



TM5 activities @ GMD

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Overview

- **Data Assimilation for NACP**
- **NCEP meteorology in TM5**
- **TransCom Continuous**



Data Assimilation

- Based on EnKF
 - JGR paper in press (January 2006)
 - documentation now in CVS
- TM5 parallel
 - ~50-100 processors
 - ~400 tracers (ensemble members)
 - variable nregions in code (was parameter)
- Per year
 - ~7000 parameters estimated
 - ~3000 observations assimilated

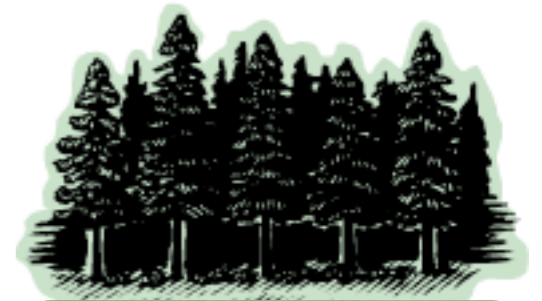


SEAT-A

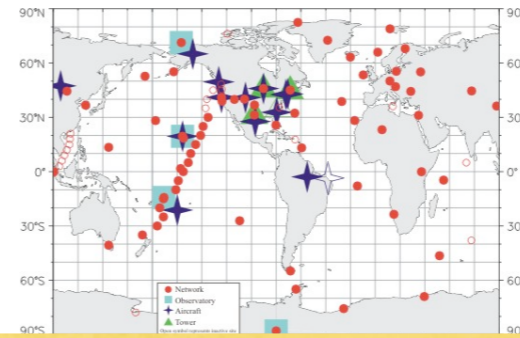
System for
Ensemble
Assimilation of
Tracers in the
Atmosphere



Ocean
Module



Biosphere
Module



Observations



Fire
Module



Fossil Fuel
Module

Ensemble
Kalman Filter

ICDC7
Sept 2005



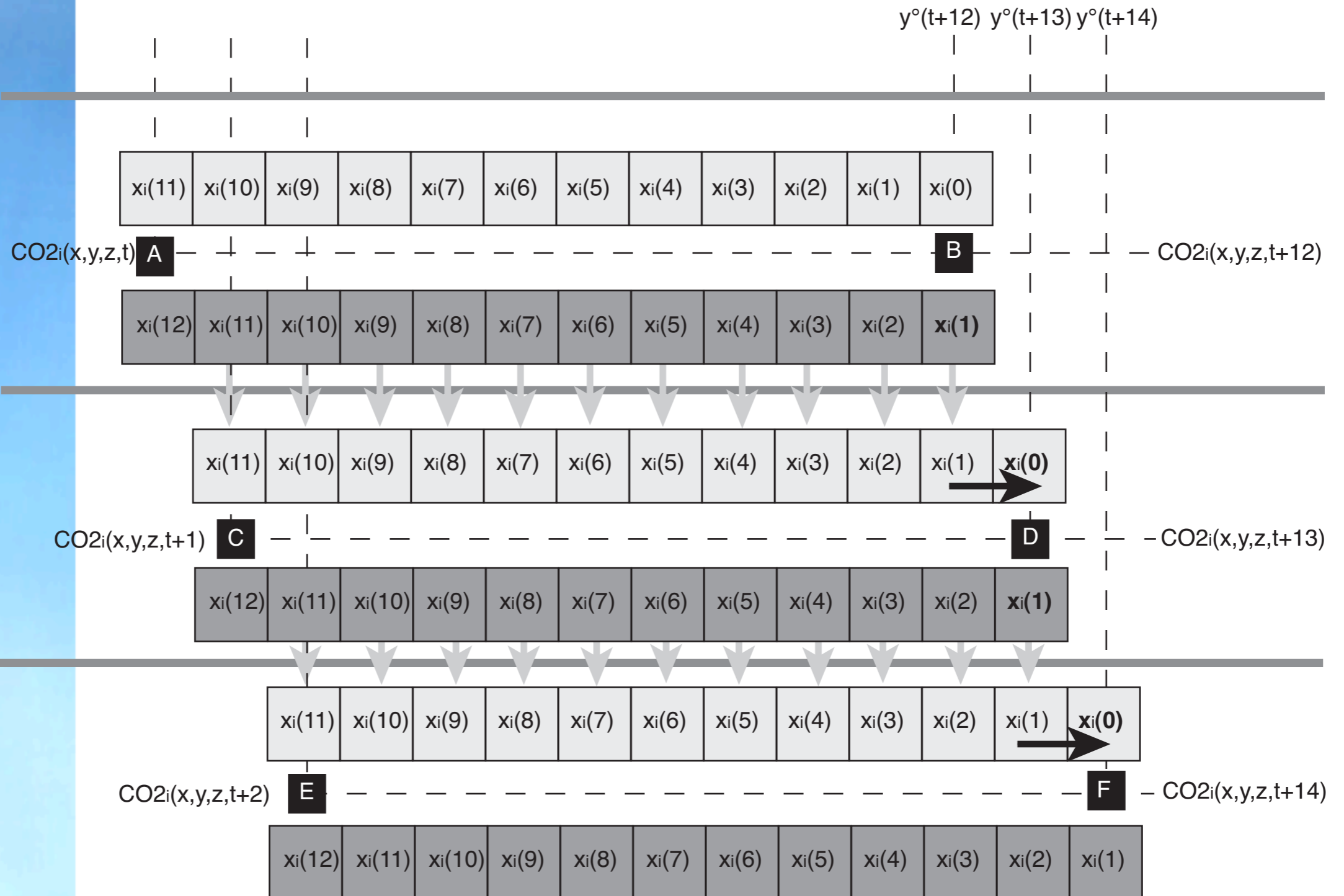


Flux Modules

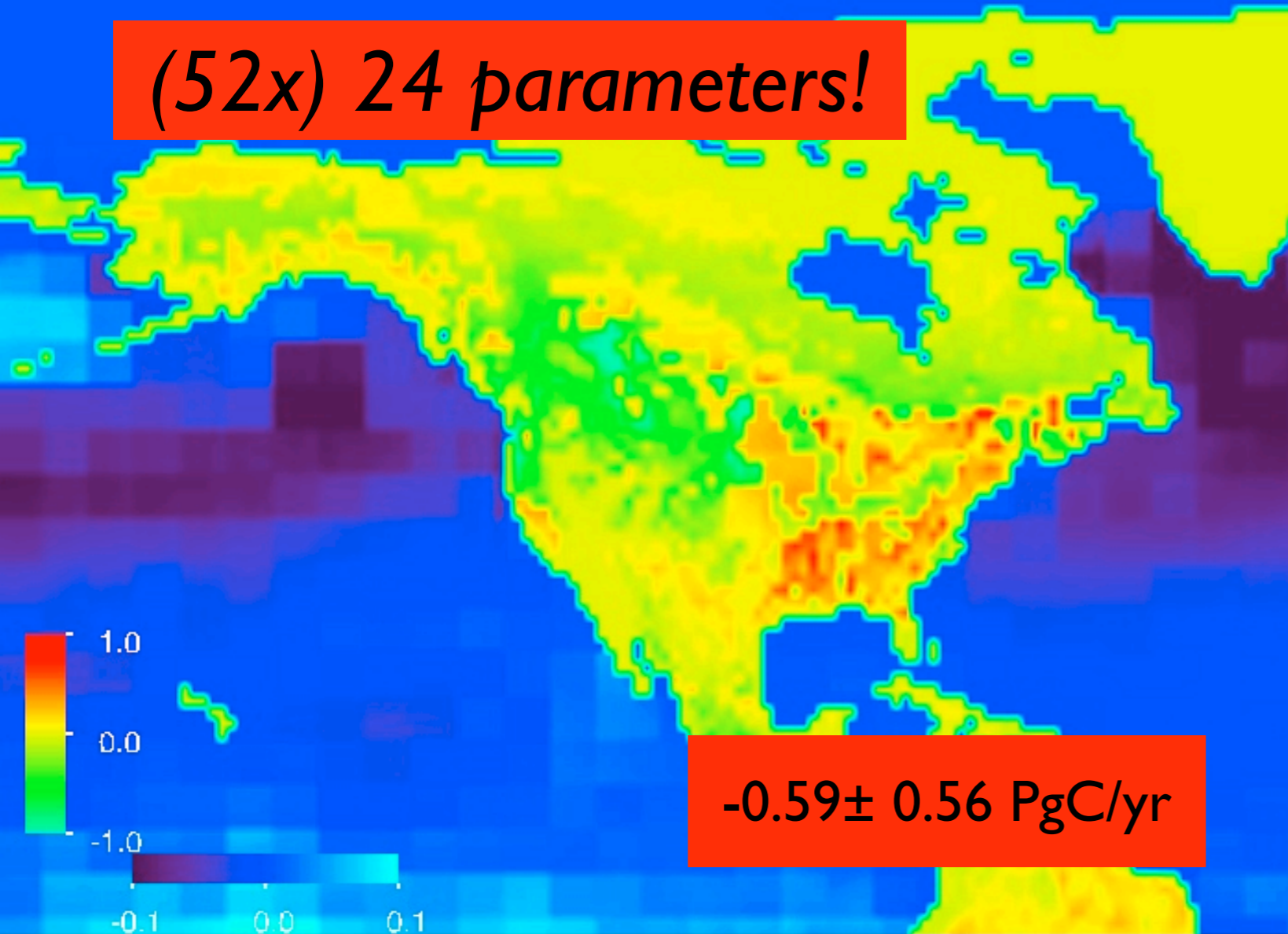
- Simple parameterizations of flux behavior (for now...)
- Include carbon cycle 'auxiliary' information
 - weather, NDVI, pCO₂, biosphere maps, fire counts,...
- Fill in details we cannot derive from atmospheric CO₂
- Straightforward extension to more tracers
- **optimizable parameters to constrain net flux**



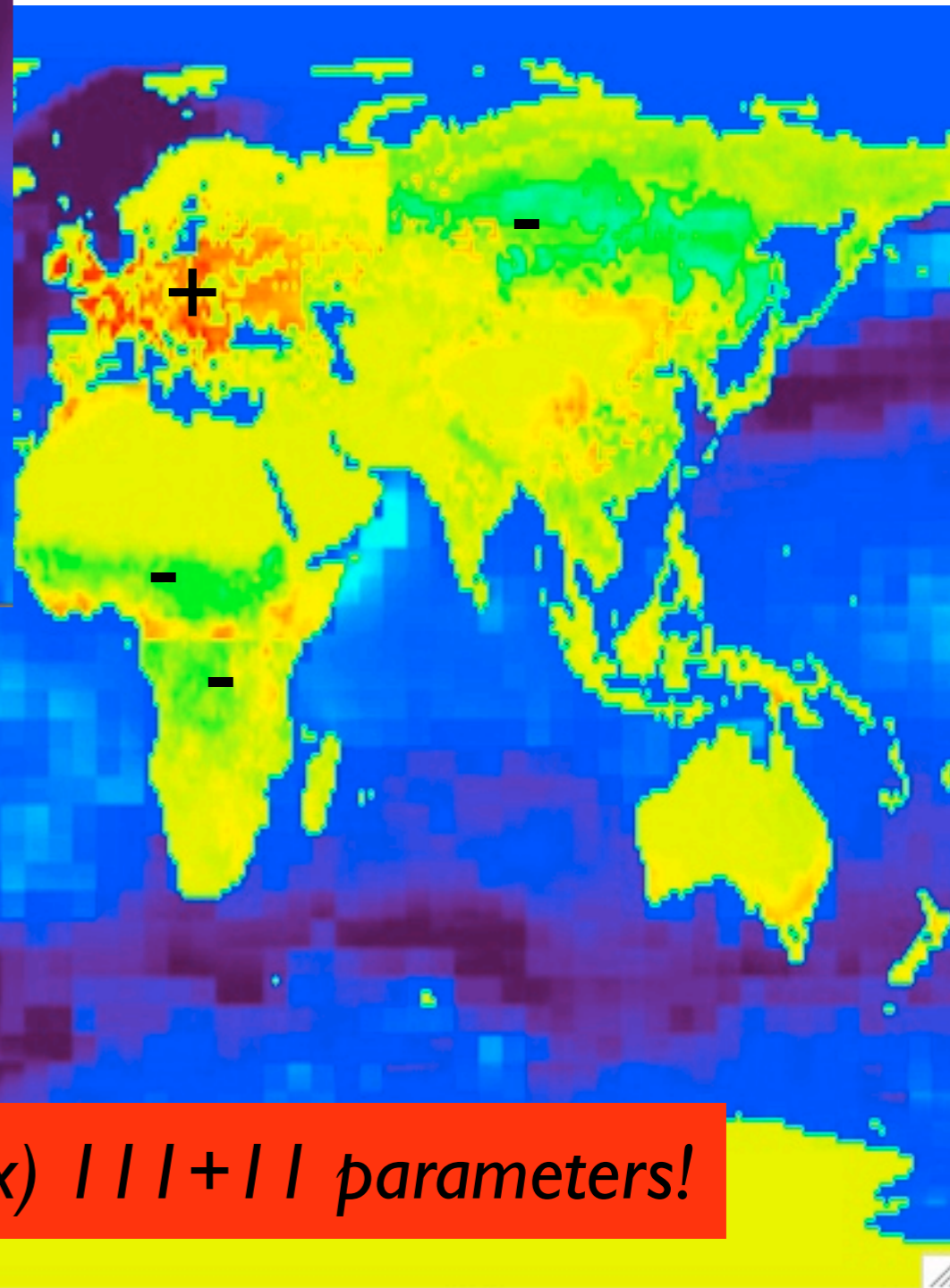
TM5 in data assimilation



(52x) 24 parameters!



2001 Annual Mean
fluxes in $\mu\text{mol}/\text{m}^2/\text{s}$



Insights

ICDC7
Sept 2005

TM5 and NCEP meteorology

Arjo Segers

Wouter Peters

What we need...

- Capability to independently process meteo data for TM5
- Preferably a NOAA in-house product
- Free, available, documented,...
- High resolution in time and space
- Zoom regions over North America

NCEP meteorology

- NCEP reanalysis
 - Reanalysis I
 - Reanalysis II (improvement)
 - 1948-now
 - T62L28 resolution (2.5x2.5 degrees, 28 layers)
 - 6-hourly output
 - ‘frozen’ model version, no forecasts
 - Data available ~3 months after today

NCEP meteorology

- NCEP global forecast
 - GFS model, previously referred to as ‘AVN’
 - Archived data
 - NCEP: 2000-now
 - GFDL: 2002-now
 - NCEP?
 - T170L42/T256L64/T384L64 resolution (0.4x0.4 degrees)
 - 3-hourly output based on 6-hourly analysis
 - Data available each day, but briefly...

NCEP meteorology

- NCEP regional forecast
 - RUC model, maintained by FSL
 - No Archived data
 - 13x13km resolution
 - Focus on boundary layer processes (precip)
 - Special vertical structure
 - Many extra datasets assimilated

NCEP vs ECMWF

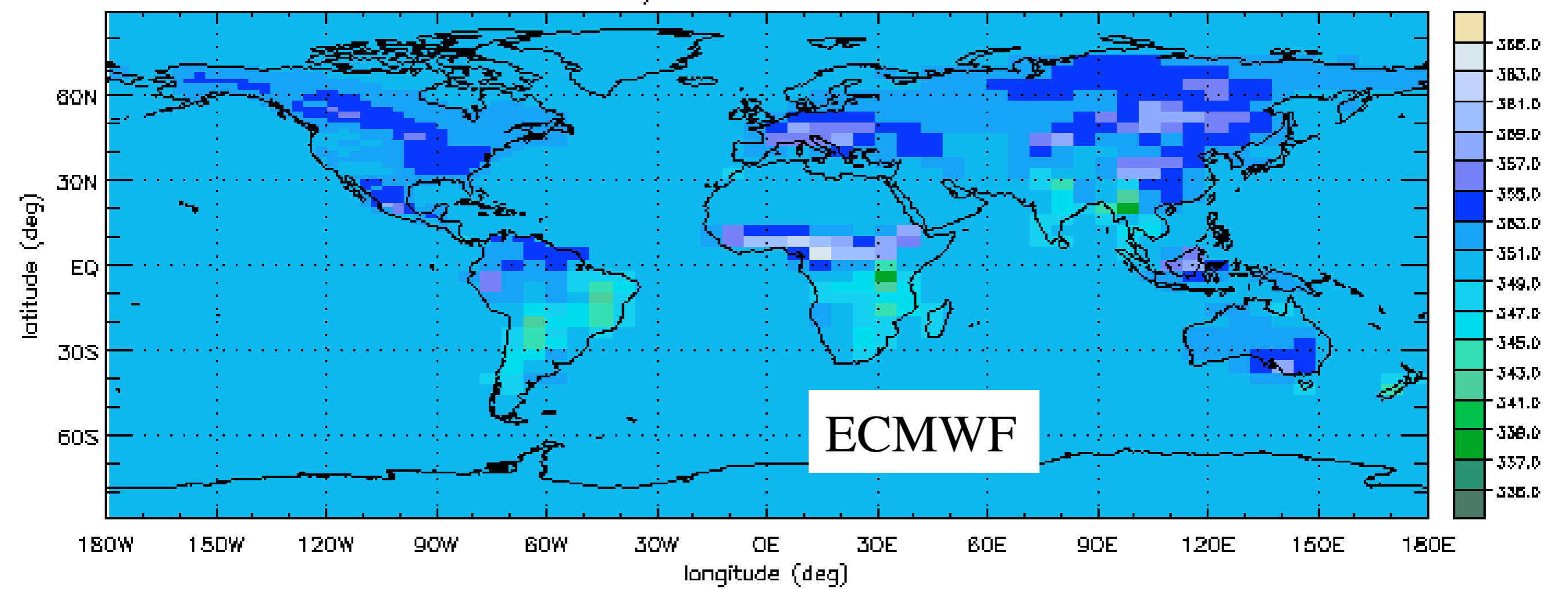
- NCEP: sigma
- ECMWF: hybrid sigma/pressure
- T384L64 vs T512L60 (T159L60)
- NCEP has a 6-hour cycle
- ECMWF has a 12-hour cycle

Storage of files

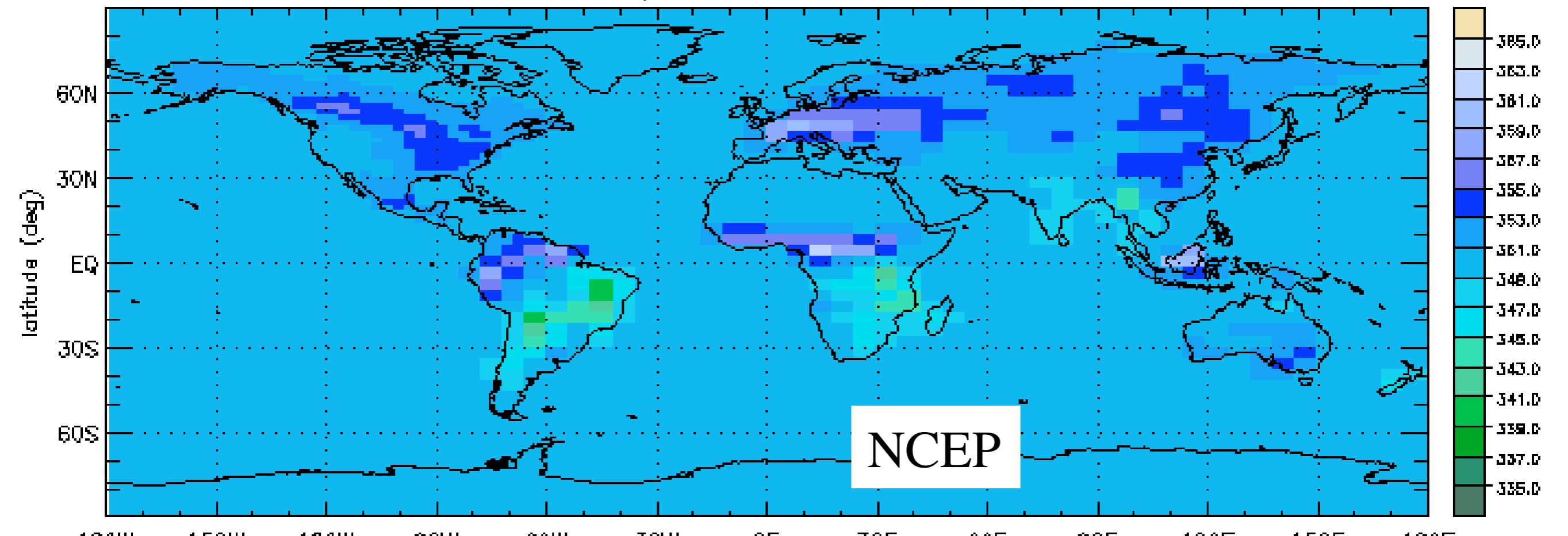
- NCEP reanalysis comes from CDC in NetCDF format: **~3.5 Gb/year**
- NCEP forecast at hi-res comes from NCEP/NCAR in GRIB +binary format: **~ 350 Gb/year**
- TM5 processed data at 3x2 degrees, 28 levels from NCEP data: **~10 Gb/year**
- TM5 processed data at 3x2 degrees, 60 levels from ECMWF data: **~ 36 Gb/year**

Where are we now...

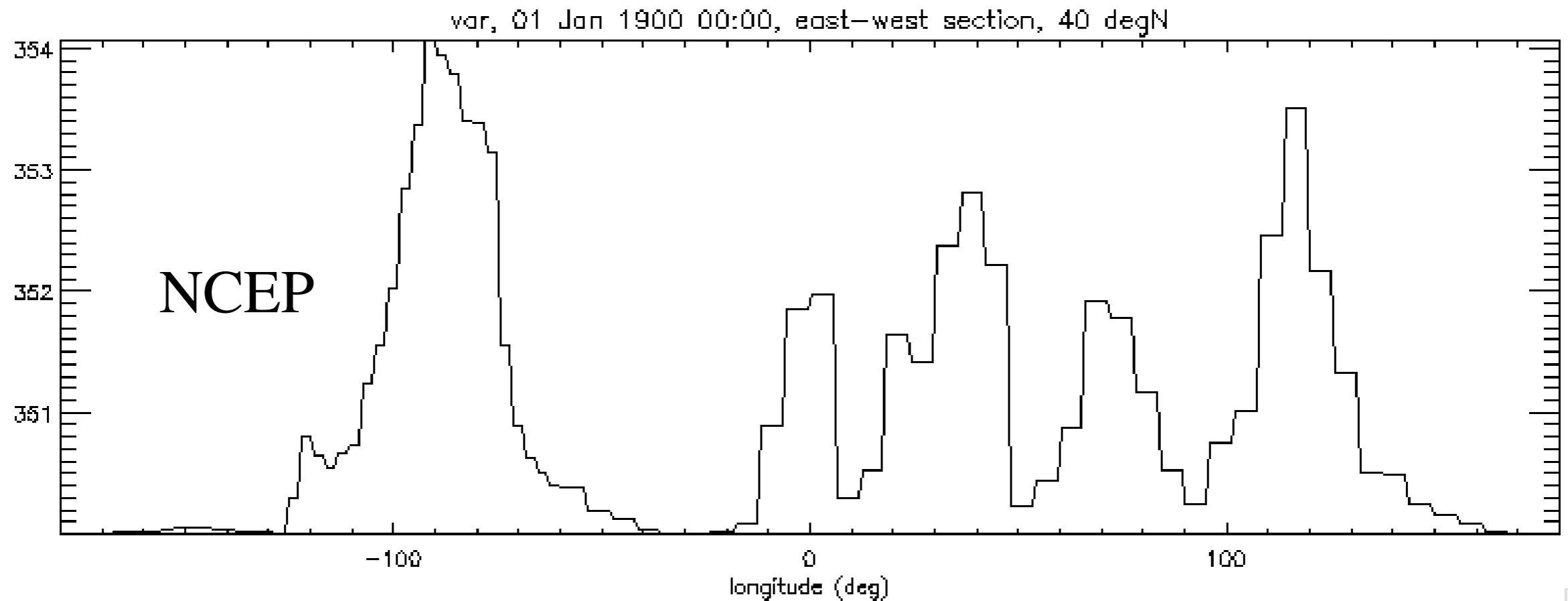
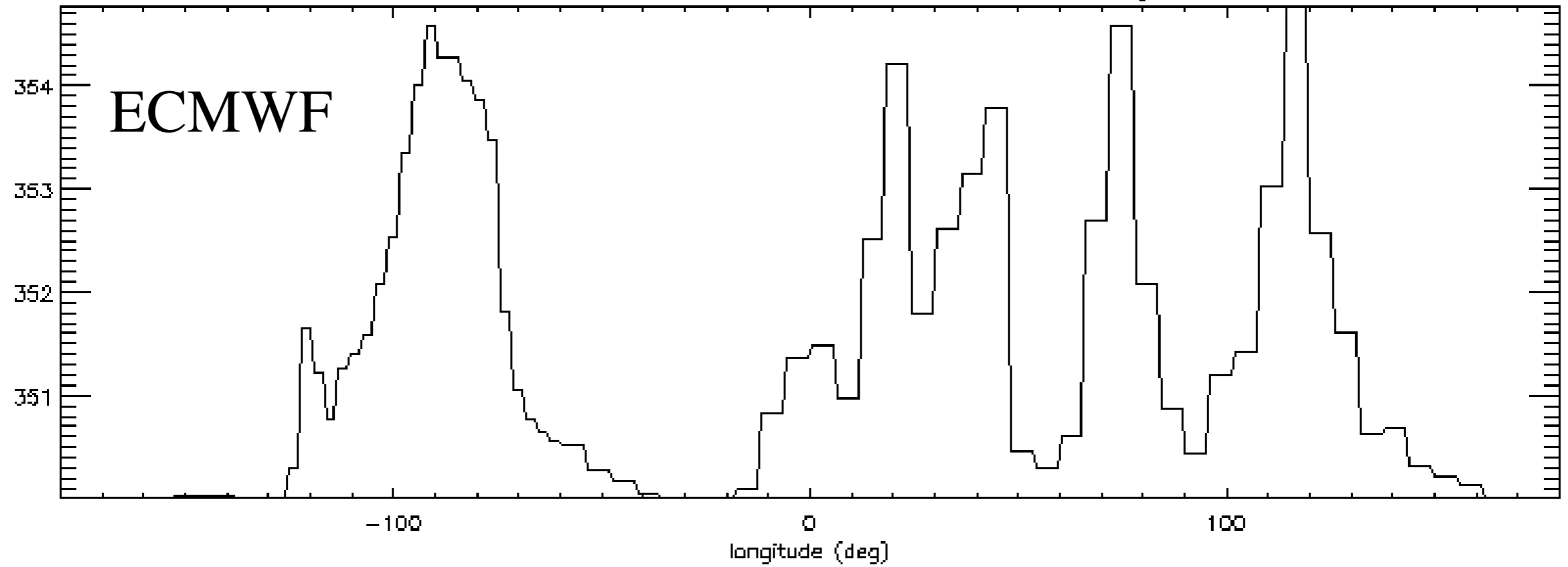
- TM5 runs off of NCEP reanalysis
 - No cloud information for wet deposition
 - No surface stress + surface roughness for diffusion, no boundary layer height
- TM5 runs off of GFS forecast
 - No surface stress + surface roughness
 - No cloud information for wet deposition
- No routine archival of GFS yet...



var, 01 Jan 1900 00:00



East-West cross section at 40 degN





TC Continuous

- New protocol released in September
- Years: 2002 and 2003
- TM5 will be run in following configs:
 - Global 3x2x25L (Wouter/Maarten)
 - + North America 1x1 (Wouter)
 - + Europe 1x1 (Maarten)
 - + Amazonia 1x1 (Wouter/John Miller)
- Status:
 - working code is in CVS
 - inputfiles+savefile on TERAS
 - Global 3x2 submitted