

Tracer Transport Models

Andy Jacobson, ESRL and CIRES

GCTM-Dust

TM5

HYSPLIT

FLEXPART

IDEA

RUC/CSU-LPDM

STILT

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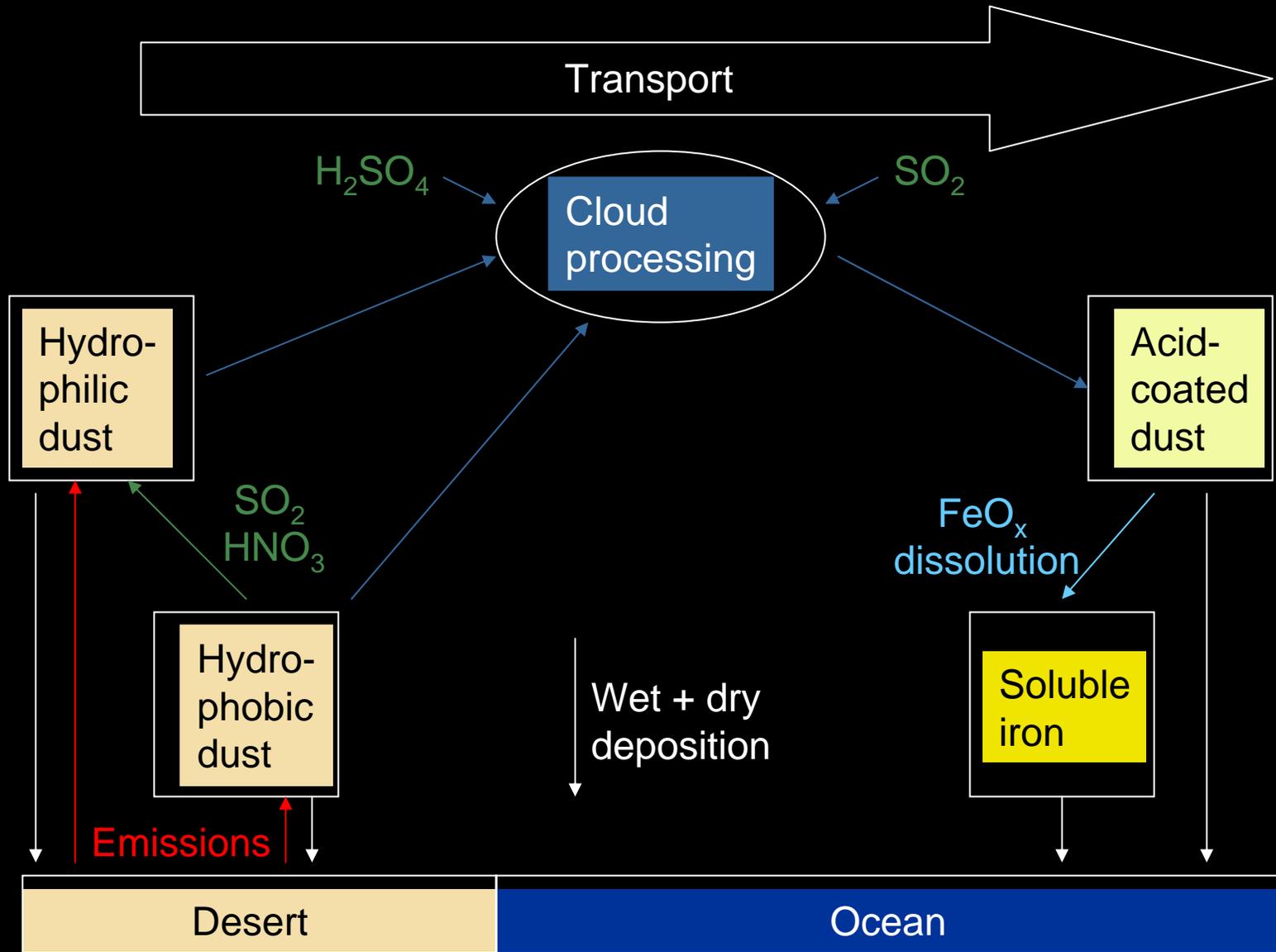
IDEA

RUC/CSU-LPDM

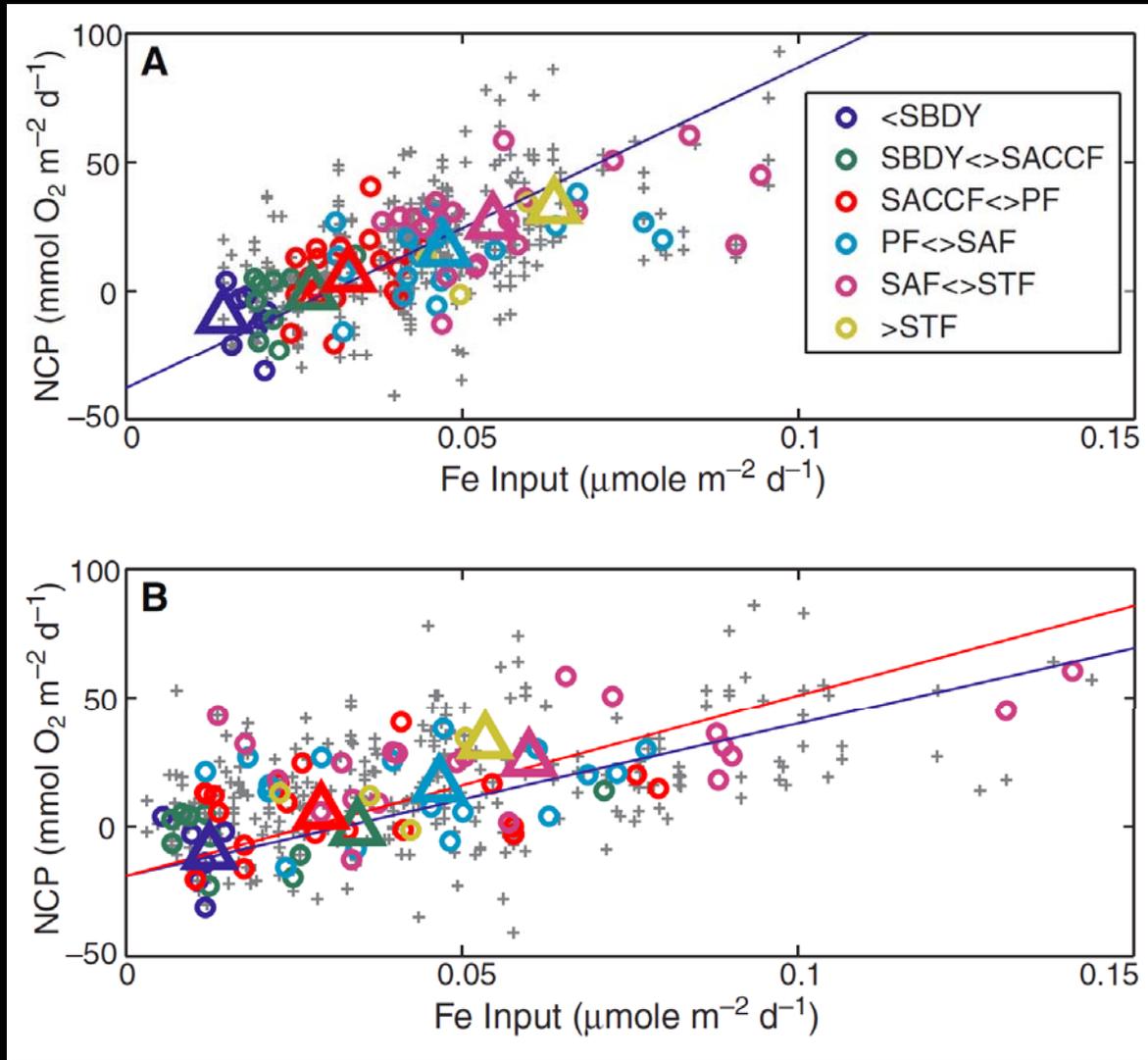
STILT

- regional vs global
- hindcast vs forecast
- point or area emissions
- forward or inverse
- sensitivity to driving meteo
- representivity

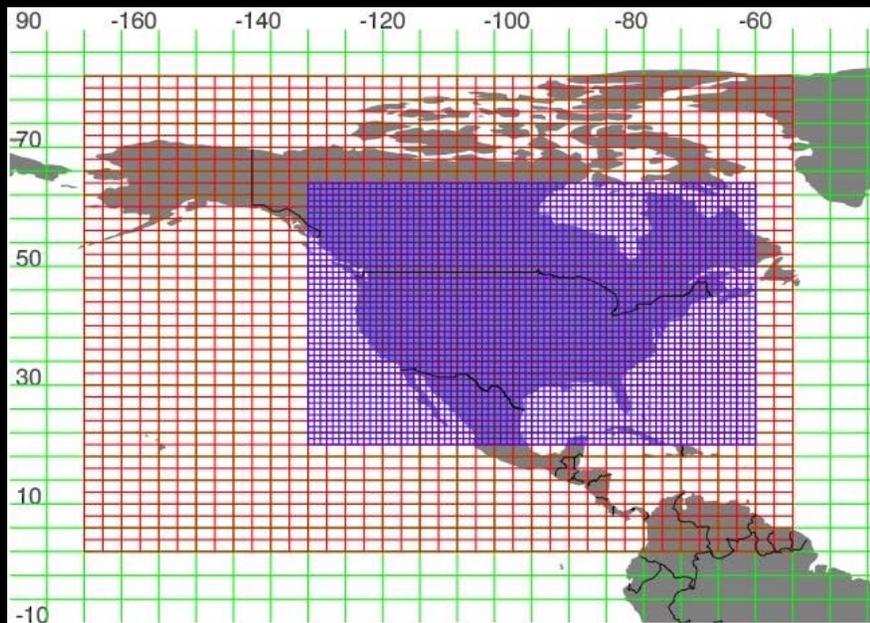
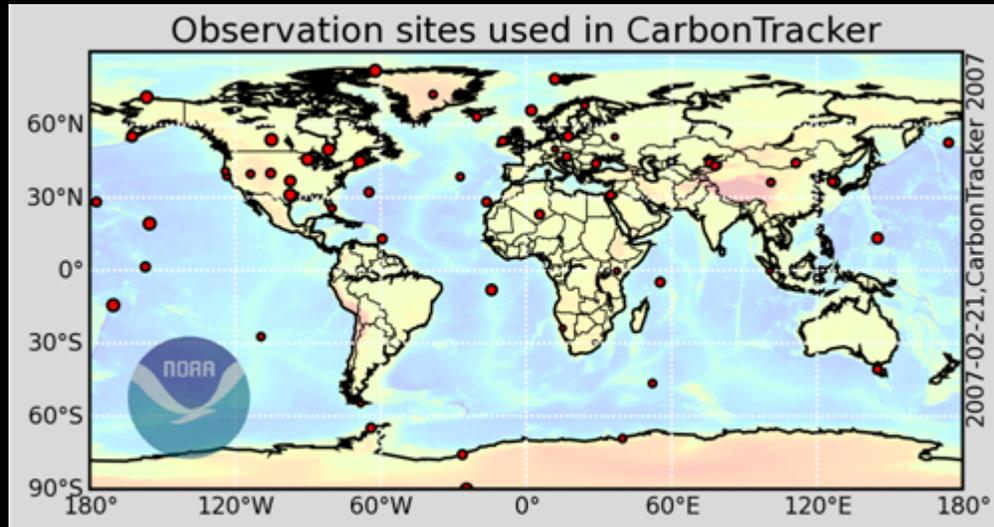
GFDL Atmospheric Dust & Iron Model



GCTM-Dust Iron Deposition Correlated with Productivity



CarbonTracker



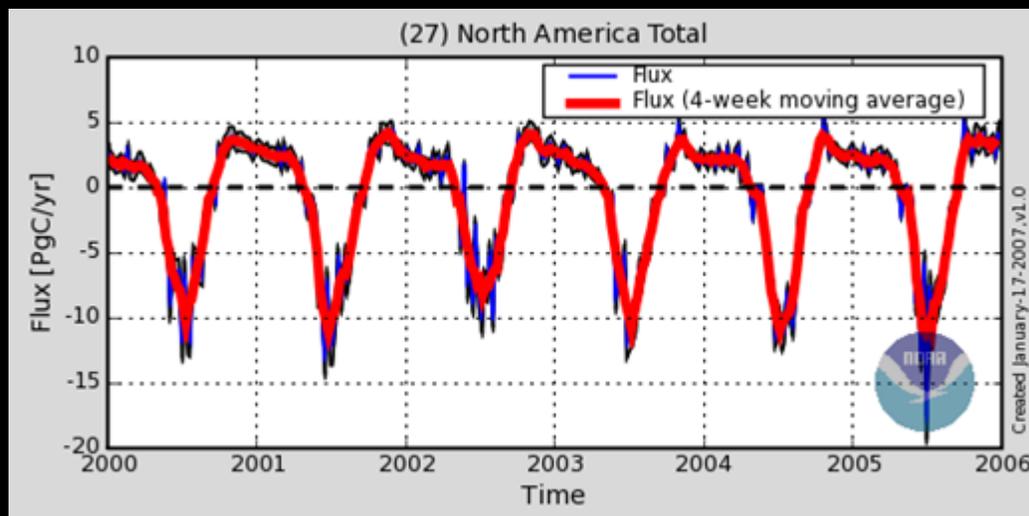
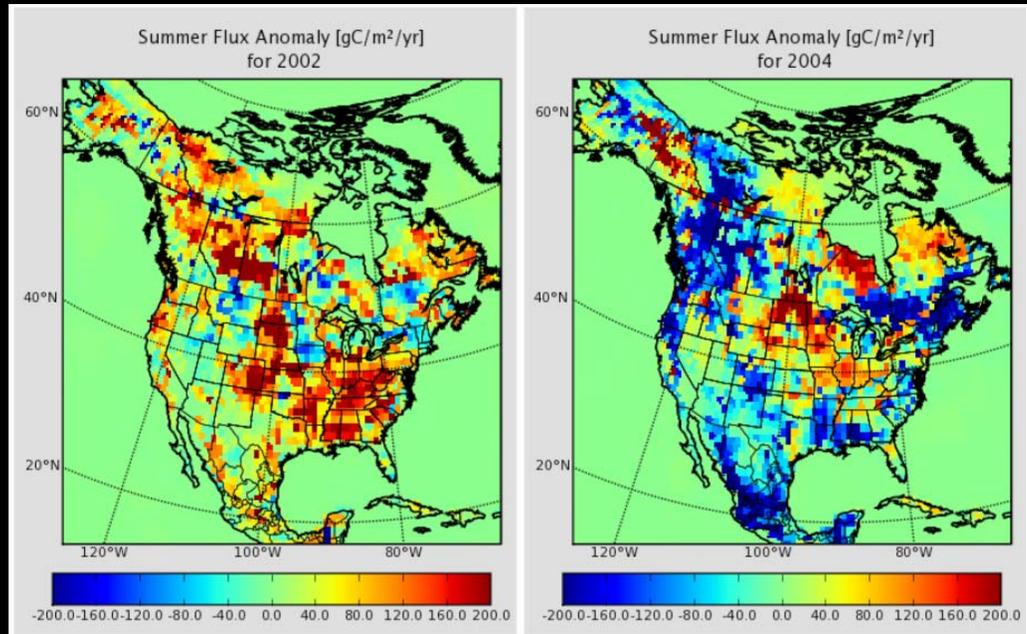
Two-way nested grids in TM5:

$6^\circ \times 4^\circ$ global,

$3^\circ \times 2^\circ$ over North America

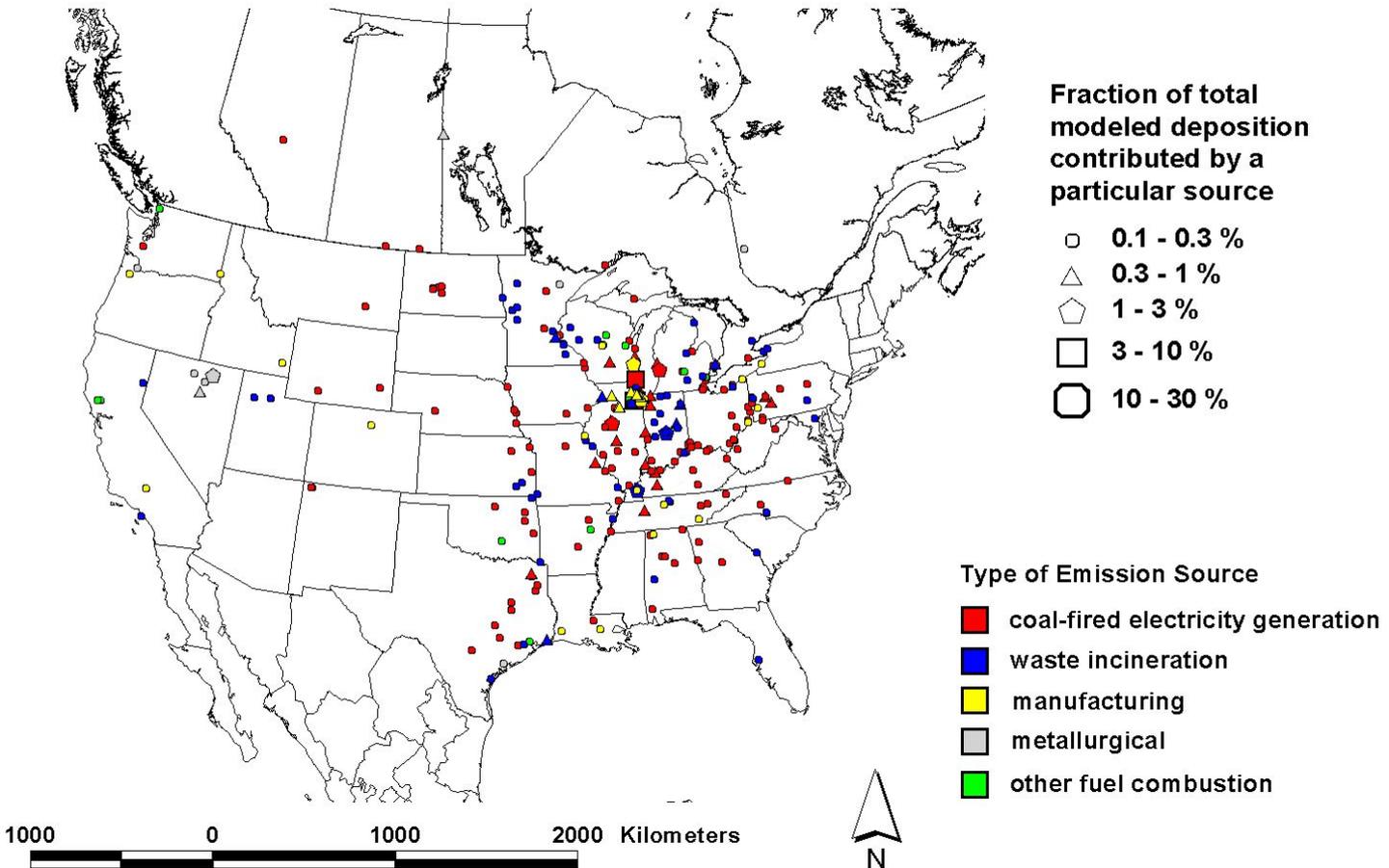
$1^\circ \times 1^\circ$ over U.S.

CarbonTracker



HYSPLIT

Largest atmospheric deposition contributors to Lake Michigan based on 1999-2000 emissions

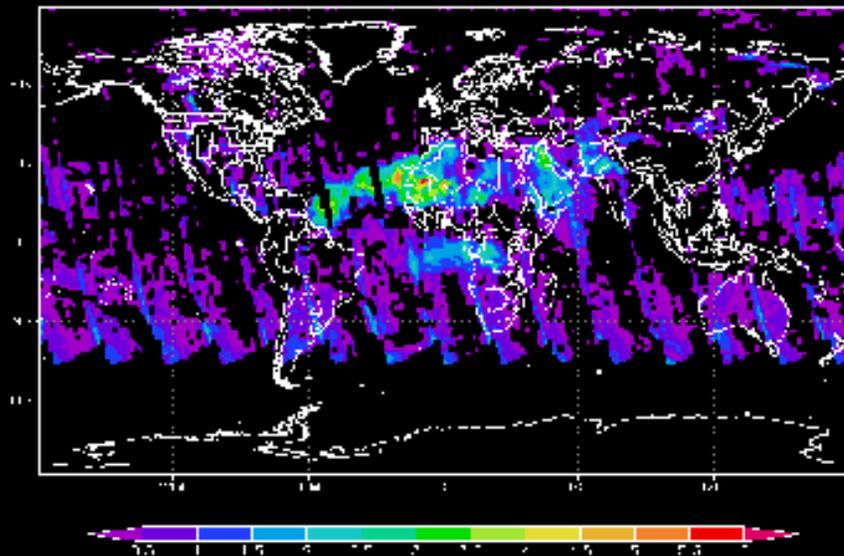


HYSPLIT

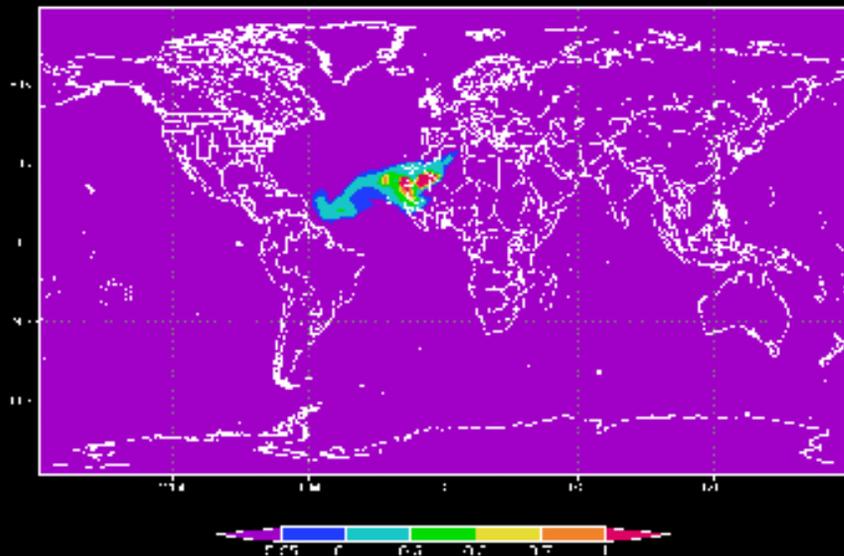
African aerosols July 2007

OMI aerosol index

AI from OMI



dust integrated column



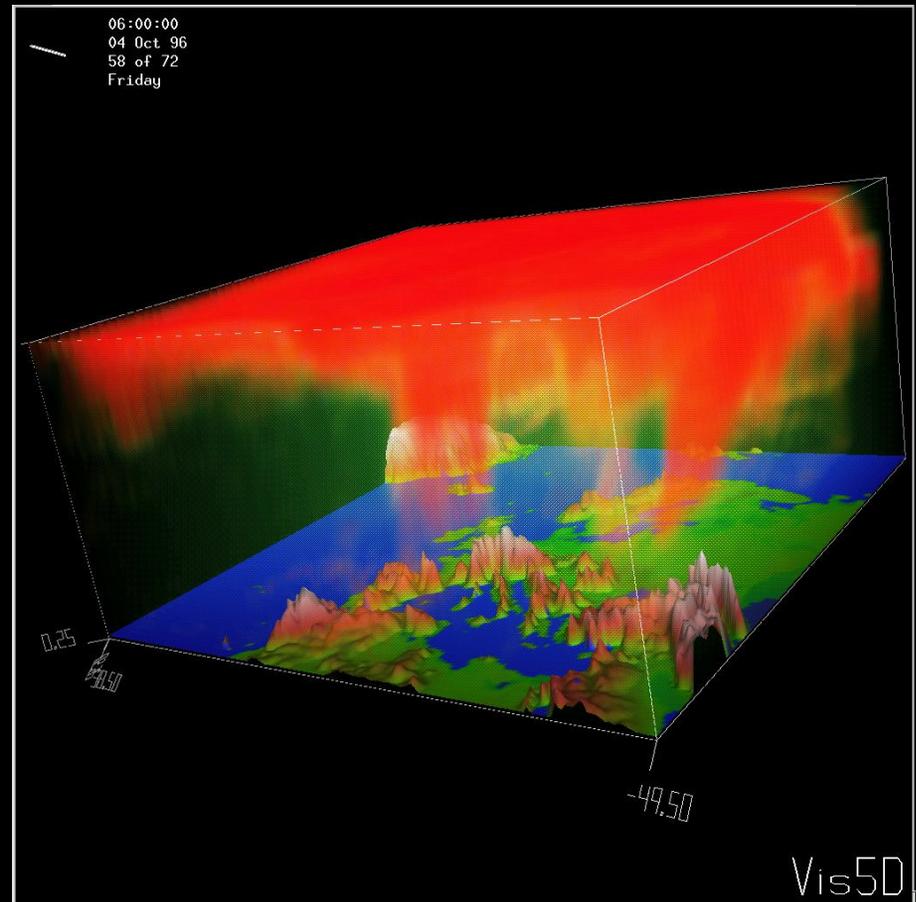
HYSPLIT-simulated column
abundance

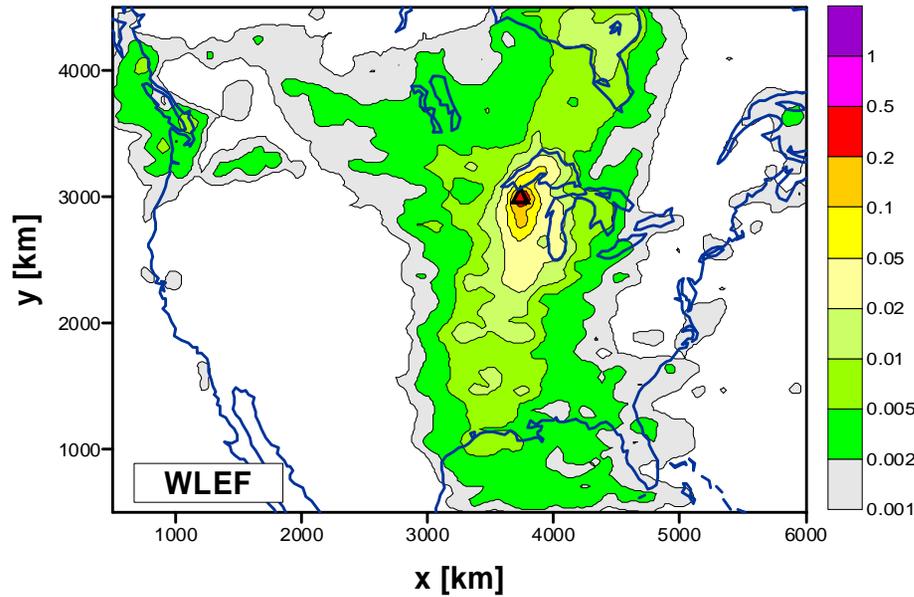
FLEXPART

3-D visualization of an intrusion of stratospheric air into the troposphere. The domain shown covers Europe, and the uppermost level is at 13 km

Applications include:

- transport of radionuclides after nuclear accidents,
- pollution transport,
- greenhouse gas cycles,
- stratosphere-troposphere exchange, and
- water cycle research.

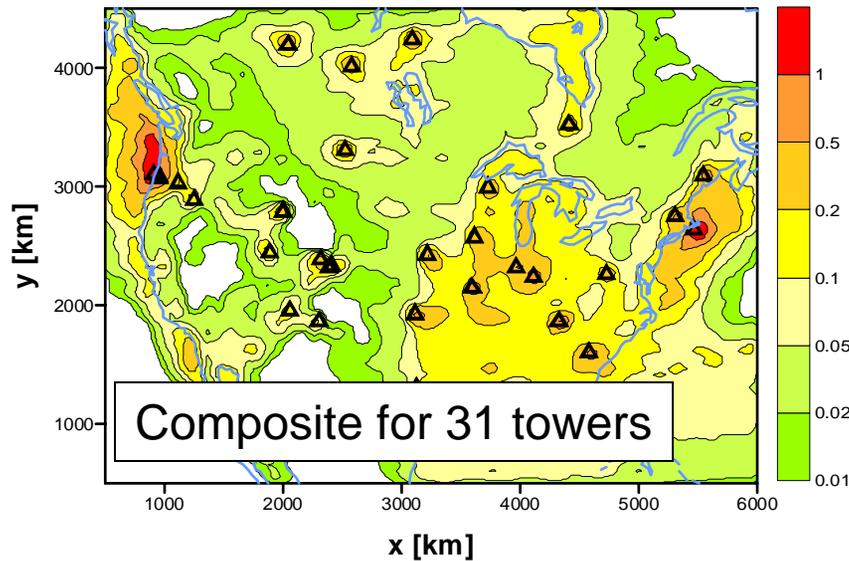




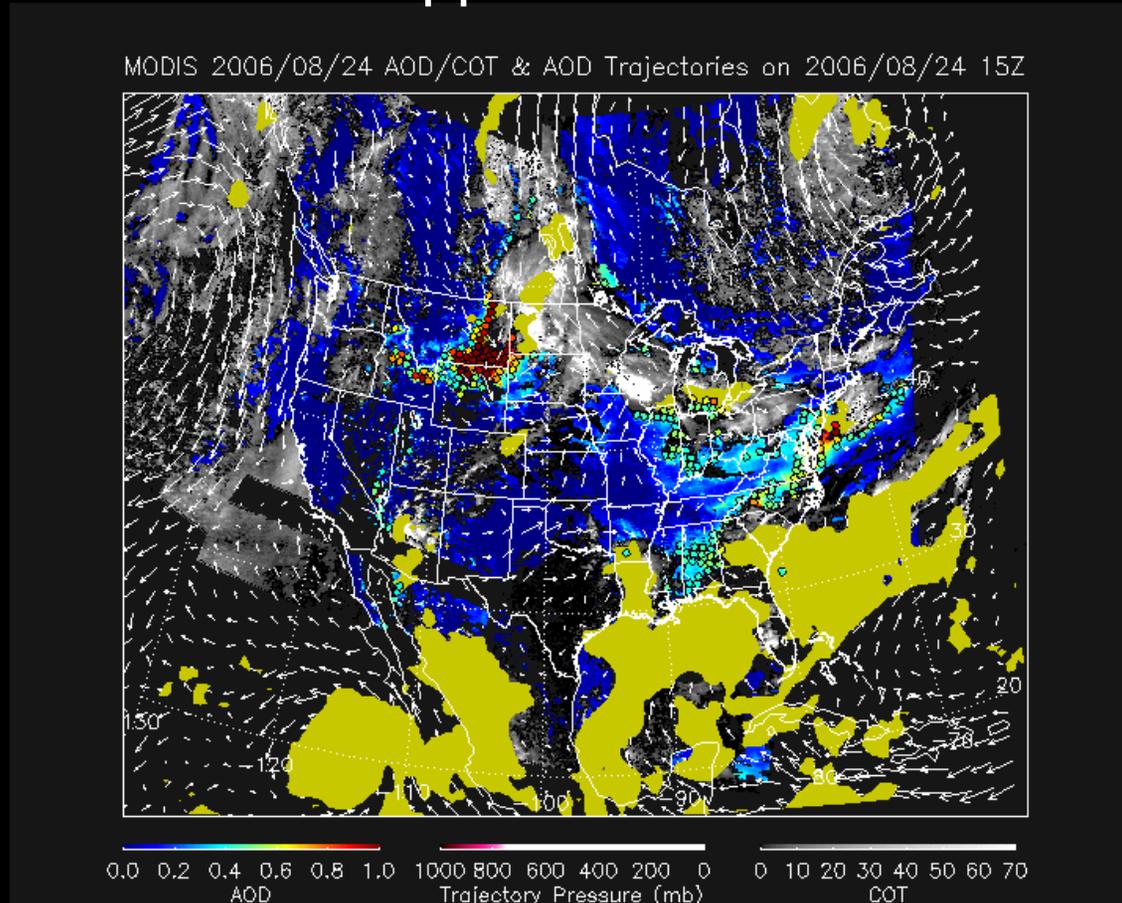
RUC-CSU/LPDM

Influence functions
precomputed for GMD
tower sites.

Use of RUC is novel

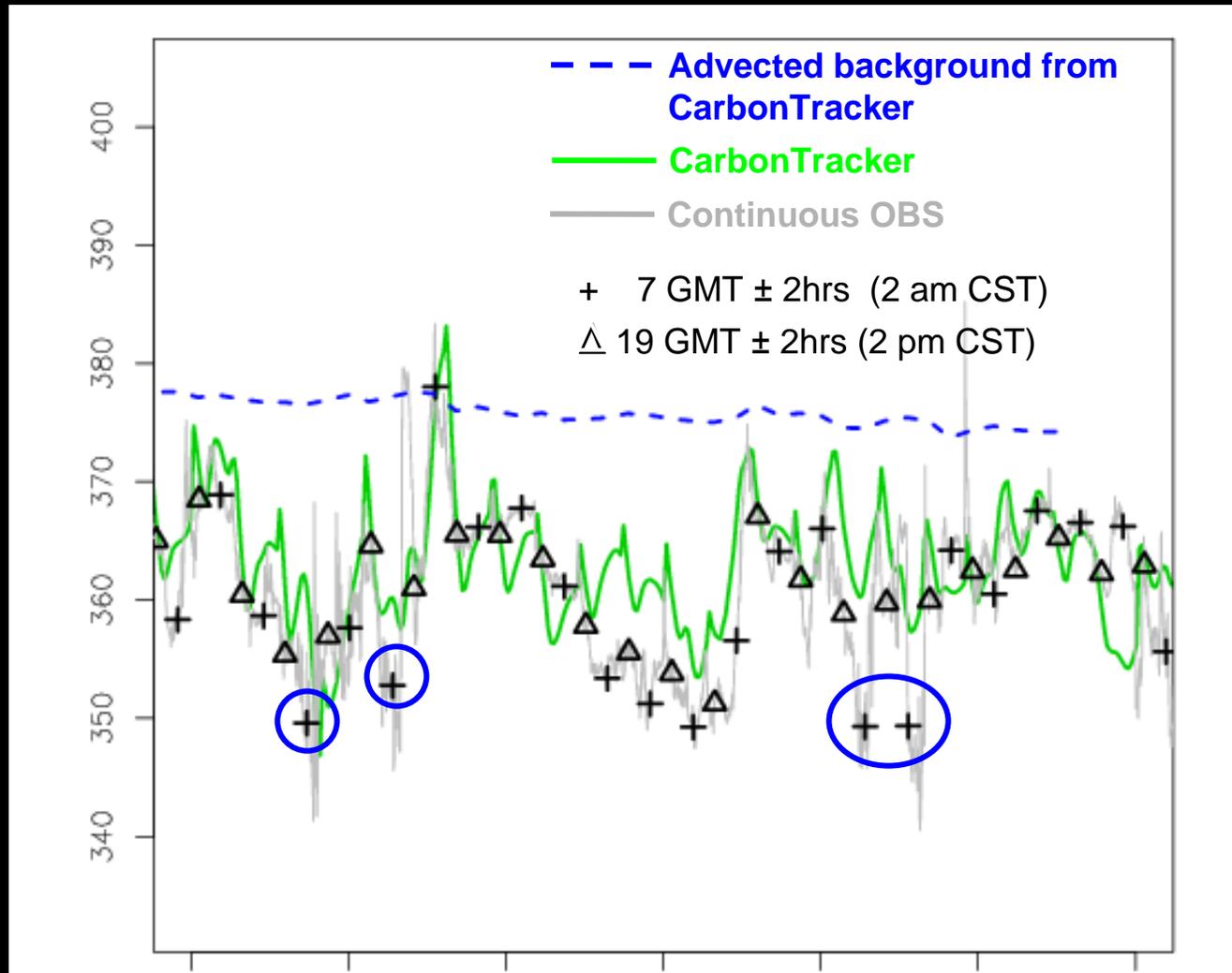


IDEA: Infusing satellite Data into Environmental Applications



48-hr trajectory forecast initialized with satellite (MODIS) observations of Aerosol Optical Depth. Pink color in the forecast trajectories indicates pollution will be closer to the ground

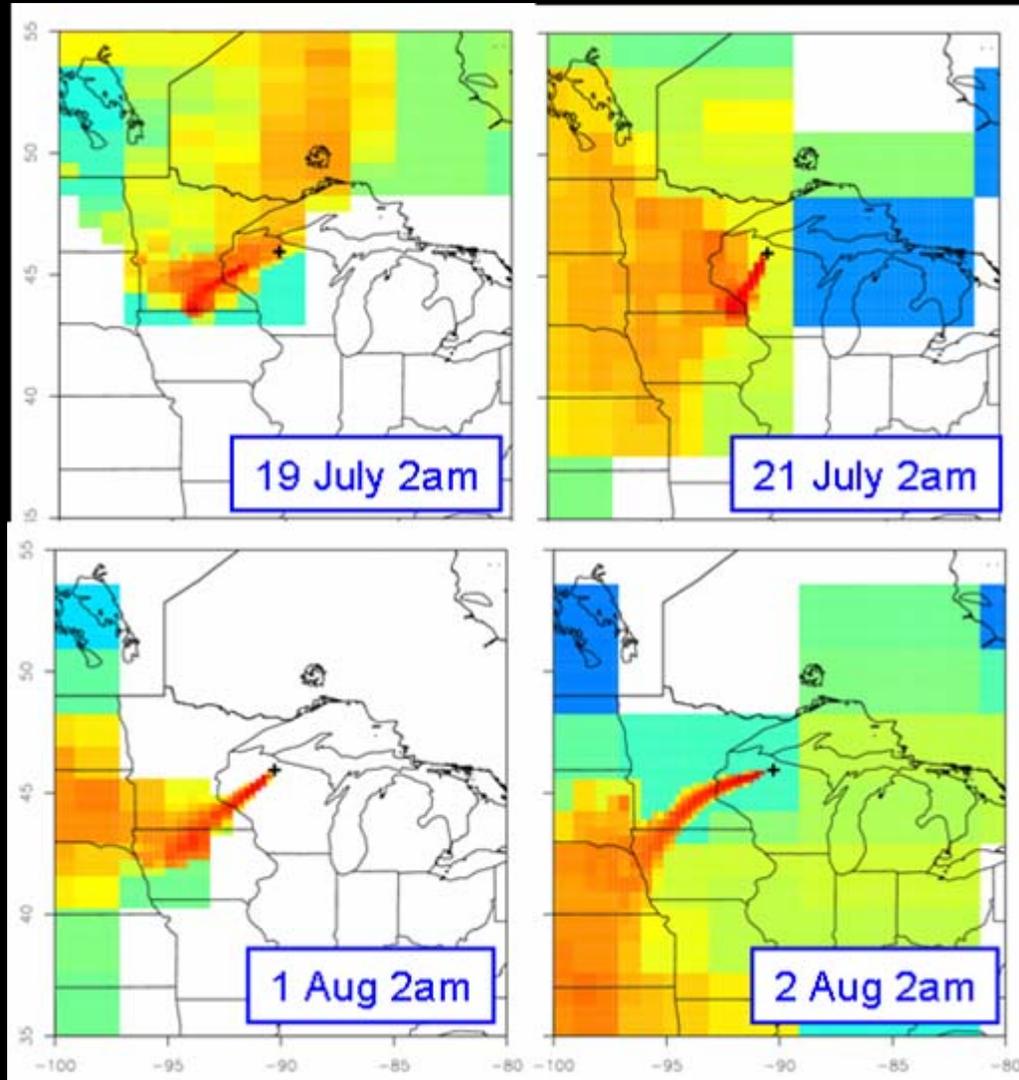
Tall Tower Observations from Park Falls, WI (LEF), 396m agl



July 15, 2004

Aug 5, 2004

Tall Tower Observations from Park Falls, WI (LEF), 396m agl



STILT footprints