Evaluation of recent model submissions with AeroCom tools

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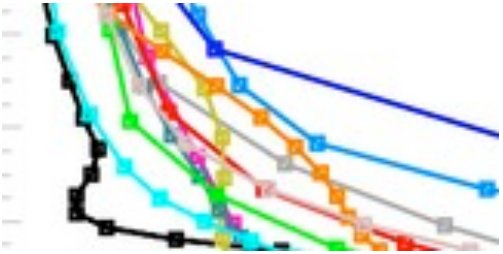
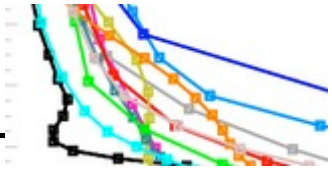


Laboratoire des Sciences du Climat et de l'Environnement

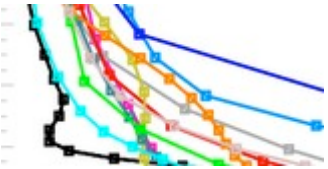
AeroCom phase II final planning



EXPERIMENTNAME	EXPERIMENT_NUMBER	Short Description	YEAR
IND2	CTRL / PRE	Indirect effect diagnostics	2000 / 1860
A2	CTRL	AeroCom phase II reference	2006
A2	SIZ1	As CTRL but with condensation switched off	2006
A2	SIZ2	As CTRL but with coagulation switched off.	2006
A2	SIZ3	As CTRL but with primary BC/OC and SO4 emissions switched off	2006
A2	SIZ4	As CTRL but with new particle formation switched off	2006
A2	CTRL	Prolongation of A2 run to allow comparison with CALIOP and campaigns in 2007-2008 (eg EUCAARI, EMEP, ARCTAS)	2007-2008
A2	PRE	AeroCom Phase II // Preindustrial emissions, meteo as in CTRL	1860
A2	ZERO	AeroCom Phase II // no aerosol radiative effect , meteo as in CTRL	0000
A2	FIX	AeroCom Phase II // Prescribed aerosol optical properties drive forcing calculation independent of aerosol module	2006
A2	TROP/ARCTIC	Radiative code is forced by albedo = 0.2 and two Standard atmospheres (TROP & ARCTIC)	Two one day simulations // 1st of January 2006
HCA	0	Complete hindcast , with preliminary AeroCom HC emissions	1860+1980-2007 (if cpu limited do 2000-2007 period)
HCA	IPCC	Complete hindcast but with IPCC emission scenario (available summer 2009?)	1860+1980-2007 (if cpu limited do 2000-2007 period)
HCA	FIX	Hindcast as HCA-0 but with fixed emissions corresponding to year 2000	1860+1980-2007
HCA	MET	Hindcast with IPCC emissions BUT only SST prescribed; free running GCMs required, aerosol-climate interactions activated	1860+1980-2007
ACCMIP - IPCC		Coupled Climate aerosol simulation, Time slice experiments, see ACCMIP description	1860-2100 // 1860, 1930, 1970, 2000, 2030, 2050

Commitment Experiment Model

AeroCom Modeller Survey March 09

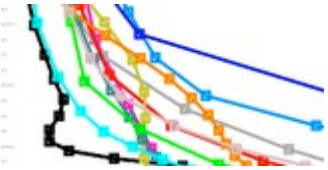


EXPERIMENT		Models
A2	CTRL 2006	**HADGEM** / SPRINTARS / **INCA** / **TM5** / GISSX / **NorAGCM** / **ECHAM5** / **GLOMAP-bin / GLOMAP-mode** / UKCA? / CAM3-MAM? / ECHAM-MESSY? /CCCma-GCM4? / GOCART
A2	SIZ1-SIZ4	**TM5** / GISSX / **NorAGCM / ECHAM5 GLOMAP-bin / GLOMAP-mode** / UKCA? / CAM3-MAM? / ECHAM-MESSY? /CCCma-GCM4?
A2	CTRL 2007-2008	**HADGEM** / SPRINTARS / **INCA** / **ECHAM5**
A2	PRE	**HADGEM** / SPRINTARS / **INCA** / GISSX / **NorAGCM** / **ECHAM5**
A2	ZERO	**HADGEM** / SPRINTARS / **INCA** / GISSX / **ECHAM5**
A2	FIX	**HADGEM** / SPRINTARS / **INCA** / **ECHAM5**
A2	TROP/ARCTIC	**HADGEM** / SPRINTARS / **INCA** / **ECHAM5**
HCA	0	SPRINTARS / **INCA** / GISSX / GISSM / **NorAGCM** / **ECHAM5?00-06** / GOCART
HCA	IPCC	**HADGEM** / SPRINTARS / **INCA** / GISSX / GISSM / **NorAGCM** / **ECHAM5?00_06**
HCA	FIX	**HADGEM** / SPRINTARS / **INCA** / **NorAGCM** / **ECHAM5?00_06** / GOCART
HCA	MET	**HADGEM** / SPRINTARS / **INCA** / **NorAGCM** / **ECHAM5?00_06**

EUCAARI Models

Commitment Diagnostics Model

AeroCom Modeller Survey March 09



QUICKLOOK	**HADGEM** / **INCA** / SPRINTARS / GISSX / GISSM / **NorAGCM** / GOCART
MICROPHYSICS	**INCA** / **TM5** / GISSX / **NorAGCM** / **GLOMAP-bin? / GLOMAP-mode?** / UKCA? / CAM3-MAM? / ECHAM-MESSY? /CCCma-GCM4?
ORGANICS	**INCA** / SPRINTARS / GISSM/ **NorAGCM**
DIRECT FORCING	**HADGEM** / **INCA** / SPRINTARS / GISSX / GISSM / **NorAGCM** / GOCART
HINDCAST	**HADGEM / INCA** / SPRINTARS / GISSX / GISSM / **NorAGCM** / GOCART
VERTICAL	**HADGEM / INCA** / SPRINTARS / GOCART
DUST	**HADGEM** / **INCA** / SPRINTARS / GOCART

EUCAARI Models

AeroCom web interface

AeroCom

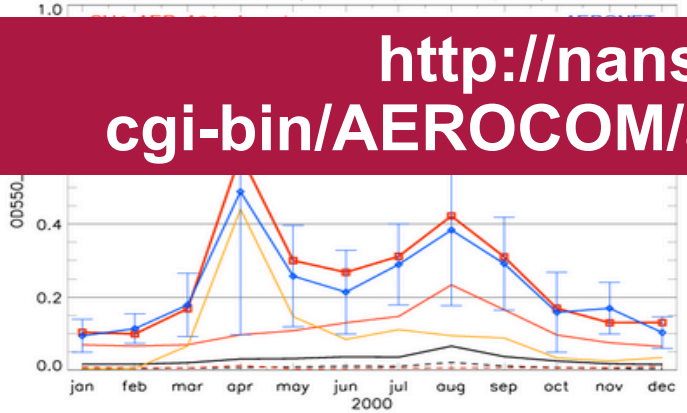
- AEROCOM PRELIMINARY RESULTS - MODEL versus SURFACE OBSERVATIONS

UPDATE - limit choices -> ALL DATA - change webpage -> presently on nansen surfobs interface

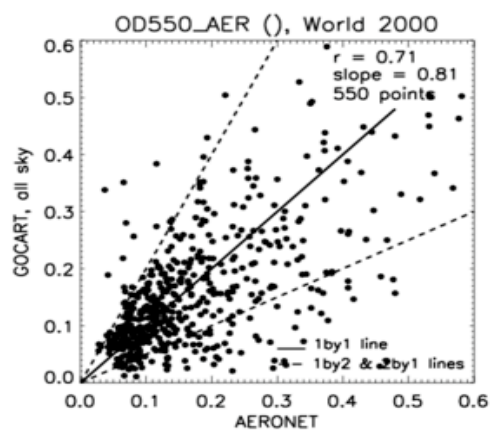
-> see info -> Explicit One image Interface - performance? -> menus & images updated after selection change (slower but little failure)

menus: graph type ---- data source ---- species ---- parameter ---- station ---- year ----- period

SERIES | INCA LSCE | AER | OD550 | Erdemli | an2000 | mALLYEAR

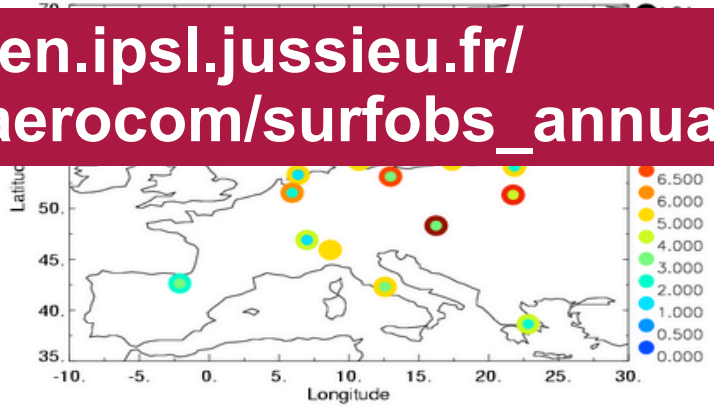


SCAT | GOCART | AER | OD550 | WORLD | an2000 | mALLYEAR

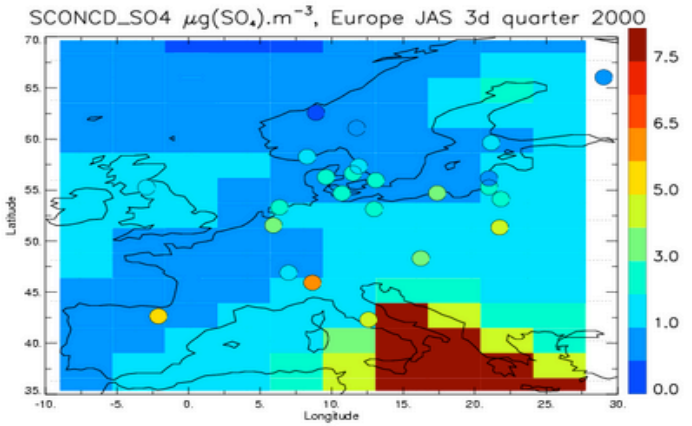


menus: graph type ---- data source ---- species ---- parameter ---- station ---- year ----- period

MAP | LOA Lille ExpA | SO4 | SCONCD | Europe | an2000 | mALLYEAR

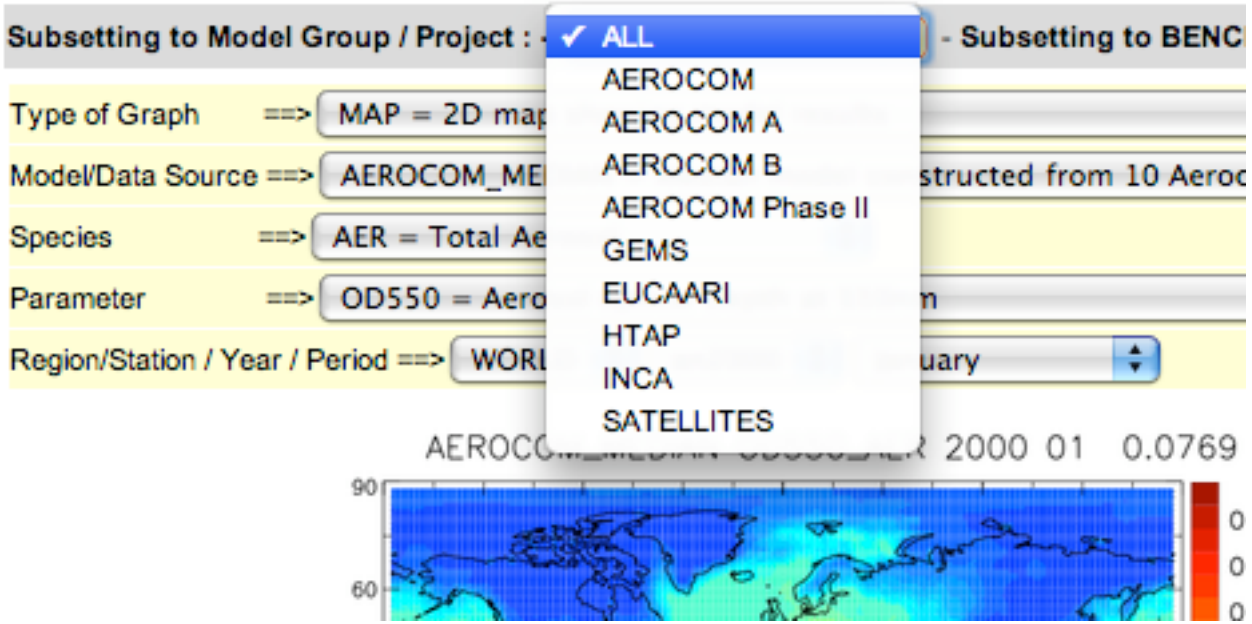


FIELDCOMPA | LOA Lille ExpB | SO4 | SCONCD | Europe | an2000 | mJAS

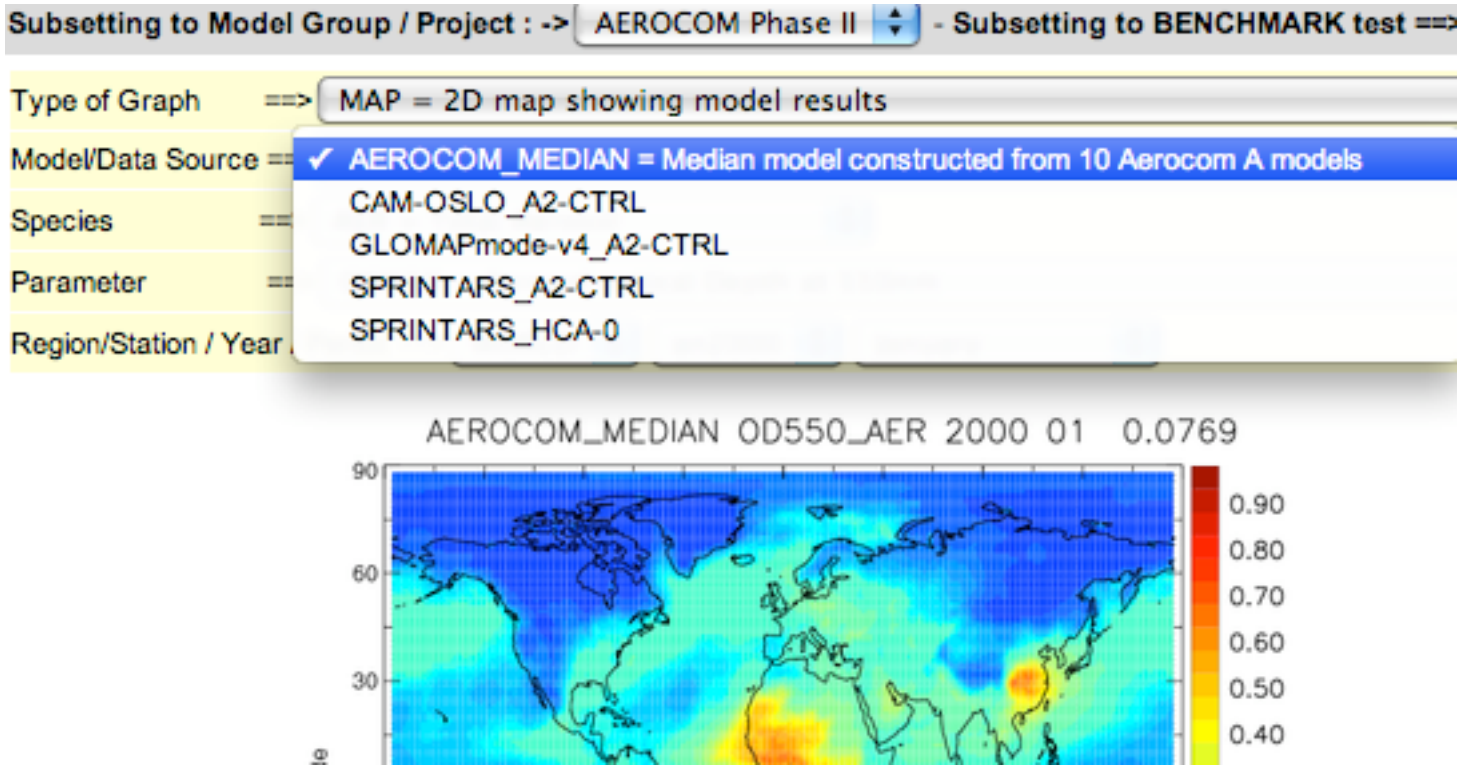


http://nansen.ipsl.jussieu.fr/cgi-bin/AEROCOM/aerocom/surfobs_annualrs.pl

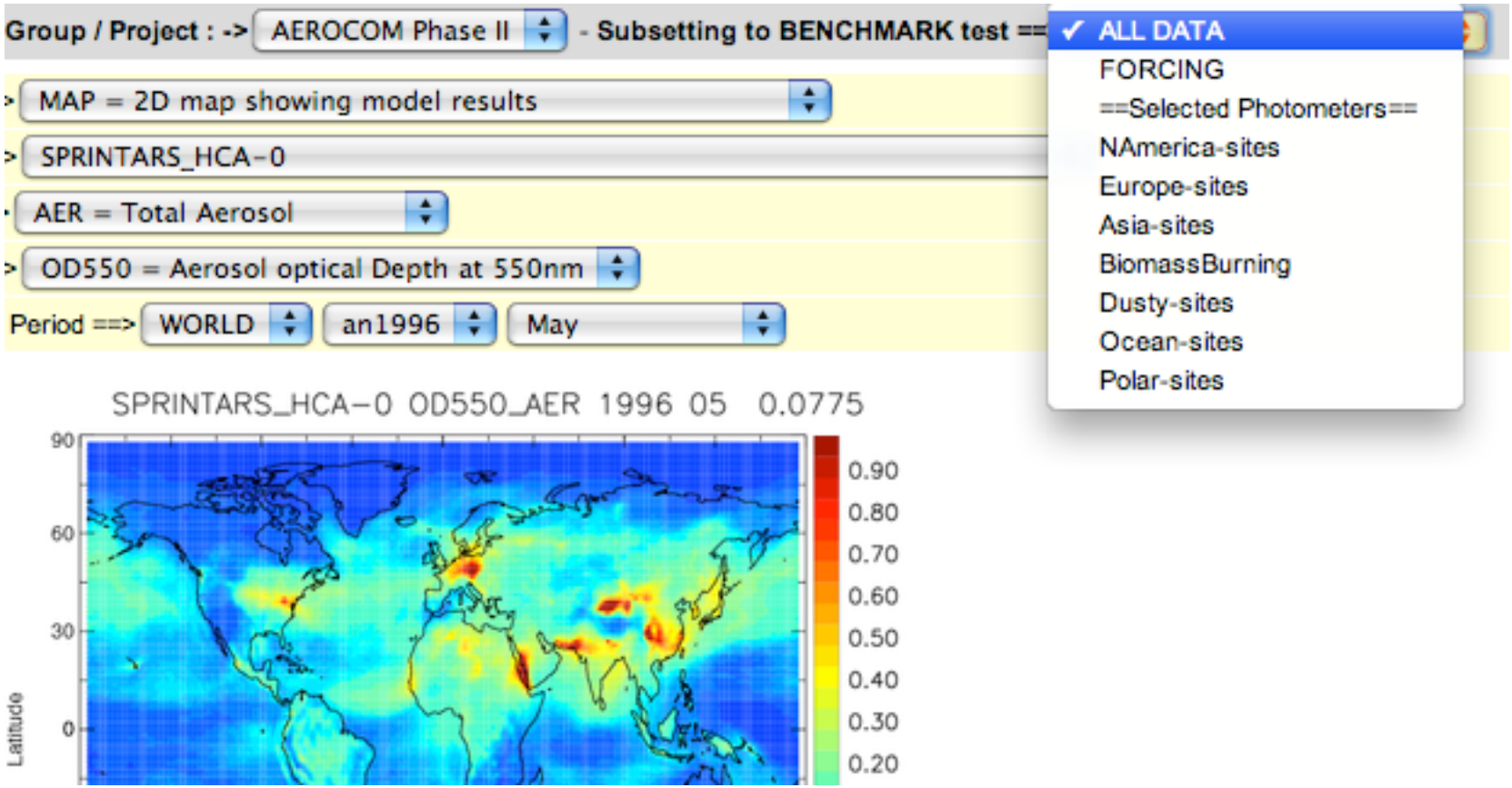
Selecting groups of models/satellites



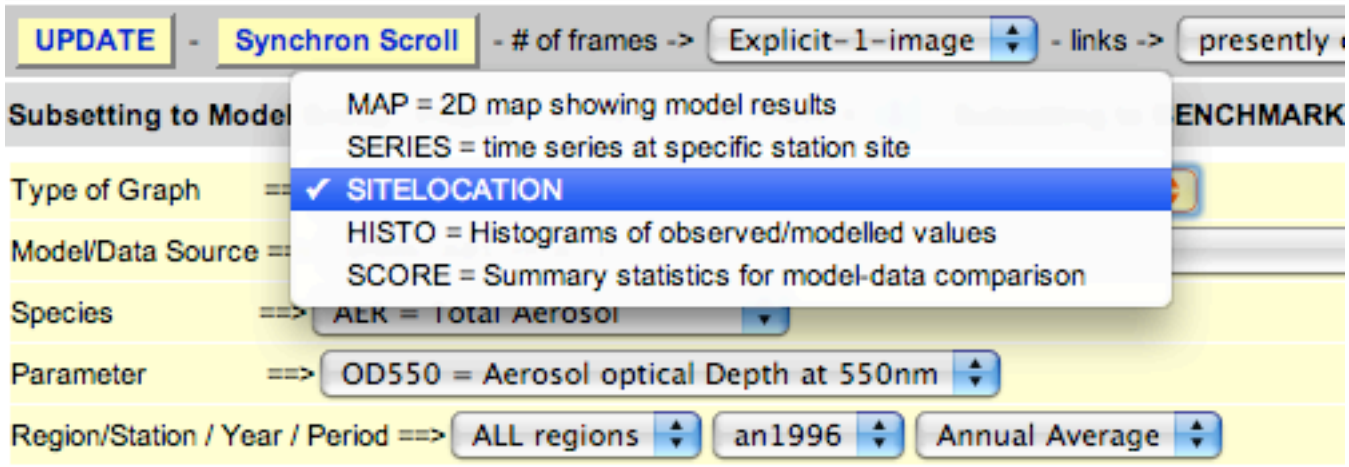
Selecting the model/satellite to be compared To station data

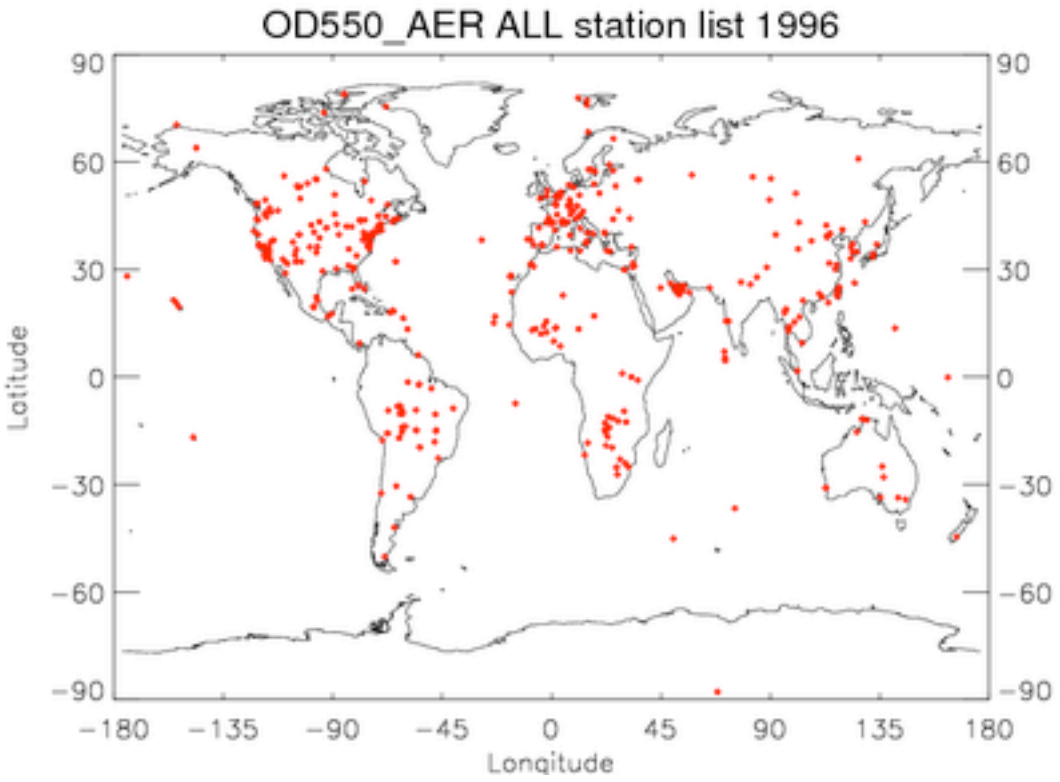


Reducing choices to selected sites or parameter

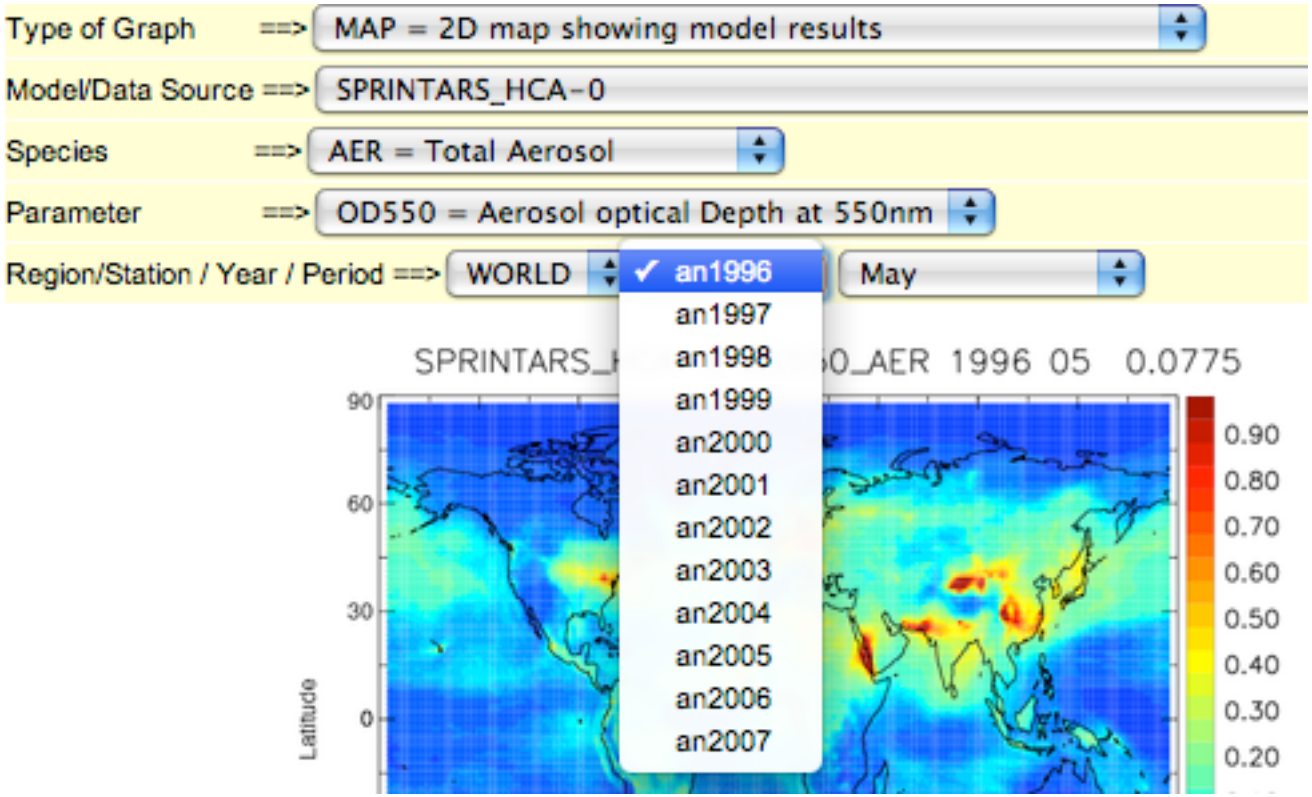


Choosing the graph type

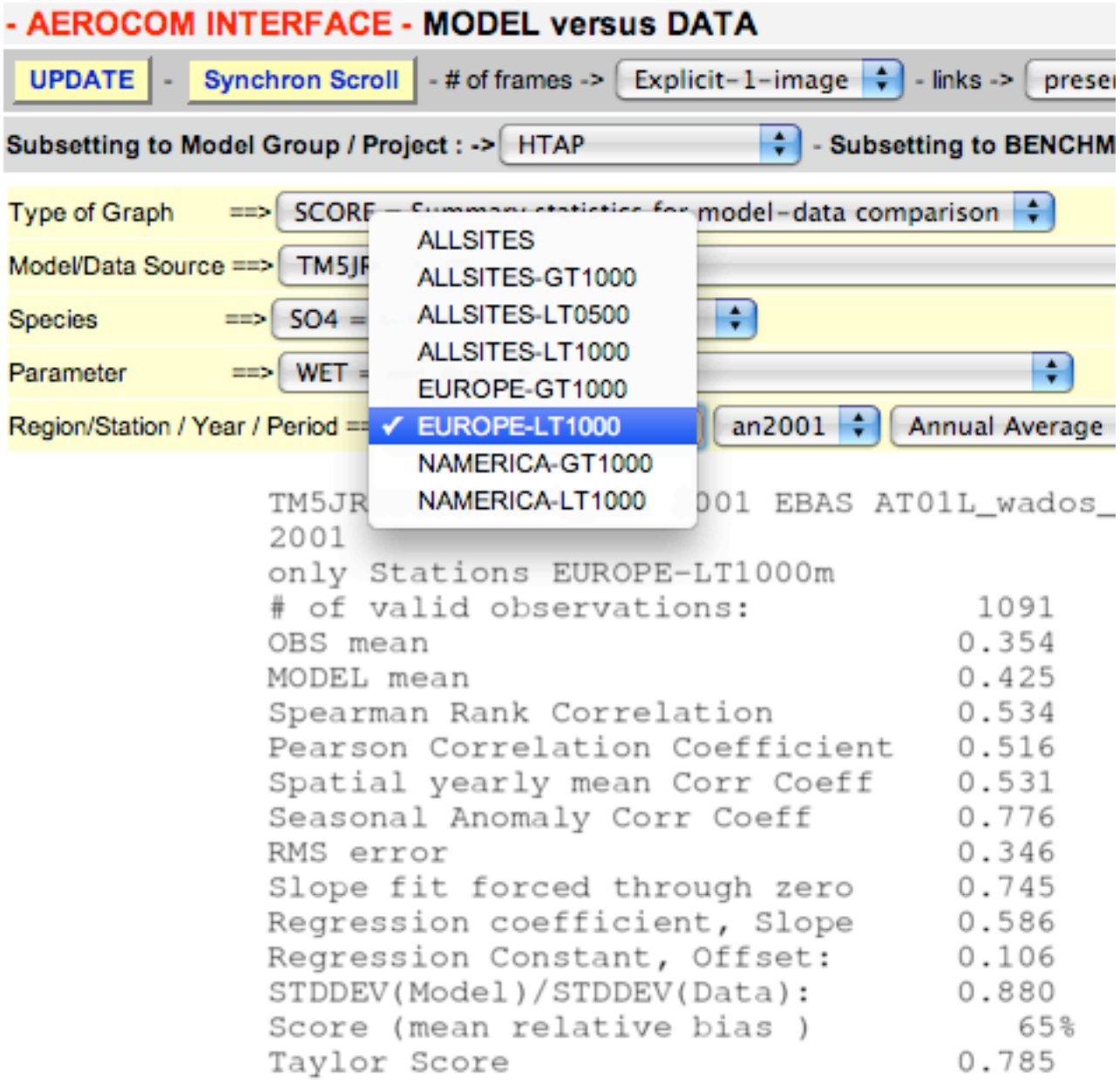




Selecting a year of observation
Attention year 9999 => climatological



Selecting score statistics or histograms for filtered data



Model-Data Comparisons available on surfobs website

EBAS-NILU database extract 1980-2007

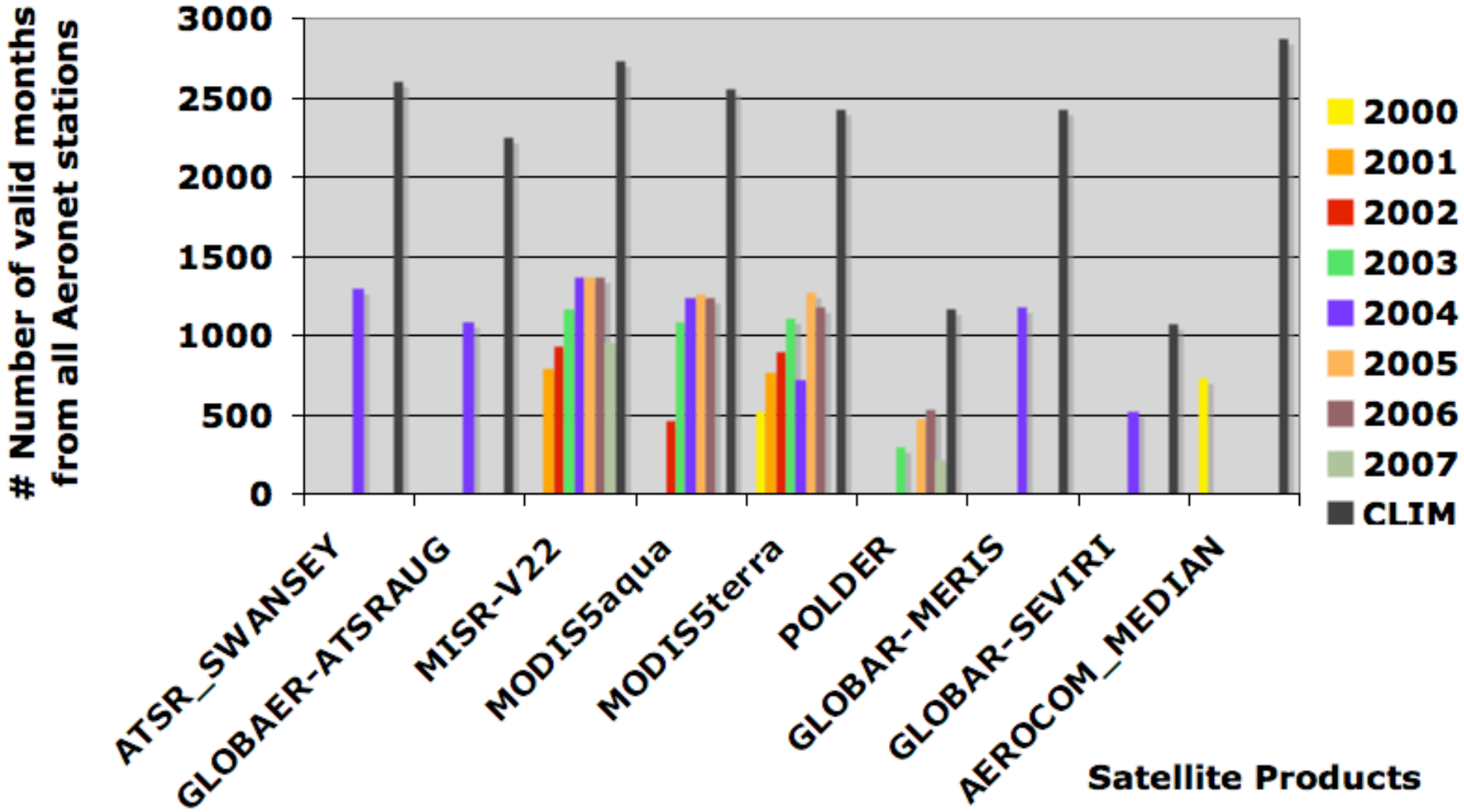
- SO4 Wet Deposition & Rain Concentration
- Precipitation
- SO4+SO2 Surface concentration
- O3 concentration
- (in prep: extinction, BC,POM,NO3,PM25)

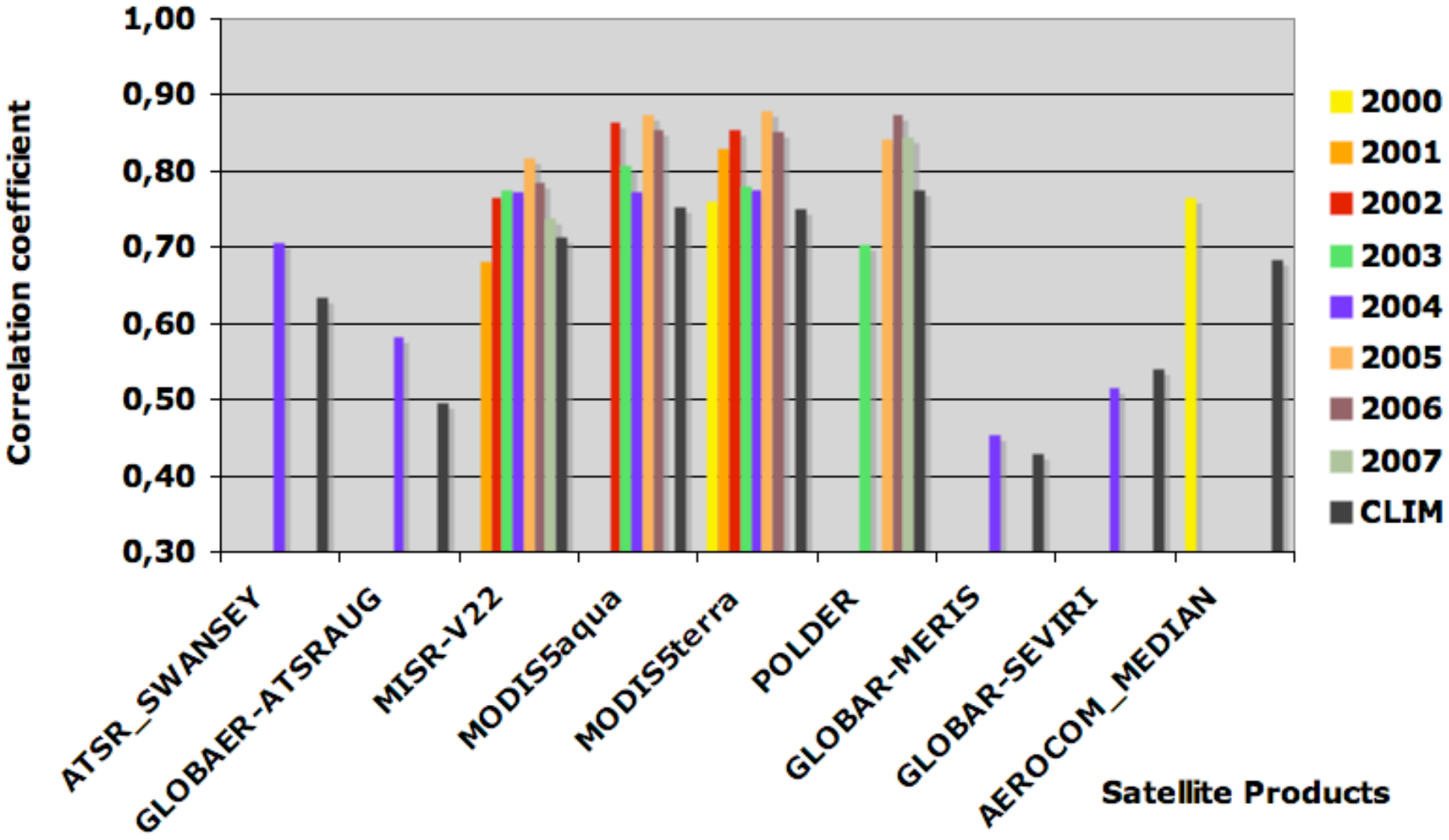
Aeronet/GAW/EANET compilation « Kinne »; 1996-2007

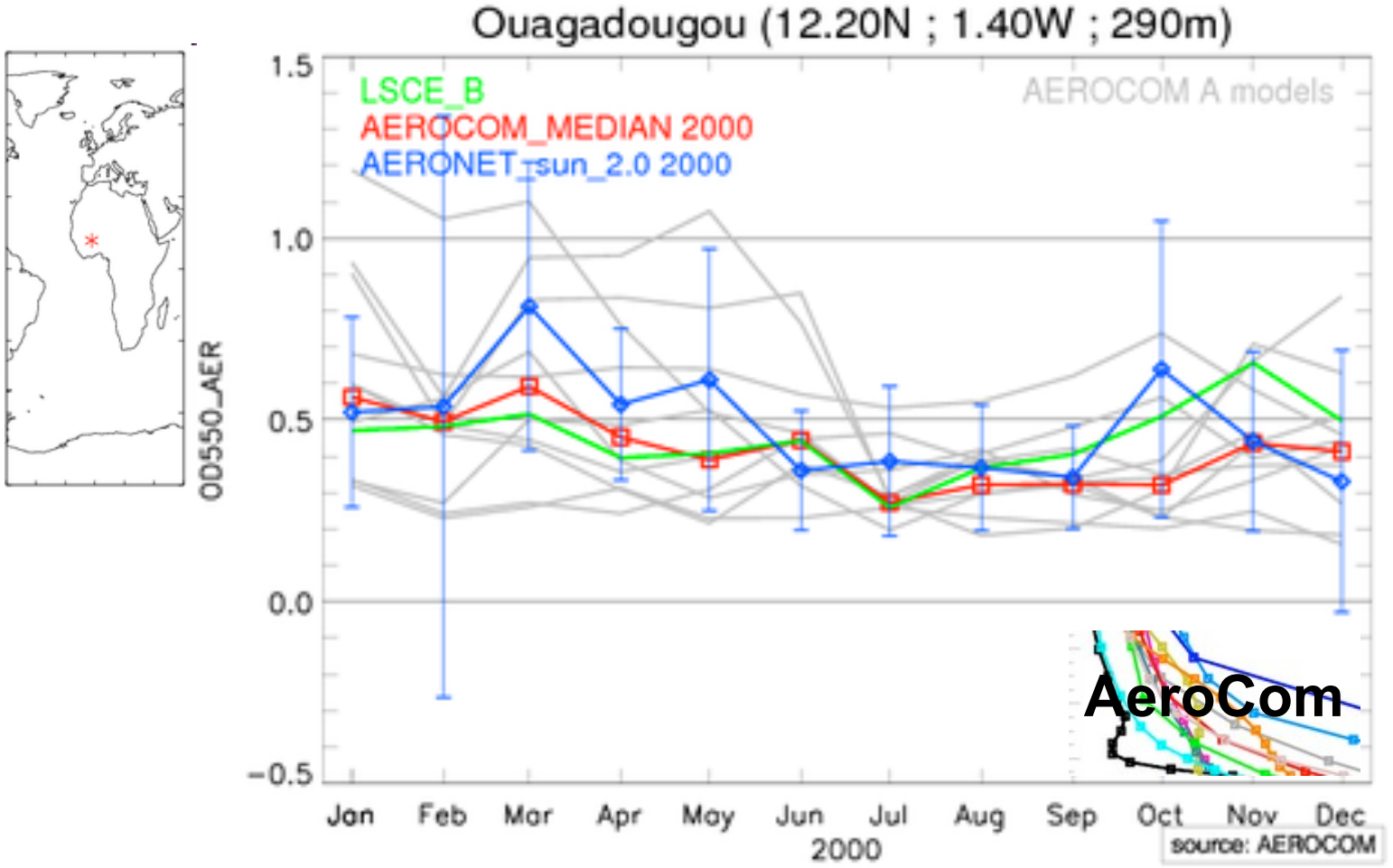
- Total, Fine, Coarse AOD; Angstroem Component
- Total, Anthropogenic SWTOA-Clear/Cloudy Forcing

Satellite 1996-2007
(MODIS,MISR,Polder,Globaer, Modis-CERES Forcing Bellouin)

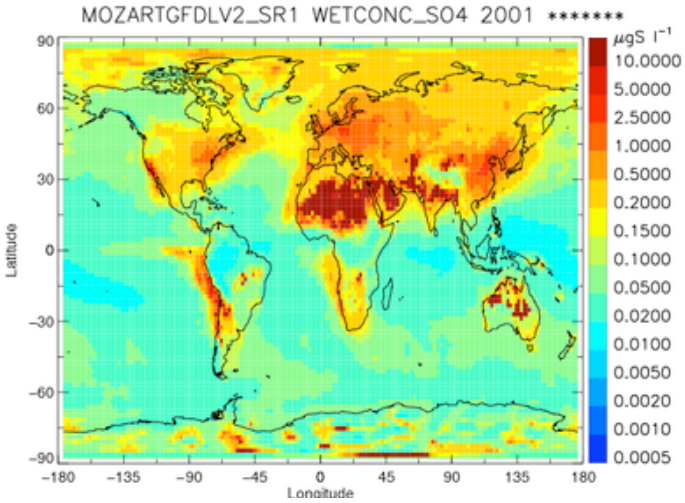
- Total, Fine AOD; Angstroem Component, CS-RF

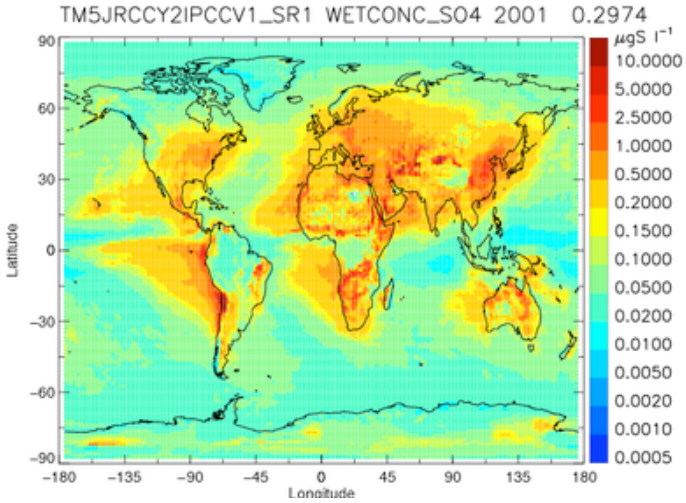

Number of valid months from all Aeronet stations
3000
2500
2000
1500
1000
500
0
2000
2001
2002
2003
2004
2005
2006
2007
CLIM
ATSR_SWANSEY
GLOBAER-ATSRAUG
MISR-V22
MODIS5aqua
MODIS5terra
POLDER
GLOBAR-MERIS
GLOBAR-SEVIRI
AEROCOM_MEDIAN
Satellite Products


Correlation coefficient
1,00
0,90
0,80
0,70
0,60
0,50
0,40
0,30
2000
2001
2002
2003
2004
2005
2006
2007
CLIM
ATSR_SWANSEY
GLOBAER-ATSRAUG
MISR-V22
MODIS5aqua
MODIS5terra
POLDER
GLOBAR-MERIS
GLOBAR-SEVIRI
AEROCOM_MEDIAN
Satellite Products

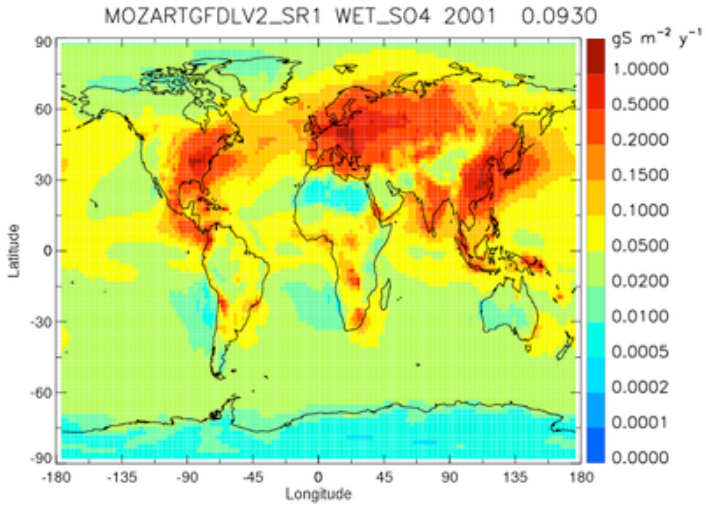

Ouagadougou (12.20N ; 1.40W ; 290m)
LSCE_B
AEROCOM_MEDIAN 2000
AERONET_sun_2.0 2000
AEROCOM A models
00550_AER
1.5
1.0
0.5
0.0
−0.5
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
2000
AeroCom
source: AEROCOM

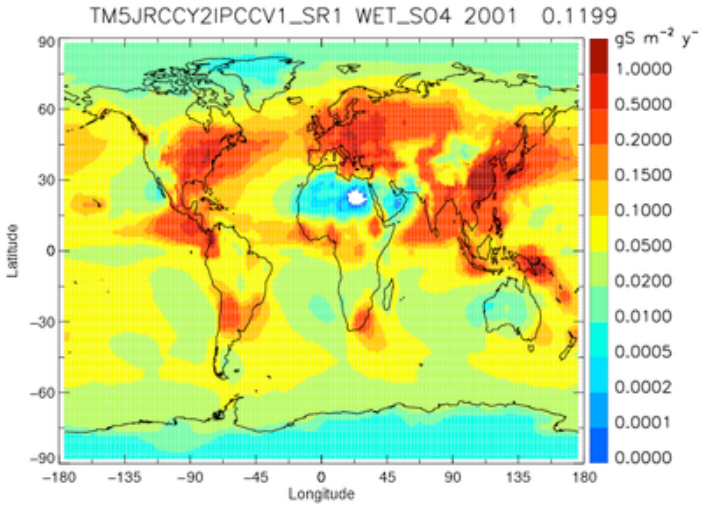
SO4
Rain
Concentration





SO4
Wet
Deposition

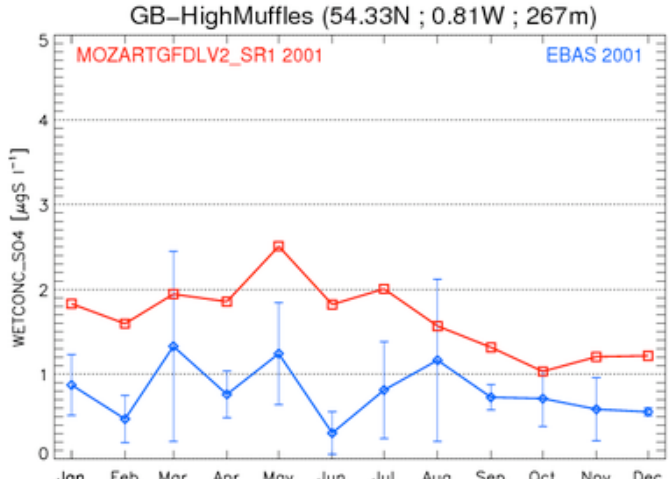


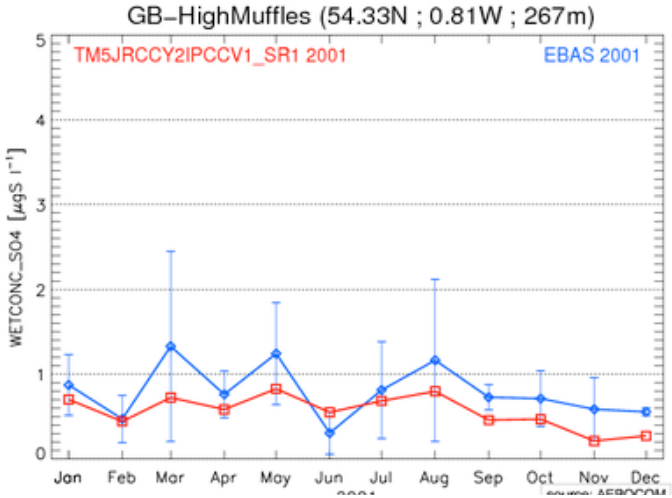


MOZART-GFDL
HTAP-SR1

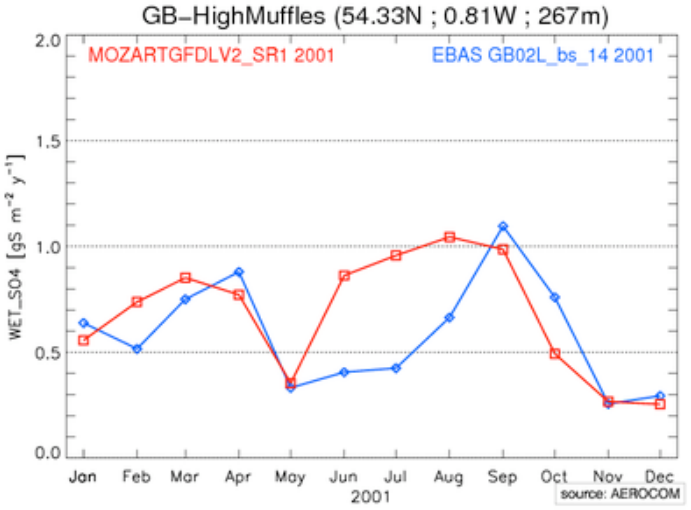
TM5-JRC
HTAP-SR1

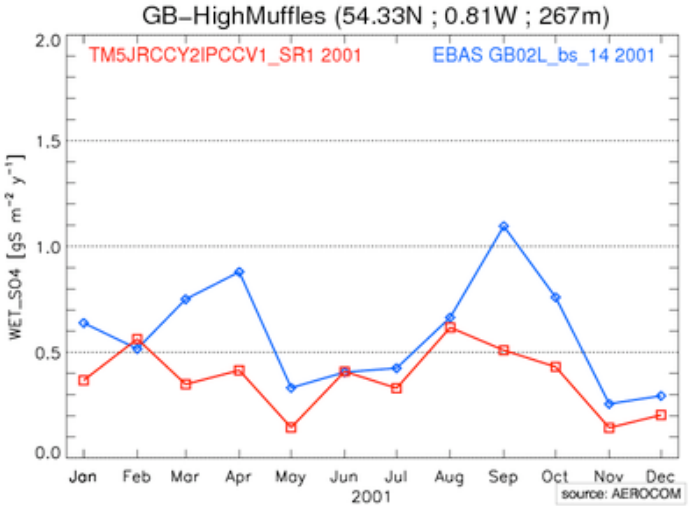
SO4
Rain
Concentration





SO4
Wet
Deposition





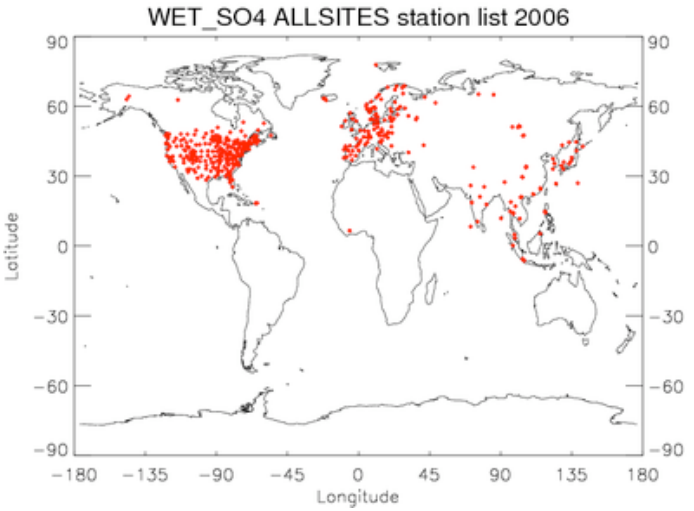
MOZART-GFDL
HTAP-SR1

TM5-JRC
HTAP-SR1

AeroCom phase II new model submissions

Comparison of sulphate wet deposition to EBAS HTAP worldwide data
Stations below 1000 m altitude
# of months in 2006 with observations: 3944

	Sprintars HCA-0	GLOMAP-mode	CAM-OSLO
Mean (obs: 0.37)	*0.42*	*0.27*	*0.36*
Rank Correlation r	*0.55*	*0.55*	*0.49*
Pearson Correlation r	*0.27*	*0.37*	*0.36*
Spatial Correlation r	*0.39*	*0.65*	*0.58*
Seasonal Anomaly r	*0.78*	*0.81*	*0.80*



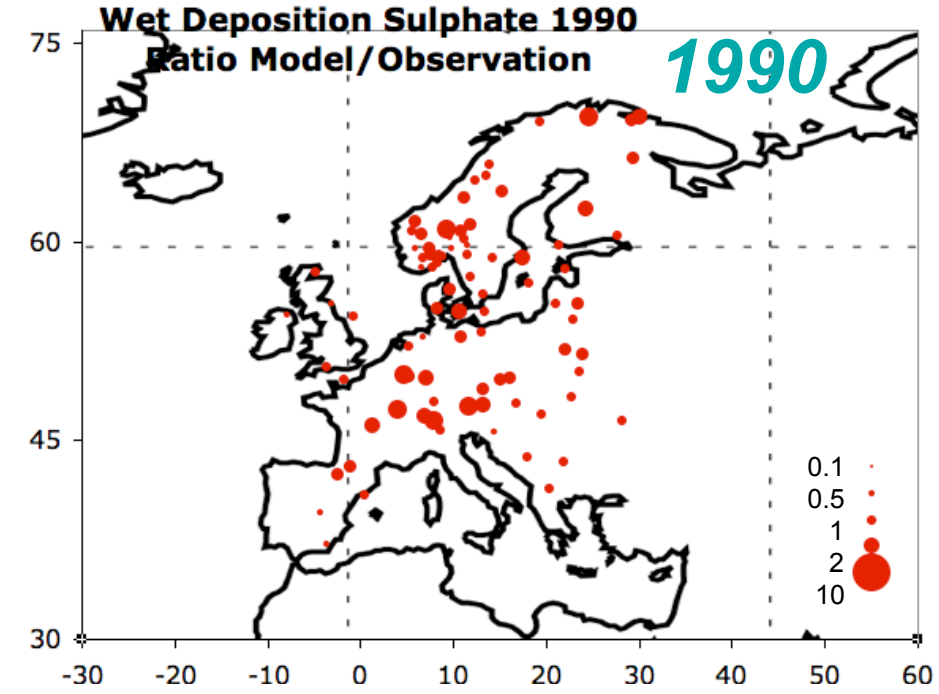
Hindcast analysis

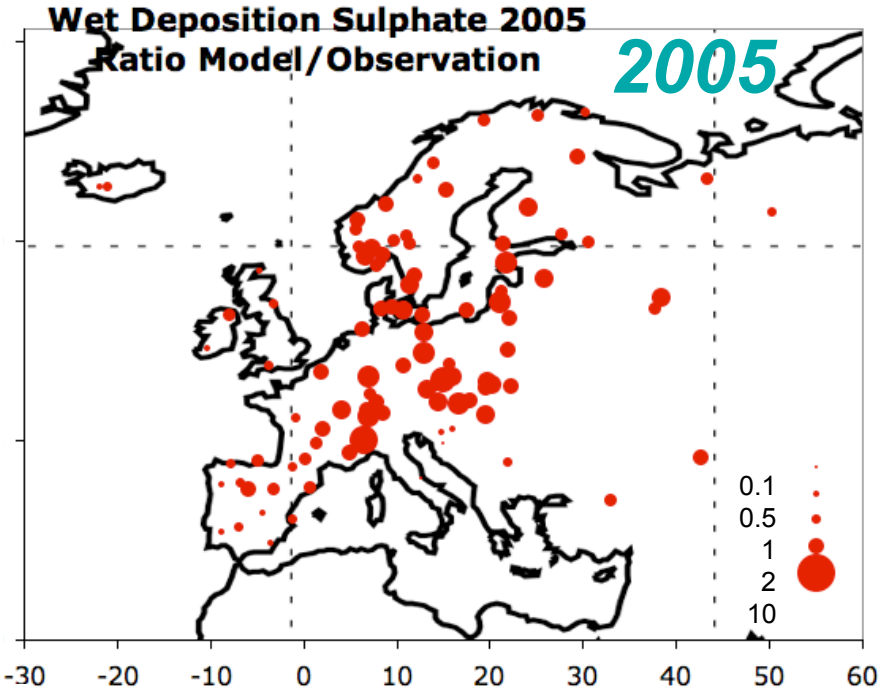
How does the relation between observations and model change over time?

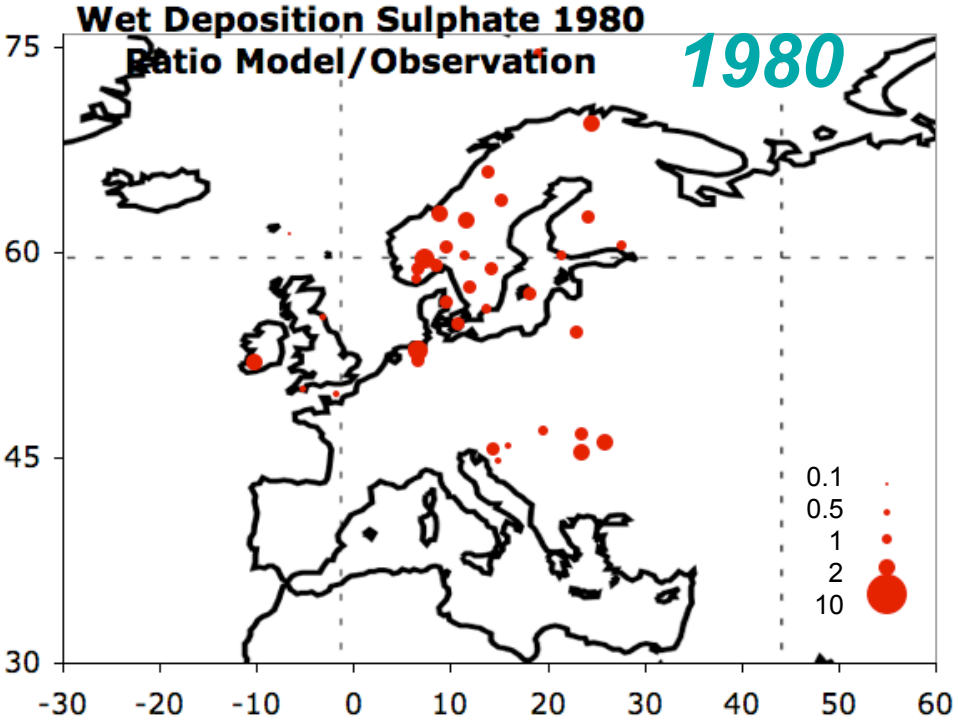
Model changes reflect emission inventory and Meteorology analysis

Observations trends are subject to instrument change, errors in database, reality

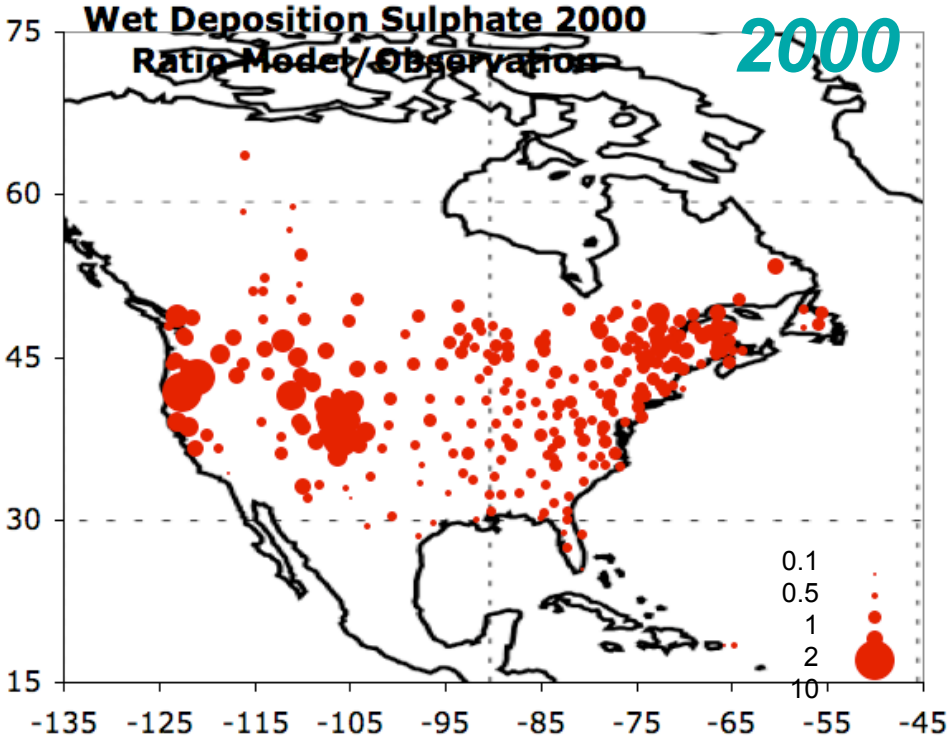
EXAMPLE: SO4 Wet deposition in Sprintars hindcast run

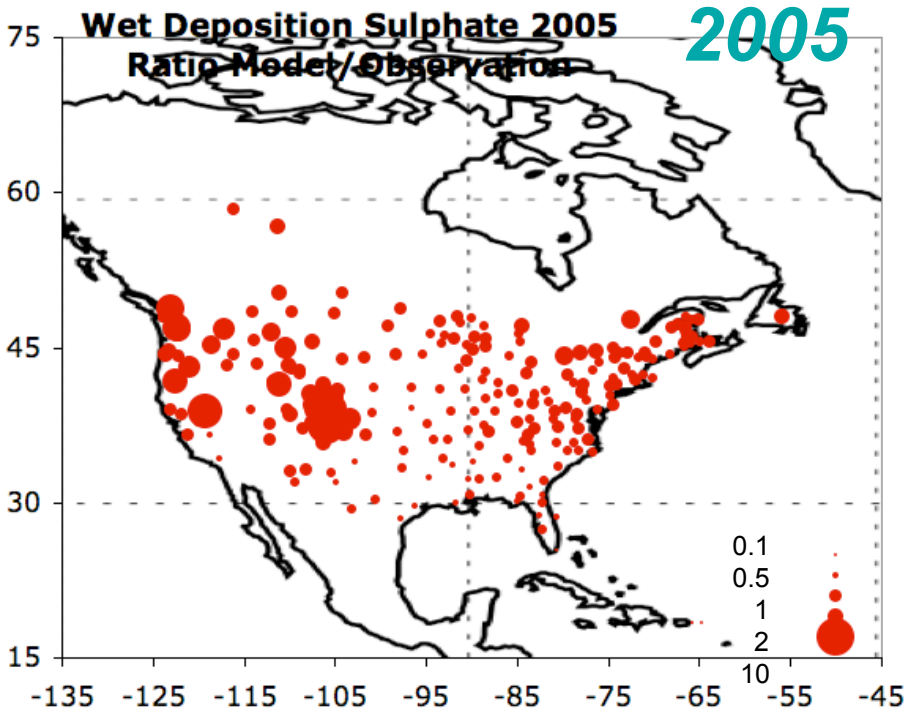




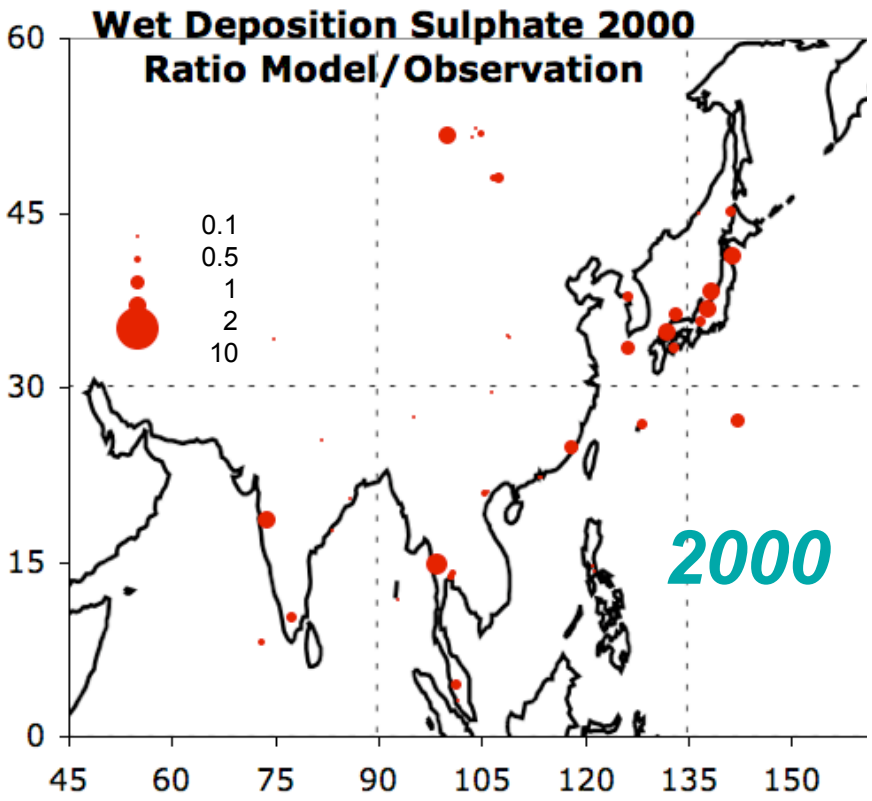


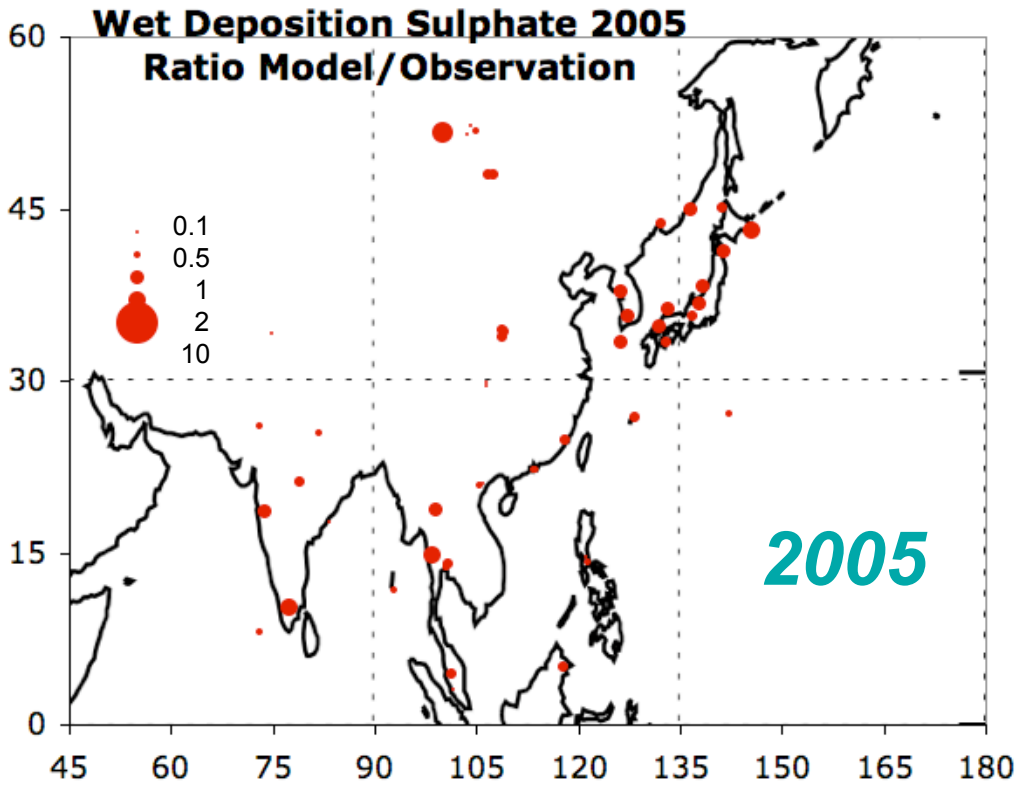
Ratio
Sprintars-HCA-0
Over
EBAS
Wet Deposition SO4





Ratio
Sprintars-HCA-0
Over
EBAS
Wet Deposition SO4



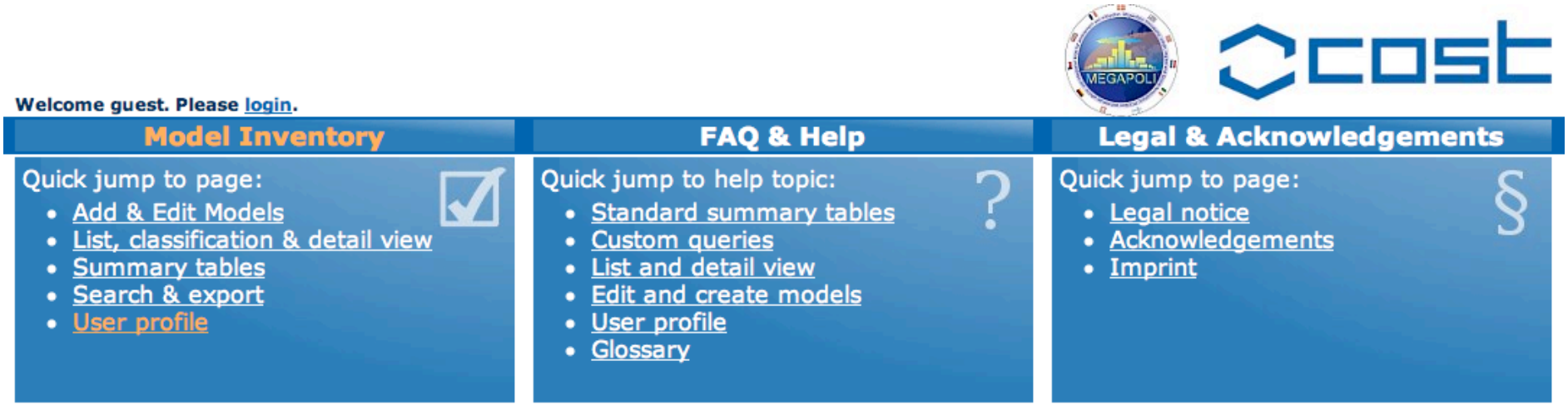


Ratio
Sprintars-HCA-0
Over
EBAS
Wet Deposition SO4

	mean AOD@550nm at stations		
	#months	Aeronet	Sprintars HCA-0
1996	204	0.24	0.14
1997	141	0.29	0.17
1998	235	0.19	0.15
1999	535	0.19	0.15
2000	731	0.18	0.15
2001	837	0.19	0.15
2002	984	0.21	0.16
2003	1225	0.22	0.16
2004	1422	0.22	0.18
2005	1421	0.22	0.17
2006	1423	0.23	0.18
2007	1004	0.24	0.20

Model & Model version Documentation tool

http://www.mi.uni-hamburg.de/costmodinv



Critical steps ahead

- Common understanding of required aerosol diagnostics
    - email list «aerocom-output » ??
- Modeler Commitment until autumn/winter 2009
- Model output analysis on several shoulders
    - Feedback to modellers on « model problems »
    - Joint analysis & publications
    - Feedback of analysis into AeroCom web platform
- Preparation of consolidated observational datasets
- Link of AeroCom - ACC - HTAP - IPCC:CMIP5
    - IPCC Emissions usage
    - Transient versus Time slice versus Hindcast