Wildfires and Biomass Burning
- GRG Requirements -

Martin Schultz

The need

Fire emissions …

- … cause local and regional hazards
- … constitute a large part of the global budget of several trace species (CO, NOx)
- … influence tropospheric ozone concentrations (particularly in the tropics)
- … are a source of large variability
- … can play an important role for the long-range transport of air pollutants

Importance for GEMS GRG

Trace gas predictions without realistic boundary conditions from fire emissions would be of very low accuracy and would be difficult to validate with independent trace gas observations.

Accurate fire emissions are important for reanalysis simulations and for operational forecasting of chemical weather.

Requirements

- Near-realtime prediction system based on space observations of (active) fires
- ~ 30 % accuracy of emission estimates
- Multiple observations during daytime to capture diurnal variability
- Empirical(?) functions for prediction of future evolution of individual burns
- Estimates of fire intensity (or proxy via fuel load, burning efficiency, combustion completeness)
- Estimate of injection heights
- Better accuracy and long-term consistency for reanalyses

Strategy

- For reanalyses use best available product (GFEDv2?)
- Future product updates have been announced

- For forecasting purposes, focus on events
- Develop fire assimilation system with plume forecasts in simple tracer set-up (potential to develop into a real user service)

Details to be discussed during this meeting

Wildfires and Biomass Burning
- Comparison of satellite products -

Martin Schultz and Angelika Heil

Objectives

- Currently, no single satellite product can provide quantitative estimates of fire emissions with reasonable accuracy and consistency across the globe

- Several remote sensing products of hot spots, burned areas, and (recently) fire radiative energy have been released and often give conflicting results

- Validation of fire products often based on small scenes; global performance unclear

- Problems of different products often known to producer, but not to data user

- A systematic evaluation of different fire products can document differences and contribute to understanding of these
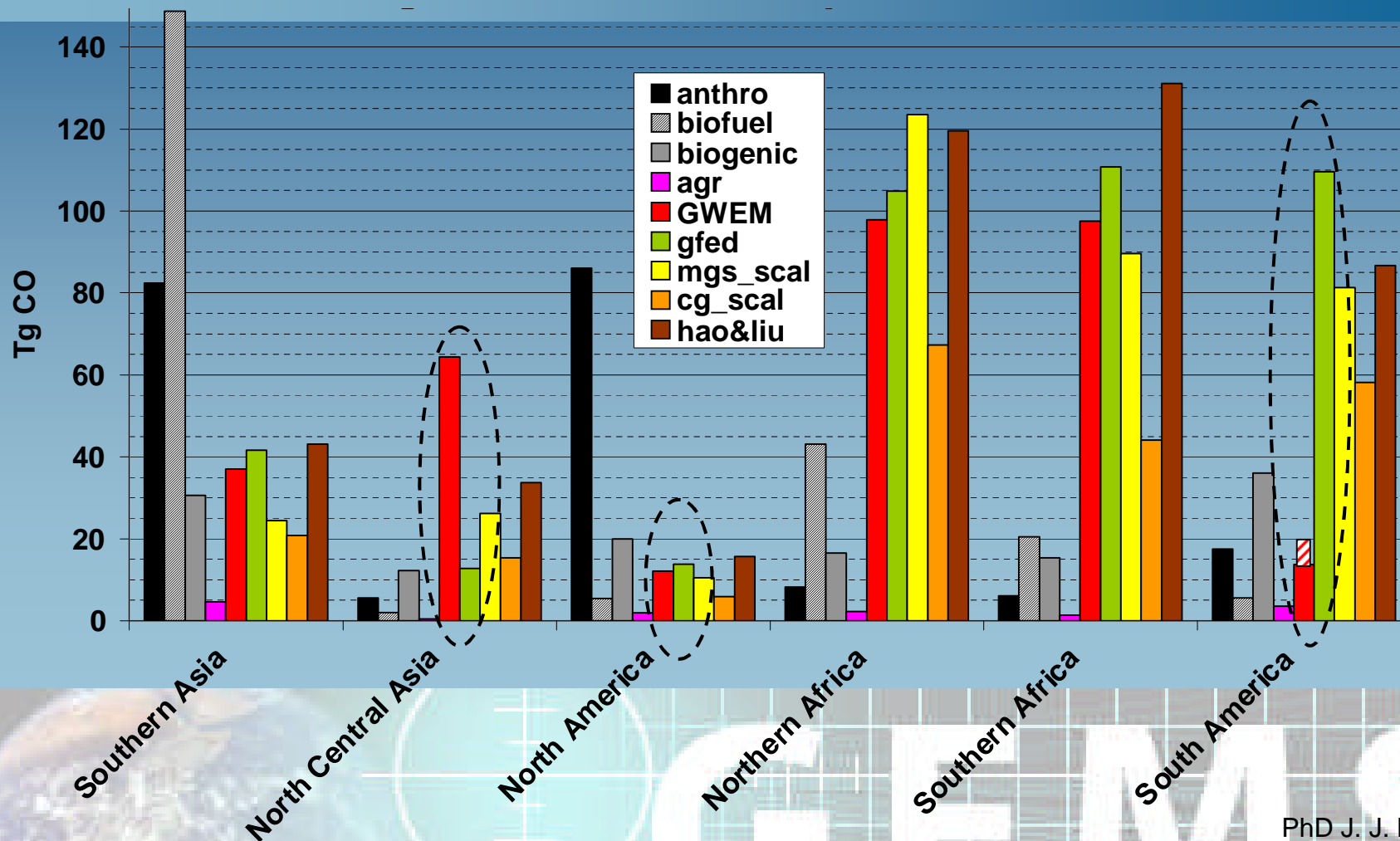
Strategy

Step 1: Begin with statistical comparison of products "as is" (regional patterns, seasonal variations, land cover type)

Step 2: Analyse differences with respect to product type (burned area vs. hot spots) and try to find systematic patterns

Step 3: After feedback with data providers, suggest corrections for individual products in individual regions and make recommendations for data use

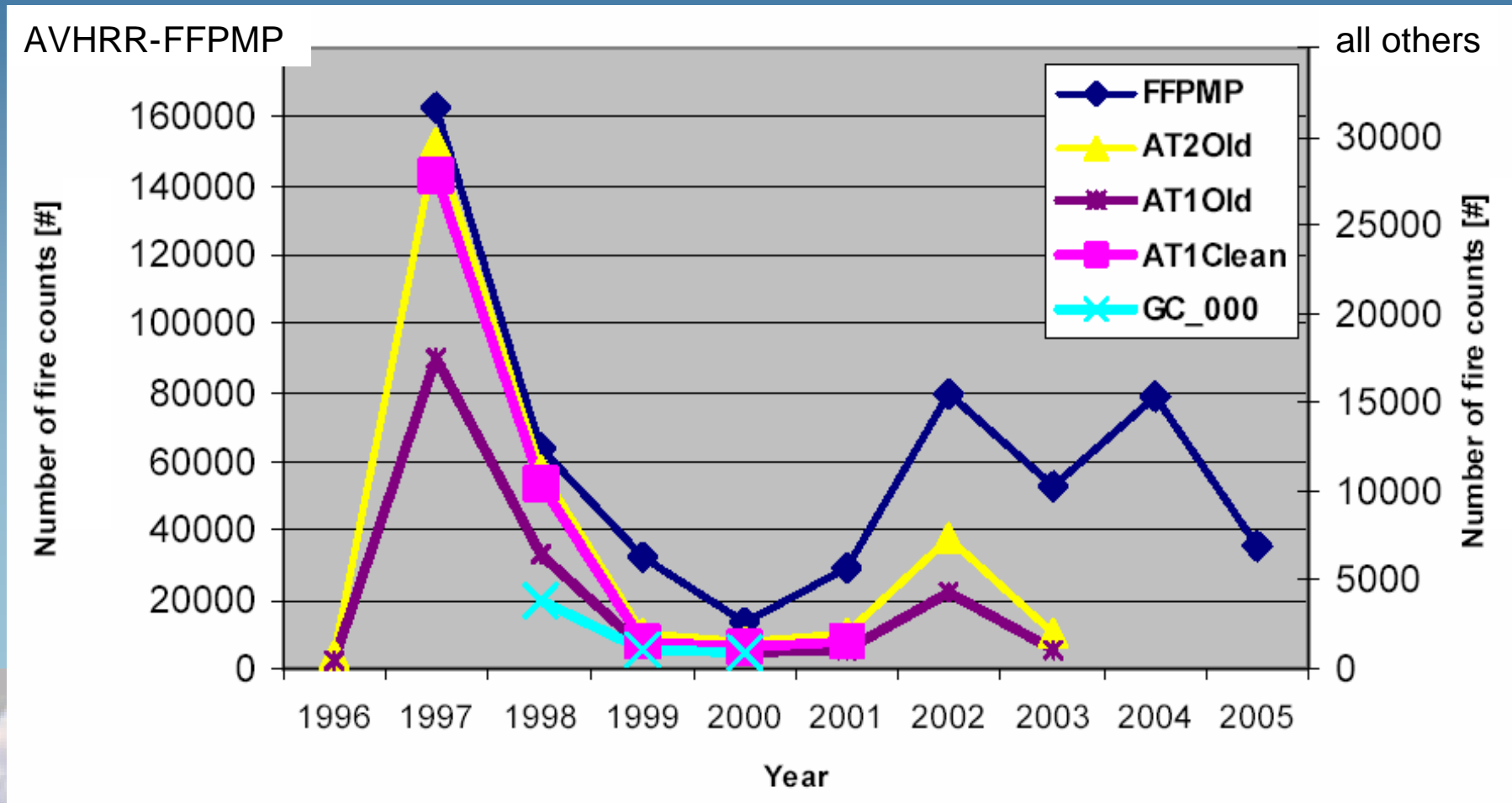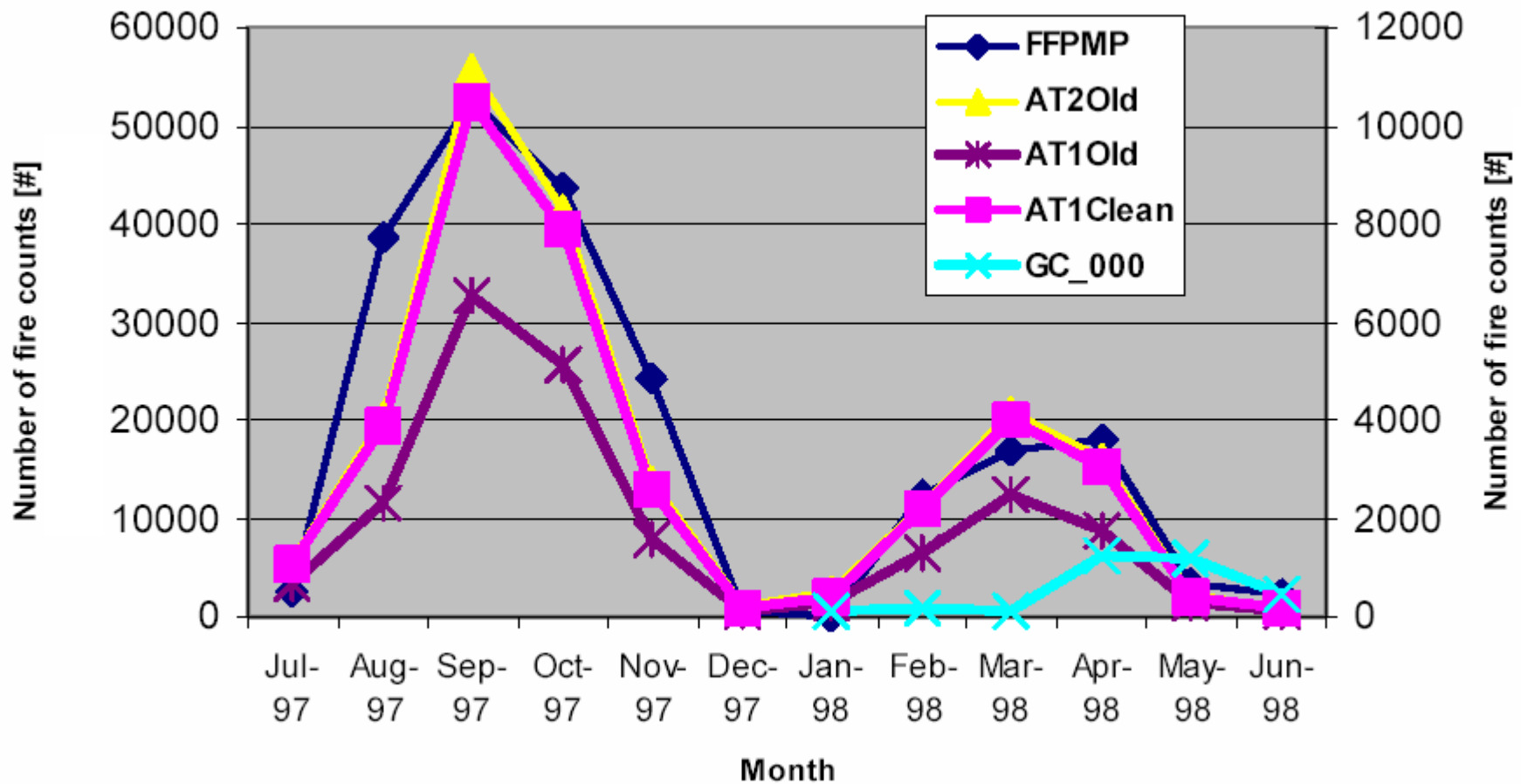# Existing fire emission inventories show large regional differences

Tg CO

Legend: anthro, biofuel, biogenic, agr, GWEM, gfed, mgs_scal, cg_scal, hao&liu

Regions: Southern Asia, North Central Asia, North America, Northern Africa, Southern Africa, South America

PhD J. J. Hoelzemann

Year	ATSR02 Old Algorithm to AVHRR FFPMP(1997: Jul-Dec total)	ATSR01 Old Algorithm to AVHRR FFPMP(1997: Jul-Dec total)	ATSR01 „Cleaned" Algorithm to AVHRR FFPMP(1997: Jul-Dec total)/	Globcarbon CRI000 to ATSR01 „Cleaned" Algorithm
1996				
1997				
1998				
1999				
2000				

Comparison of fire products: Indonesia

Seasonality of fire counts: Indonesia

Wildfires and Biomass Burning
- RETRO inventory -
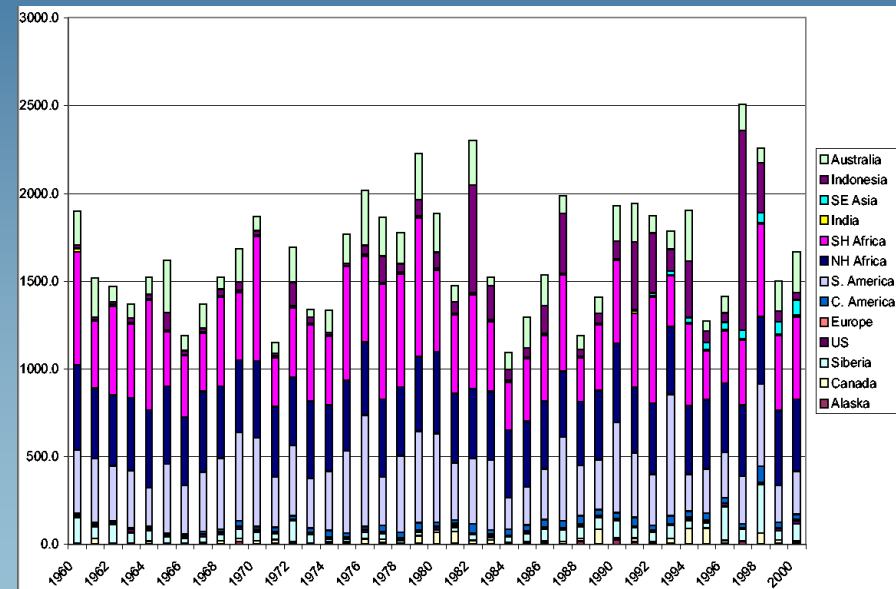
The RETRO wildfire emissions inventory

- based on extensive literature review
- two parameters: burned area and emissions of tC/ha
- different parameter choices in different regions
- takes interannual variability into account
- spatial patterns and seasonal variability based on (some) satellite data

Total direct carbon emissions from wildfires in different regions for 1960-2000 (units: TgC/year)

Paper (GBC) in revision.