



# *Hyperspectral Infrared Water Vapor Radiance Assimilation*

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# Problems (from last year)

- Cold temperature bias from 100 hPa to the top of the model and increases with forecast time
- Geopotential height bias above 100 hPa also increases with forecast time
- Generation of negative  $q$
- Water vapor radiance fits (IASI)



# Work in Progress (from last year)

- New background error for moisture (RH)
  - Stratosphere
- Height/Temperature bias
  - Tropopause
  - Stratosphere
- Channel selection
  - Sensitivity to Stratosphere moisture
  - # required to maintain a stable stratospheric moisture field
- Greater Impact near the surface
  - Surface emissivity
  - Background error



# What has changed?

- Global Forecast Model
  - Implementation scheduled for next month
  - T574L64
  - Convective Schemes
  - Positive Definite Moisture Scheme
    - ♦ Minimal negative moisture generation
  - Minimum moisture value changed in the radiation scheme
    - ♦  $1.0e-6 \rightarrow 1.0e-20$
- Gridpoint Statistical Interpolation (GSI)
  - Reset negative  $q$  to  $1.0e-10$  on each outer iteration
- Community Radiative Transfer Model
  - New infrared ocean surface emissivity model
  - Version 2.0 (ODPS)

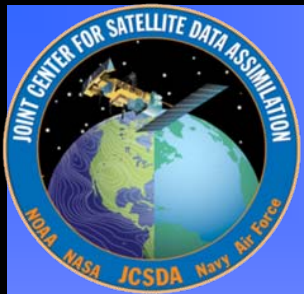
( Almost everything )





# Work in Progress

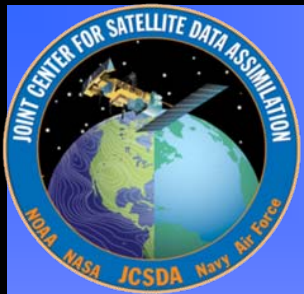
- Temperature bias in tropopause - stratosphere
  - Different characteristics with the new model
  - Reduction with addition of Stratosphere water vapor
- GSI
  - Troposphere and Stratosphere WV channels
  - Negative q generation in GSI
  - qoption1 vs qoption2 (and variations)
- CRTM v2.0
  - ODPS vs ODPS/Optran (Paul van Delst, Yong Chen)
- AIRS channel selection
  - More and/or different WV channels (Chris Barnet)
- AIRS/IASI water vapor denials



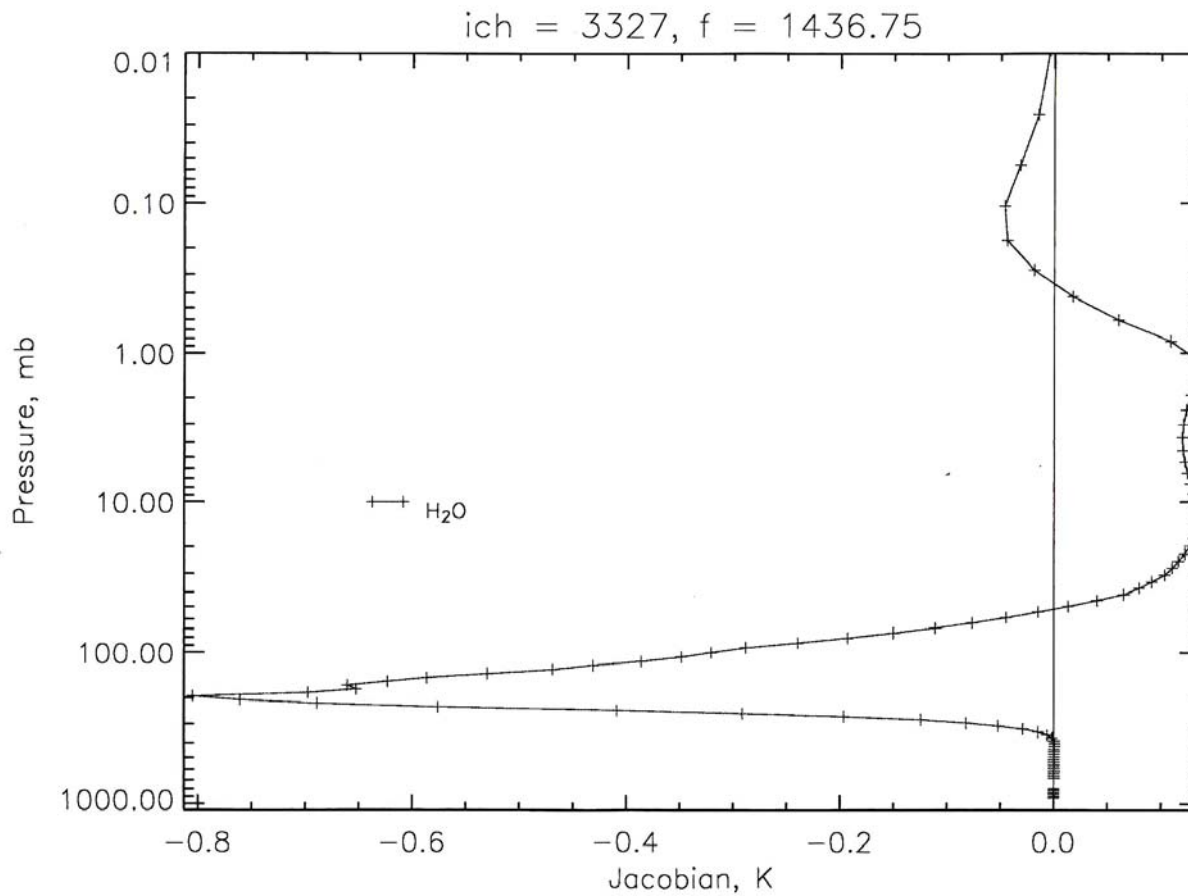
# Experiment Background

- NCEP Global Model (June implementation)
  - T382L64
- GSI
  - Pseudo RH used for moisture assimilation
  - December 2010+ update
- All Operational Conventional and Satellite data
- IR data thinned to 145 Km
- Using weights and gross error check described last year
- Tropospheric water vapor channels

44 on-line water vapor channels  
March 24-31 2010



# IASI Jacobian for on-line water vapor channel 3327

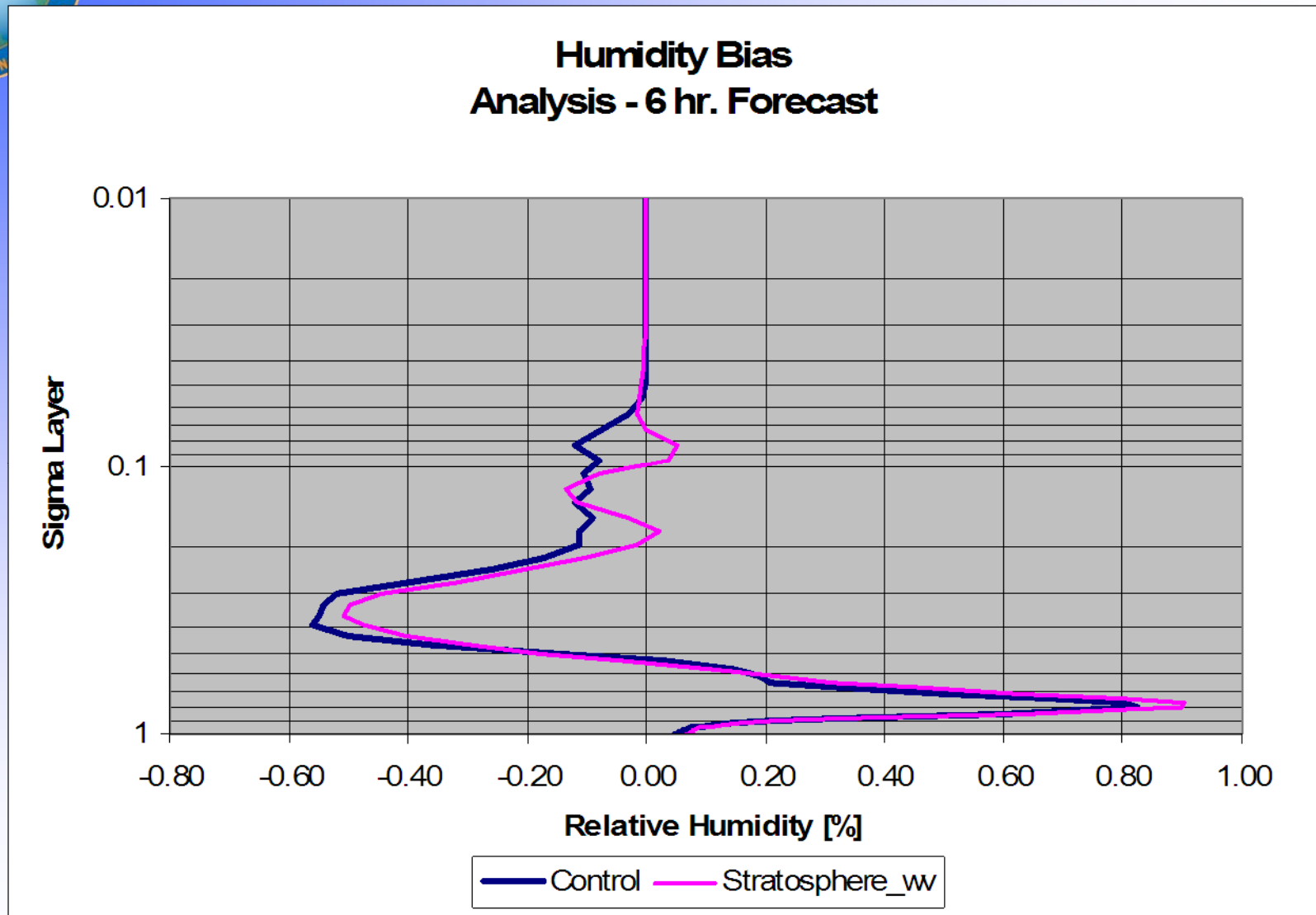


From Chris Barnet





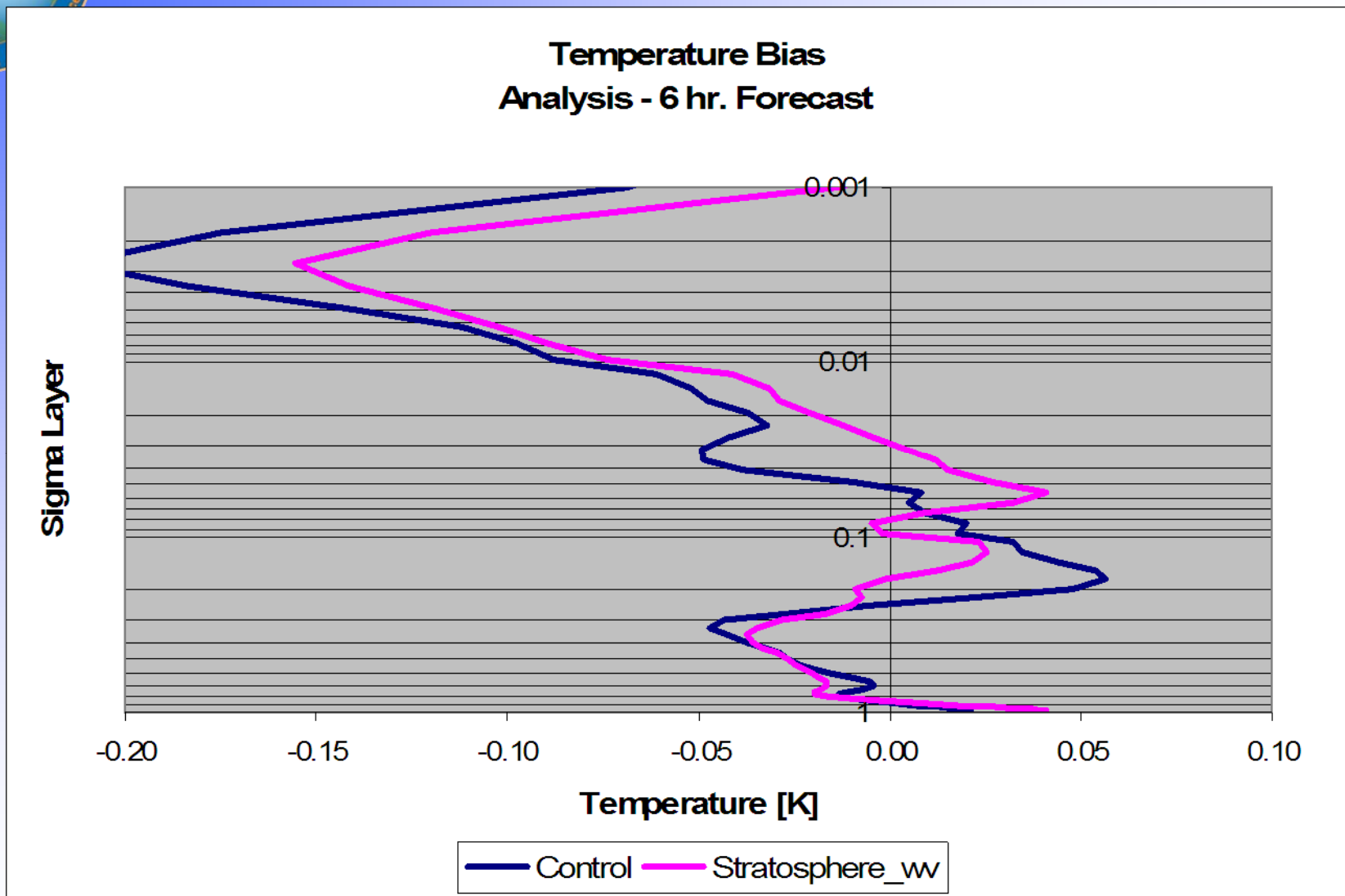
# Analysis - Background Difference





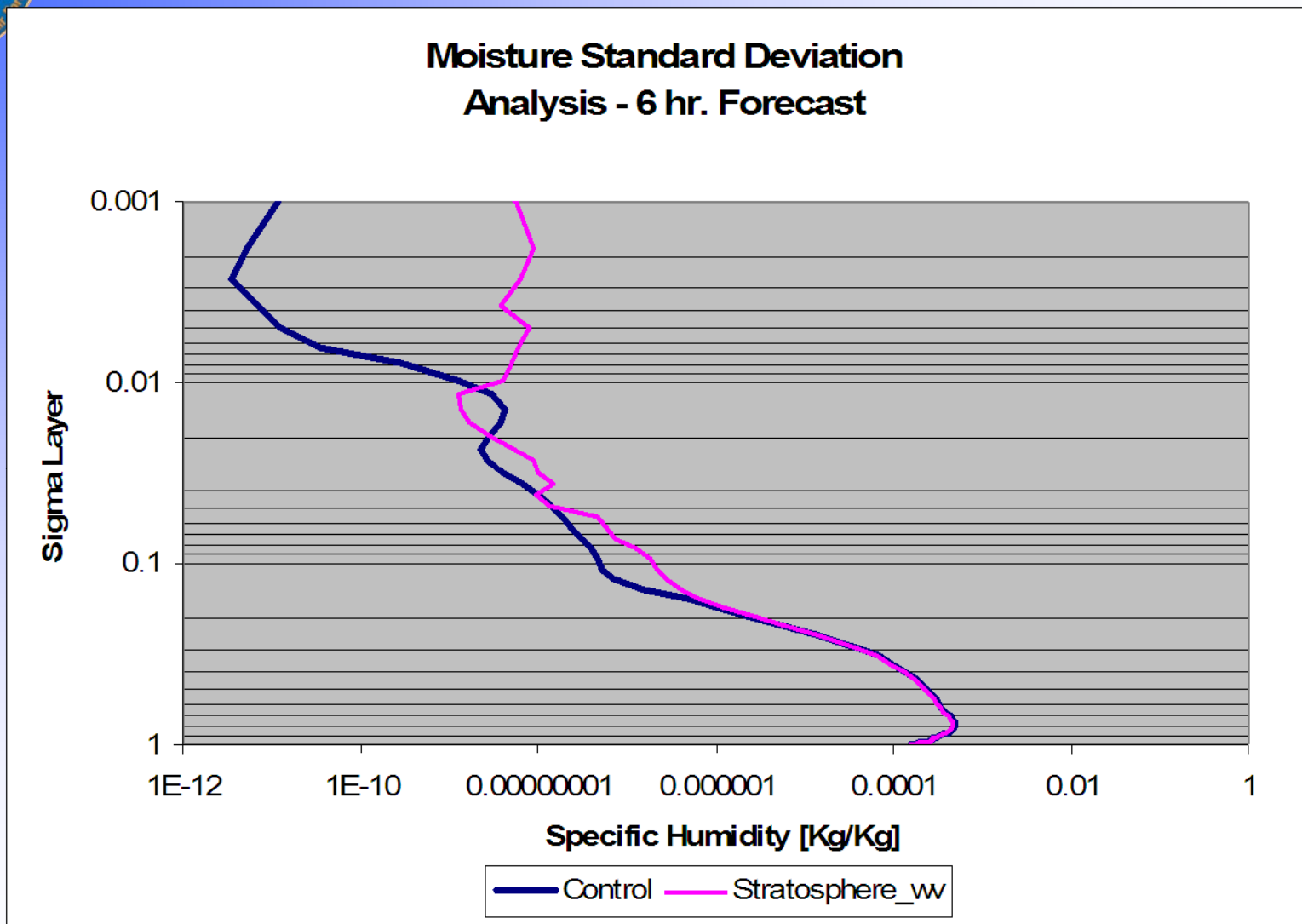


# Analysis - Background Difference



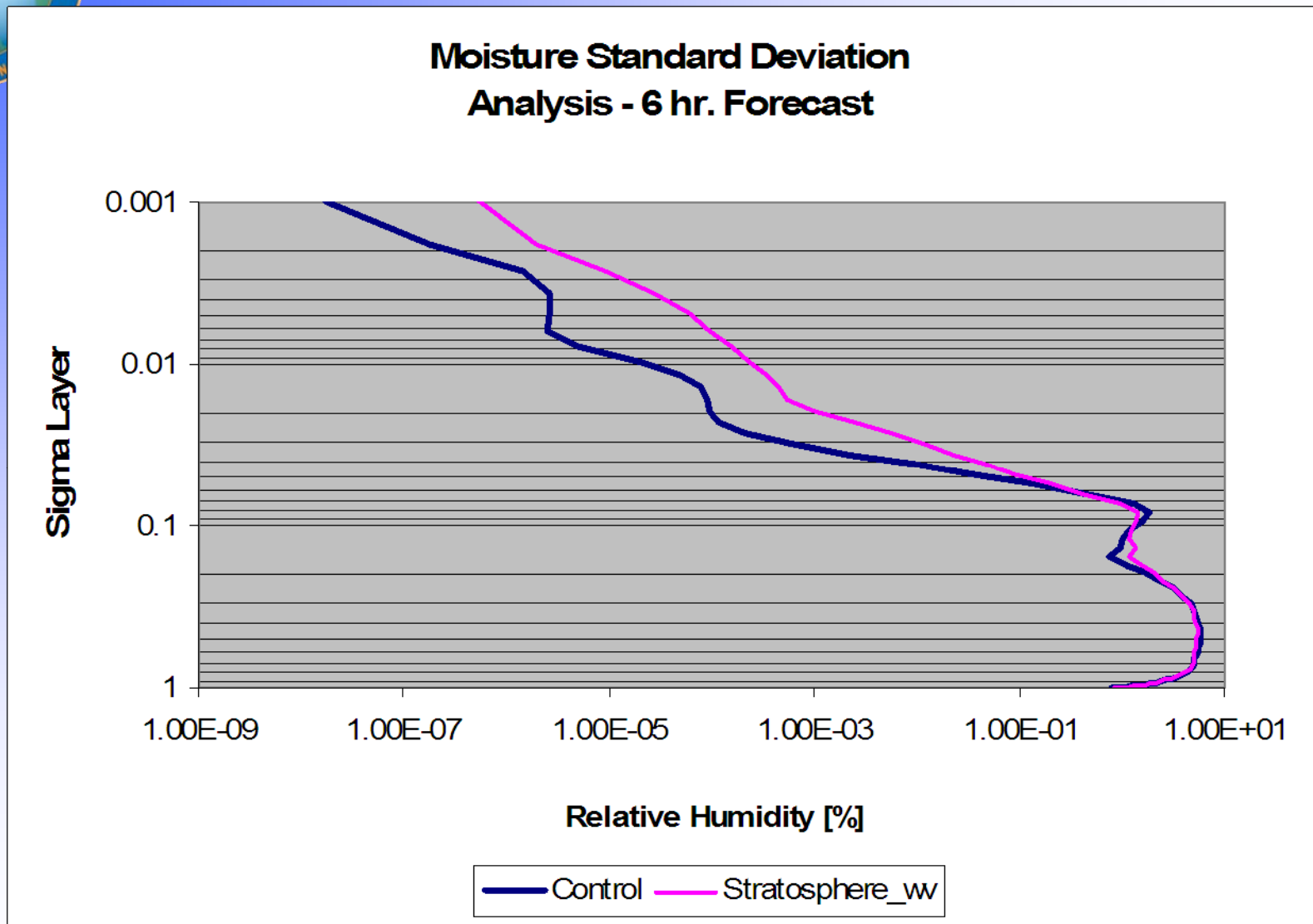


# Analysis - Background Difference



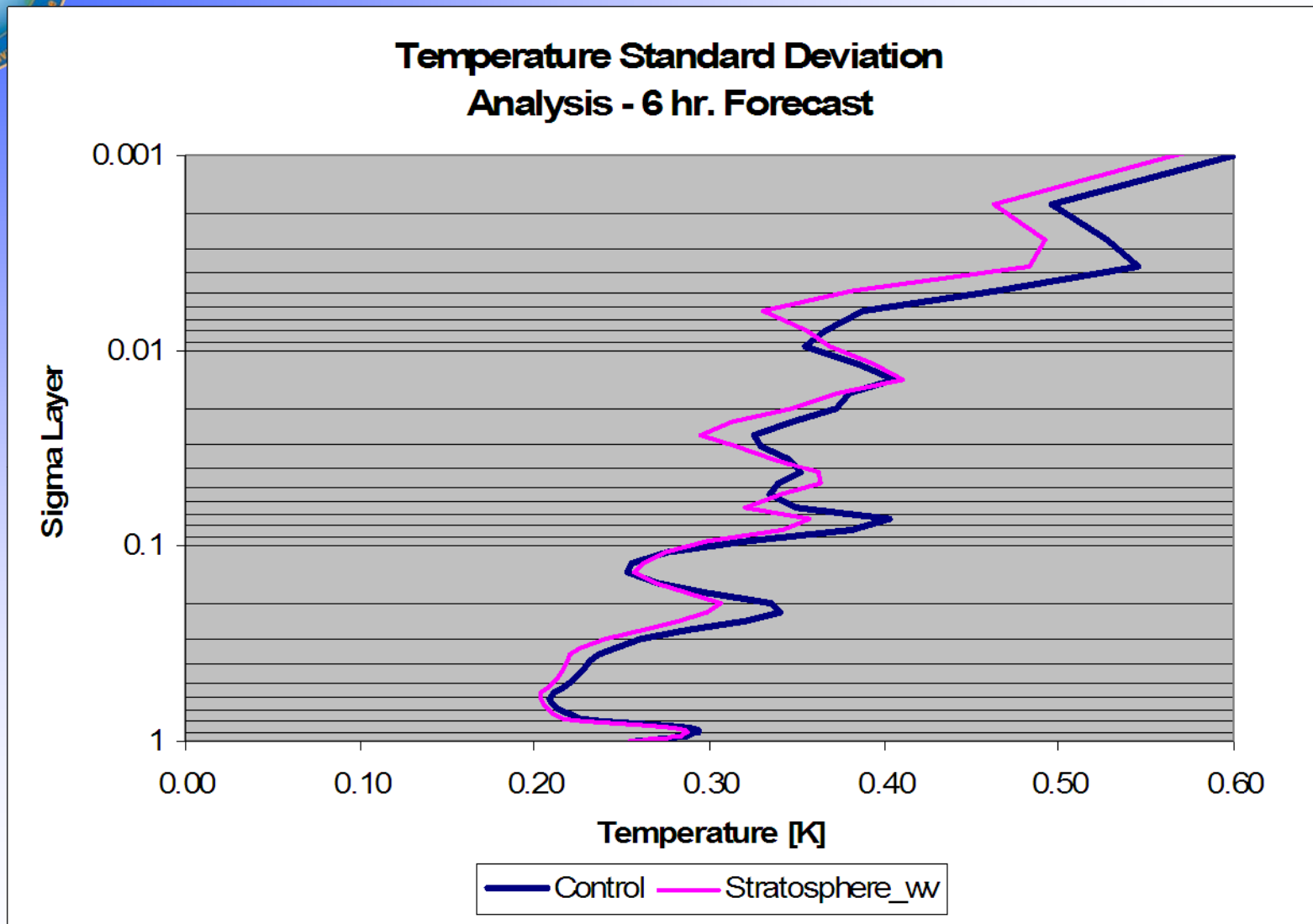


# Analysis - Background Difference

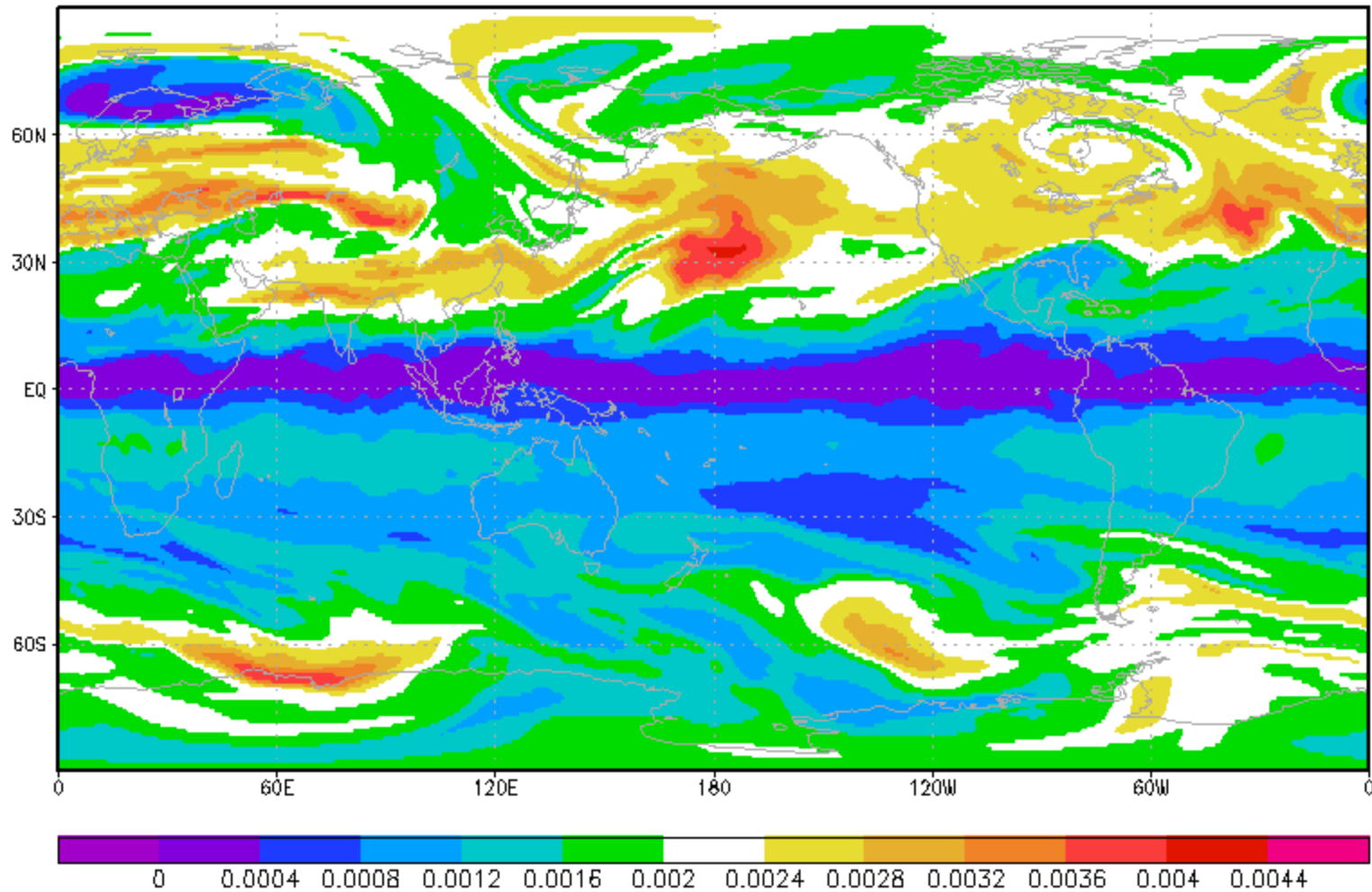




# Analysis - Background Difference



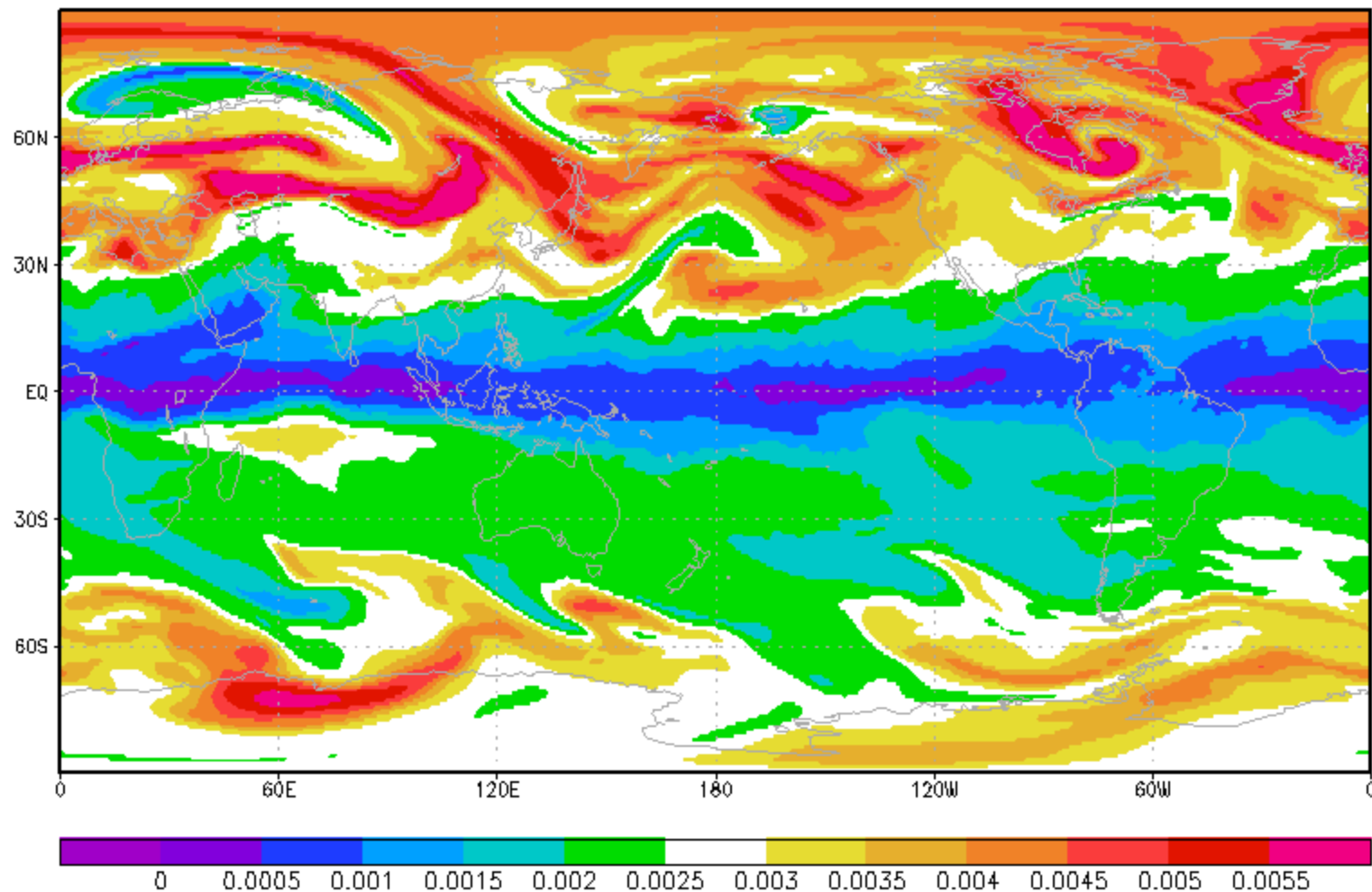
## Specific Humidity Analysis 31 mb MAR 31 00z



GrADS: COLA/IGES

Units [g/Kg]

## Specific Humidity Analysis 48 mb MAR 31 00z



GrADS: OOLA/IGES

Units [g/Kg]



Questions ?

