Comparison of Cloud Properties from MODIS and GOES During TC⁴

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Data and Methodology

- **Data**
  - GOES-12 (4-km, 30 minute)
  - Terra MODIS (1-km, sub-sampled to 2 km)

- **Algorithms**
  - Visible Infrared Solar-Infrared Split Window Technique (VISST)
    - Day
      - 0.65, 3.9, 10.7, & 13.3 µm (GOES-12)
      - 0.65, 1.6, 3.7, 10.8, 12.0, & 13.3 µm (Terra MODIS)
    - Enhanced with CO2-slicing, New Lapse Rates, Cloud Top Adjustment
  - Solar-Infrared Infrared Split-Window Technique (SIST)
    - Night
      - 3.9, 10.7, & 13.3 µm (GOES-12)
      - 3.7, 10.8, & 12.0 µm (Terra MODIS)

- Match 4-nearest pixels (9 for StDev) to Aircraft Flight Path
- Compare Spatial and Temporal Matched GOES-12/MODIS Retrievals
ER-2 Aircraft Flight Track (July 29, 2007)

Complete

G-12 1545 UTC Optical Depth Retrieval
Comparison of GOES-12 and Terra MODIS VISST Derived Cloud Properties (July 29, 2007)

GOES-12

Cloud Mask

Cloud Top Height

Terra MODIS
Comparison of GOES-12 and Terra MODIS VISST Derived Cloud Properties (July 29, 2007)

GOES-12

Terra MODIS

Effective Droplet Radius

LWP
Cloud Top Height Comparison (July 29, 2007)

GOES-12 Mean = 1.787 km
Terra MODIS Mean = 1.791 km
Bias = 0.004
RMS = 0.224
RMS% = 12.56
N = 674
Cloud Thickness Comparison (July 29, 2007)

GOES-12 Mean = 0.931 km
Terra MODIS Mean = 0.958 km
Bias = 0.027
RMS = 0.144
RMS% = 15.49
N = 674
LWP Comparison (July 29, 2007)

GOES-12 Mean = 94.68 g/m²
Terra MODIS Mean = 87.45 g/m²
Bias = 7.229
RMS = 27.324
RMS% = 28.86
N = 674
ER-2 Aircraft Flight Track (July 17, 2007)

Complete

Focus Area

G-12 1615 UTC Optical Depth Retrieval

Focus Area
GOES-12 VISST Derived Cloud Properties (July 17, 2007)

Cloud Phase
Effective Ice Diameter
Cloud Thickness
Cloud Top Height
Cloud Top Height Comparison (July 17, 2007)

GOES-12 Mean = 10.31 km
Terra MODIS Mean = 10.99 km
Bias = 0.68
RMS = 0.953
RMS% = 9.24
N = 405
Cloud Thickness Comparison (July 17, 2007)

GOES-12 Mean = 3.47 km  
Terra MODIS Mean = 4.31 km

Bias = 0.84  
RMS = 1.26  
RMS% = 36.21  
N = 405
Summary/Future Work

• GOES-12 and Terra MODIS Data Have Been Processed With New Algorithms
  – Multi-Layer Cloud/CO2-Slicing Corrections
  – Improved Cloud Tops
  – New Cloud Mask
• Low Cloud Property Comparisons Show Good General Agreement
  – Some Differences Due to Resolution, Time Offset, and Sub-Pixel Level Effects
• High Cloud Top Retrievals are Improved but Additional Comparisons are Needed
  – Additional MODIS Channels Allow Better Detection of Thin Cirrus and Cloud Top
• Continue Evaluation of MODIS and GOES Retrievals
• Validate Retrievals with Insitu Measurements
• Update WWW Page to Provide Access to New Results