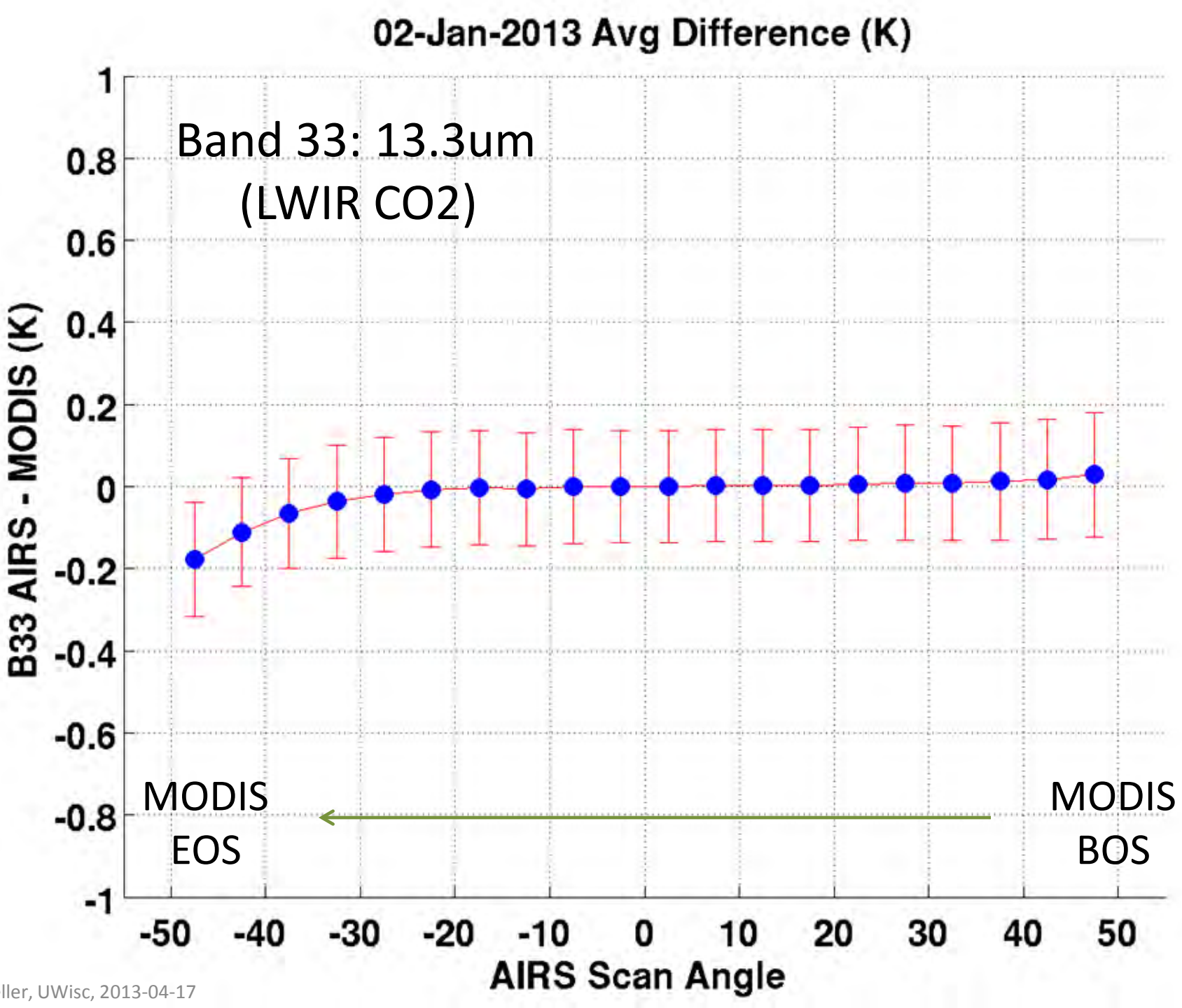

01-Jan-2008 Avg Difference (K)
Band 33: 13.3um
(LWIR CO2)
B33 AIRS - MODIS (K)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-50
-40
-30
-20
-10
0
10
20
30
40
50
AIRS Scan Angle
MODIS
EOS
MODIS
BOS

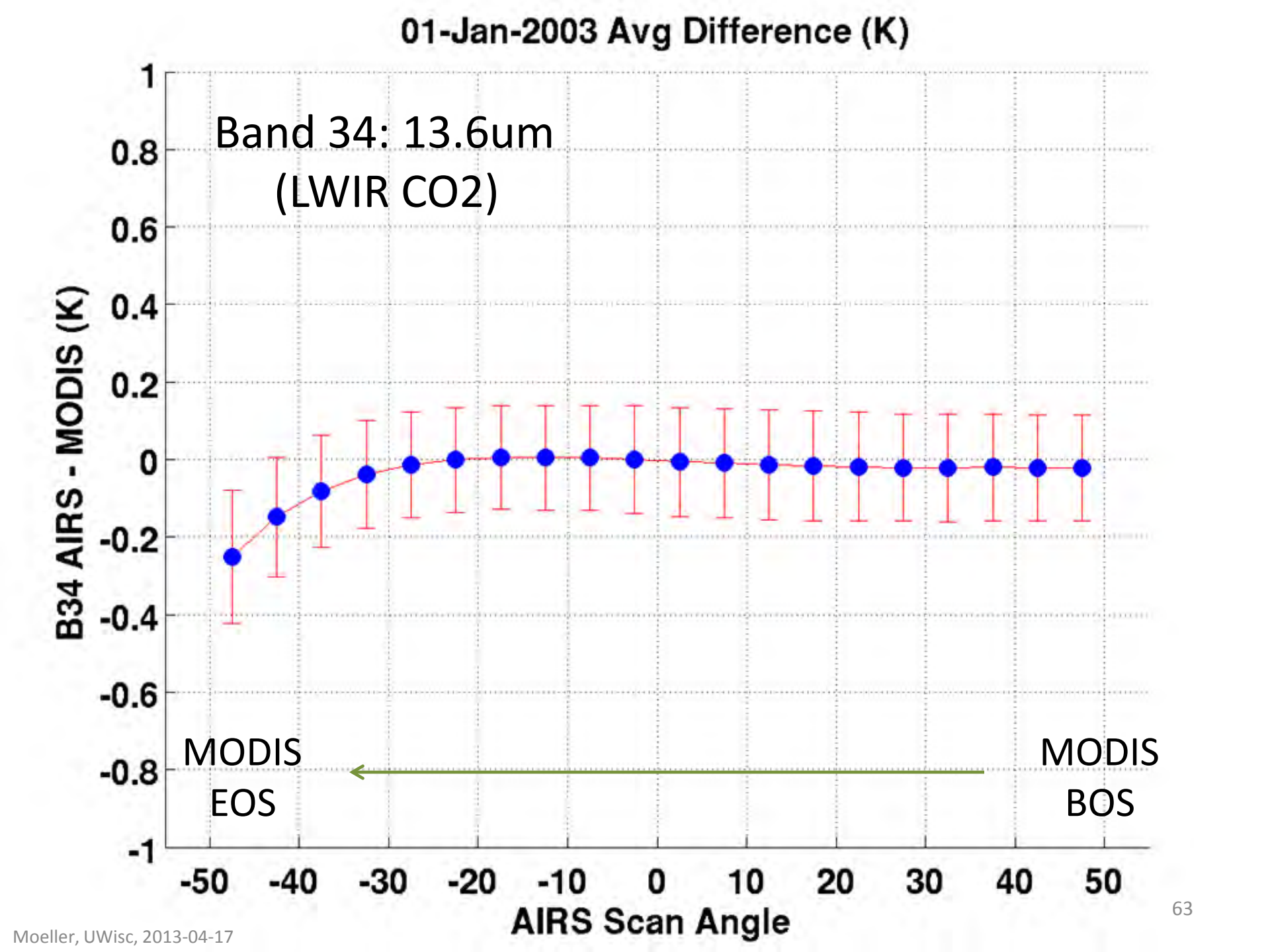

01-Jan-2009 Avg Difference (K)
Band 33: 13.3um
(LWIR CO2)
B33 AIRS - MODIS (K)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-50
-40
-30
-20
-10
0
10
20
30
40
50
AIRS Scan Angle
MODIS
EOS
MODIS
BOS

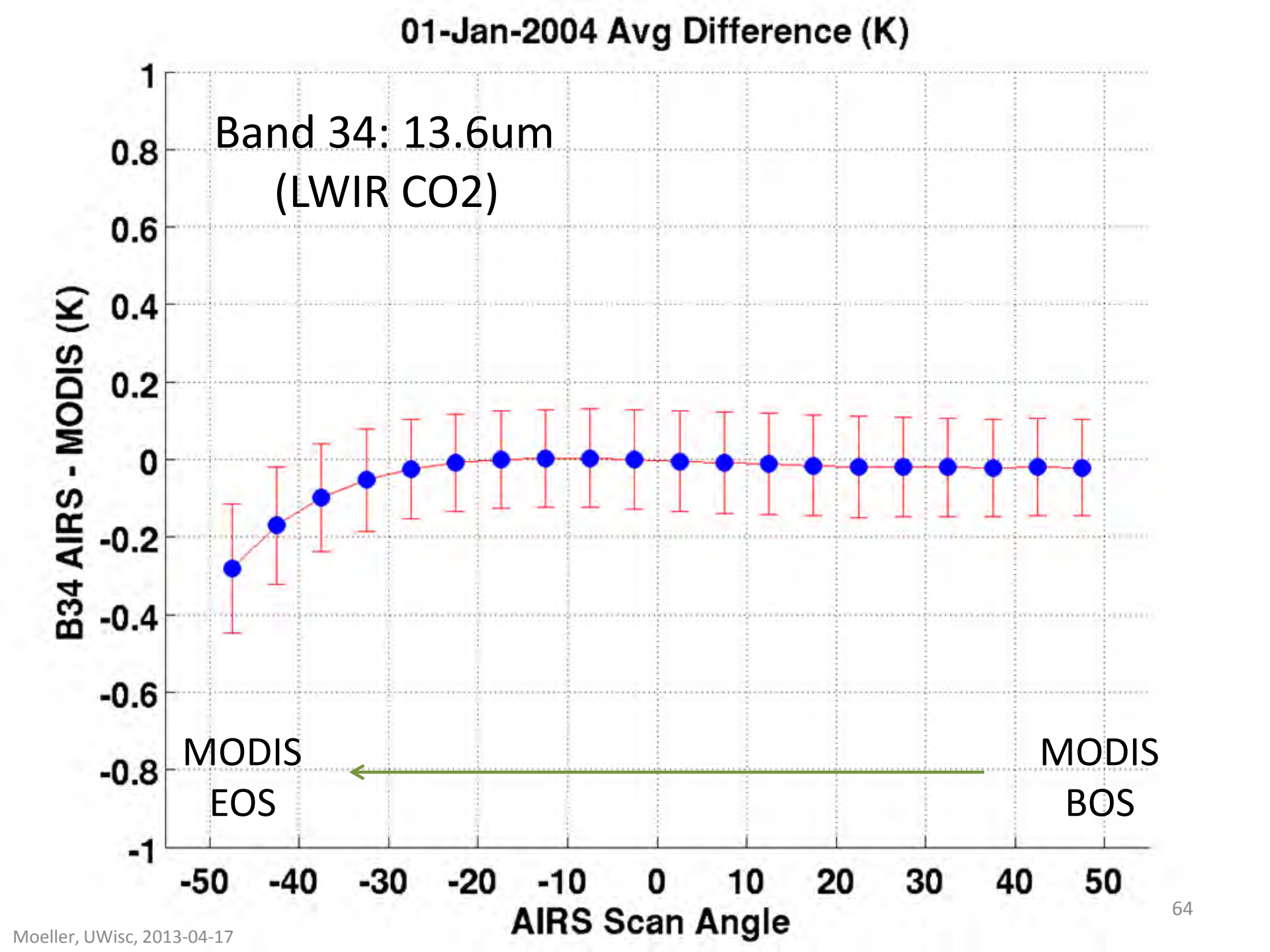

01-Jan-2010 Avg Difference (K)
Band 33: 13.3um
(LWIR CO2)
B33 AIRS - MODIS (K)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-50
-40
-30
-20
-10
0
10
20
30
40
50
AIRS Scan Angle
MODIS
EOS
MODIS
BOS

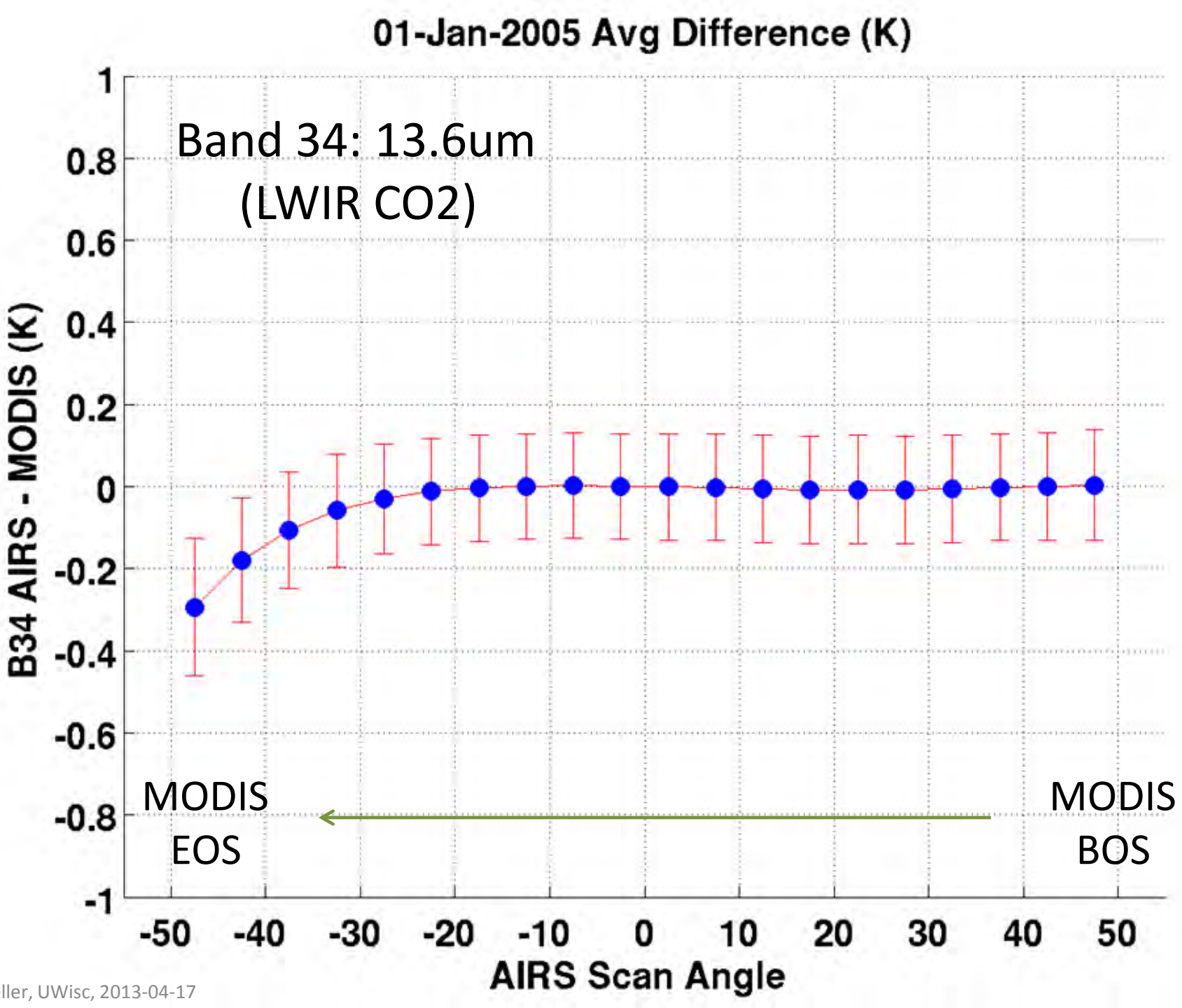

01-Jan-2011 Avg Difference (K)
Band 33: 13.3um
(LWIR CO2)
B33 AIRS - MODIS (K)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-50
-40
-30
-20
-10
0
10
20
30
40
50
AIRS Scan Angle
MODIS
EOS
MODIS
BOS

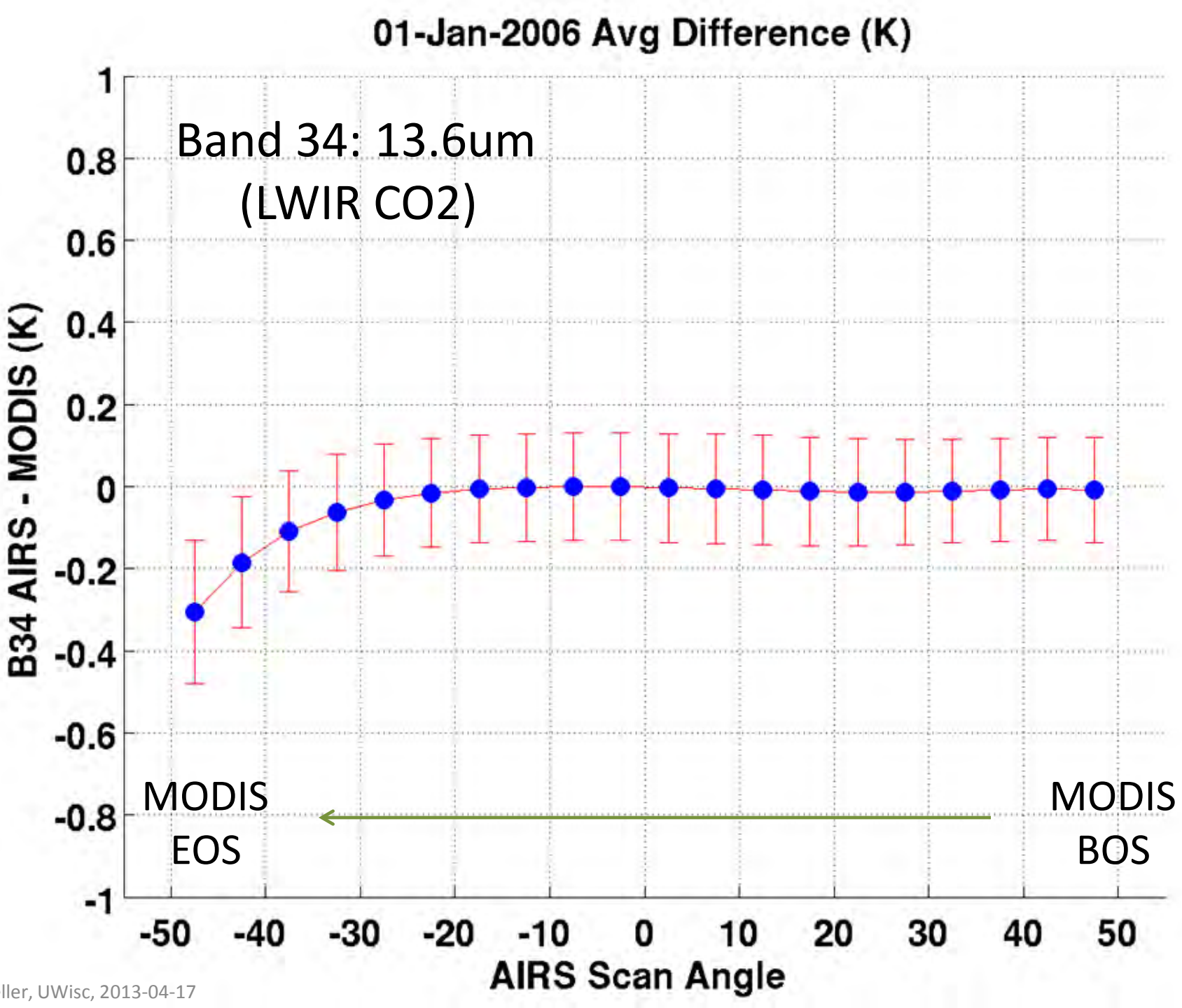

02-Jan-2012 Avg Difference (K)
Band 33: 13.3um
(LWIR CO2)
B33 AIRS - MODIS (K)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-50
-40
-30
-20
-10
0
10
20
30
40
50
AIRS Scan Angle
MODIS
EOS
MODIS
BOS


02-Jan-2013 Avg Difference (K)
Band 33: 13.3um
(LWIR CO2)
B33 AIRS - MODIS (K)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-50
-40
-30
-20
-10
0
10
20
30
40
50
AIRS Scan Angle
MODIS
EOS
MODIS
BOS


01-Jan-2003 Avg Difference (K)
Band 34: 13.6um
(LWIR CO2)
B34 AIRS - MODIS (K)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-50
-40
-30
-20
-10
0
10
20
30
40
50
AIRS Scan Angle
MODIS
EOS
MODIS
BOS


01-Jan-2004 Avg Difference (K)
Band 34: 13.6um
(LWIR CO2)
B34 AIRS - MODIS (K)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-50
-40
-30
-20
-10
0
10
20
30
40
50
AIRS Scan Angle
MODIS
EOS
MODIS
BOS


01-Jan-2005 Avg Difference (K)
Band 34: 13.6um
(LWIR CO2)
B34 AIRS - MODIS (K)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-50
-40
-30
-20
-10
0
10
20
30
40
50
AIRS Scan Angle
MODIS
EOS
MODIS
BOS


01-Jan-2006 Avg Difference (K)
Band 34: 13.6um
(LWIR CO2)
B34 AIRS - MODIS (K)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-50
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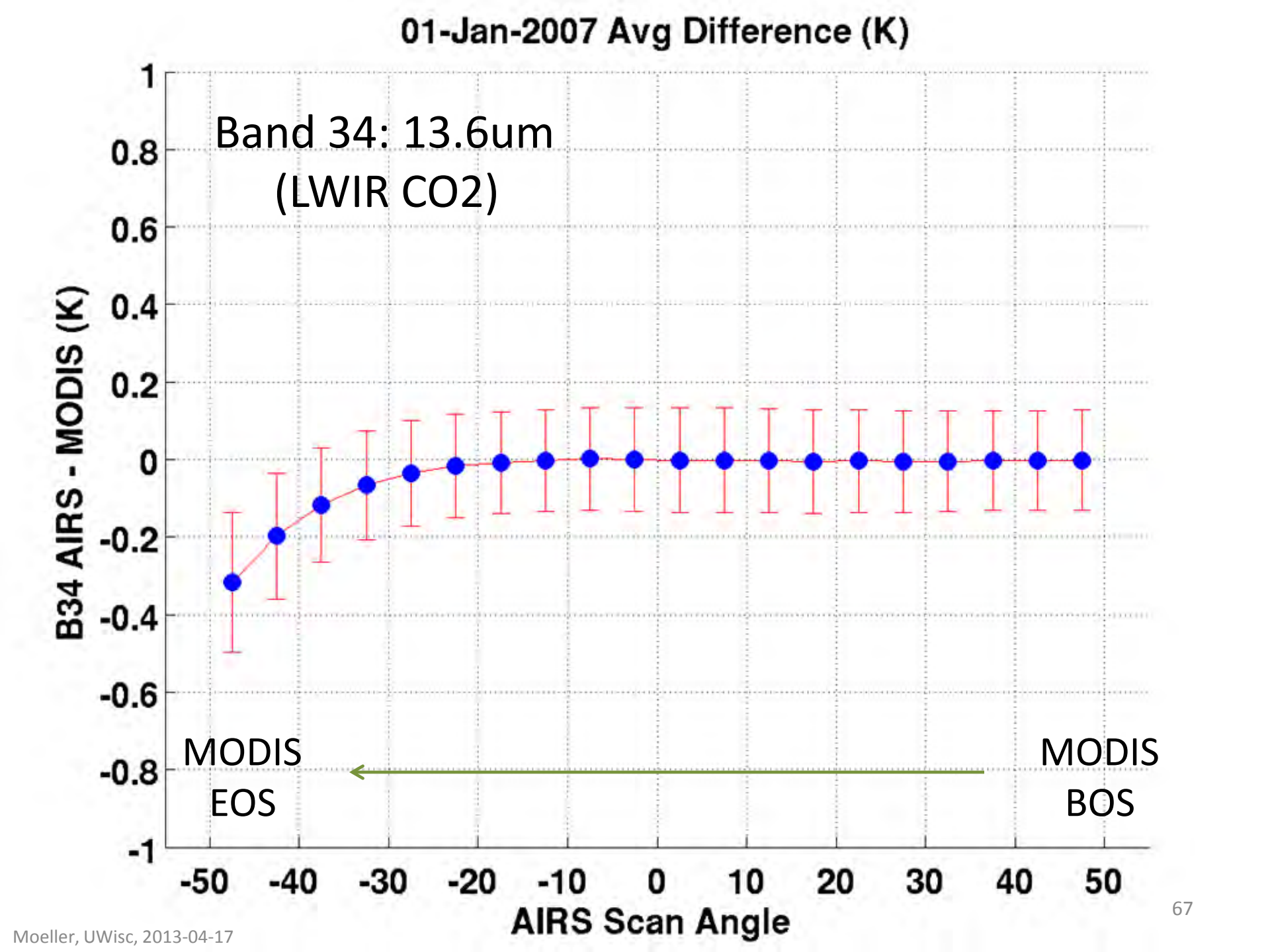
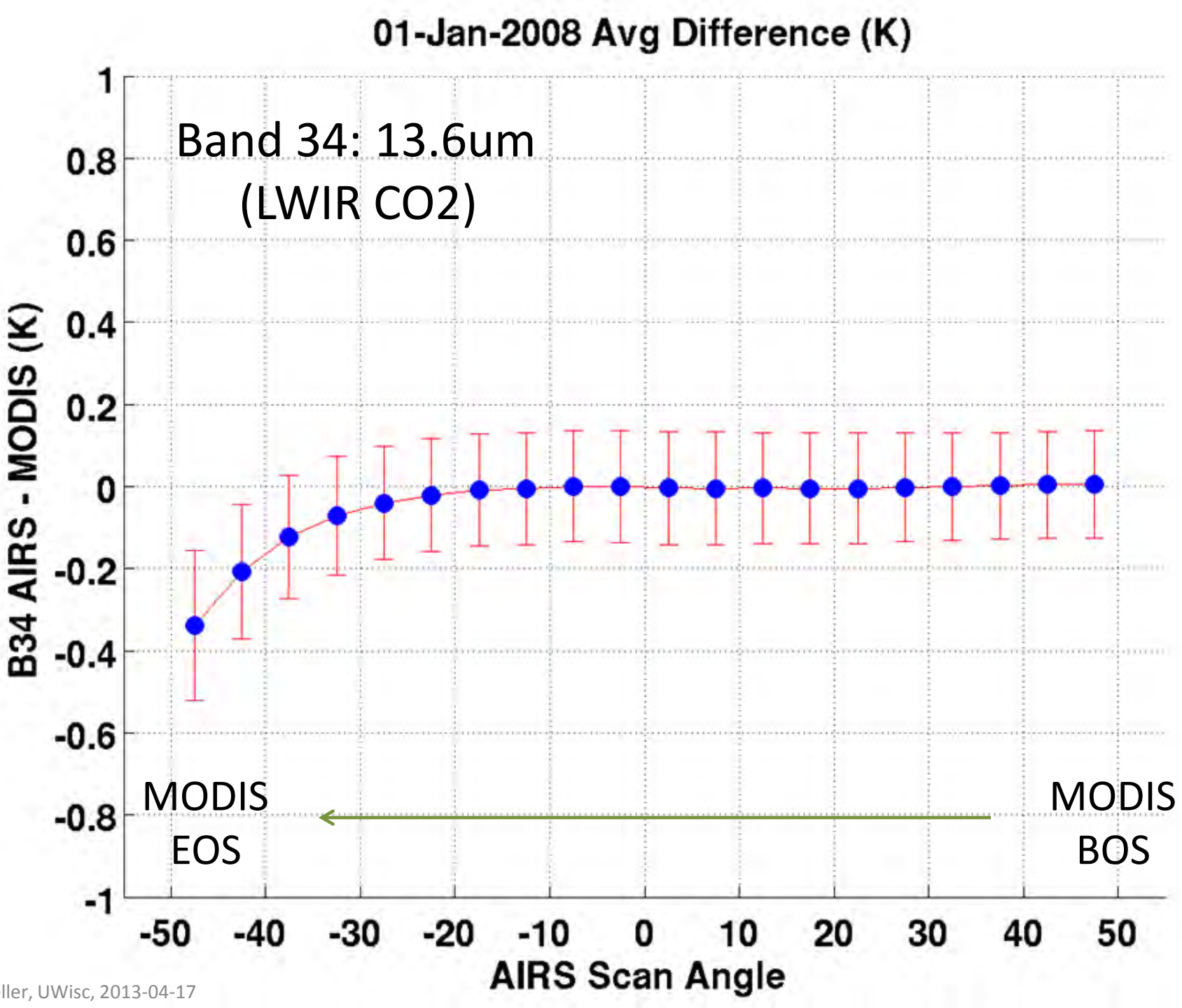
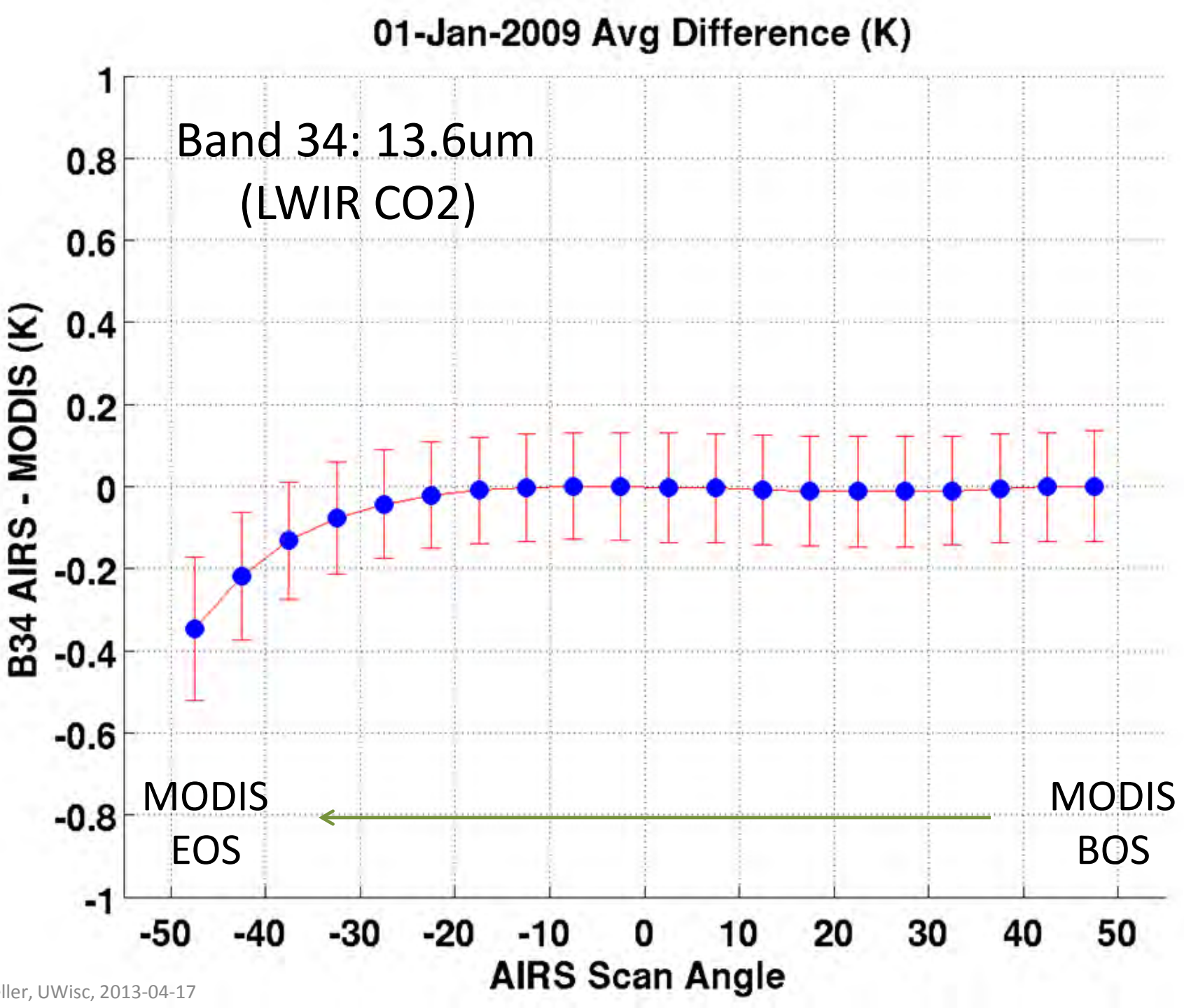
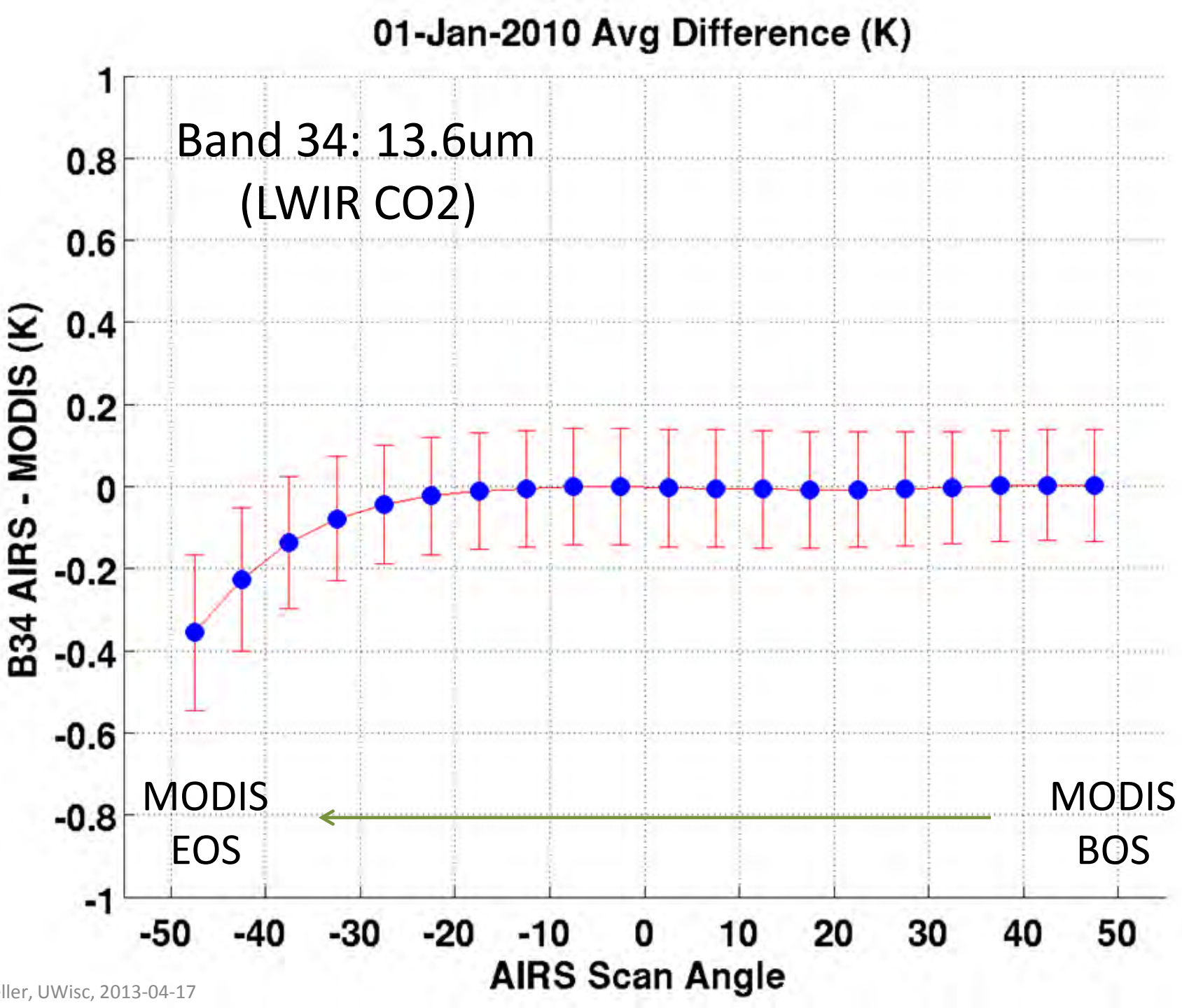
-30
-20
-10
0
10
20
30
40
50
AIRS Scan Angle
MODIS
EOS
MODIS
BOS


01-Jan-2007 Avg Difference (K)
Band 34: 13.6um
(LWIR CO2)
B34 AIRS - MODIS (K)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-50
-40
-30
-20
-10
0
10
20
30
40
50
AIRS Scan Angle
MODIS
EOS
MODIS
BOS


01-Jan-2008 Avg Difference (K)
Band 34: 13.6um
(LWIR CO2)
B34 AIRS - MODIS (K)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-50
-40
-30
-20
-10
0
10
20
30
40
50
AIRS Scan Angle
MODIS
EOS
MODIS
BOS


01-Jan-2009 Avg Difference (K)
Band 34: 13.6um
(LWIR CO2)
B34 AIRS - MODIS (K)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-50
-40
-30
-20
-10
0
10
20
30
40
50
AIRS Scan Angle
MODIS
EOS
MODIS
BOS


01-Jan-2010 Avg Difference (K)
Band 34: 13.6um
(LWIR CO2)
B34 AIRS - MODIS (K)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-50
-40
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-20
-10
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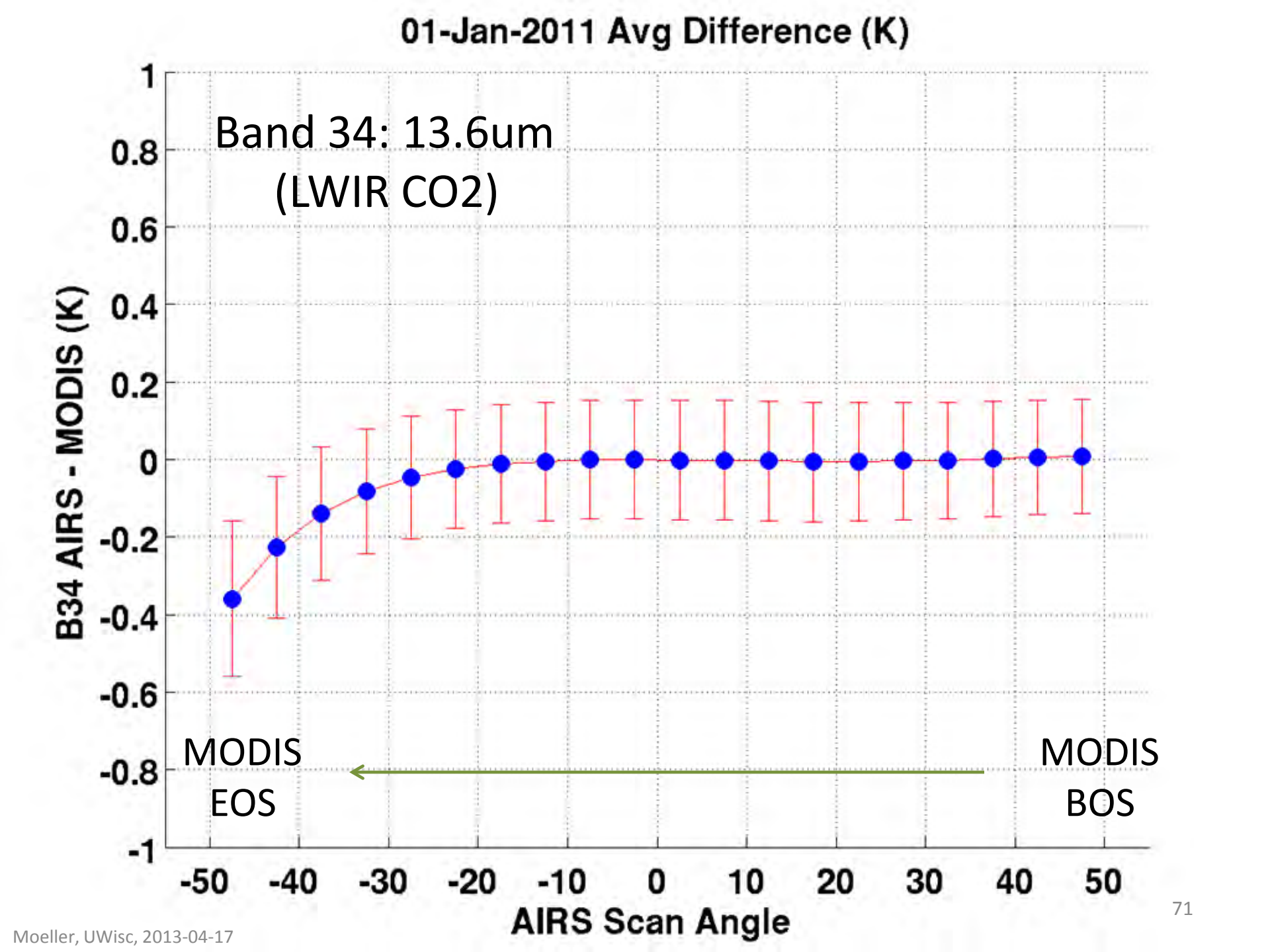
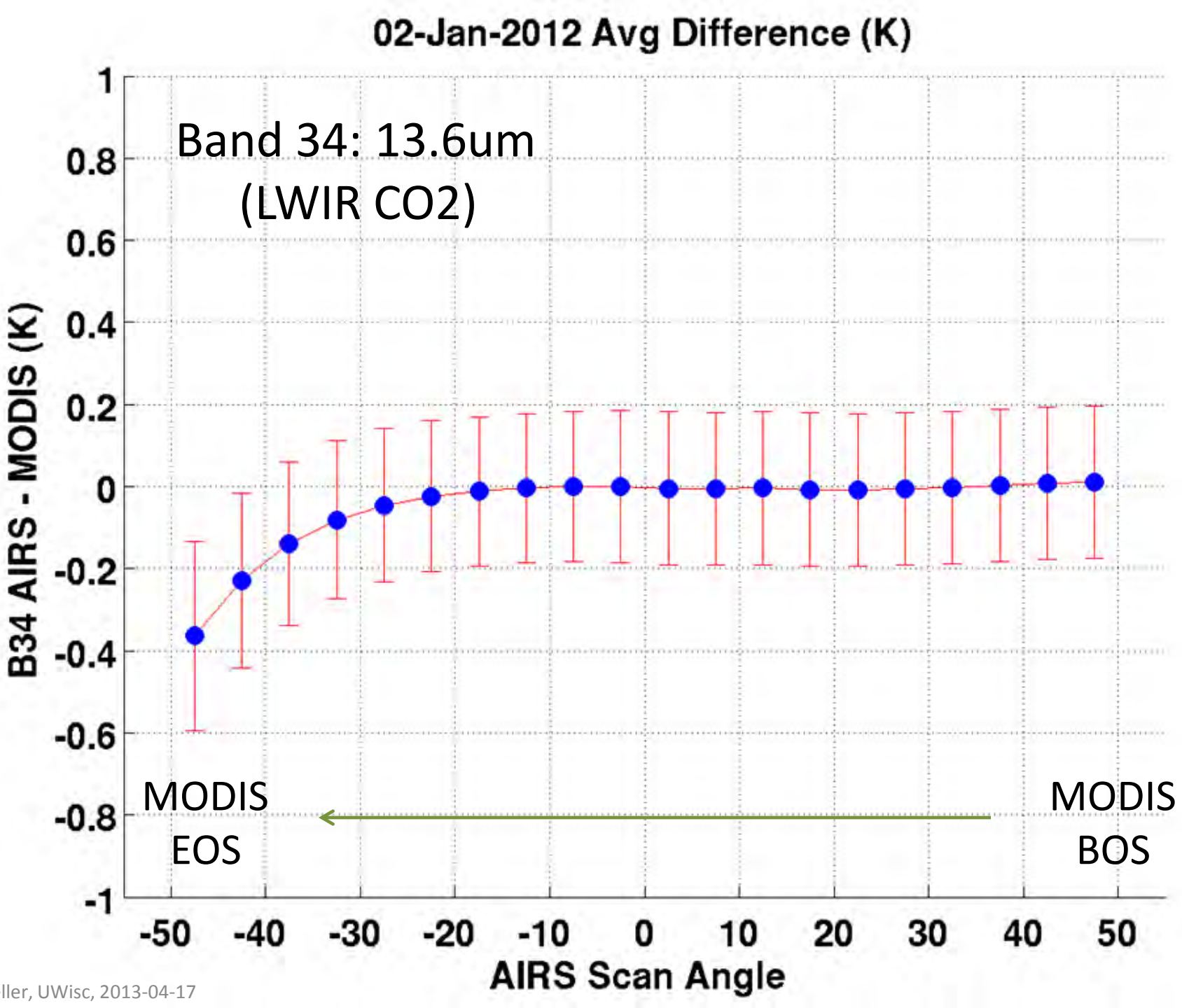
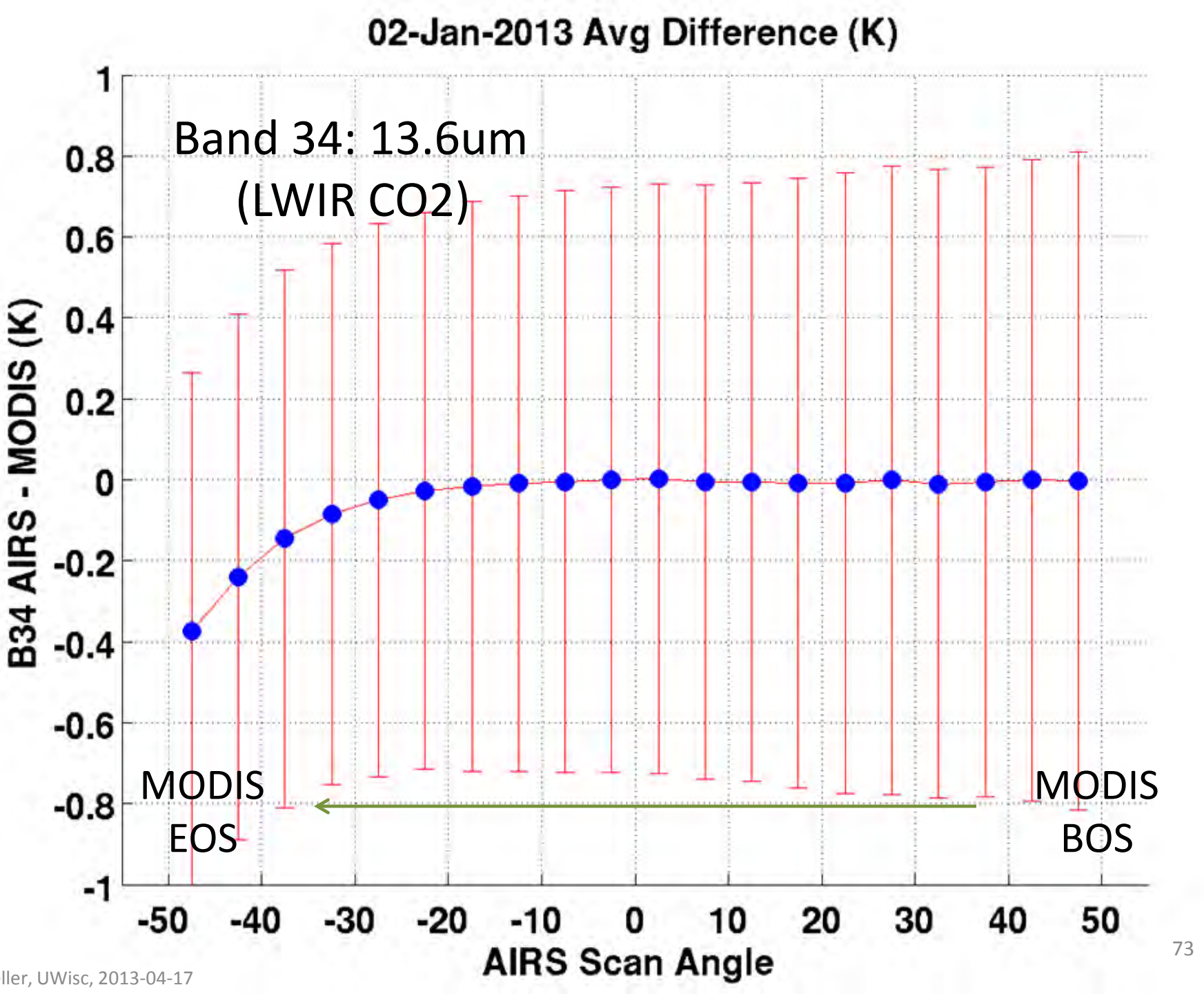
10
20
30
40
50
AIRS Scan Angle
MODIS
EOS
MODIS
BOS


01-Jan-2011 Avg Difference (K)
Band 34: 13.6um
(LWIR CO2)
B34 AIRS - MODIS (K)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-50
-40
-30
-20
-10
0
10
20
30
40
50
AIRS Scan Angle
MODIS
EOS
MODIS
BOS


02-Jan-2012 Avg Difference (K)
Band 34: 13.6um
(LWIR CO2)
B34 AIRS - MODIS (K)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-50
-40
-30
-20
-10
0
10
20
30
40
50
AIRS Scan Angle
MODIS
EOS
MODIS
BOS


02-Jan-2013 Avg Difference (K)
Band 34: 13.6um
(LWIR CO2)
B34 AIRS - MODIS (K)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-50
-40
-30
-20
-10
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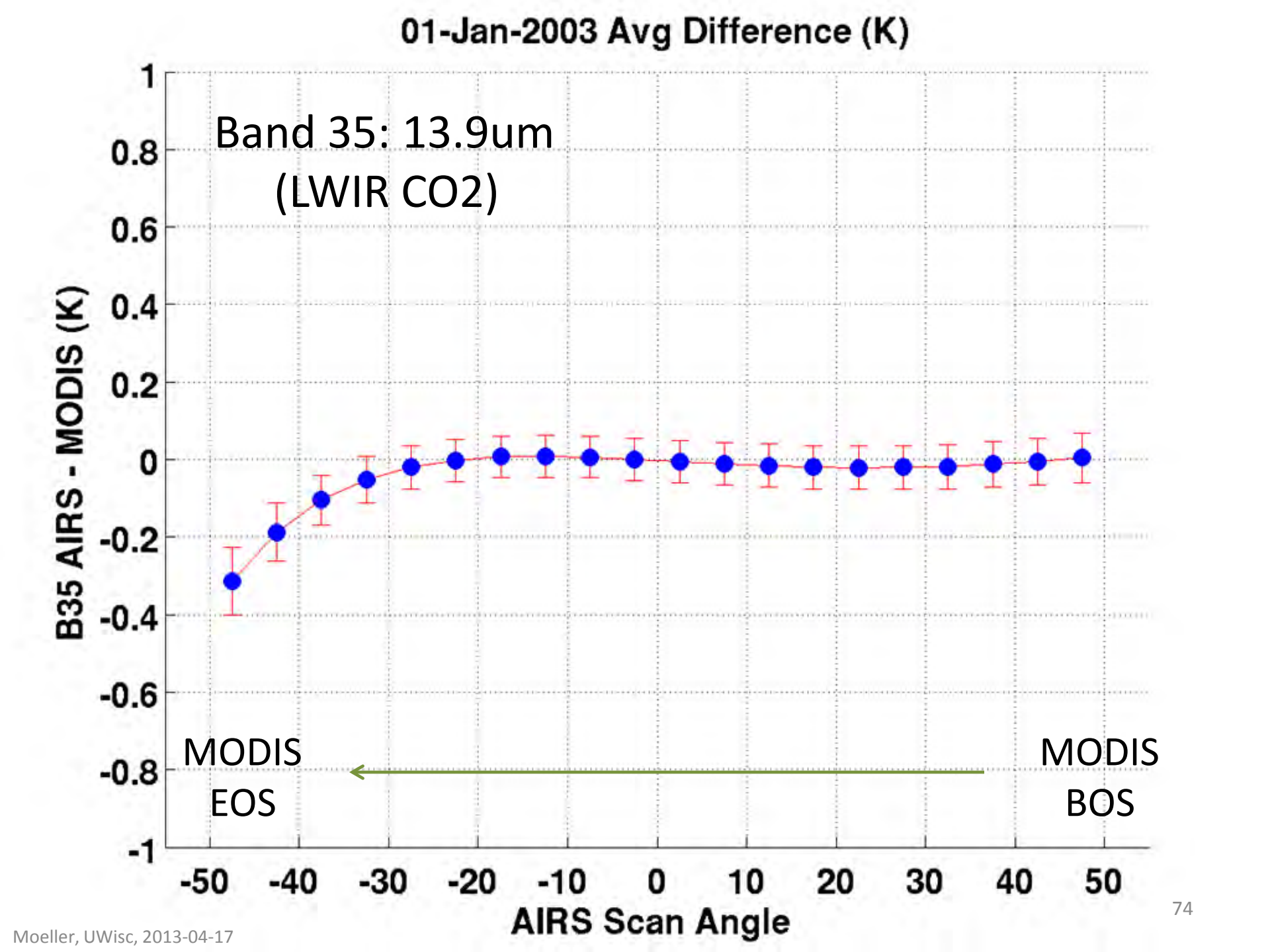
10
20
30
40
50
AIRS Scan Angle
MODIS
EOS
MODIS
BOS


01-Jan-2003 Avg Difference (K)
Band 35: 13.9um
(LWIR CO2)
B35 AIRS - MODIS (K)
1
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0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-50
-40
-30
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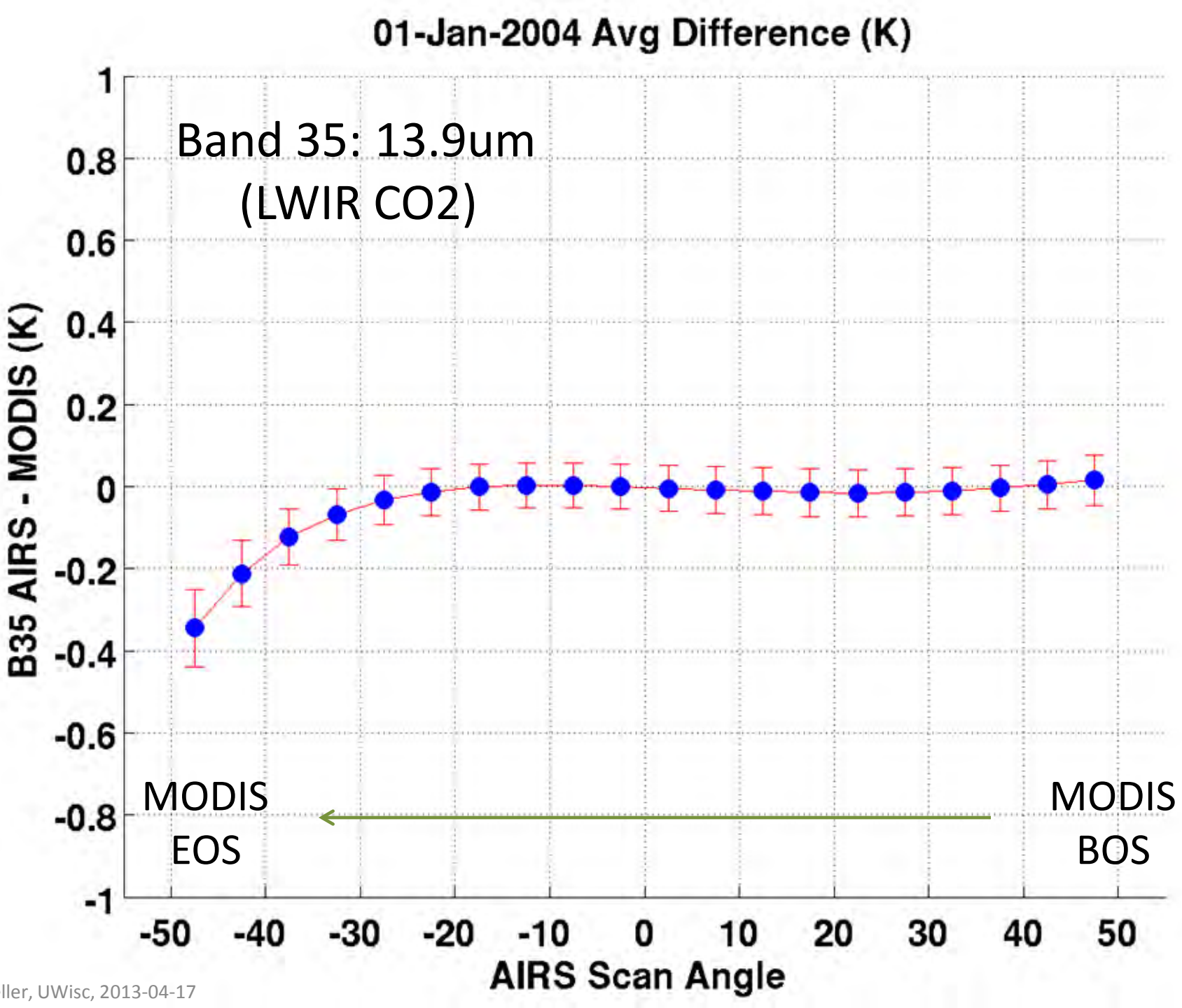
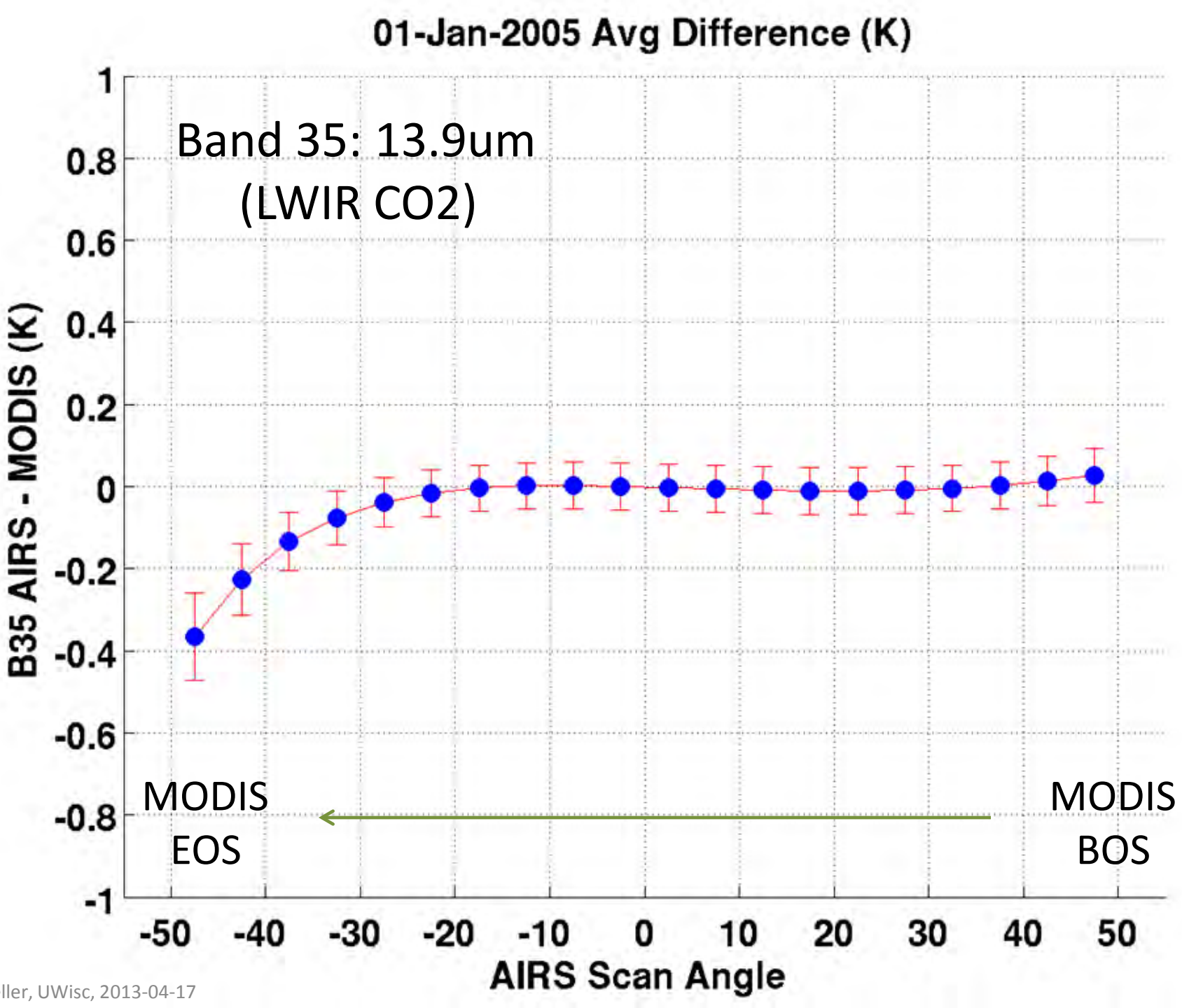
-10
0
10
20
30
40
50
AIRS Scan Angle
MODIS
EOS
MODIS
BOS


01-Jan-2004 Avg Difference (K)
Band 35: 13.9um
(LWIR CO2)
B35 AIRS - MODIS (K)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-50
-40
-30
-20
-10
0
10
20
30
40
50
AIRS Scan Angle
MODIS
EOS
MODIS
BOS


01-Jan-2005 Avg Difference (K)
Band 35: 13.9um
(LWIR CO2)
B35 AIRS - MODIS (K)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-50
-40
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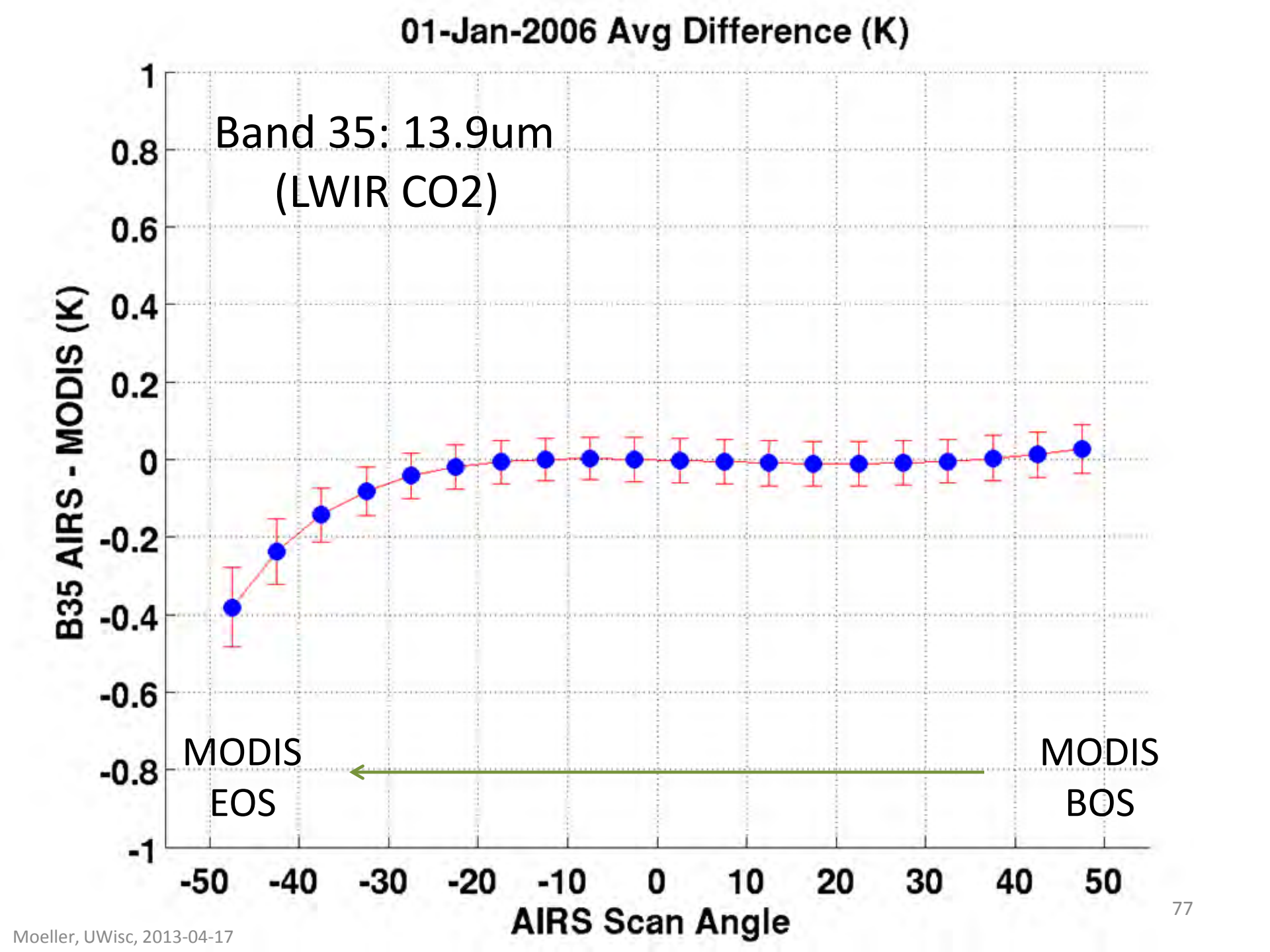
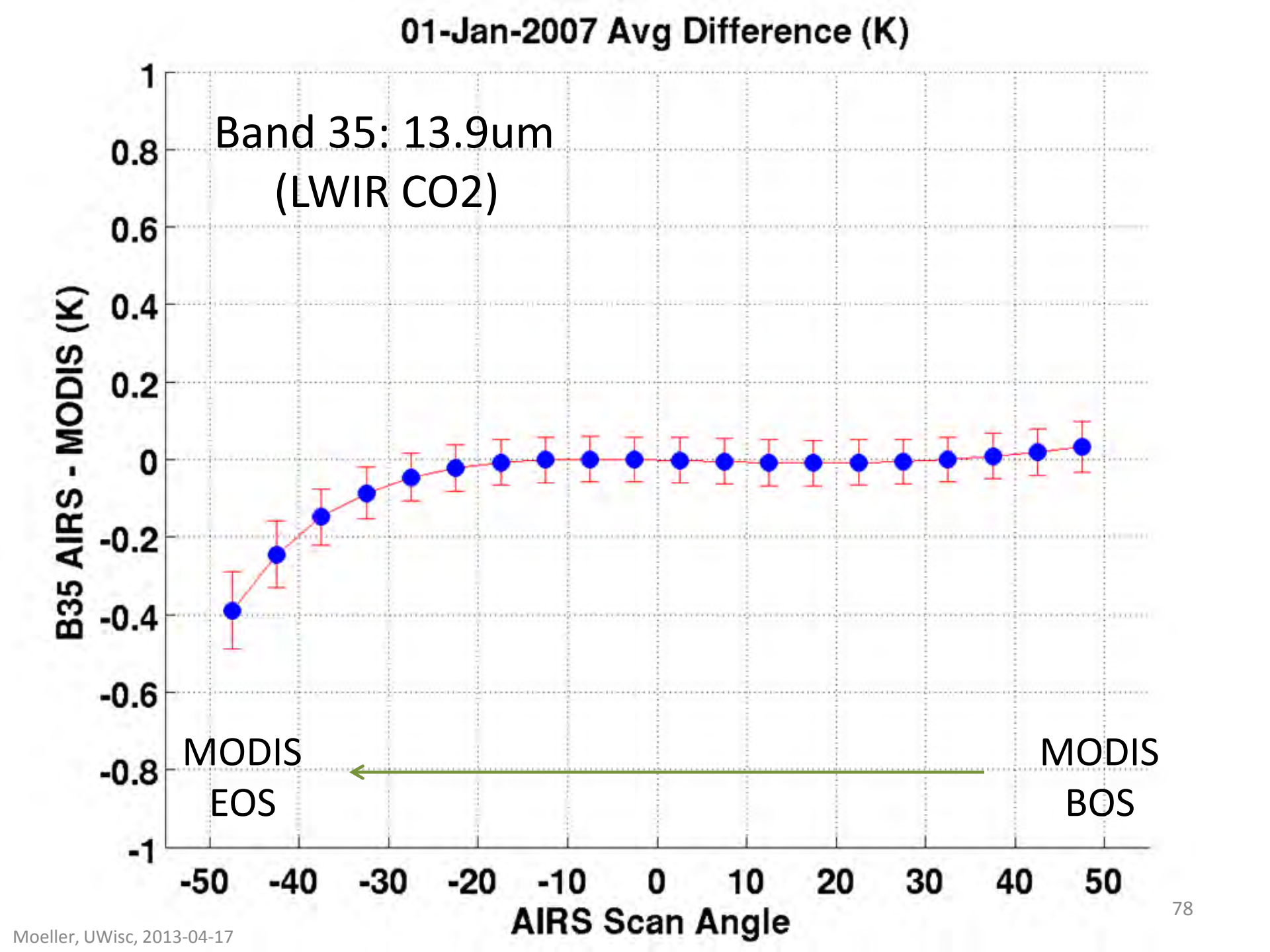
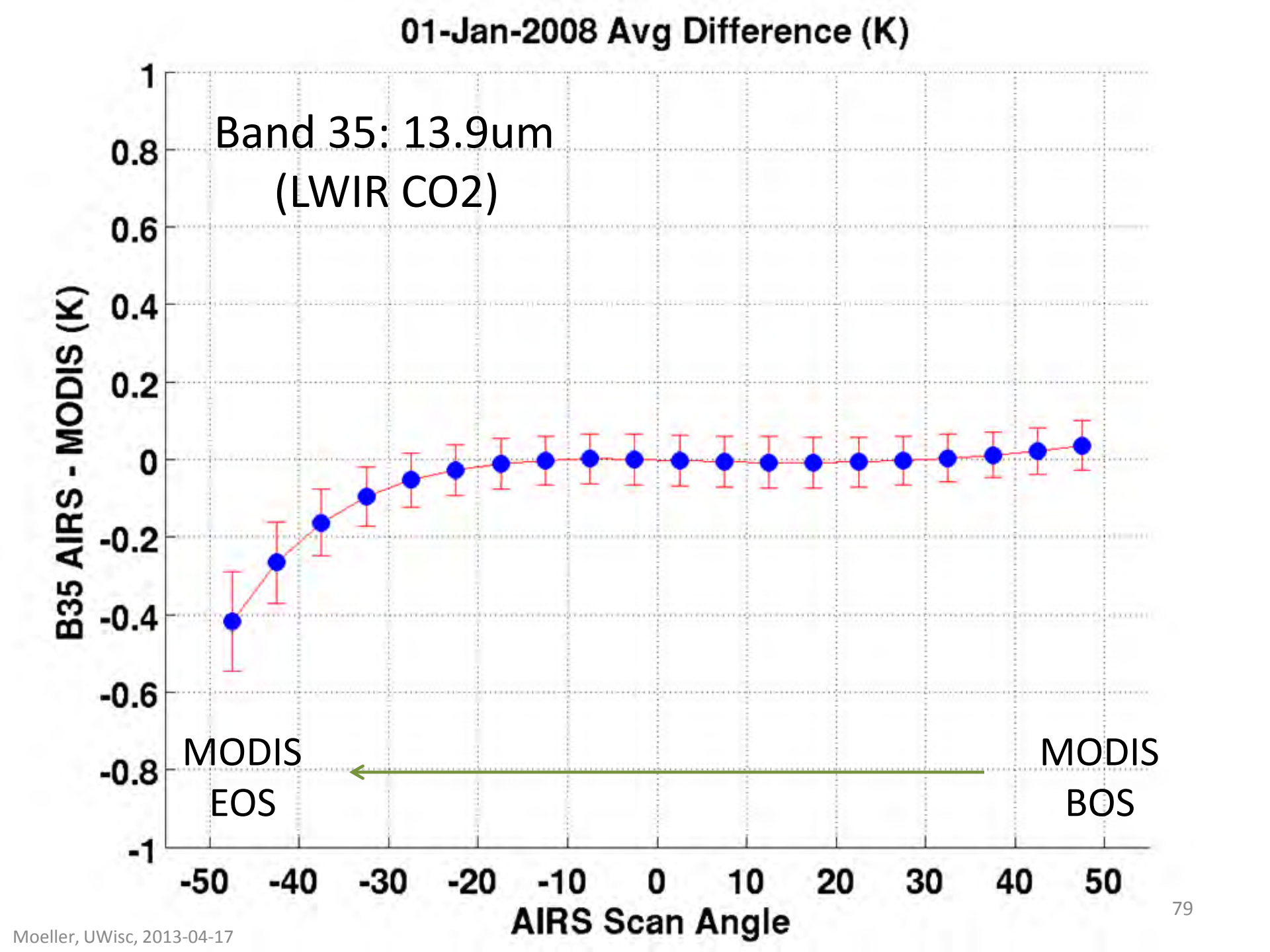
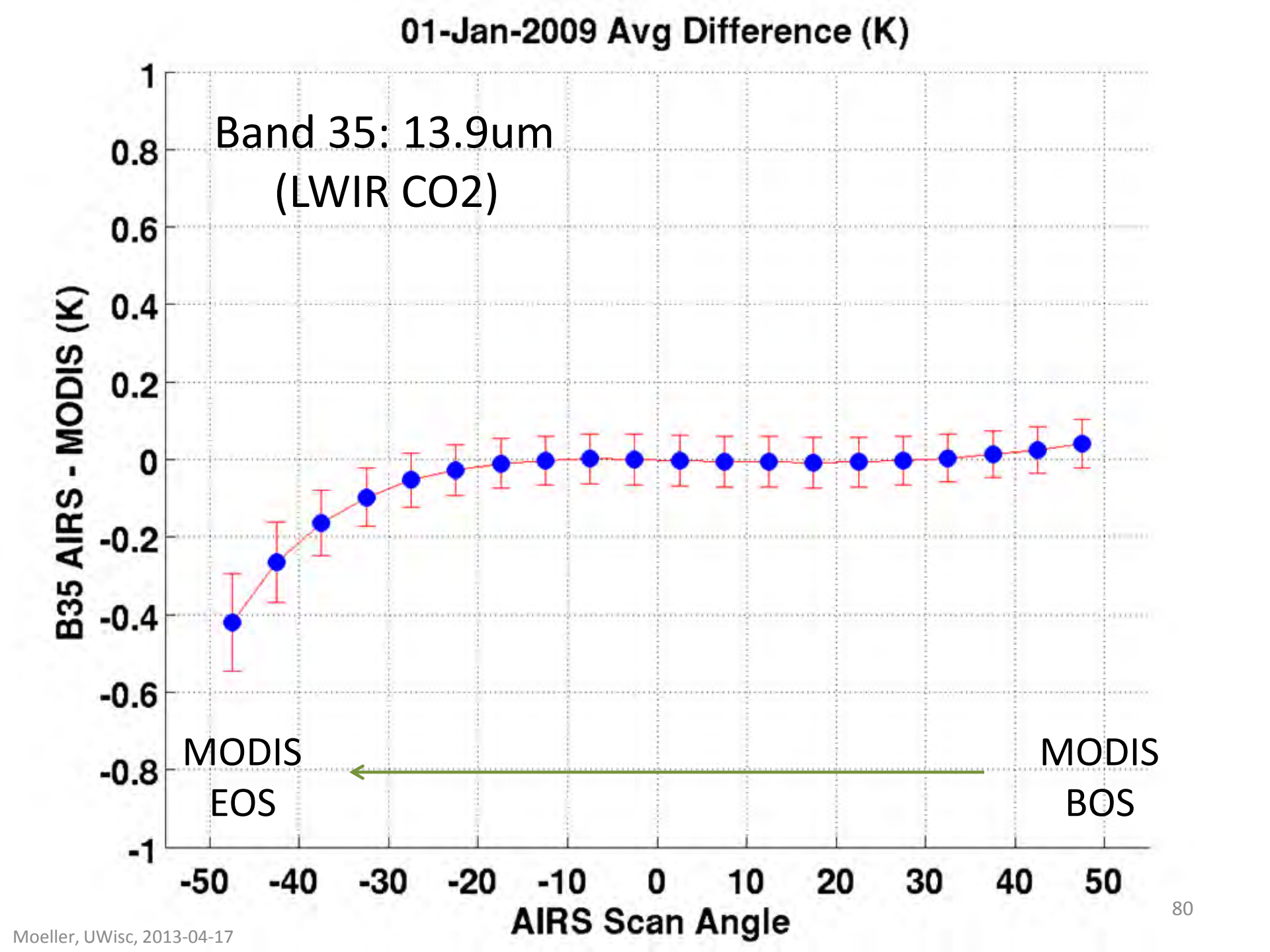
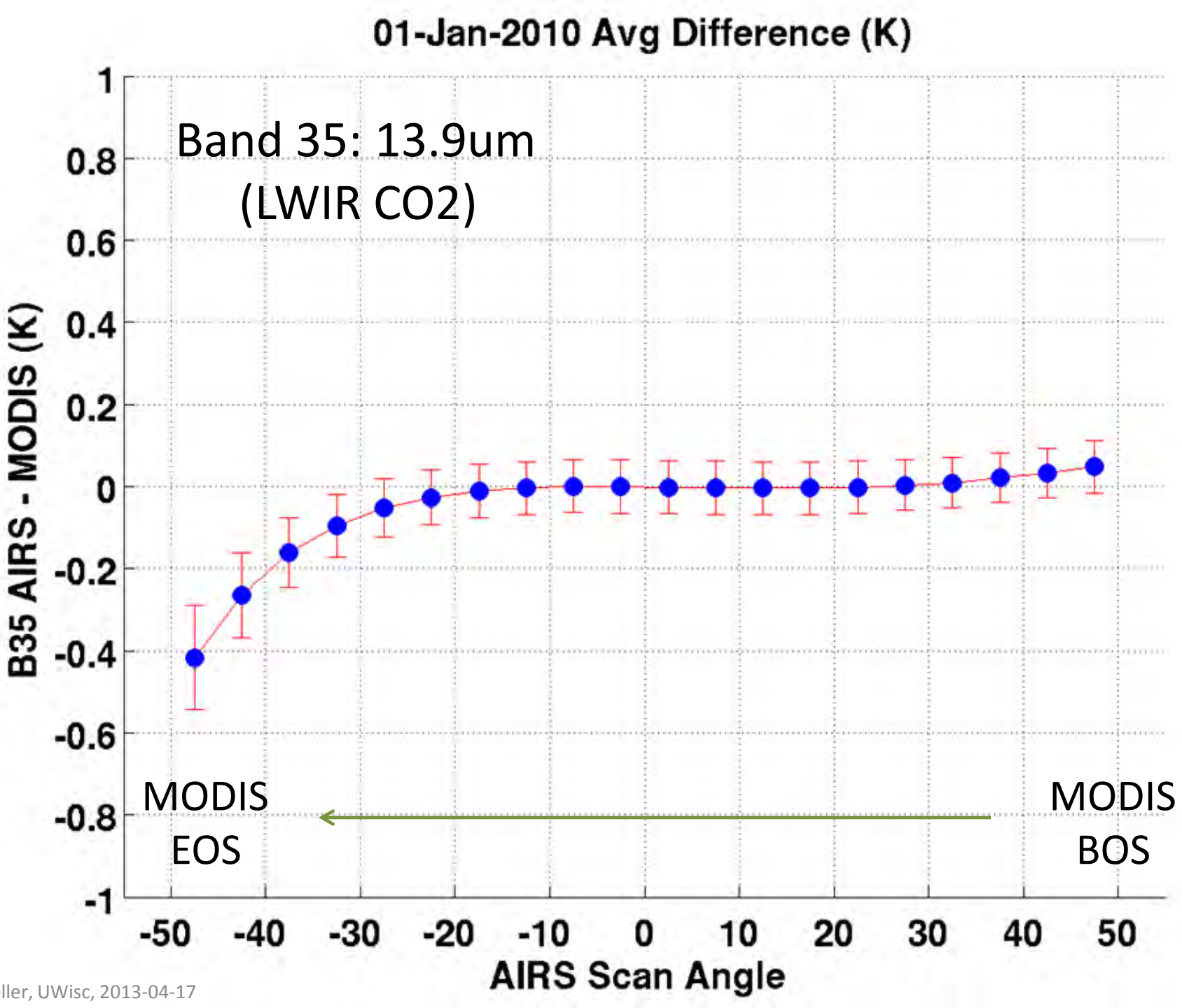
-20
-10
0
10
20
30
40
50
AIRS Scan Angle
MODIS
EOS
MODIS
BOS

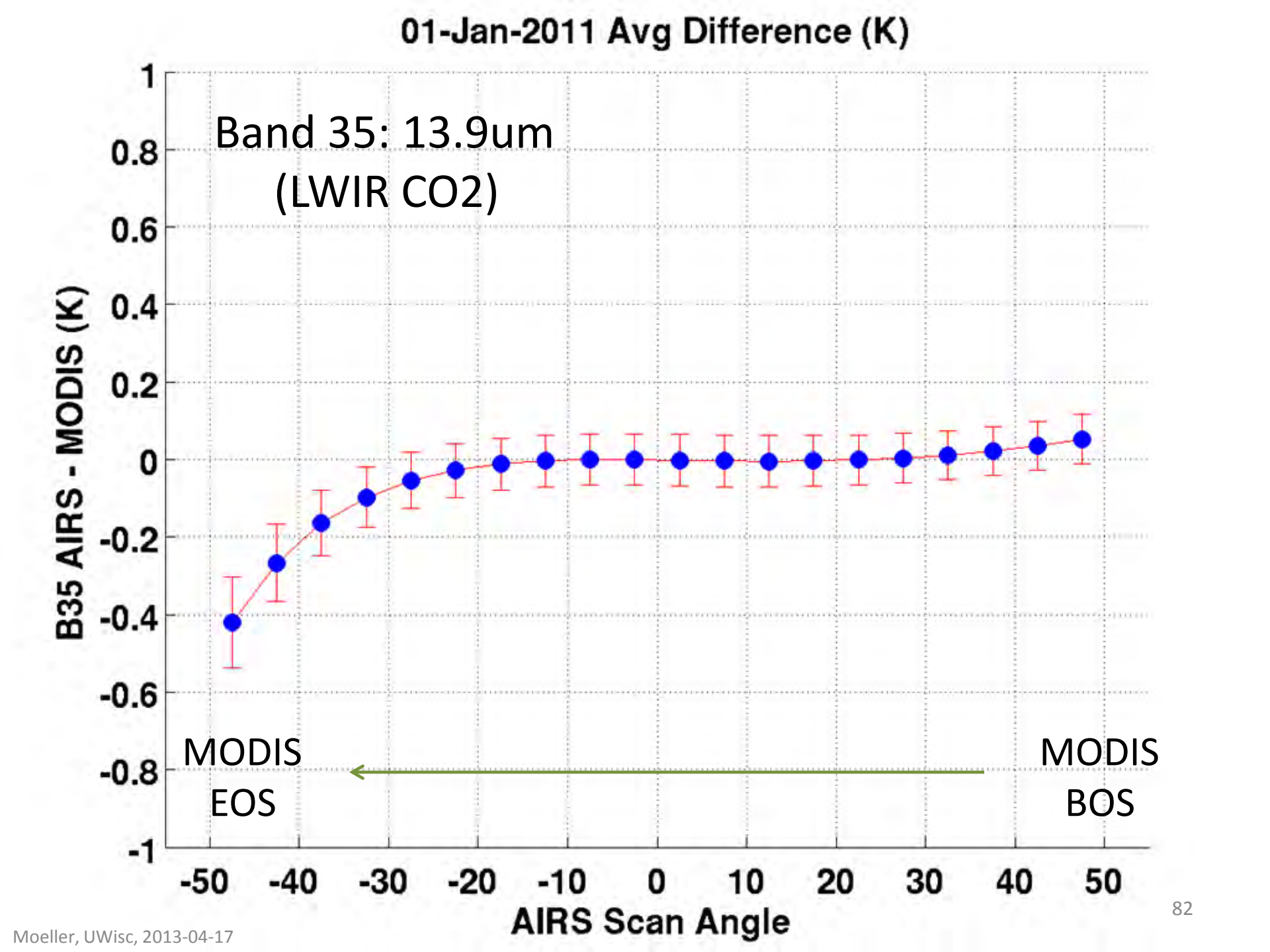

01-Jan-2006 Avg Difference (K)
Band 35: 13.9um
(LWIR CO2)
B35 AIRS - MODIS (K)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-50
-40
-30
-20
-10
0
10
20
30
40
50
AIRS Scan Angle
MODIS
EOS
MODIS
BOS

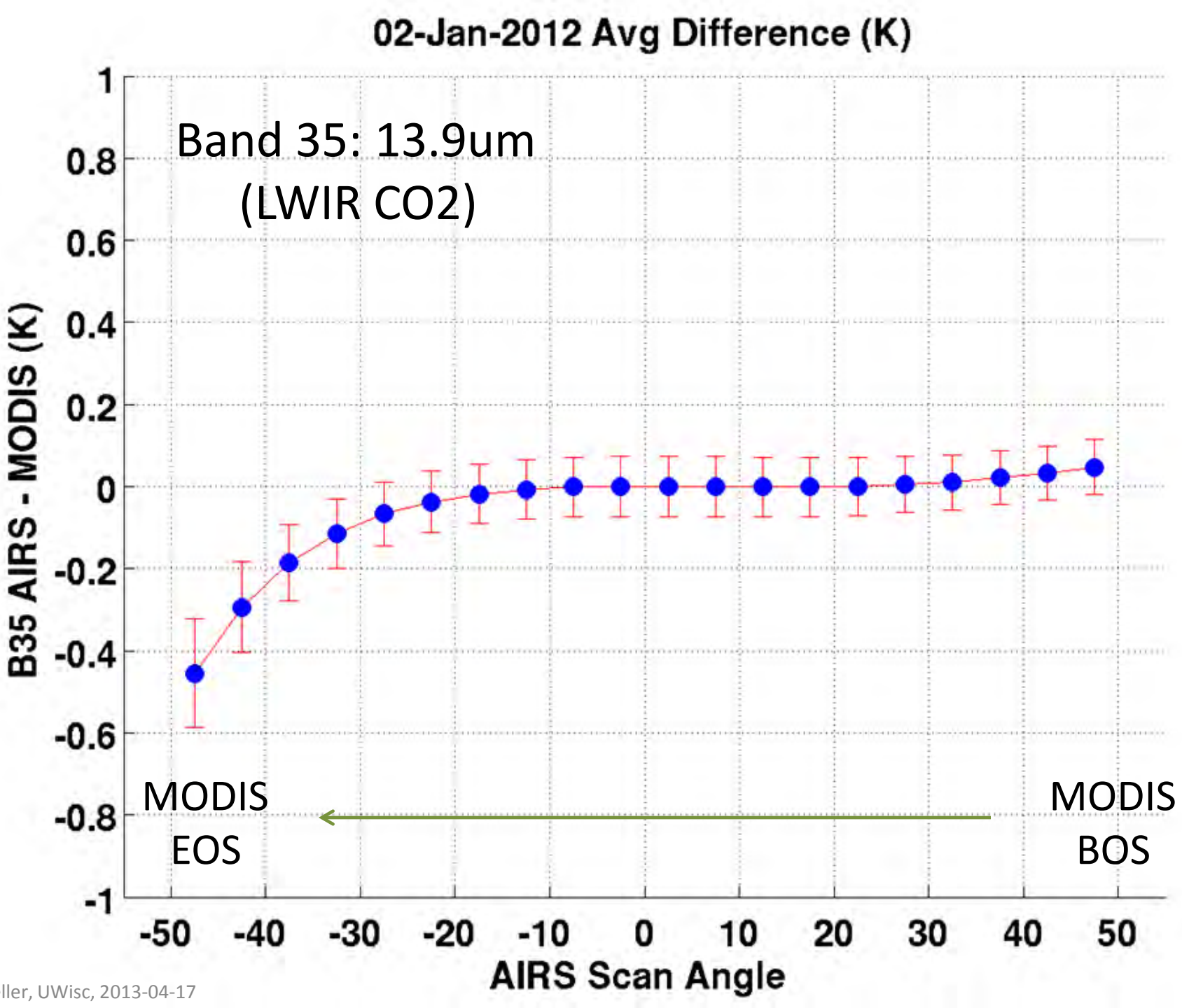

01-Jan-2007 Avg Difference (K)
Band 35: 13.9um
(LWIR CO2)
B35 AIRS - MODIS (K)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-50
-40
-30
-20
-10
0
10
20
30
40
50
AIRS Scan Angle
MODIS
EOS
MODIS
BOS

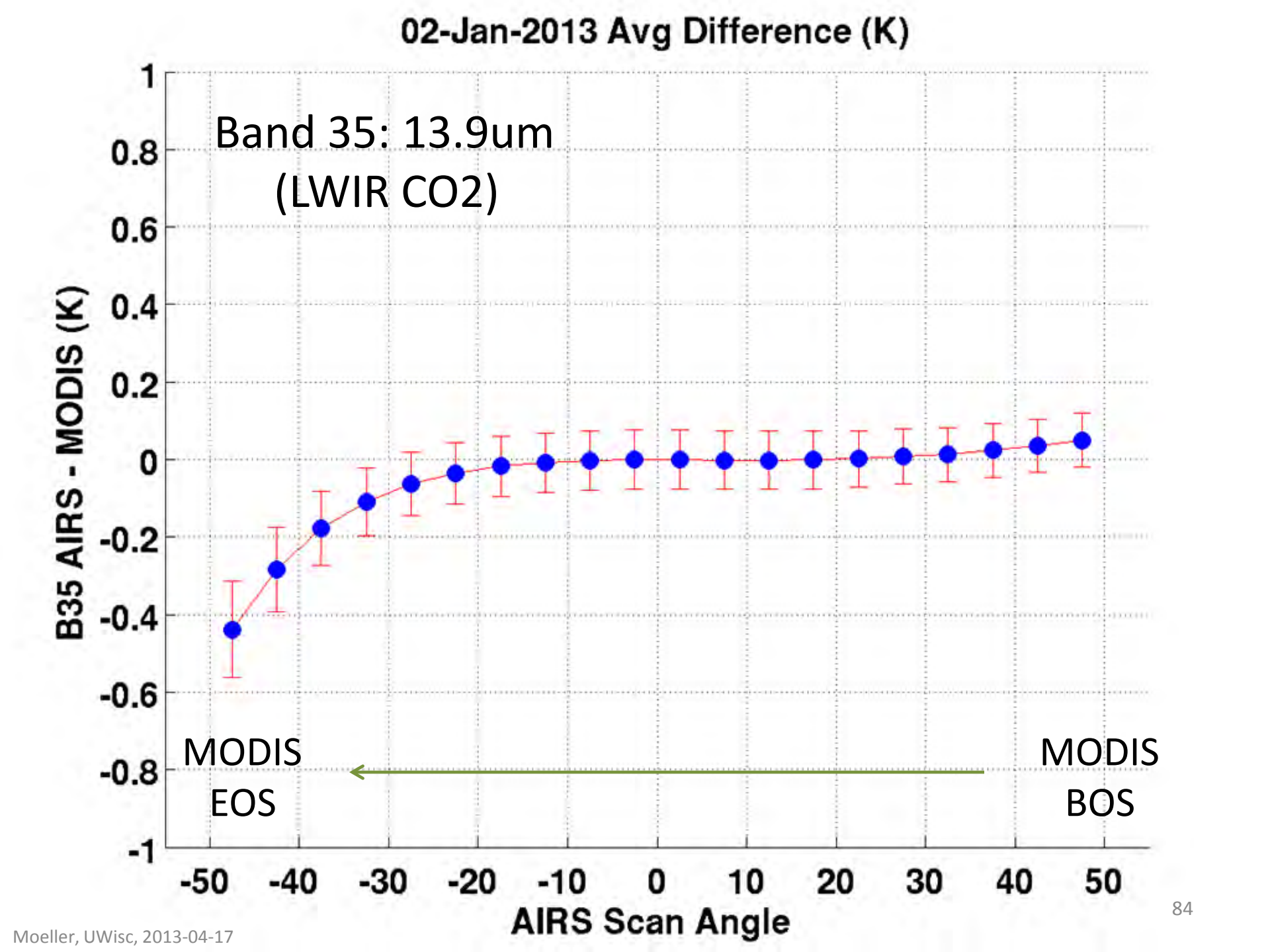

01-Jan-2008 Avg Difference (K)
Band 35: 13.9um
(LWIR CO2)
B35 AIRS - MODIS (K)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-50
-40
-30
-20
-10
0
10
20
30
40
50
AIRS Scan Angle
MODIS
EOS
MODIS
BOS

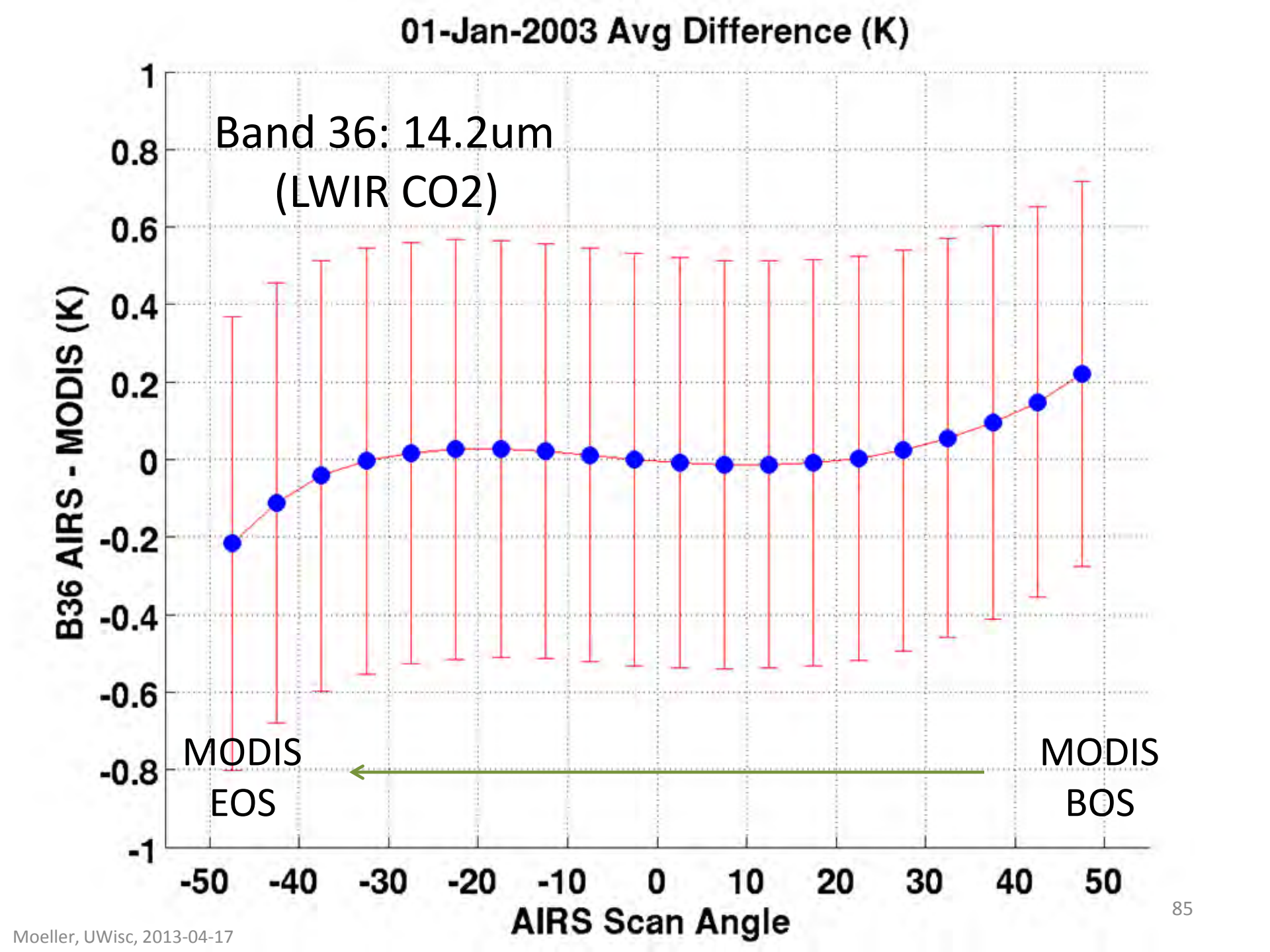

01-Jan-2009 Avg Difference (K)
Band 35: 13.9um
(LWIR CO2)
B35 AIRS - MODIS (K)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-50
-40
-30
-20
-10
0
10
20
30
40
50
AIRS Scan Angle
MODIS
EOS
MODIS
BOS

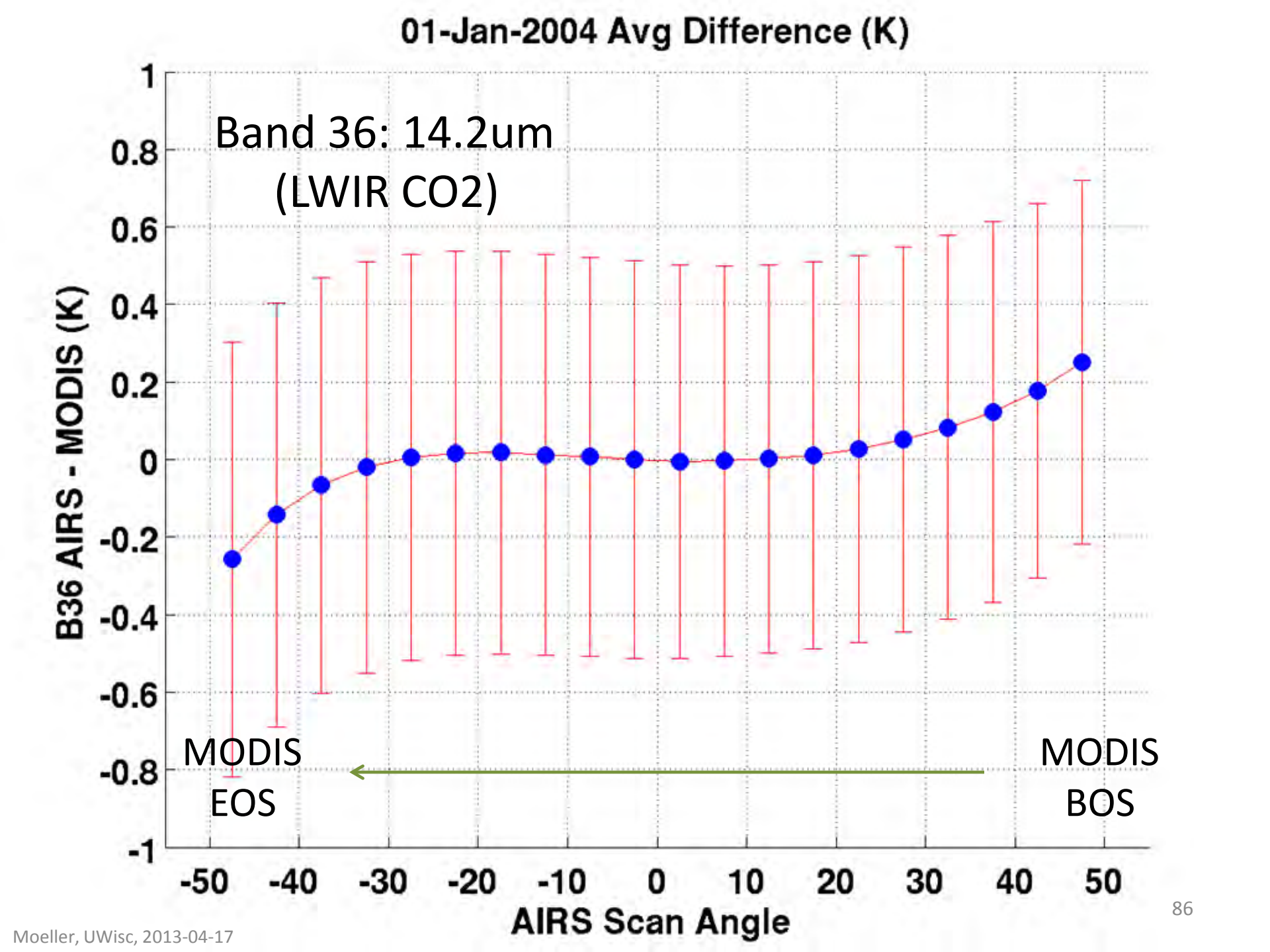

01-Jan-2010 Avg Difference (K)
Band 35: 13.9um
(LWIR CO2)
B35 AIRS - MODIS (K)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-50
-40
-30
-20
-10
0
10
20
30
40
50
AIRS Scan Angle
MODIS
EOS
MODIS
BOS

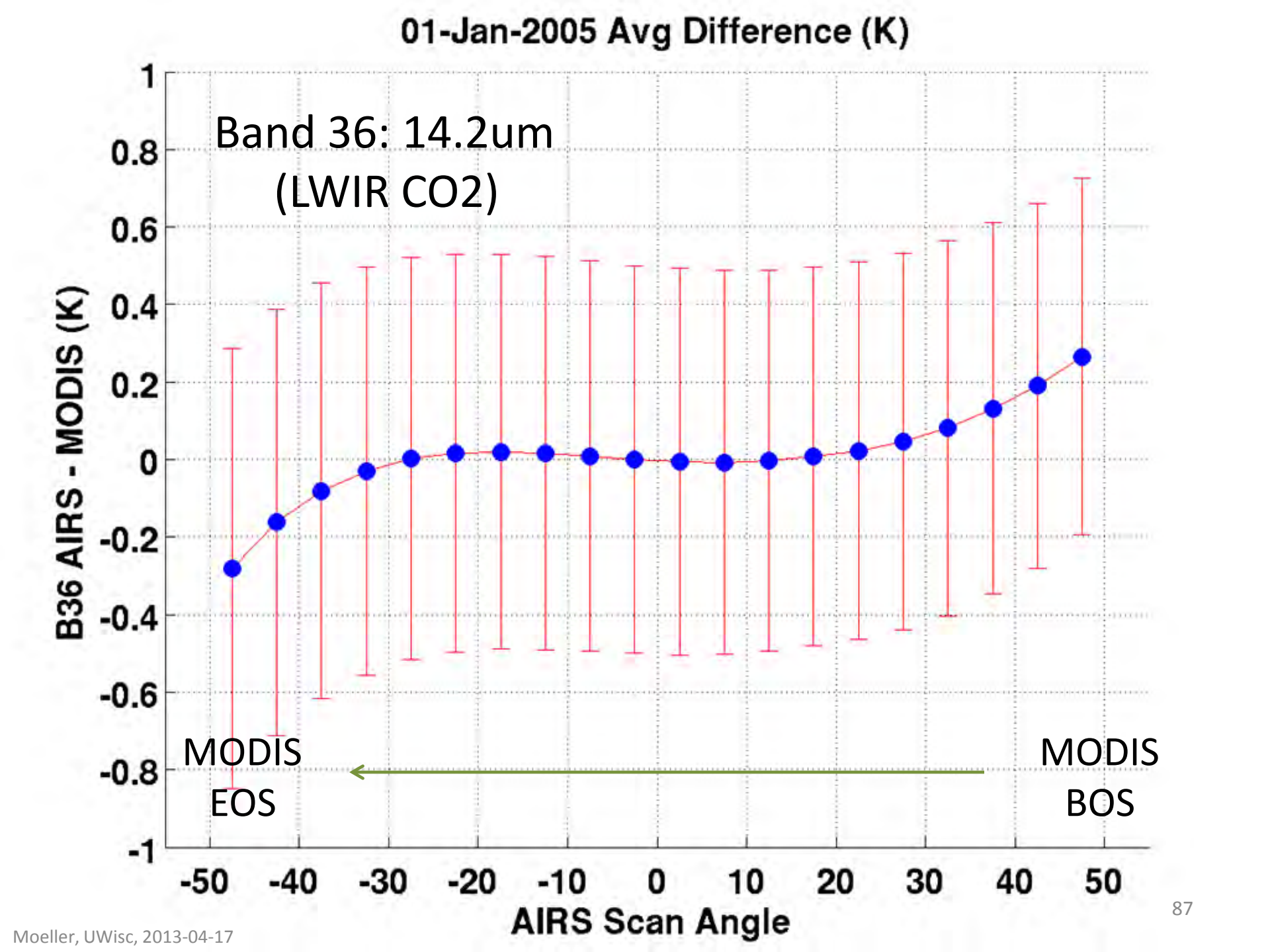

01-Jan-2011 Avg Difference (K)
Band 35: 13.9um
(LWIR CO2)
B35 AIRS - MODIS (K)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-50
-40
-30
-20
-10
0
10
20
30
40
50
AIRS Scan Angle
MODIS
EOS
MODIS
BOS

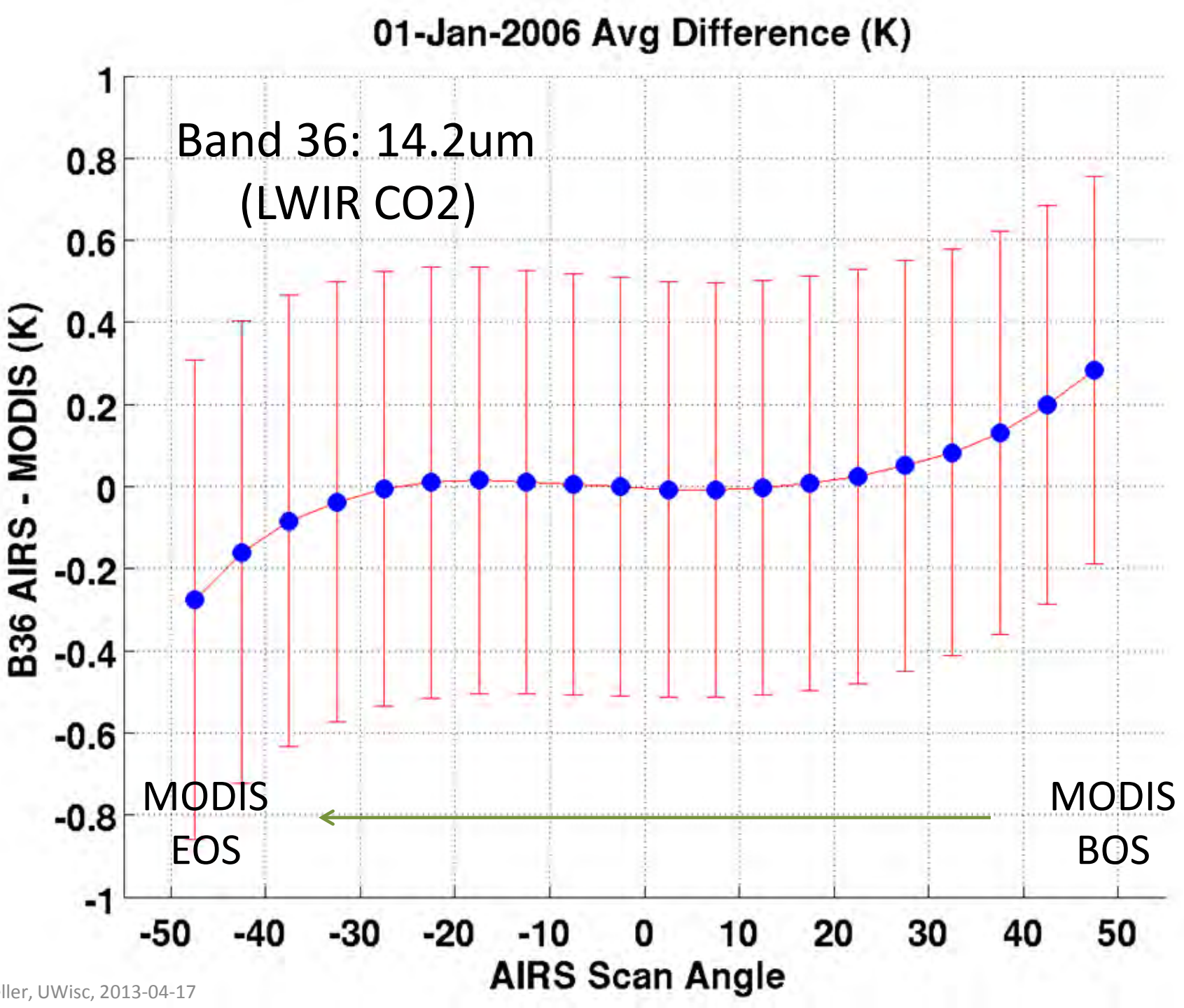

02-Jan-2012 Avg Difference (K)
Band 35: 13.9um
(LWIR CO2)
B35 AIRS - MODIS (K)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-50
-40
-30
-20
-10
0
10
20
30
40
50
AIRS Scan Angle
MODIS
EOS
MODIS
BOS

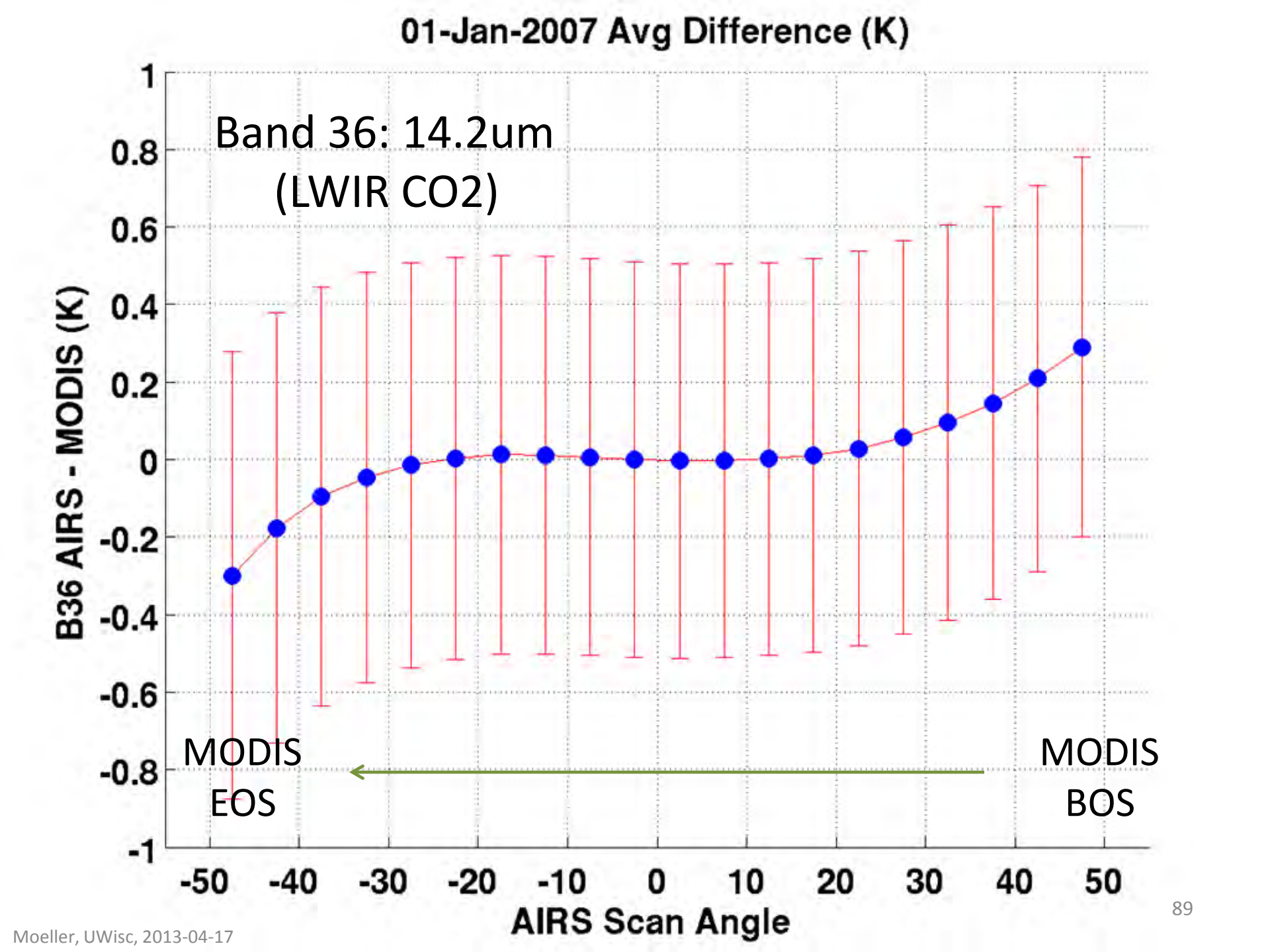

02-Jan-2013 Avg Difference (K)
Band 35: 13.9um
(LWIR CO2)
B35 AIRS - MODIS (K)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-50
-40
-30
-20
-10
0
10
20
30
40
50
AIRS Scan Angle
MODIS
EOS
MODIS
BOS

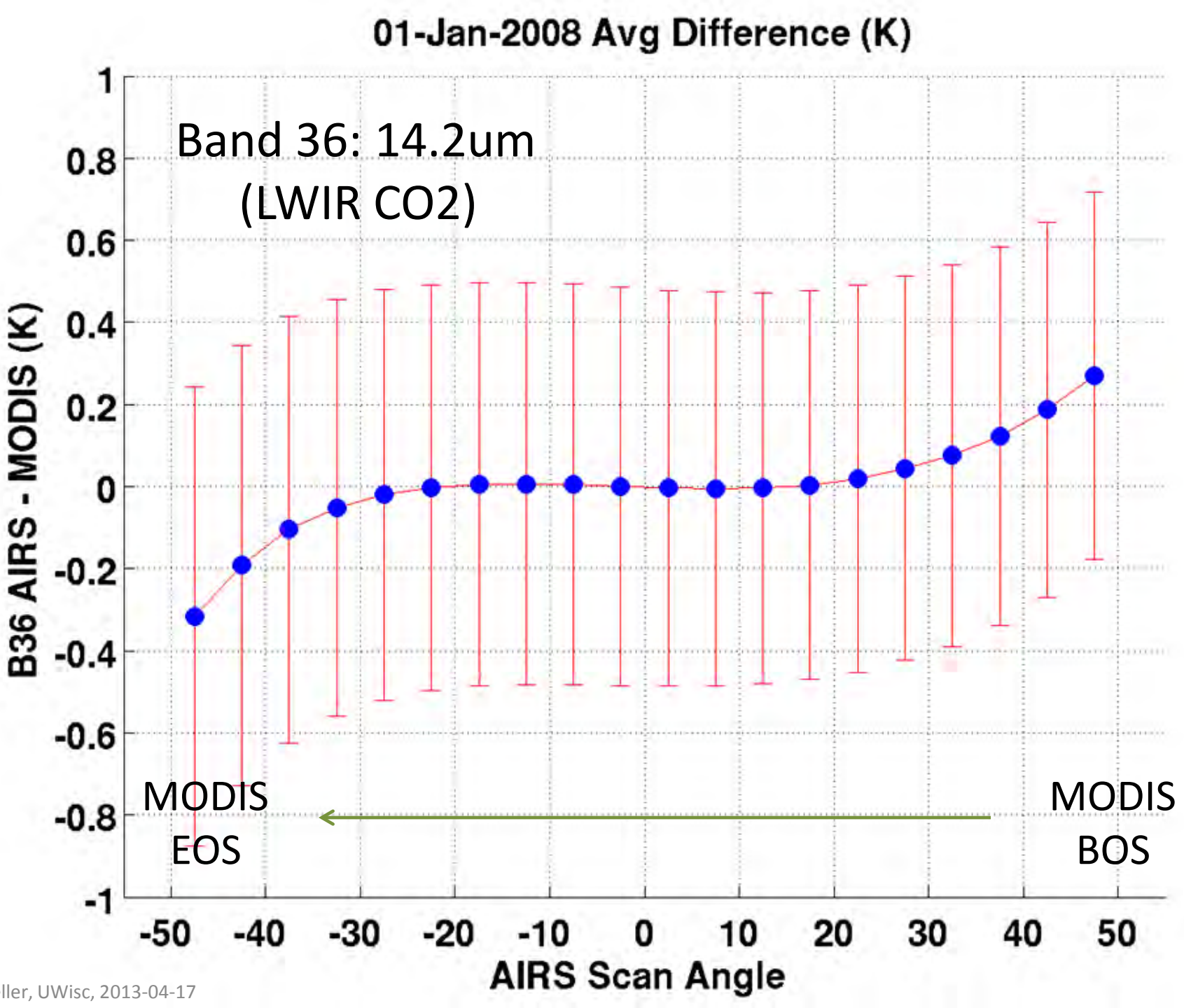

01-Jan-2003 Avg Difference (K)
Band 36: 14.2um
(LWIR CO2)
B36 AIRS - MODIS (K)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-50
-40
-30
-20
-10
0
10
20
30
40
50
AIRS Scan Angle
MODIS
EOS
MODIS
BOS

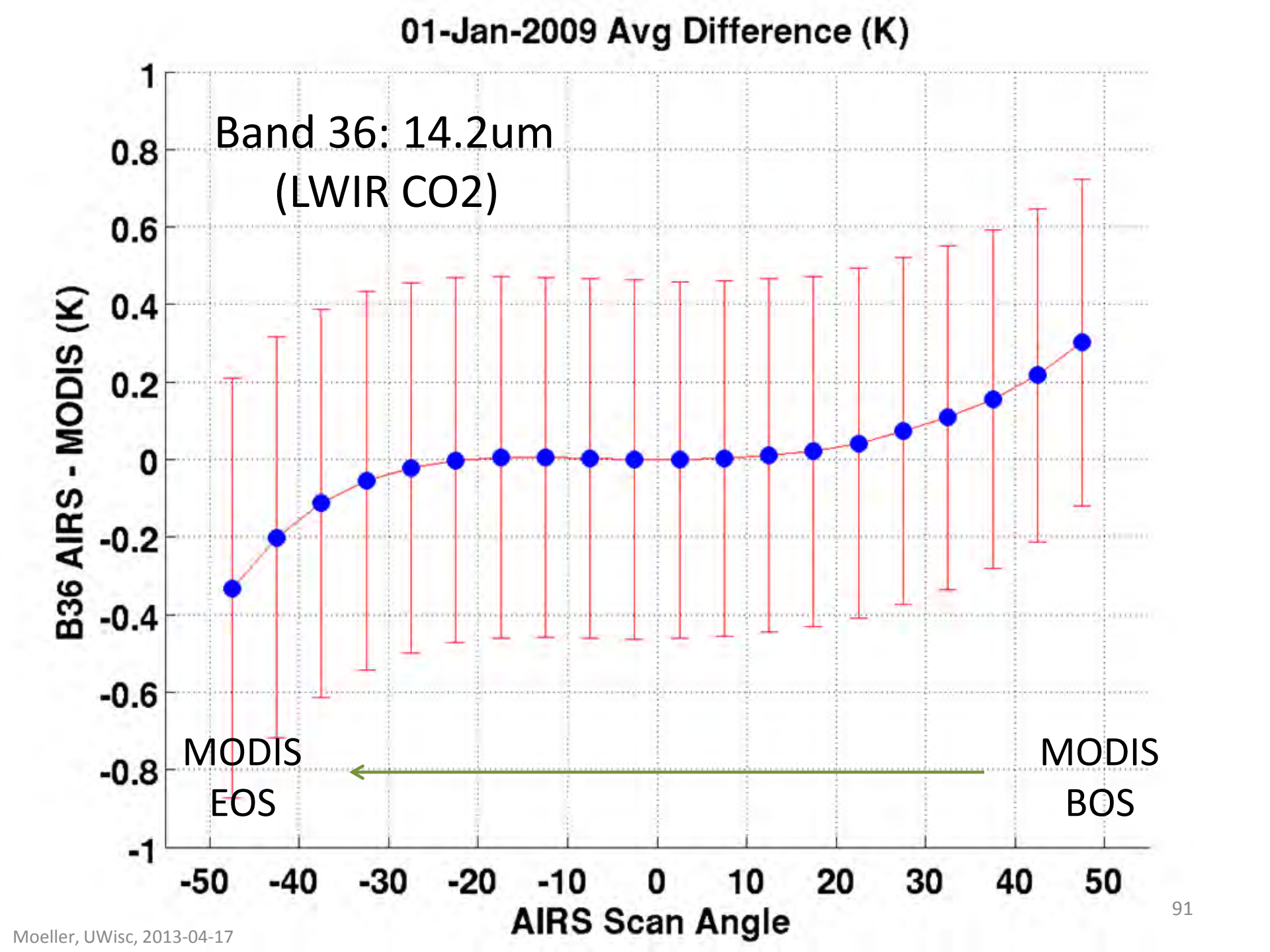

01-Jan-2004 Avg Difference (K)
Band 36: 14.2um
(LWIR CO2)
B36 AIRS - MODIS (K)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-50
-40
-30
-20
-10
0
10
20
30
40
50
AIRS Scan Angle
MODIS
EOS
MODIS
BOS

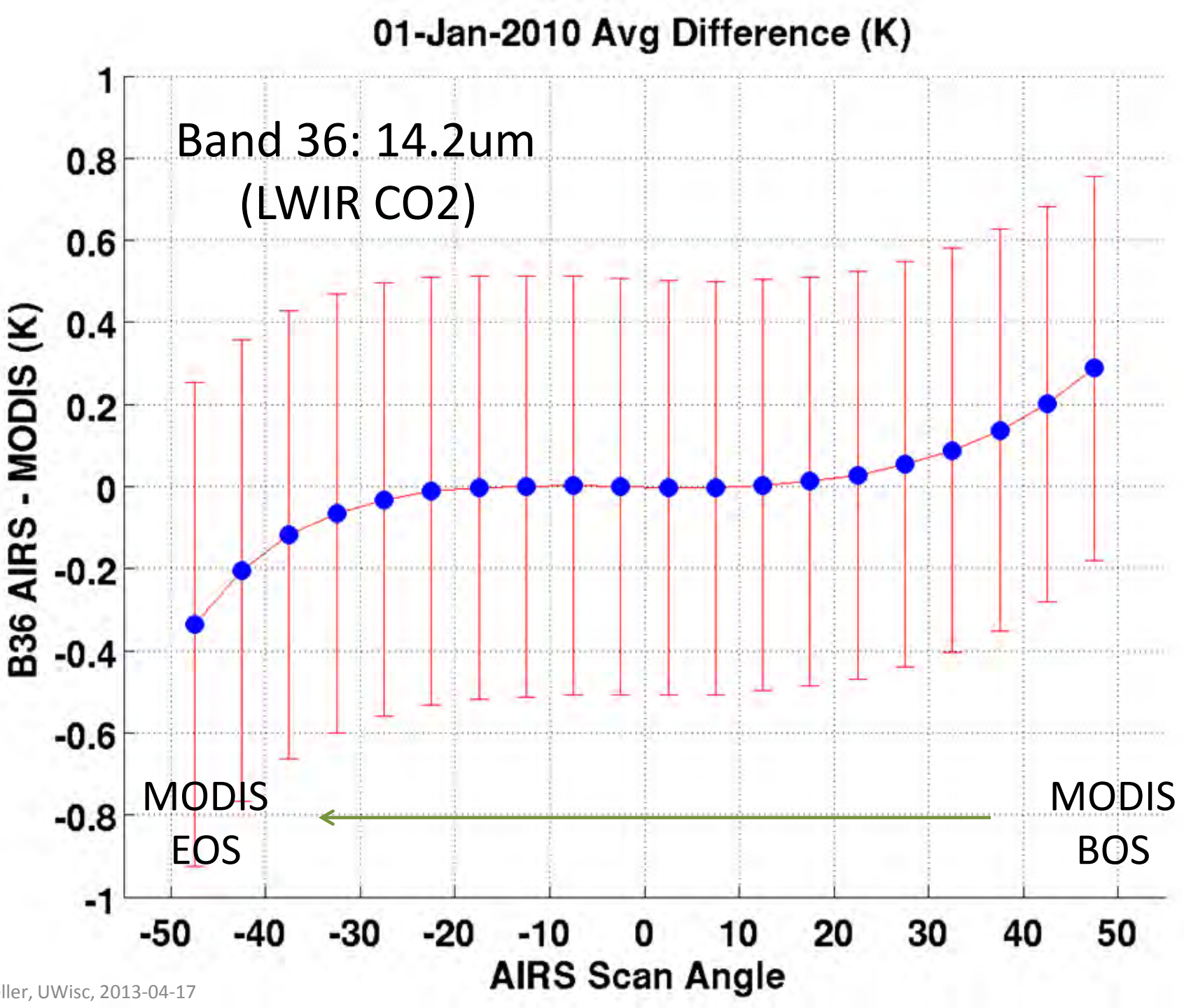

01-Jan-2005 Avg Difference (K)
Band 36: 14.2um
(LWIR CO2)
B36 AIRS - MODIS (K)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-50
-40
-30
-20
-10
0
10
20
30
40
50
AIRS Scan Angle
MODIS
EOS
MODIS
BOS

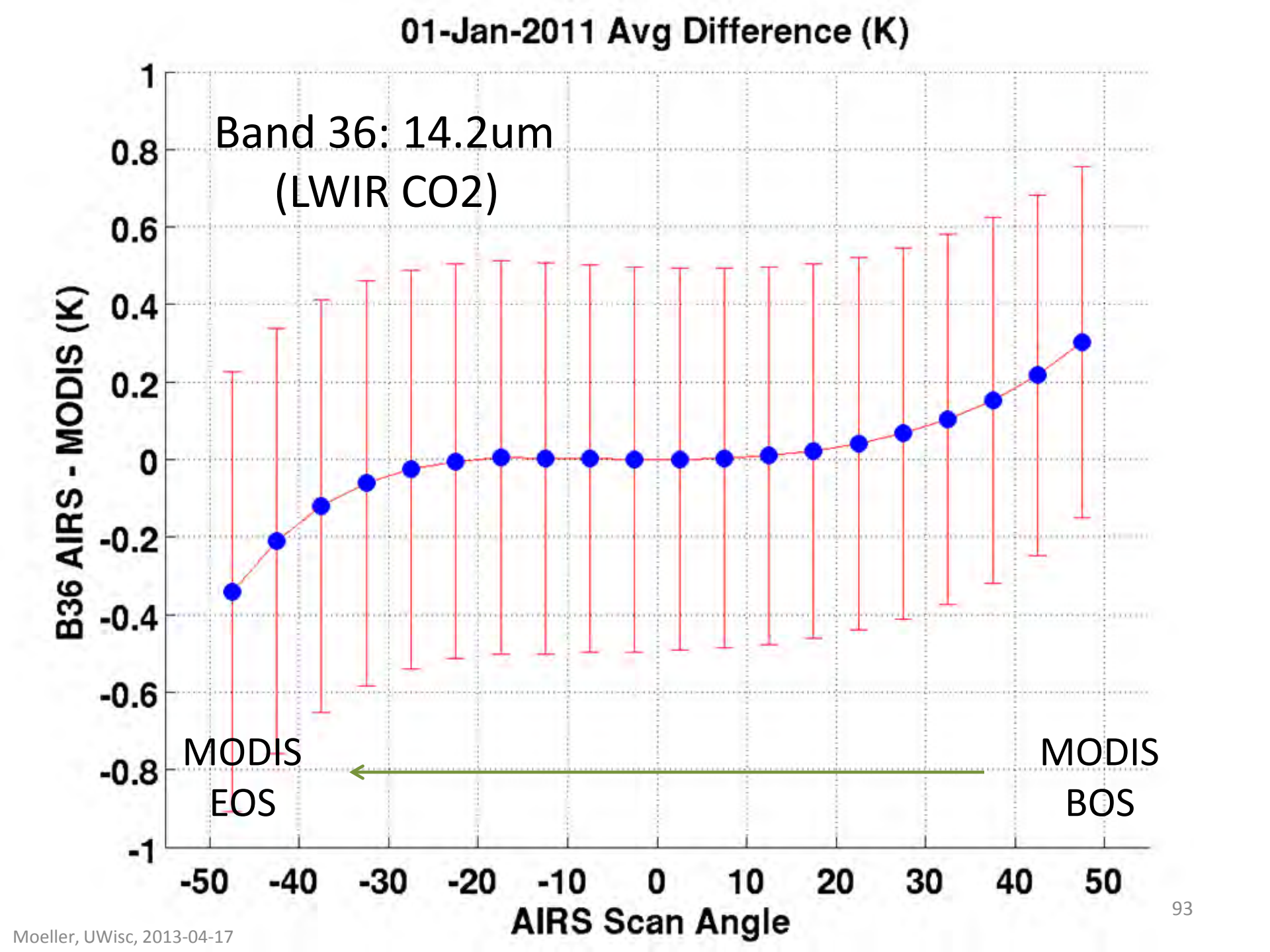

01-Jan-2006 Avg Difference (K)
Band 36: 14.2um
(LWIR CO2)
B36 AIRS - MODIS (K)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-50
-40
-30
-20
-10
0
10
20
30
40
50
AIRS Scan Angle
MODIS
EOS
MODIS
BOS

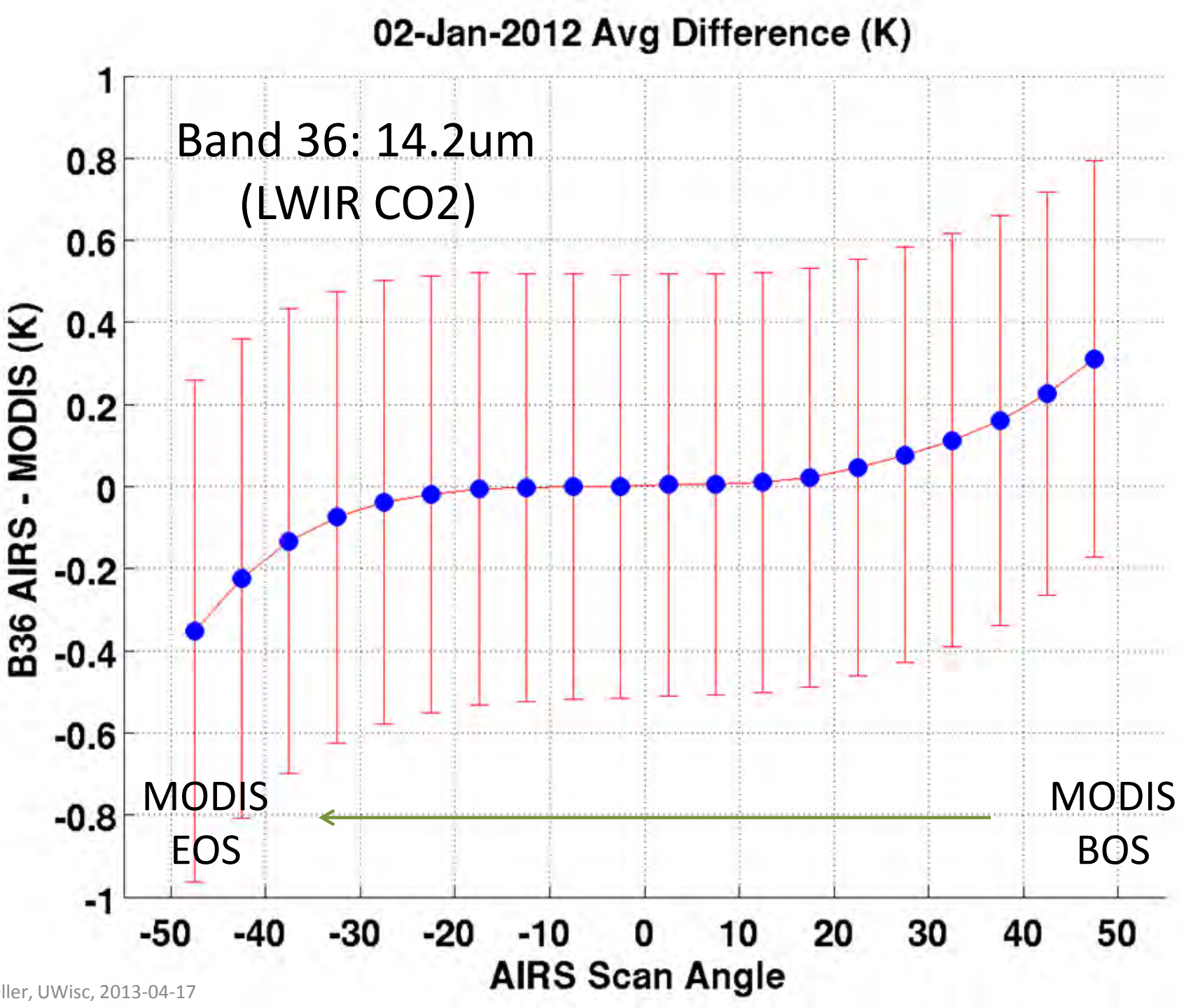

01-Jan-2007 Avg Difference (K)
Band 36: 14.2um
(LWIR CO2)
B36 AIRS - MODIS (K)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-50
-40
-30
-20
-10
0
10
20
30
40
50
AIRS Scan Angle
MODIS
EOS
MODIS
BOS

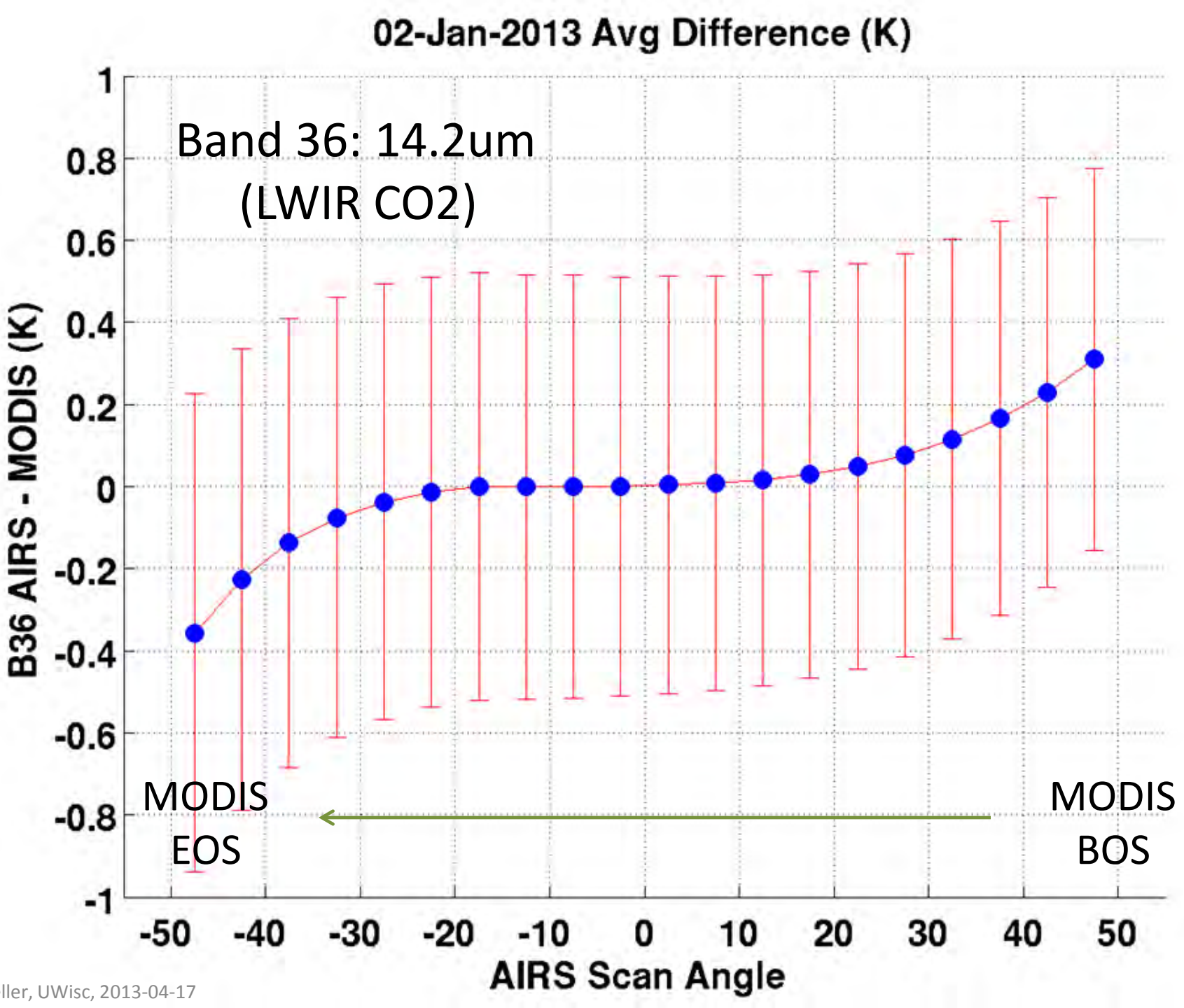

01-Jan-2008 Avg Difference (K)
Band 36: 14.2um
(LWIR CO2)
B36 AIRS - MODIS (K)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-50
-40
-30
-20
-10
0
10
20
30
40
50
AIRS Scan Angle
MODIS
EOS
MODIS
BOS


01-Jan-2009 Avg Difference (K)
Band 36: 14.2um
(LWIR CO2)
B36 AIRS - MODIS (K)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-50
-40
-30
-20
-10
0
10
20
30
40
50
AIRS Scan Angle
MODIS
EOS
MODIS
BOS


01-Jan-2010 Avg Difference (K)
Band 36: 14.2um
(LWIR CO2)
B36 AIRS - MODIS (K)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-50
-40
-30
-20
-10
0
10
20
30
40
50
AIRS Scan Angle
MODIS
EOS
MODIS
BOS


01-Jan-2011 Avg Difference (K)
Band 36: 14.2um
(LWIR CO2)
B36 AIRS - MODIS (K)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-50
-40
-30
-20
-10
0
10
20
30
40
50
AIRS Scan Angle
MODIS
EOS
MODIS
BOS


02-Jan-2012 Avg Difference (K)
Band 36: 14.2um
(LWIR CO2)
B36 AIRS - MODIS (K)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-50
-40
-30
-20
-10
0
10
20
30
40
50
AIRS Scan Angle
MODIS
EOS
MODIS
BOS


02-Jan-2013 Avg Difference (K)
Band 36: 14.2um
(LWIR CO2)
B36 AIRS - MODIS (K)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-50
-40
-30
-20
-10
0
10
20
30
40
50
AIRS Scan Angle
MODIS
EOS
MODIS
BOS

Summary: Aqua MODIS RVS

- Aqua MODIS LWIR CO2 bands 33-36 (and B30) exhibit a small (up to 0.3K) baseline bias at end of scan attributable to MODIS RVS characterization.
- This bias appears to trend from baseline over time in LWIR CO2 bands, adding another ~0.1K.
- Aqua MODIS RVS was not measured on-orbit with a Deep Space Maneuver.
- If on-orbit evolution is occurring in Aqua MODIS RVS then its probably also occurring on Terra.

Terra MODIS Radiometric Performance

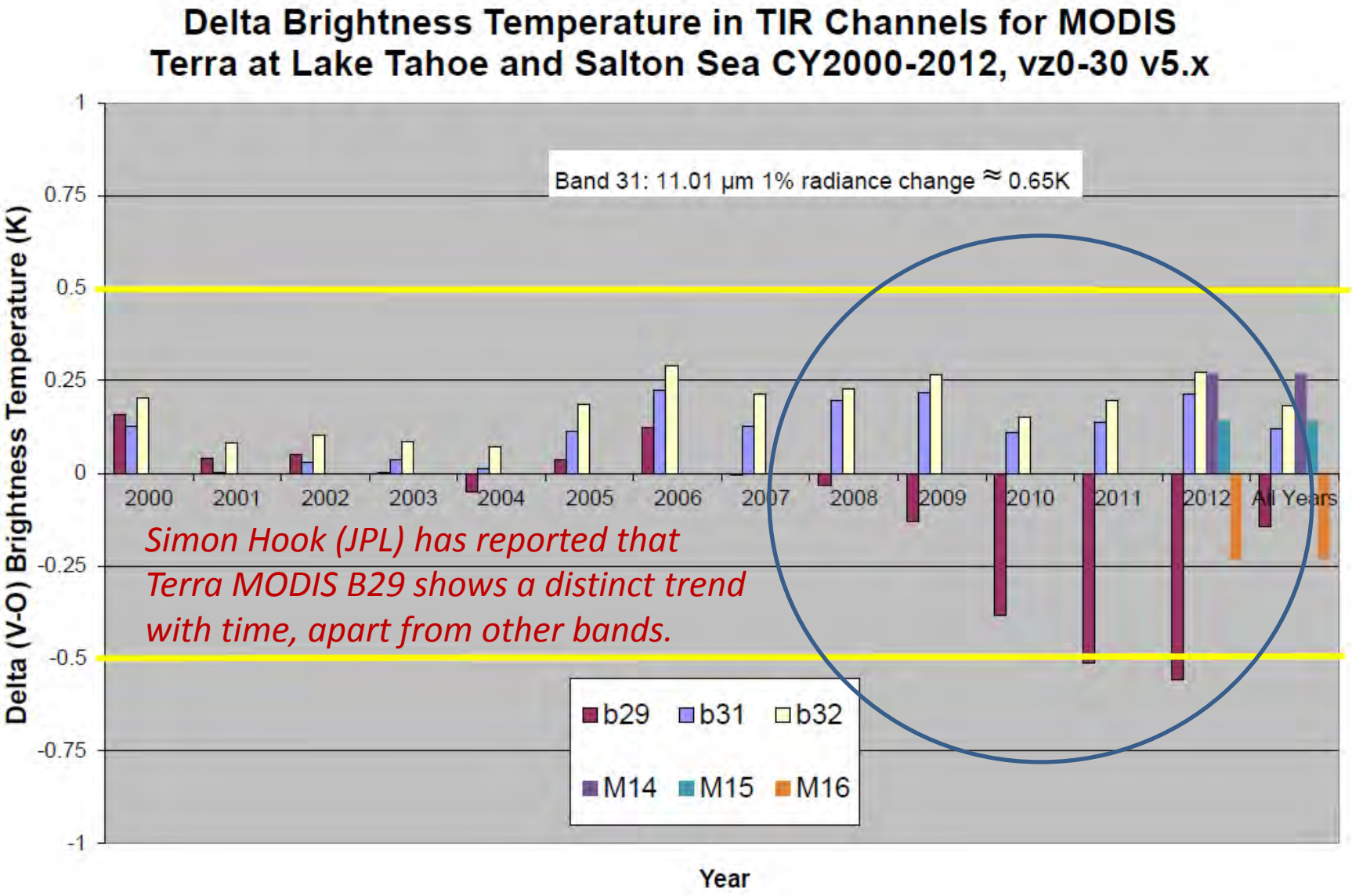
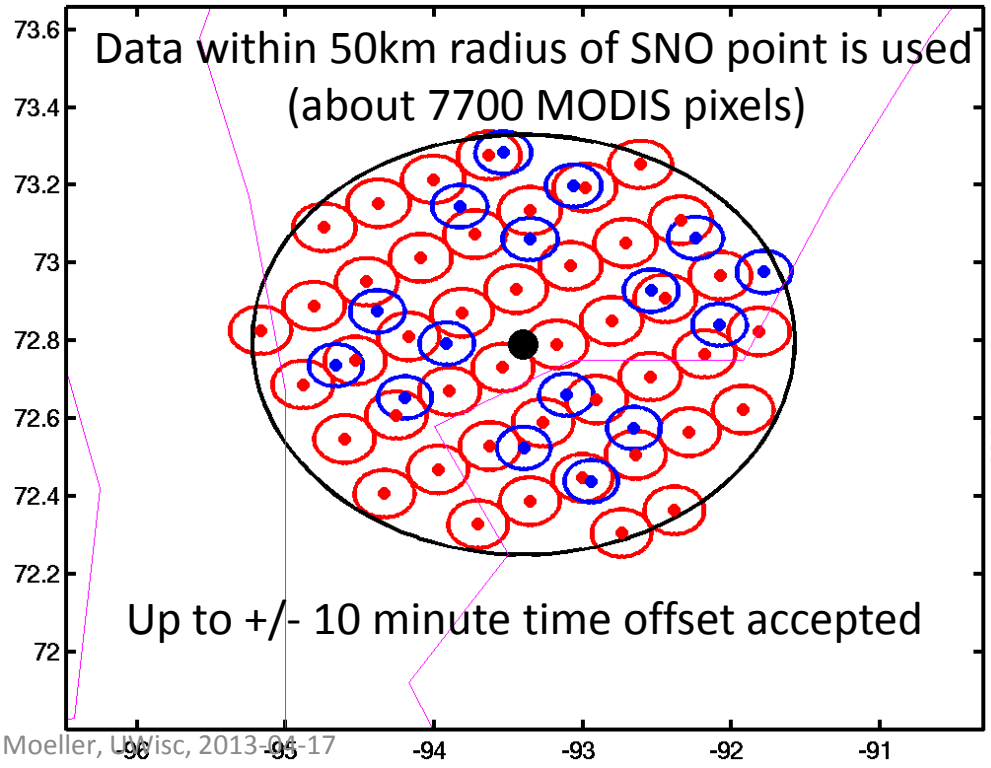
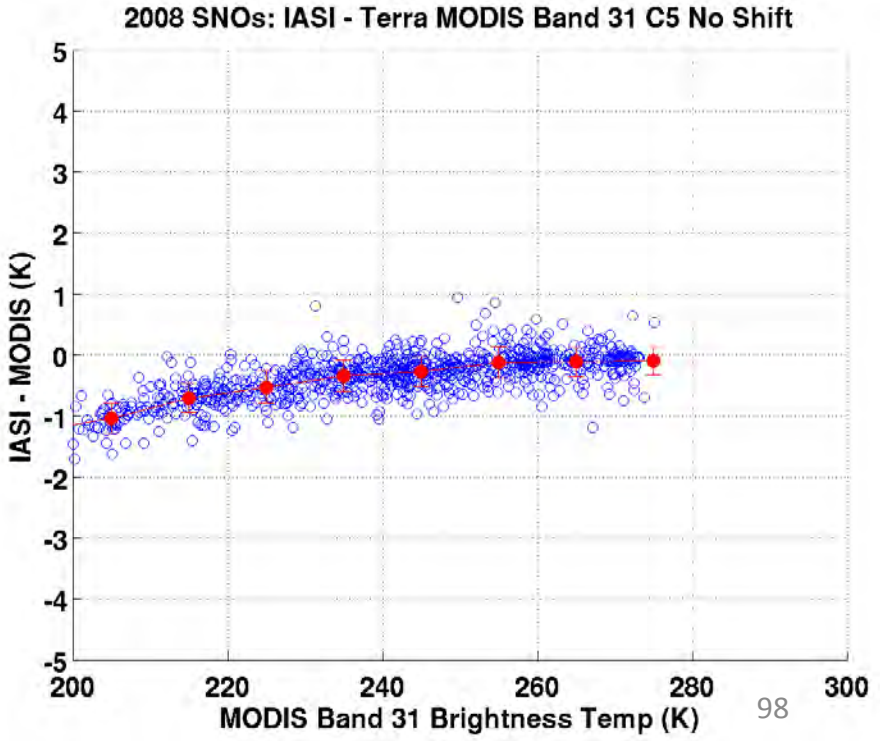


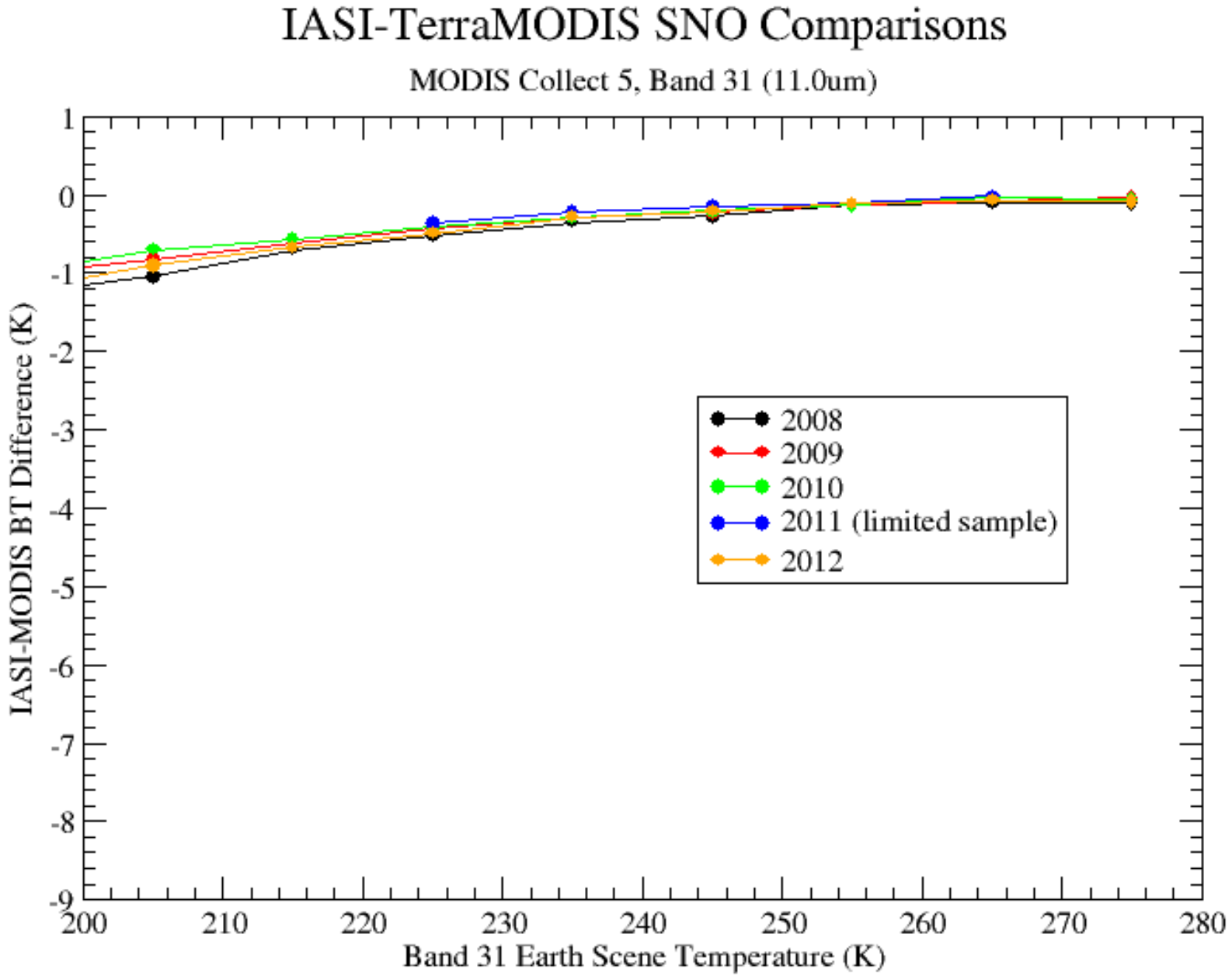
Chart Courtesy of Simon Hook (JPL)

IASI-Terra MODIS SNO Comparisons offer an independent look at Band 29

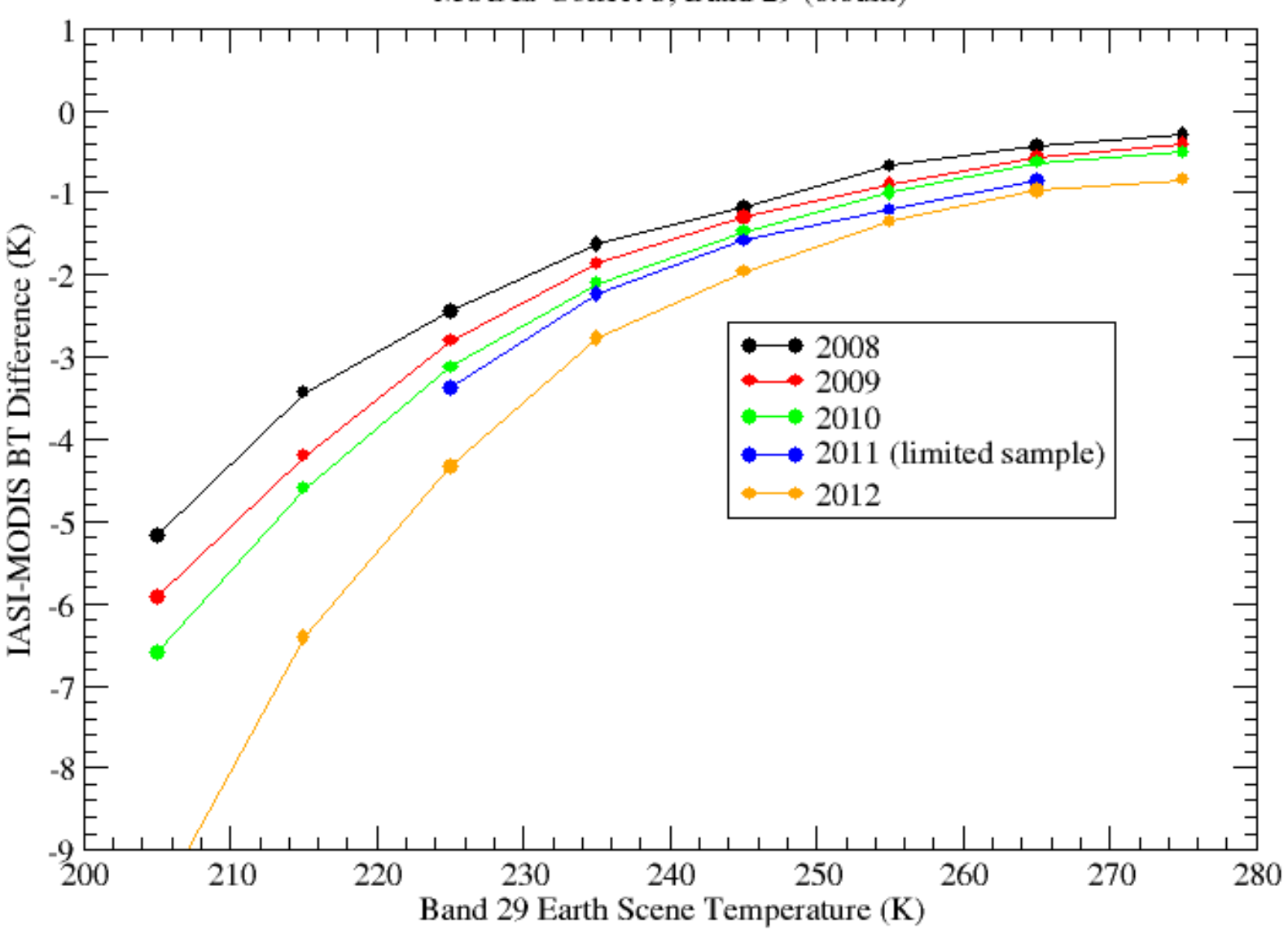
- MetopA - Terra MODIS SNOs processed for each year 2008-2012
- About 1200 SNOs per year within +/-10 minutes. Near Nadir only.
- Each SNO consists of ~7700 MODIS FOVs and ~16 IASI FOVs
- Used Terra MODIS **C5** L1B "as is". No spectral shifts or destriping.

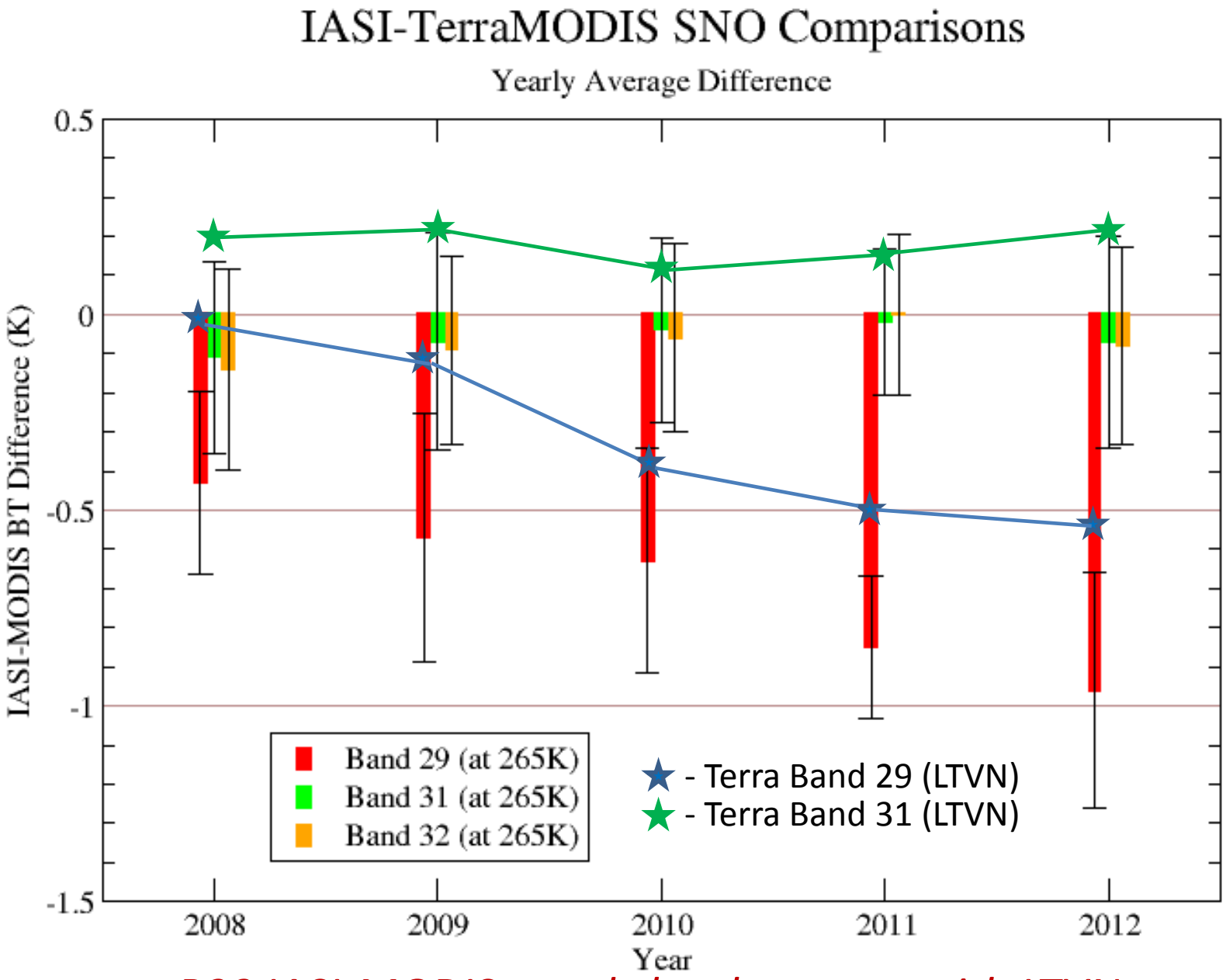





IASI-TerraMODIS SNO Comparisons
MODIS Collect 5, Band 31 (11.0um)
IASI-MODIS BT Difference (K)
Band 31 Earth Scene Temperature (K)
2008
2009
2010
2011 (limited sample)
2012

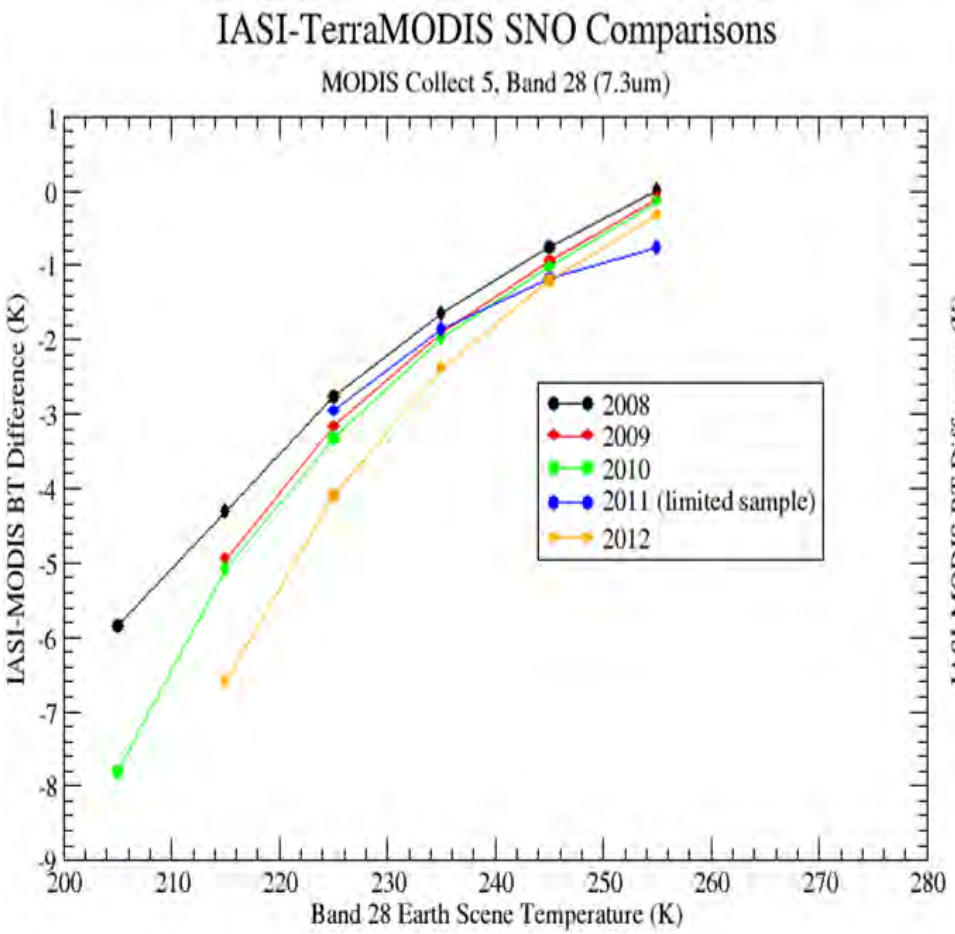
IASI-TerraMODIS SNO Comparisons

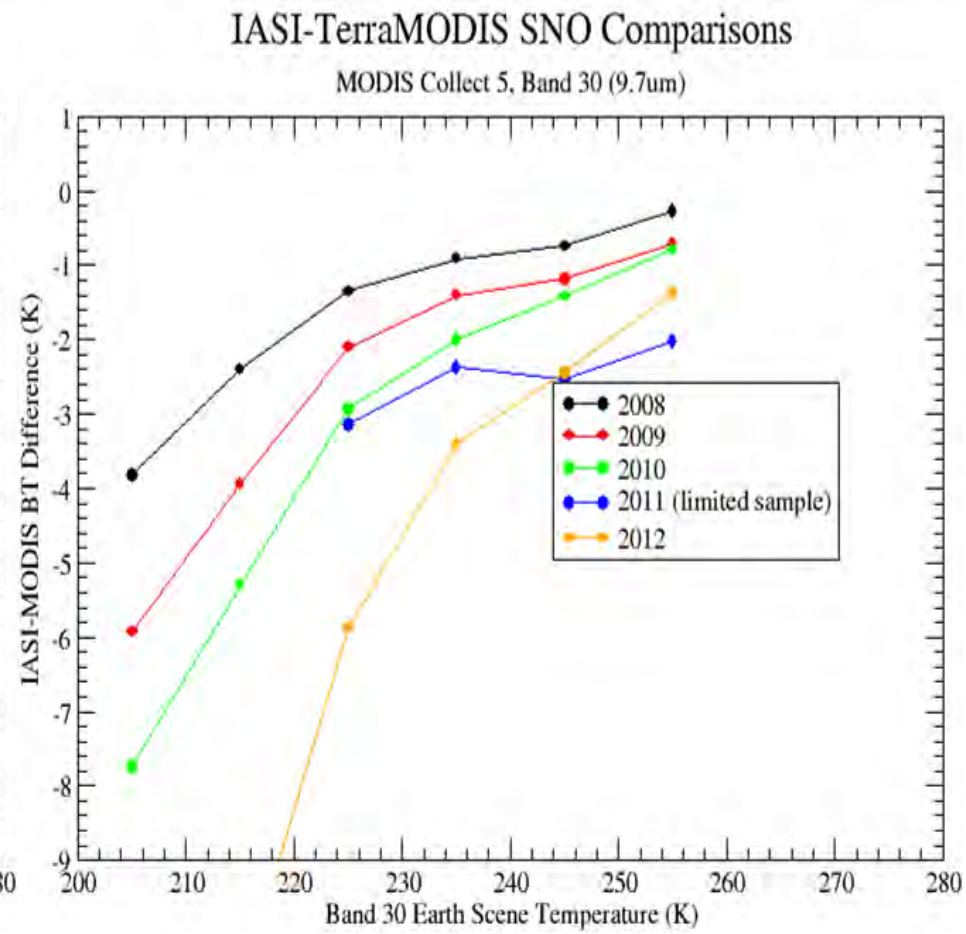




B29 IASI-MODIS trend closely agrees with LTVN

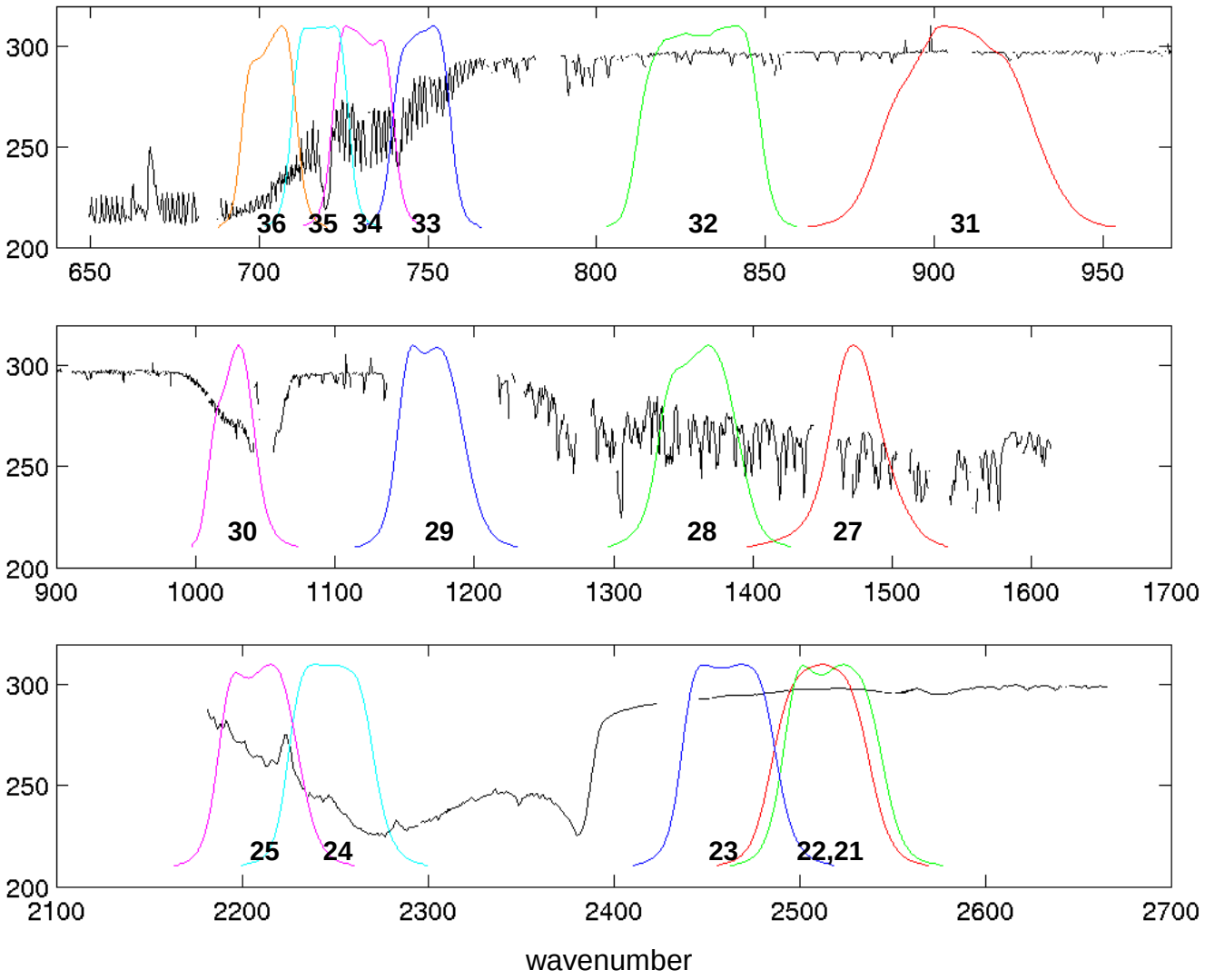
Two other Terra MODIS bands show indications of radiometric trend





Summary: Terra MODIS Radiometric

- IASI-Terra MODIS comparisons corroborate trend in Band 29 (and non-trends in bands 31 and 32).
- Also found trends in Band 28 and Band 30, bracketing Band 29 trend.
- Q: Why trends in these bands and not other bands? What aspect of calibration might have unique influence on these bands?

Backup

A sample AIRS brightness temperature spectrum overlaid with the Aqua MODIS Spectral Response Functions