A Comparison of AIRS Level 2 Products using two different cloud clearing methods

By

R. Chris Wilson[1], Eric Maddy[2]

1. NASA JPL / California Institute of Technology
2. Science and Technology Corporation

Copyright 2013. All rights reserved

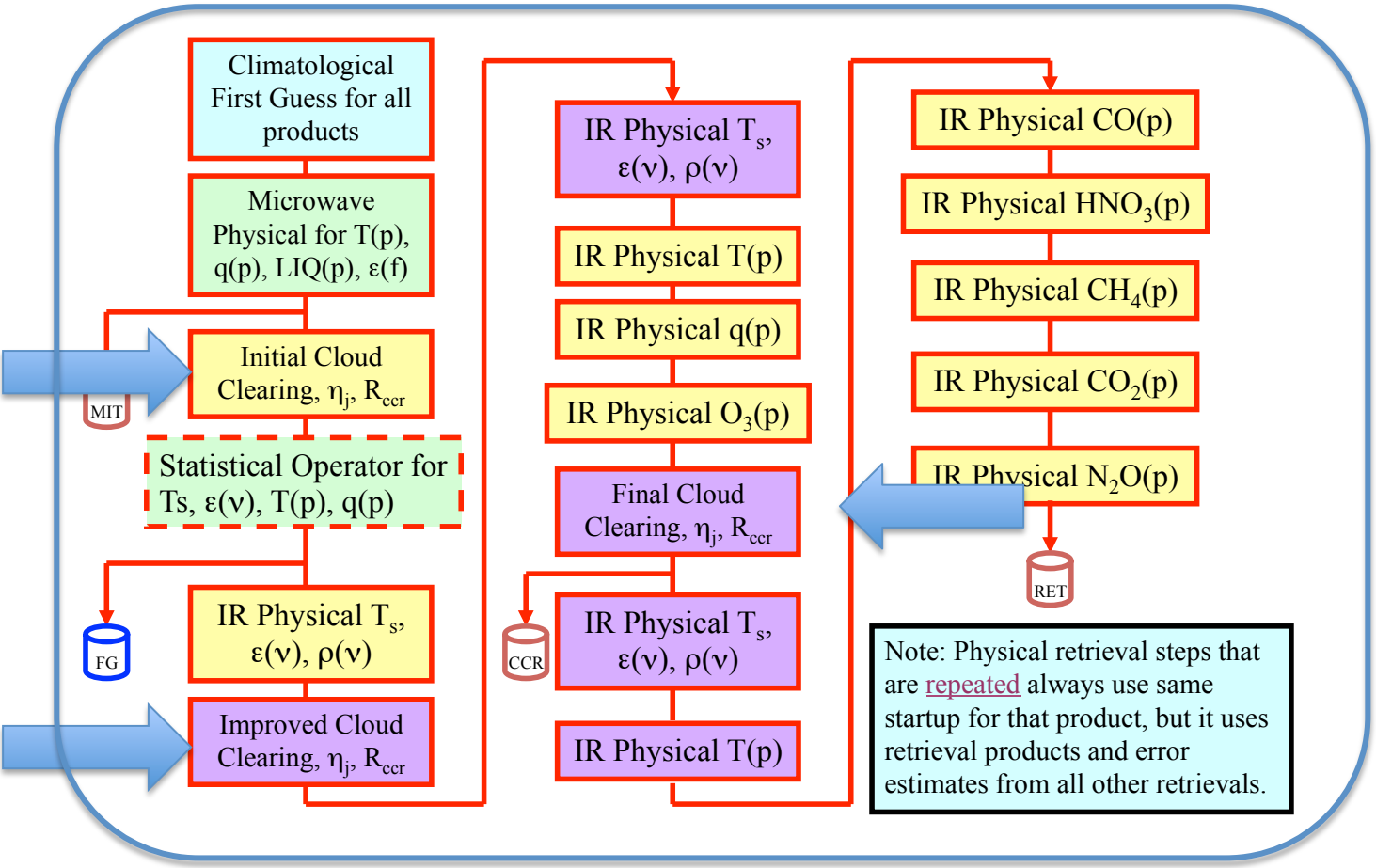
Outline

- Overview of how the new radiances were included in the operational code
- Systematic views of the temperature/h2o retrievals (Ascending and Descending, DOFs, Pbest/Pgood yields)
- Global DOF plots of Ozone, CO, CH4

Reprocessing of AIRS Operational Code

- Case study day: February 3, 2013
- Replace R_{ccr} and error covariance with new radiances and diagonal covariance
- 324000 Measurement points

Operational Processing Chain



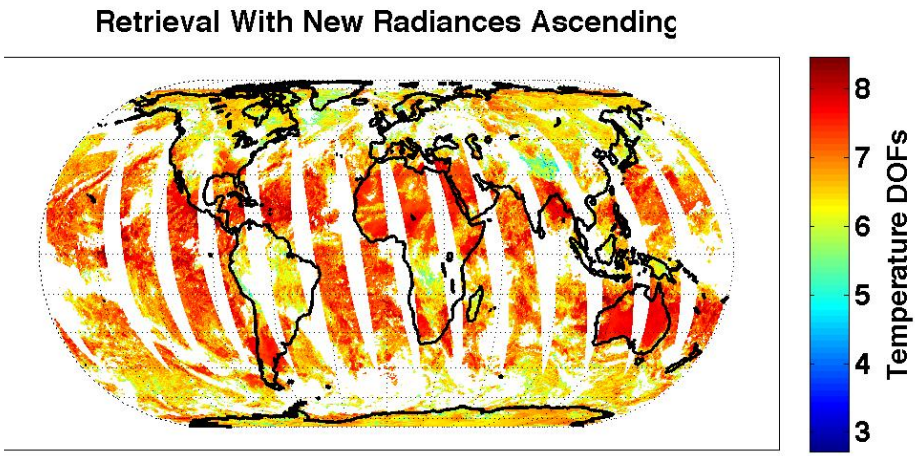
*From Chris Barnet's Talk at AIRS 2012 Fall Meeting

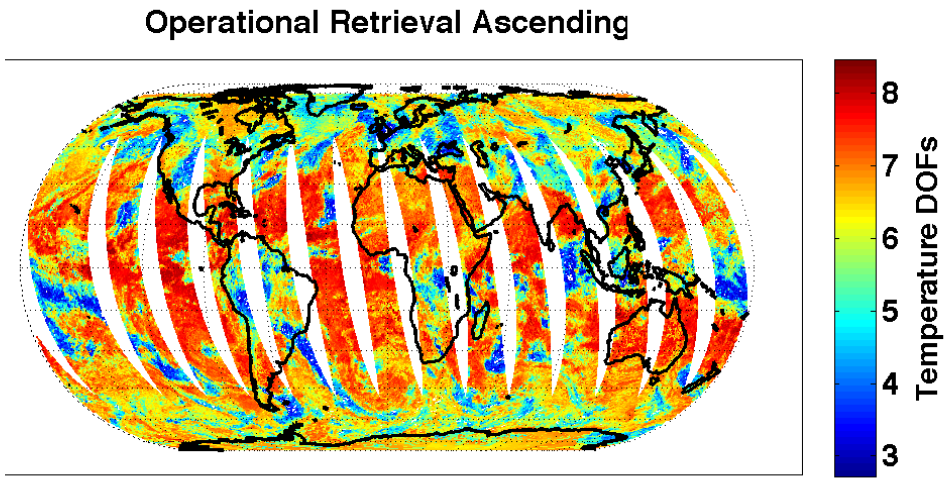
Some QCs

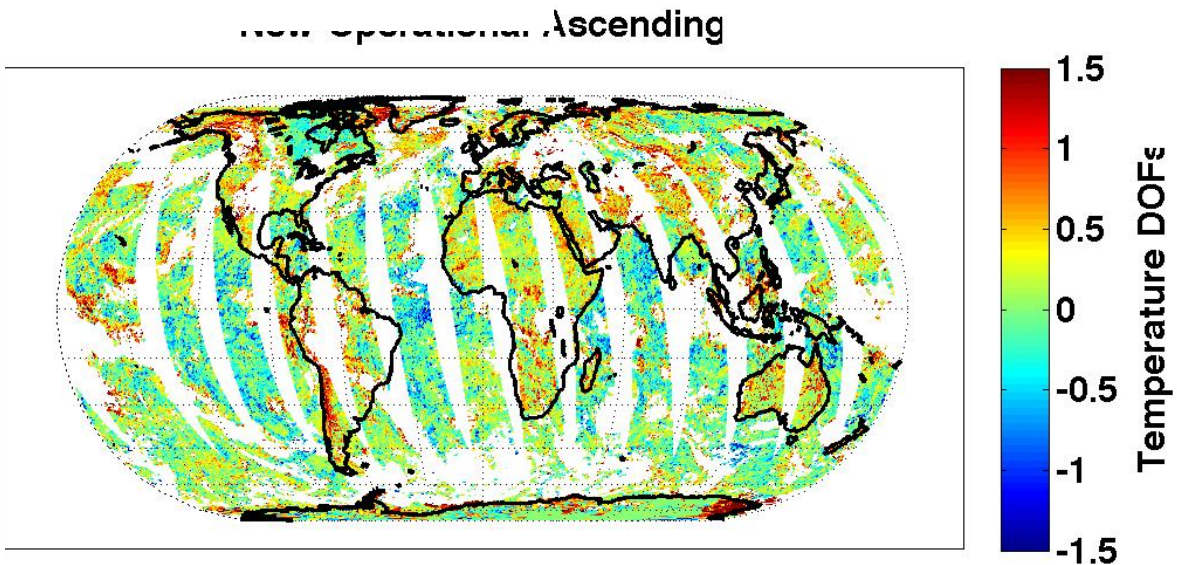
	Operational Retrieval	Retrieval with new Cloud Clearing
Pbest > 650	96709 (30%)	59879 (18%)
Avg Pbest	515.82	352.88
Pgood > 650	290554 (90%)	202573 (63%)
Avg Pgood	893.82	627.79

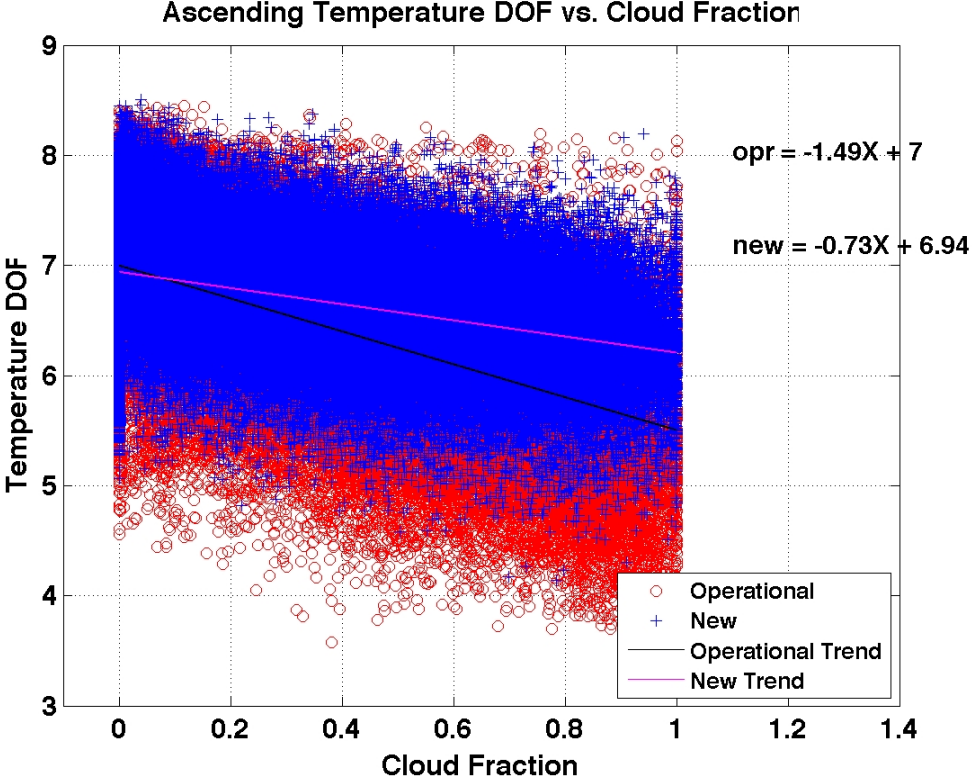
Ascending Temperature DOFS

- Degrees of Freedom are trace of the averaging kernel
- Measure information content inside the radiances



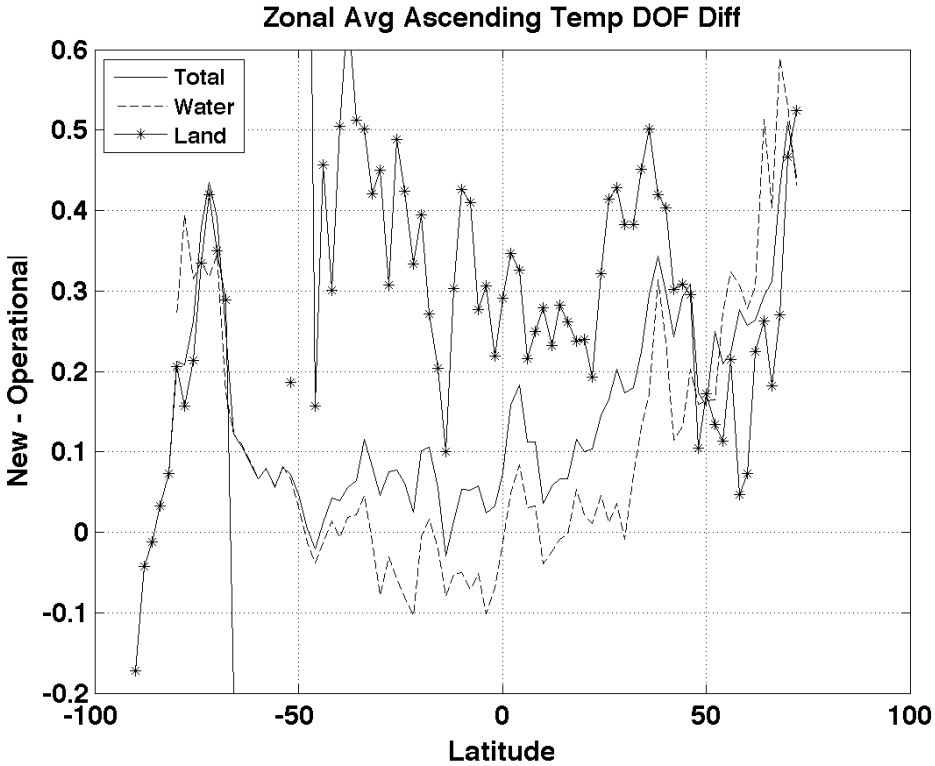






land (landfrac = 1)

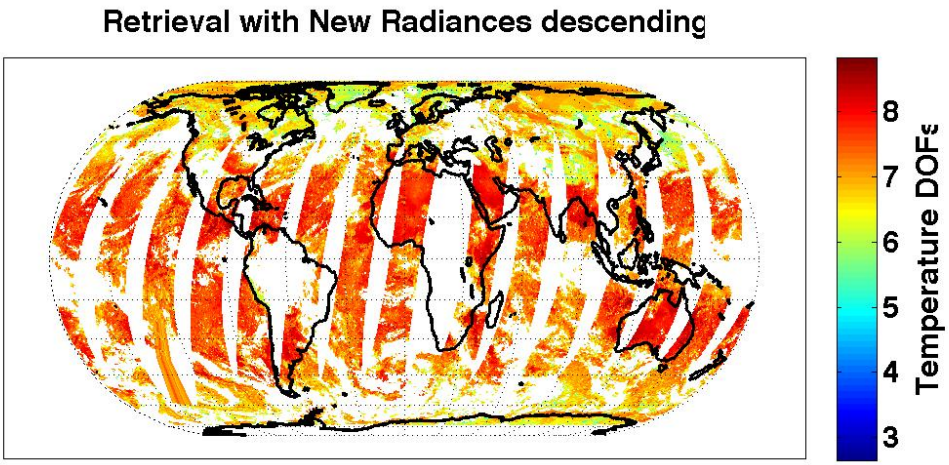
	Operational	New
Avg Pbest	471.01	372.74
Pbest > 650	17 %	15 %
Avg Pgood	804.03	650.90
Pgood > 650	78 %	65 %

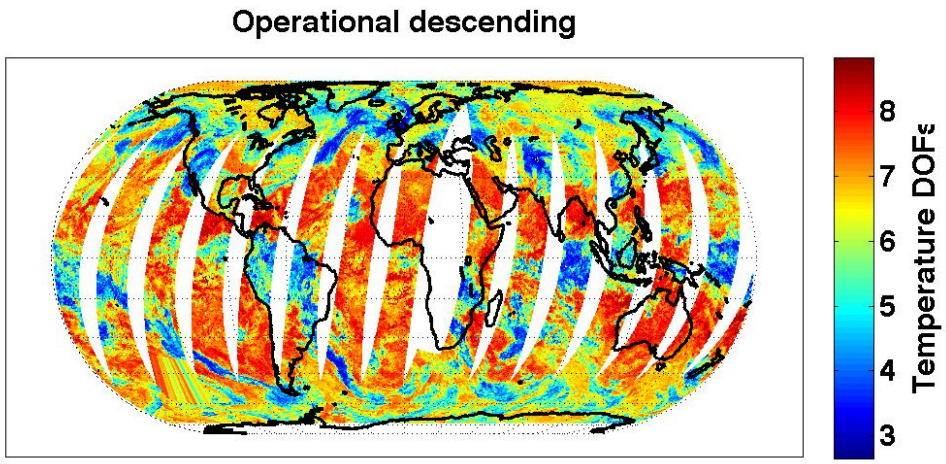


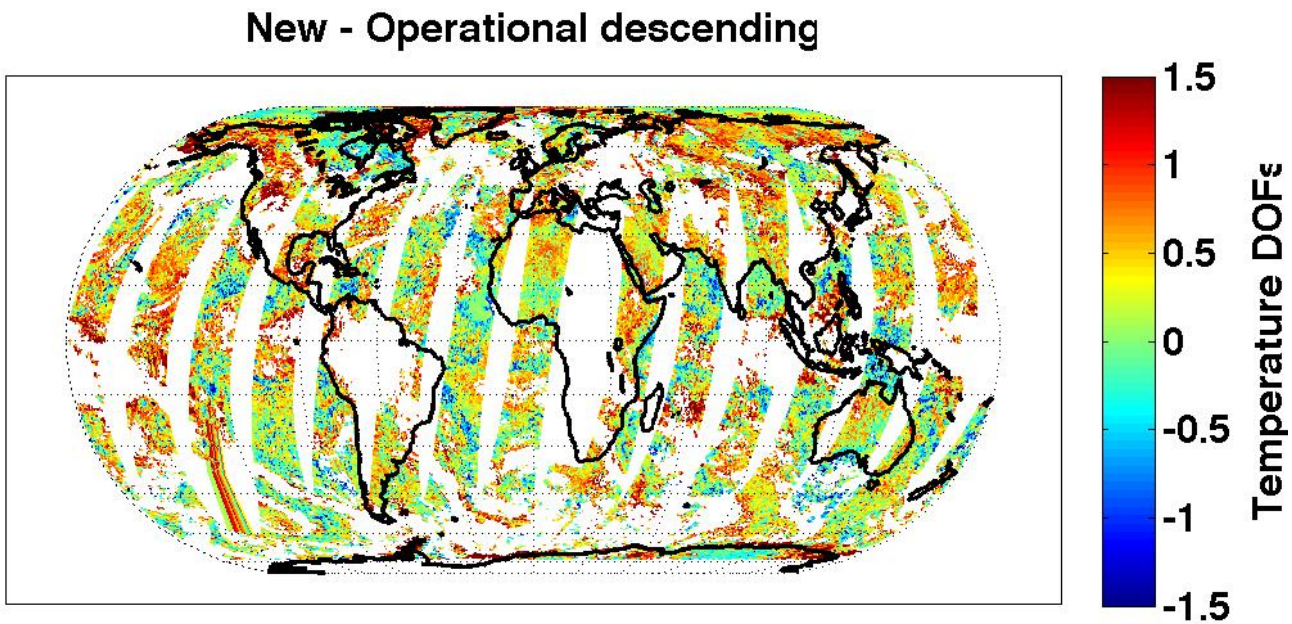
Water (landfrac = 0)

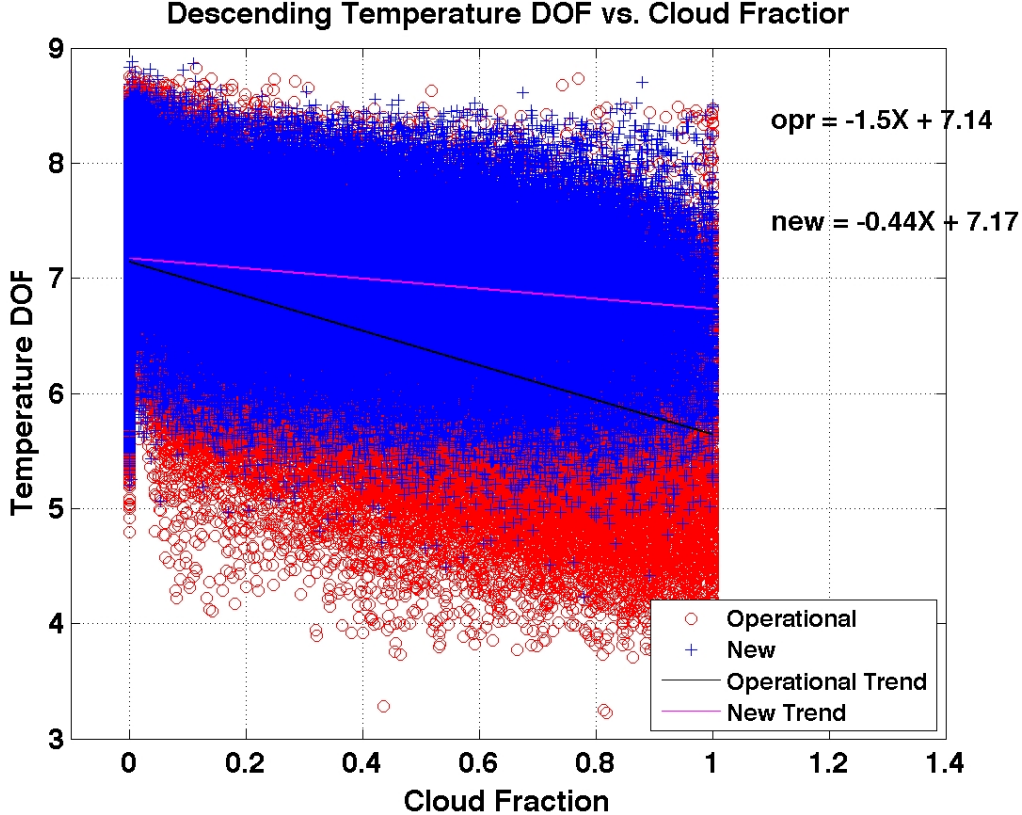
	Operational	New
Avg Pbest	567.63	375.19
Pbest > 650	40 %	23 %
Avg Pgood	943.82	630.13
Pgood > 650	93 %	62 %

Descending Temperature DOFs



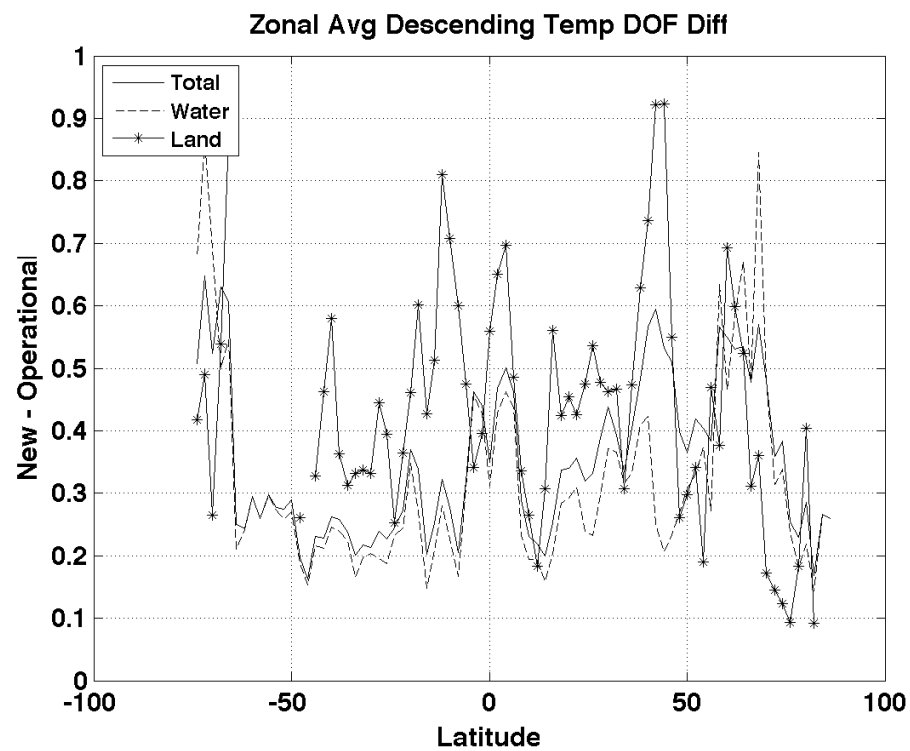






land (landfrac = 1)

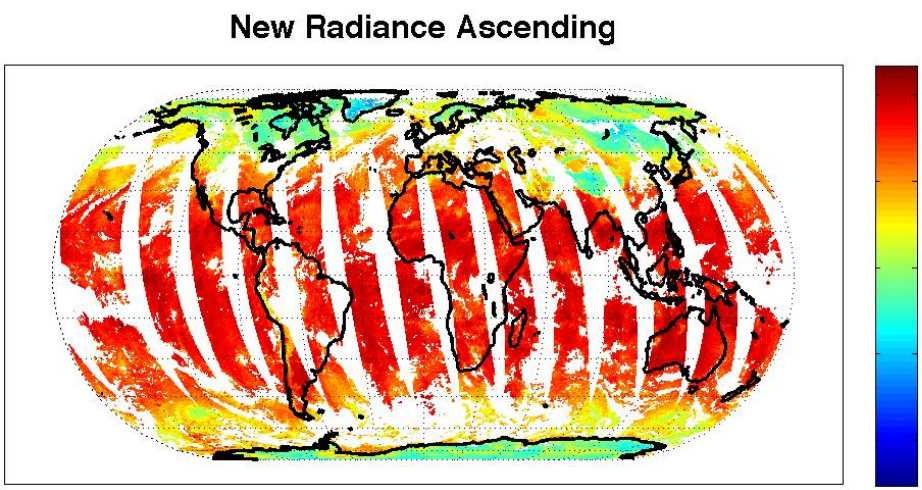
	Operational	New
Avg Pbest	460	324
Pbest > 650	27 %	18 %
Avg Pgood	824	606
Pgood > 650	88 %	64 %

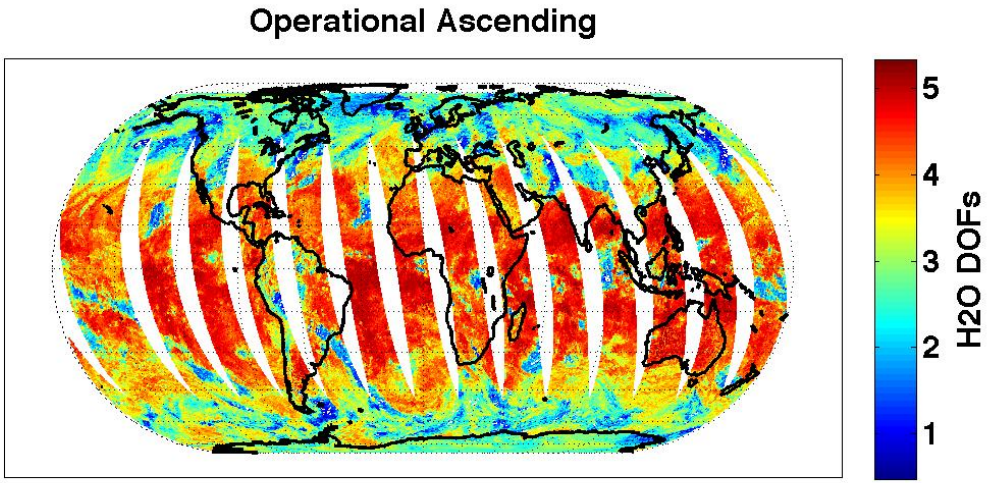


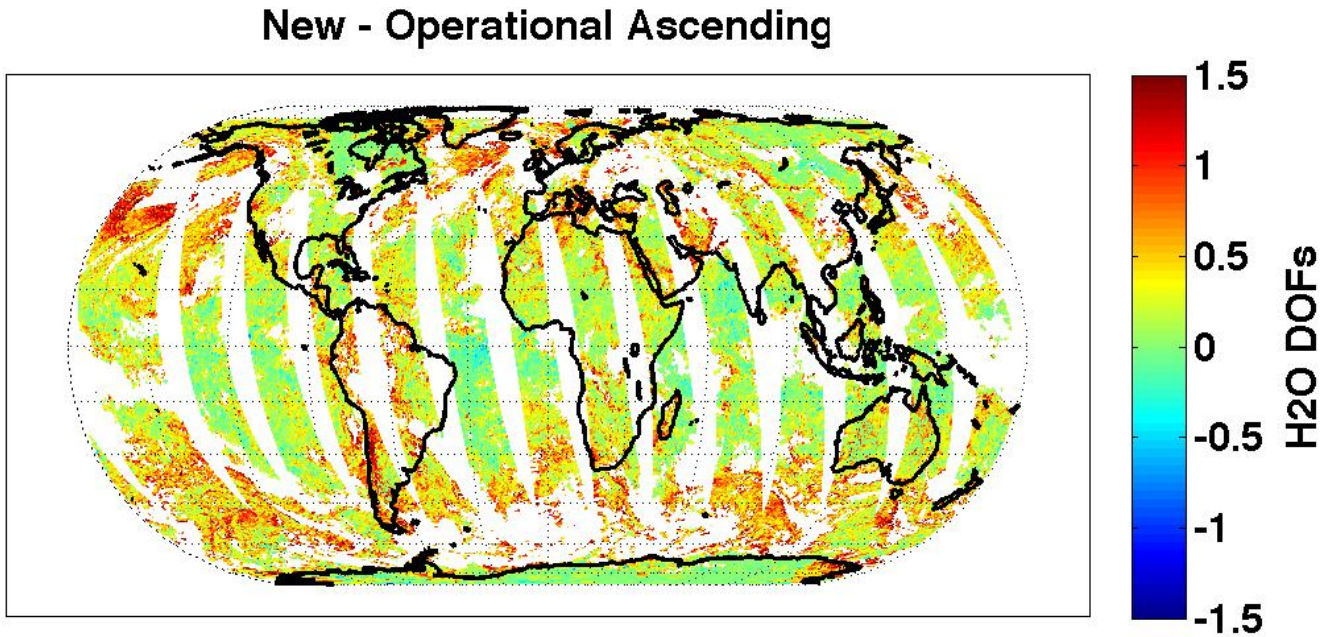
Water (landfrac = 0)

	Operational	New
Avg Pbest	480	310
Pbest > 650	30 %	16 %
Avg Pgood	906	602
Pgood > 650	92 %	60 %

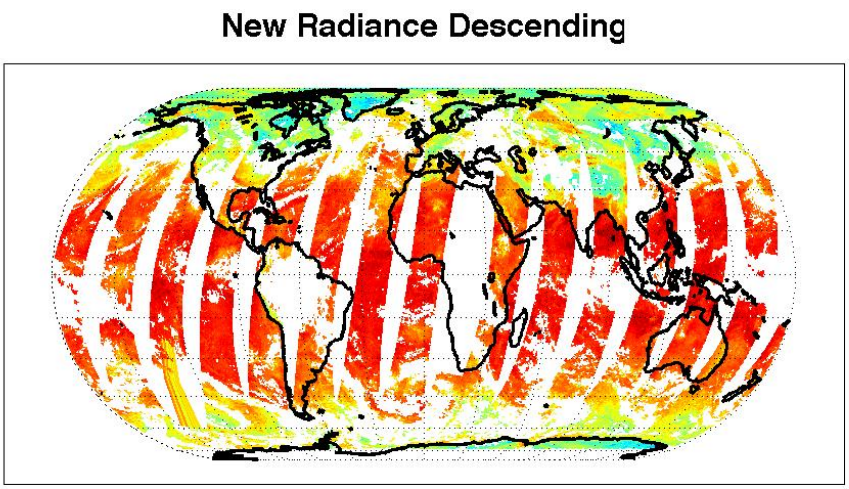
Ascending water vapor DOFs

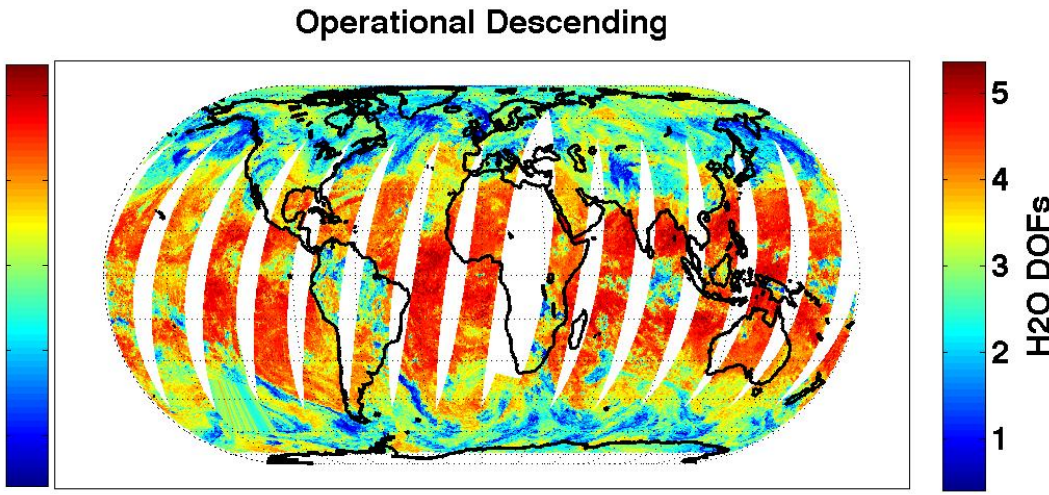


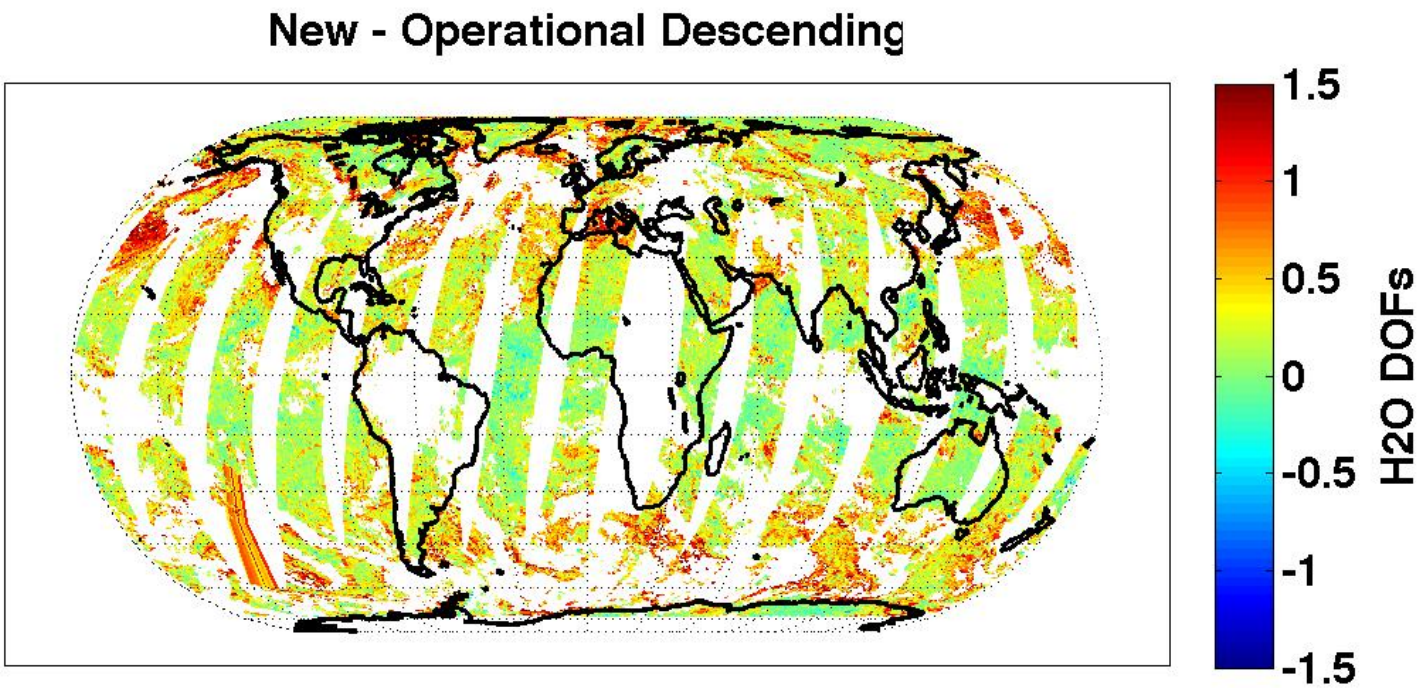


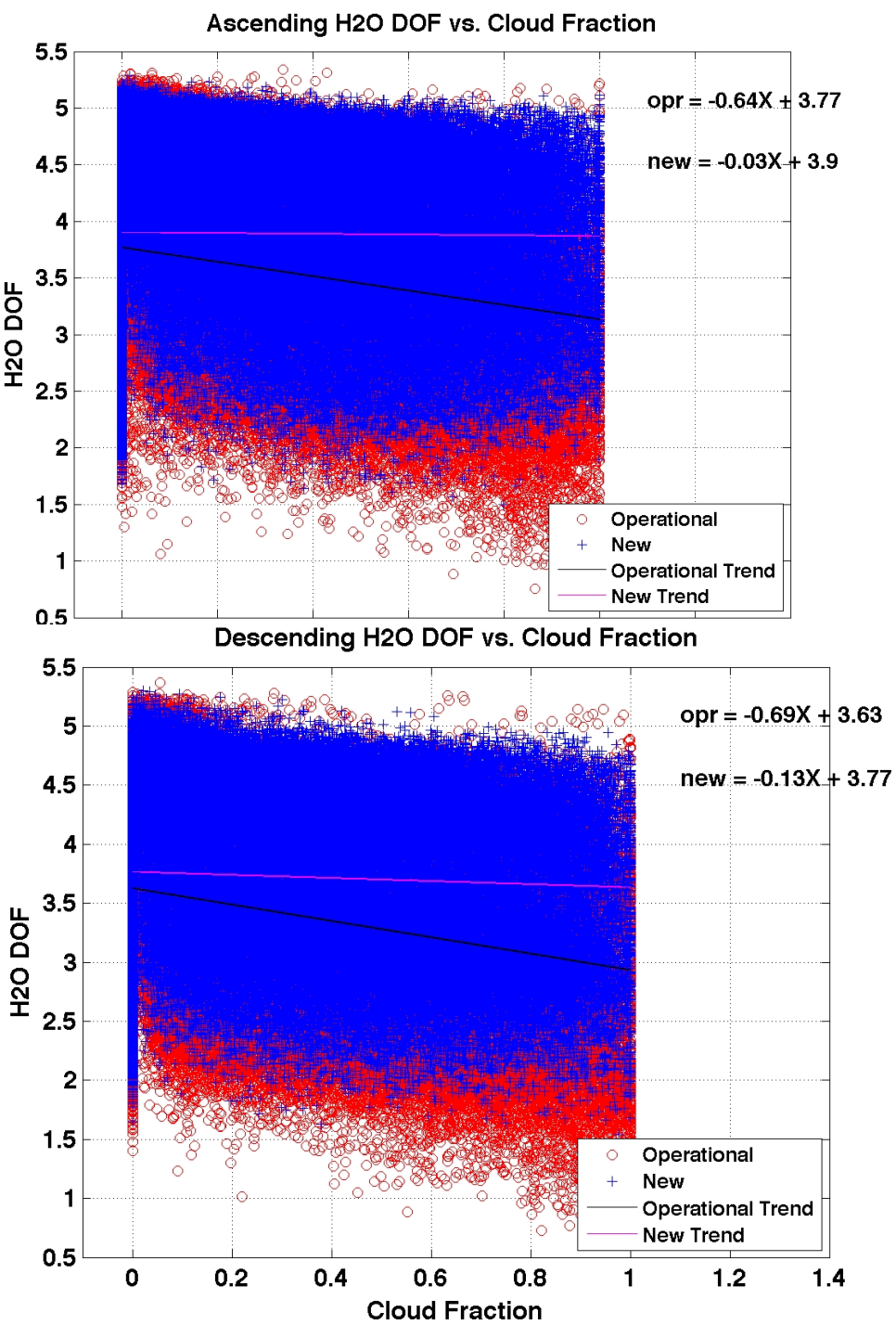


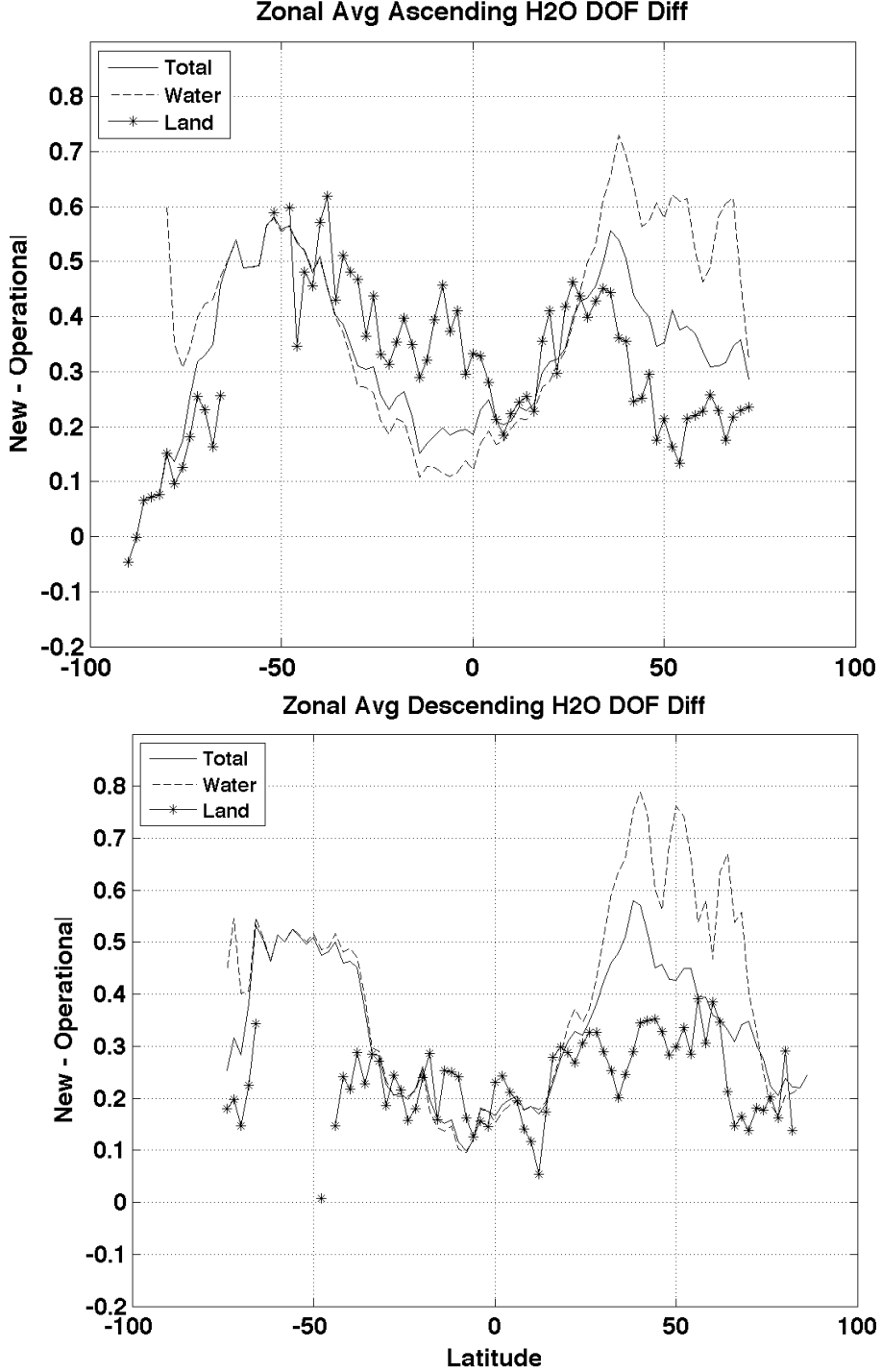
Descending Water Vapor DOFs

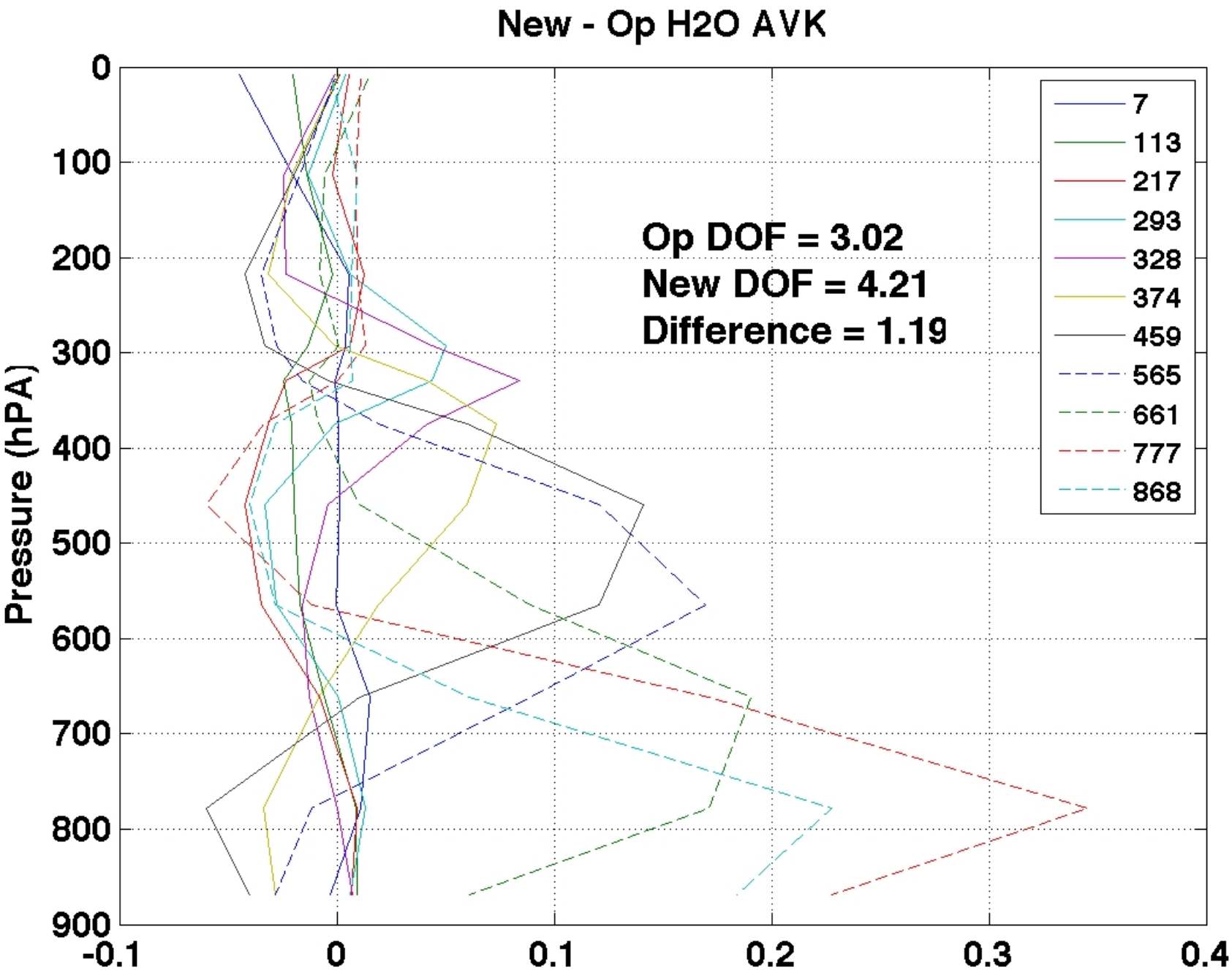




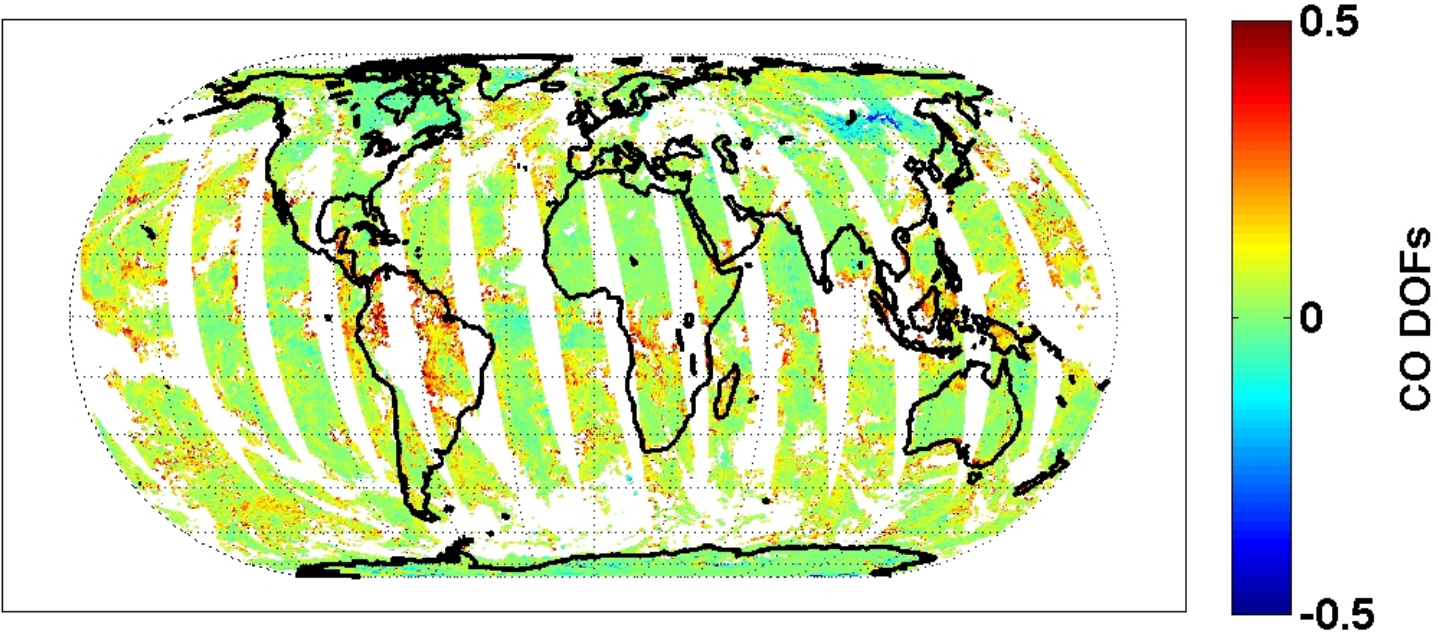



Ascending H2O DOF vs. Cloud Fraction
opr = -0.64X + 3.77
new = -0.03X + 3.9
H2O DOF
Operational
New
Operational Trend
New Trend
Descending H2O DOF vs. Cloud Fraction
opr = -0.69X + 3.63
new = -0.13X + 3.77
H2O DOF
Cloud Fraction
Operational
New
Operational Trend
New Trend

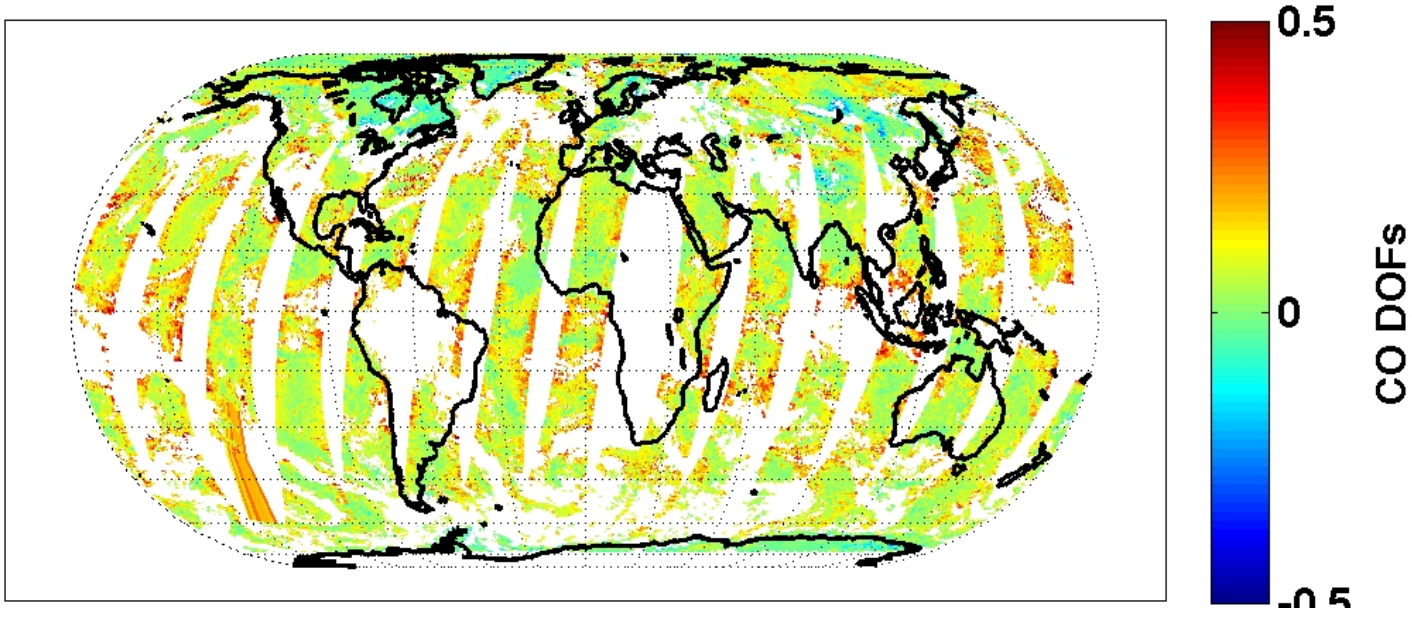

Zonal Avg Ascending H2O DOF Diff
Total
Water
Land
New - Operational
Zonal Avg Descending H2O DOF Diff
Total
Water
Land
New - Operational
Latitude

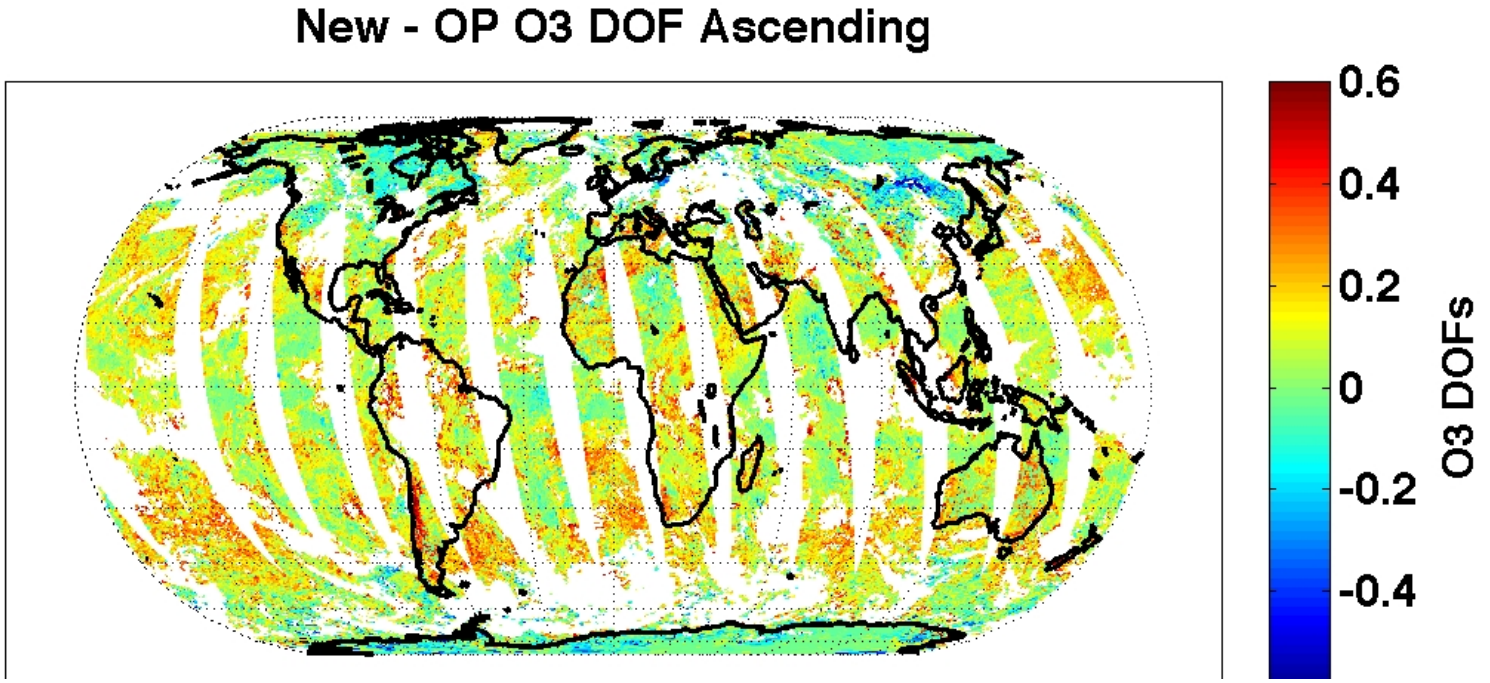

New - Op H2O AVK
Op DOF = 3.02
New DOF = 4.21
Difference = 1.19
7
113
217
293
328
374
459
565
661
777
868
Pressure (hPA)
0
100
200
300
400
500
600
700
800
900
-0.1
0
0.1
0.2
0.3
0.4

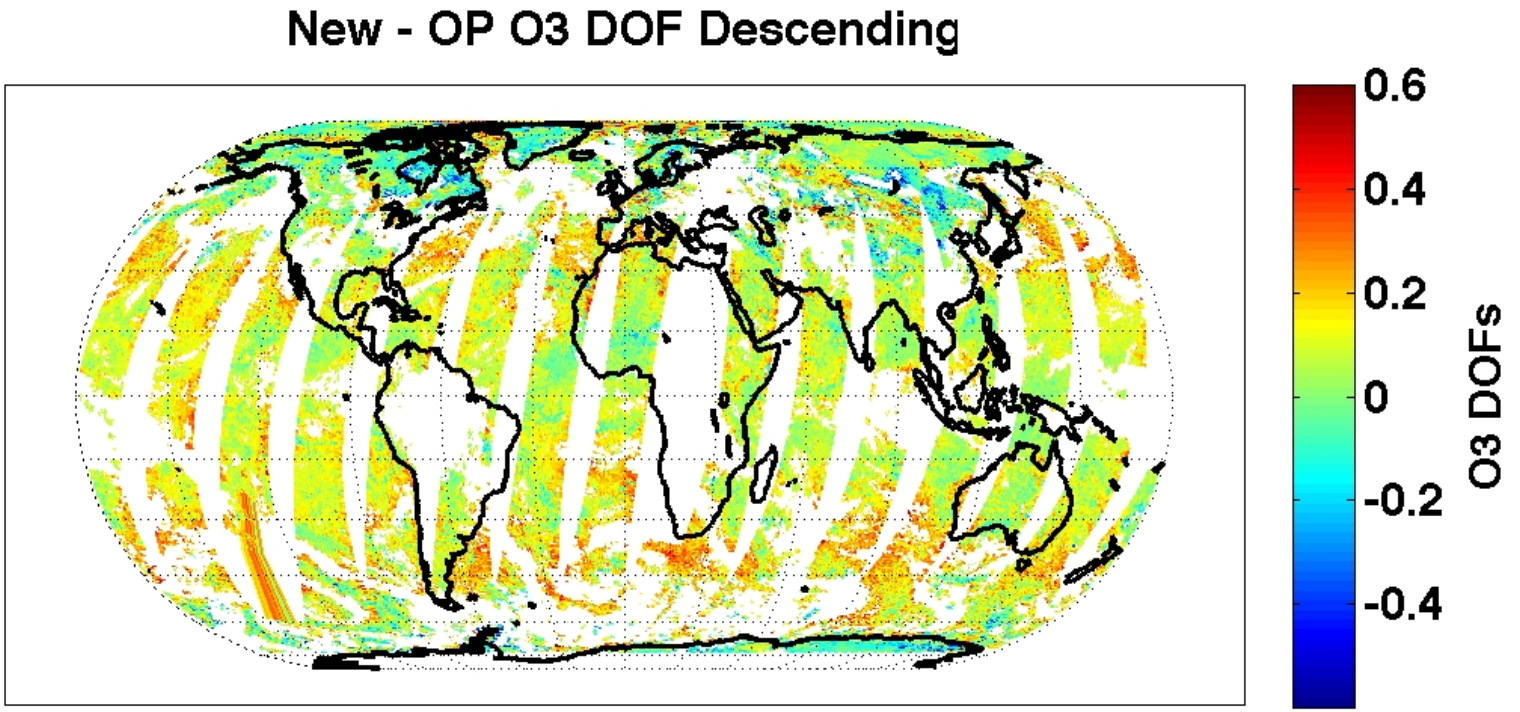
New - OP CO DOF Ascending

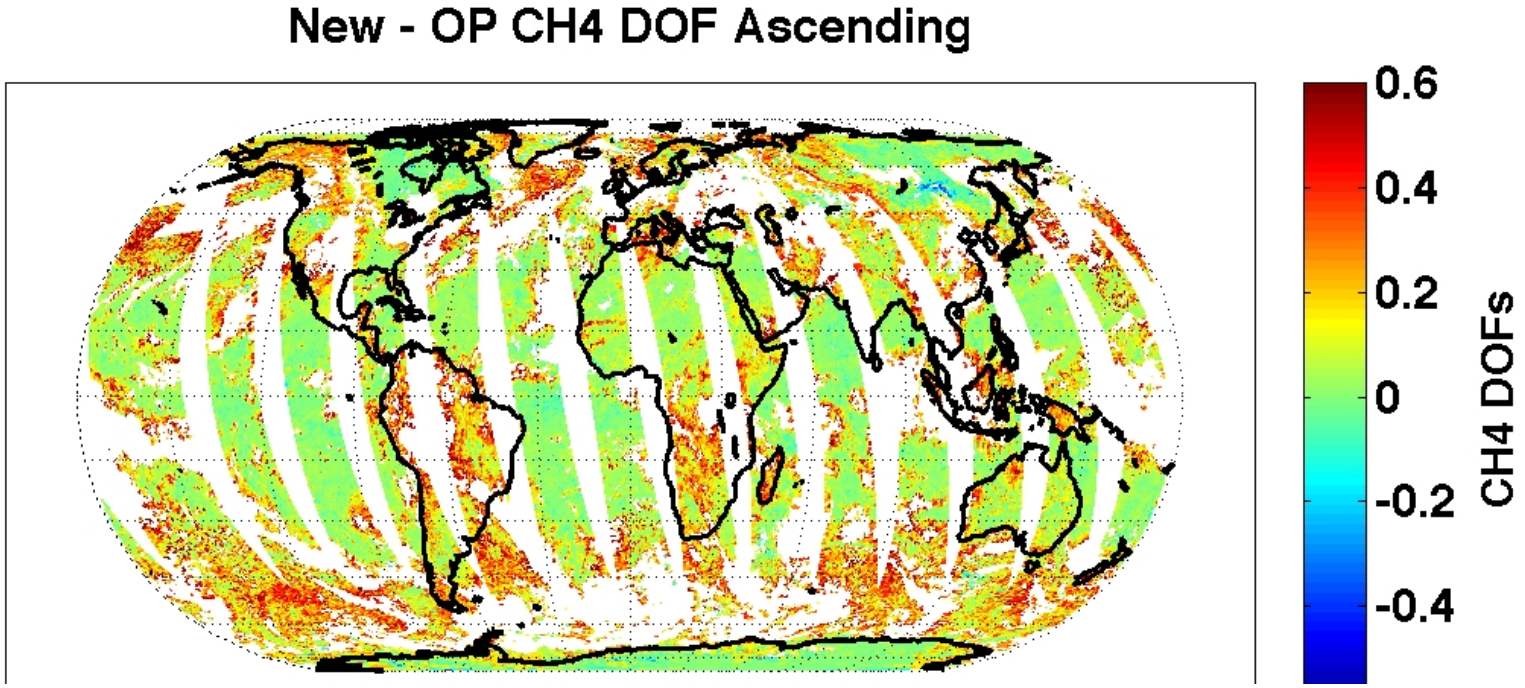


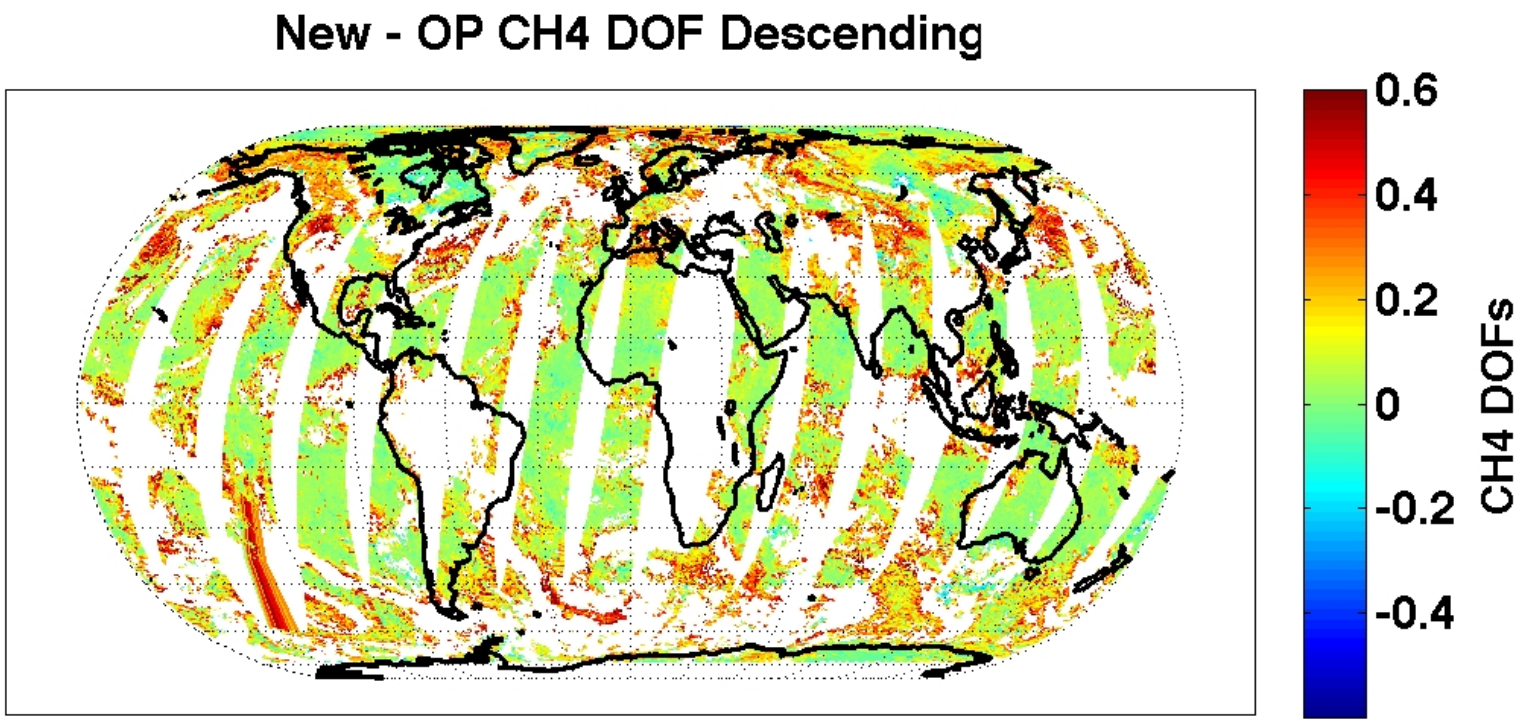
New - OP CO DOF Descending




New - OP O3 DOF Ascending
0.6
0.4
0.2
0
-0.2
-0.4
O3 DOFs


New - OP O3 DOF Descending
0.6
0.4
0.2
0
-0.2
-0.4
O3 DOFs


New - OP CH4 DOF Ascending
0.6
0.4
0.2
0
-0.2
-0.4
CH4 DOFs


New - OP CH4 DOF Descending
0.6
0.4
0.2
0
-0.2
-0.4
CH4 DOFs

Conclusion

Temperature and Water

- Information content was increased for both water and temperature
- Temperature information is increased more over land while water vapor information is increased more over water
- Preliminary results show increased water vapor profile sensitivity in lower troposphere

Yield and Quality Control

- Yield is reduced up to 30 %
- The average Pbest and Pgood are reduced for the new method

Trace Gases

- CO, CH4 and O3 all see increases in their information content

Special Thanks to Evan Manning and John Blaisdell for their assistance in running the AIRS Code with Eric's Radiances