# 2007 Arctic viewed from CERES and MODIS

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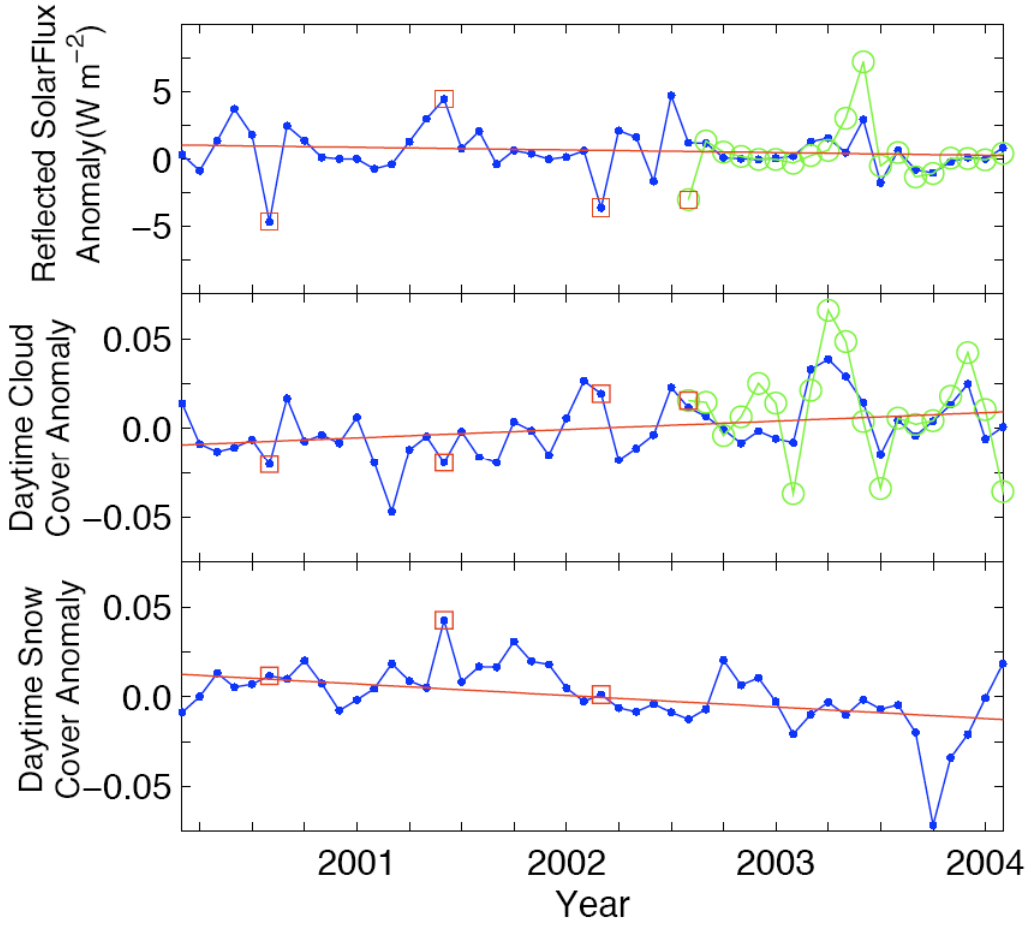
# Objectives of this study

- Assess the impact of a small sea ice cover in Summer 2007 to the Arctic radiation budget.
- Estimate the atmospheric change associated with a large sea ice change.
- Identify spatial distribution of cloud and radiation changes.

# Arctic albedo, cloud, snow/sea ice trends




Terra

Aqua

Linear fit to Terra data

Month with missing significant days

2000-2004 due to large cloud cover and increasing clod cover the TOA albedo did not change very much.

How much and how long can clouds compensate?

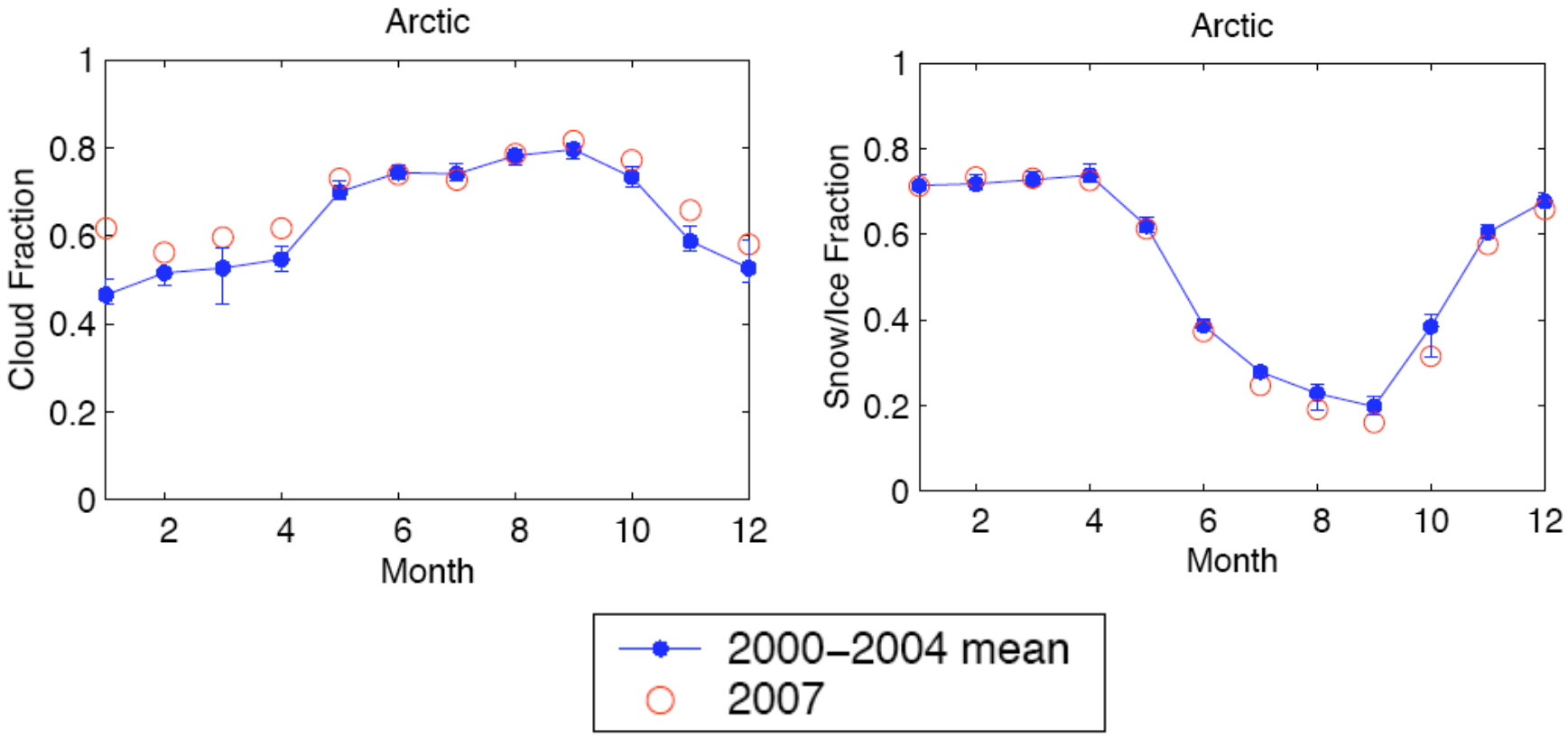
Which region and what process cause the cloud change?

Kato et al. 2006, GRL

# CERES Data

- March 2000 through December 2006, SSF ed2B, ed2F
- 2007 FlashFlux

# Cloud and snow/sea ice cover over the Arctic in 2007

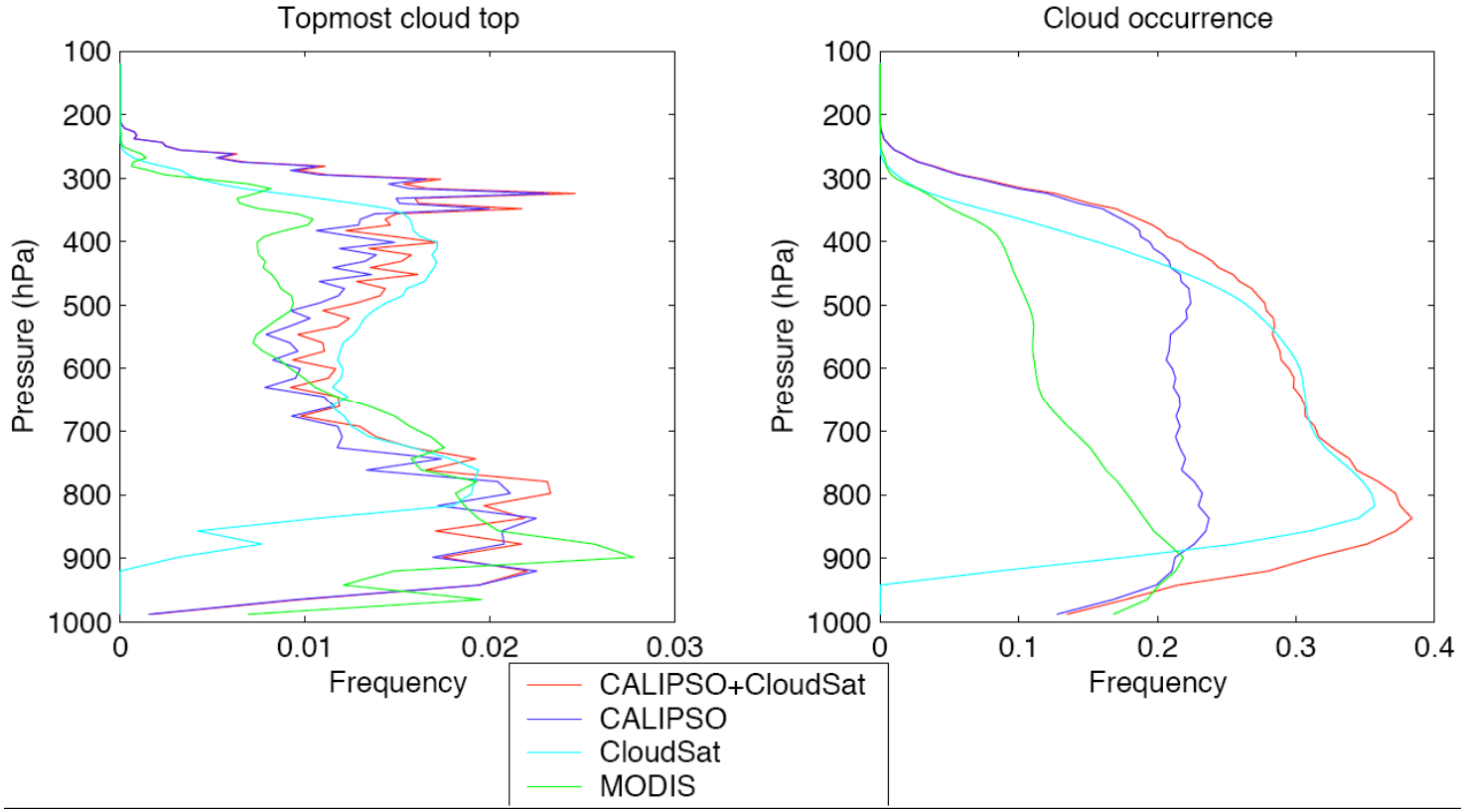



Day+night cloud and snow/sea ice cover

# MODIS vs. C3M

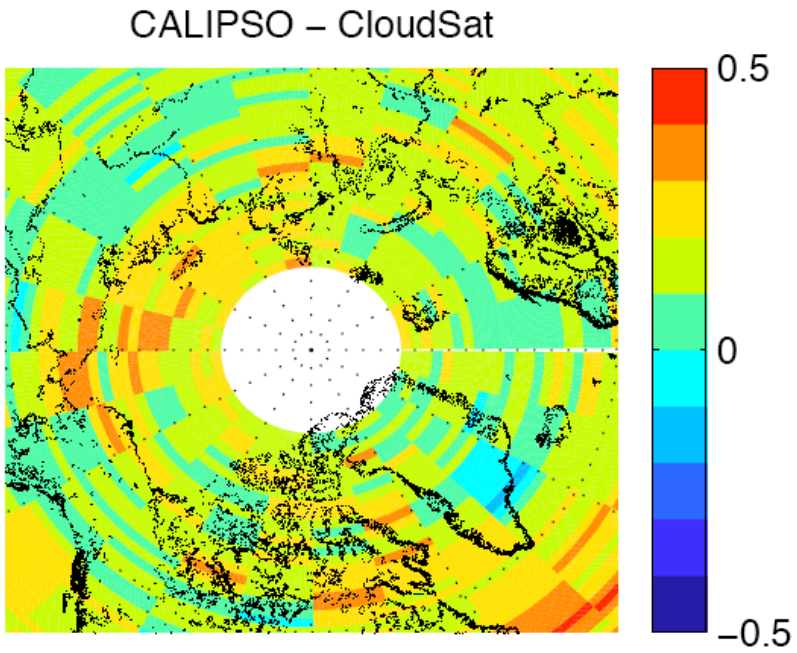
Cloud top only

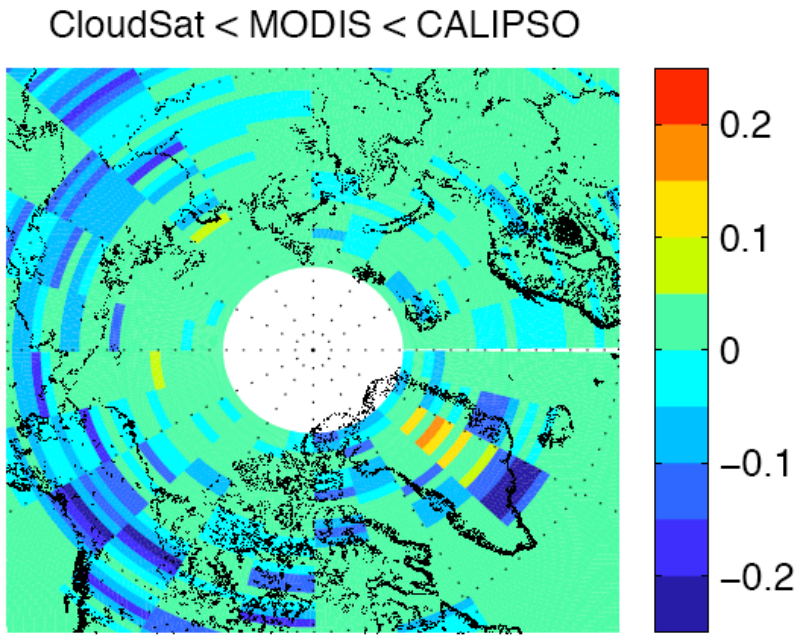
All vertical extent




April 2007, Latitude between 60 and 90N

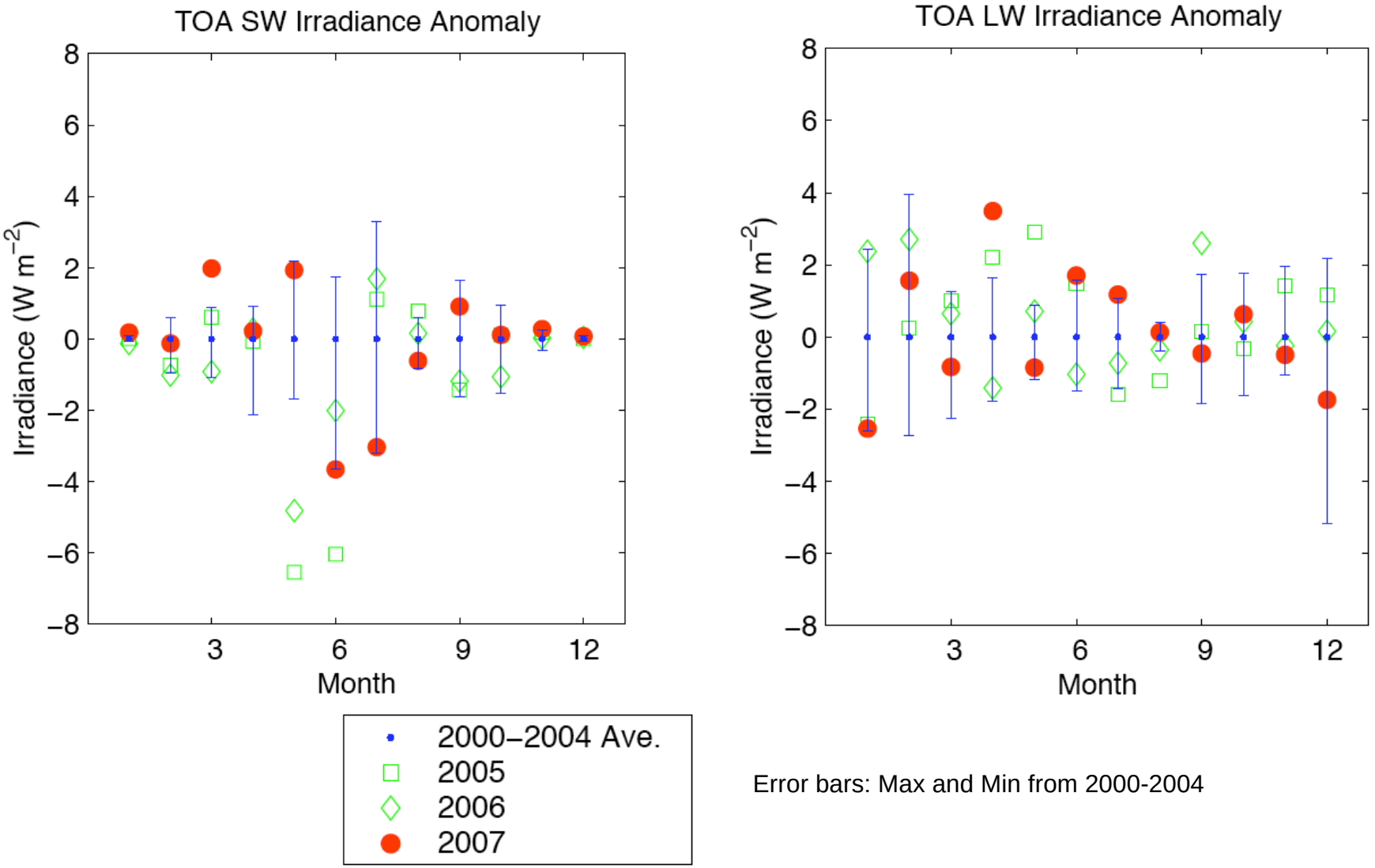
# Regional difference (day + night)



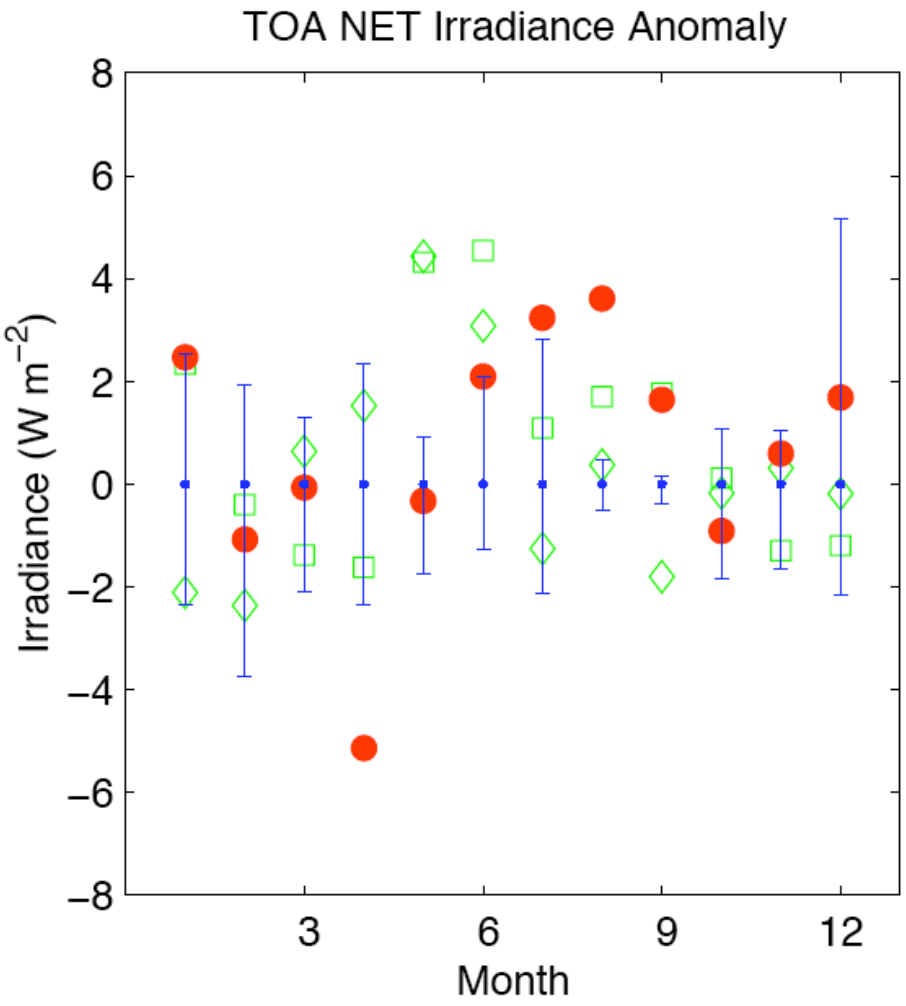

April 2007 cloud cover

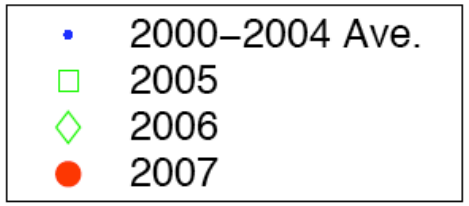
# 2007 Reflected Shortwave and OLR Anomalies




Error bars: Max and Min from 2000-2004

# 2007 NET Anomalies



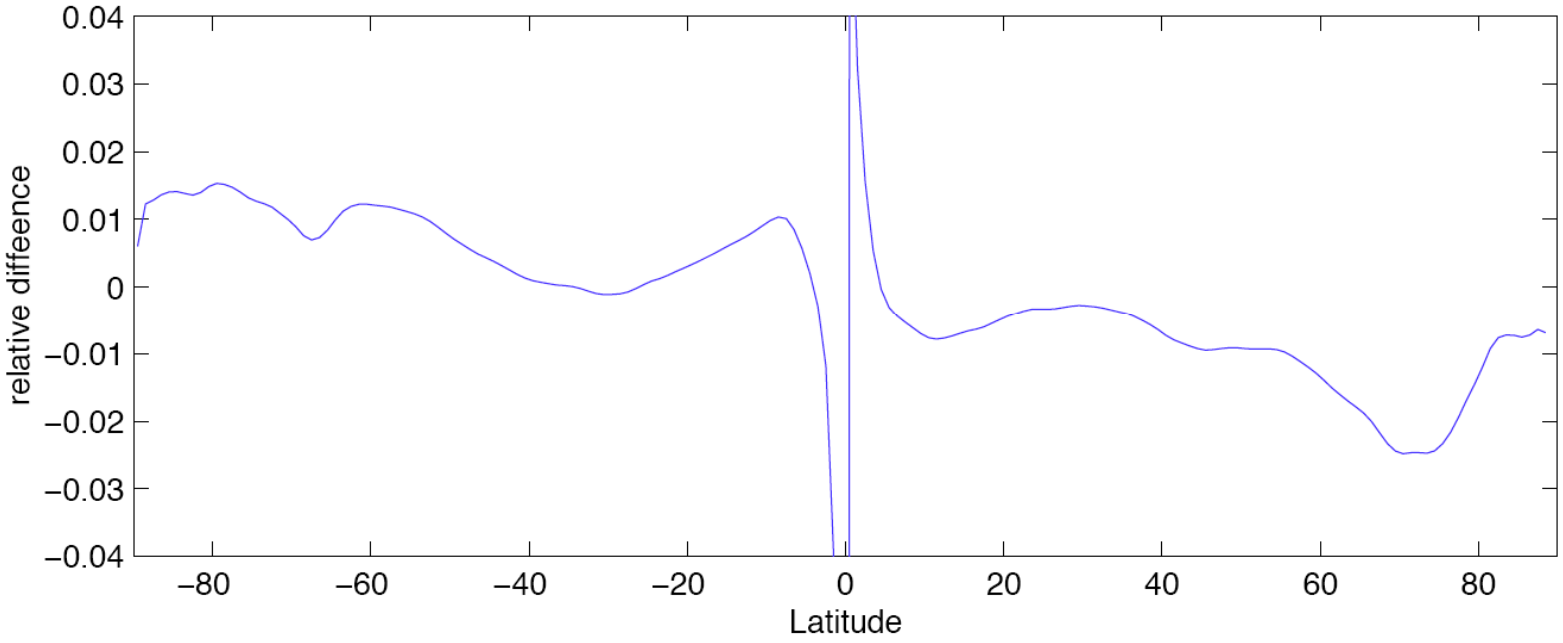




Error bars: Max and Min from 2000-2004

NET = SW absorbed - LW emitted

# Relative Anomaly of Rate of Meridional Energy Transport

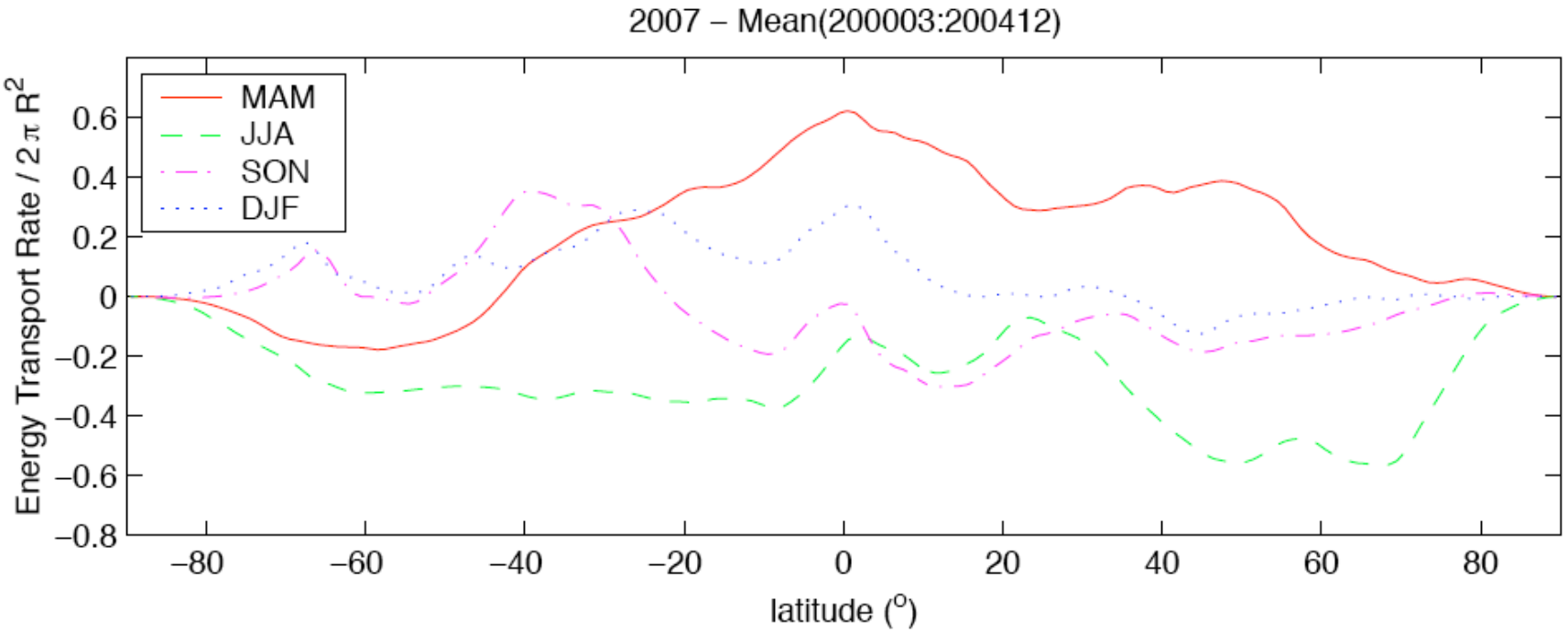
(2007 - 2000-2004 mean) / 2000-2004 mean




Northward transport decreased in NH
Southward transport increased in SH

# Meridional Energy transport

## Anomalies of the rate of meridional energy transport




How much are these related to sea ice anomalies?

Is there any relations to a larger cloud cover in March - May 2007 ?

# Summary and future work

- Negative anomalies of reflected SW and positive LW anomalies from June through August 2007 (compared with March 2000 - Dec 2004 mean).
- A small positive reflected SW anomaly and a small negative LW anomalies in September 2007.
- Net TOA is positive from June through September 2007.
- Positive cloud cover anomalies from January through May 2007.
- Need to investigate regional pattern of anomalies and relation to synoptic systems.
- More cloud comparisons (CALIPSO, CloudSat, MODIS, MISR, GLAS, and ground-based radars).