

# Aerosol “hindcast”: 1980 – present

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(As a part of AC&C activity)

# Objectives

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- Aerosol effects on surface radiation – global or regional or local dimming/brightening?
  - GHG warming vs. aerosol cooling?
  - Relationships between emission, aerosol loading, AOD, surface radiation, TOA flux
  - Natural vs. industrial pollution effects
  - Satellite records – long term AVHRR and TOMS, near-term SeaWiFS, MODIS, and MISR
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# Two phases:

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## □ 2000 – 2007(8):

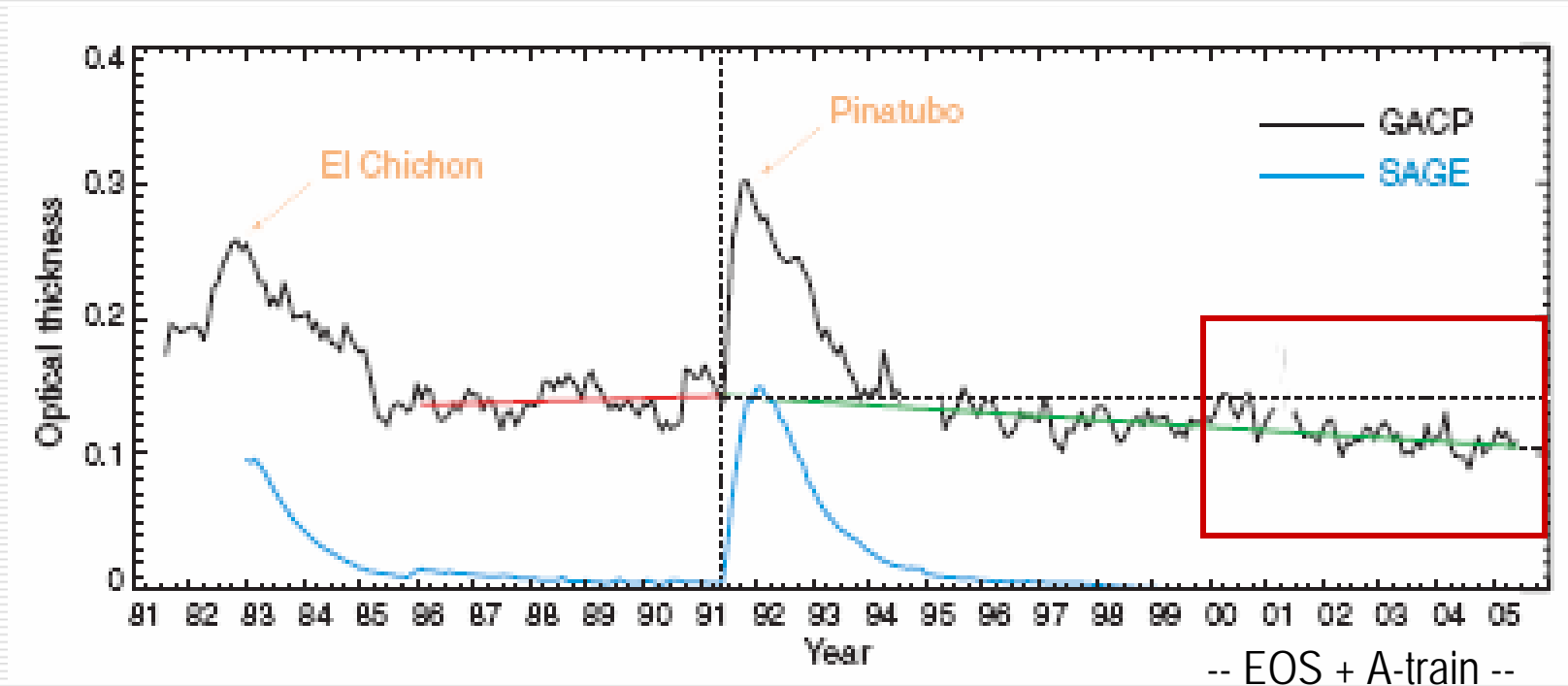
- From EOS to A-train – high quality remote sensing data
- Period covering many interesting field projects (SAFARI 2000, ACE-Asia, TRACE-P, ICARTT, MILAGRO, ARCTAS (POLARCAT)...

## □ 1980 – 2007:

- Satellite era (AVHRR, TOMS, plus EOS and A-train)
  - Transition from “dimming” to “brightening” (and “dimming” again?)
  - Volcanic forcing, ozone depletion
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# Global aerosol change, 1980 – present

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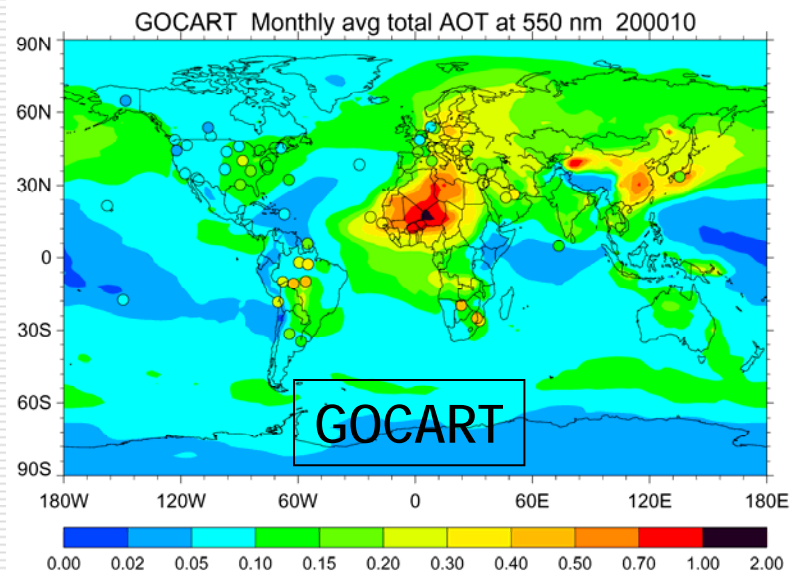
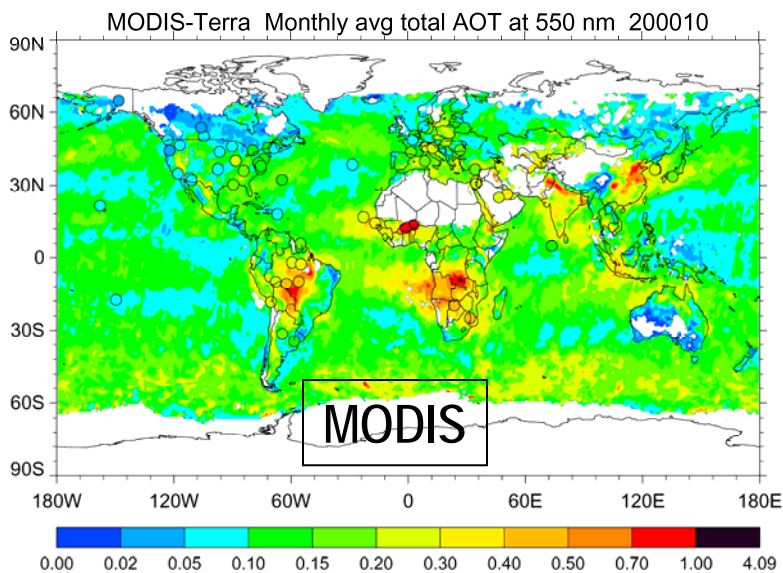


AVHRR global average AOD over ocean, from Mishchenko et al., 2001

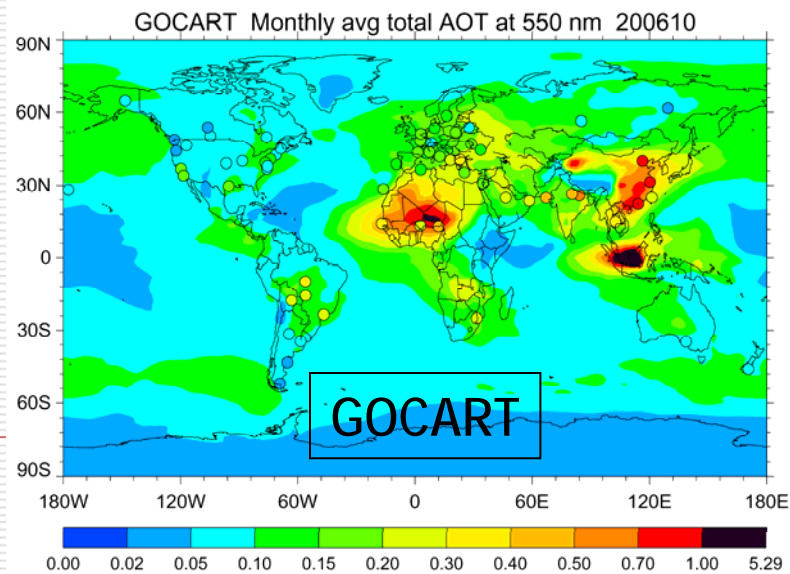
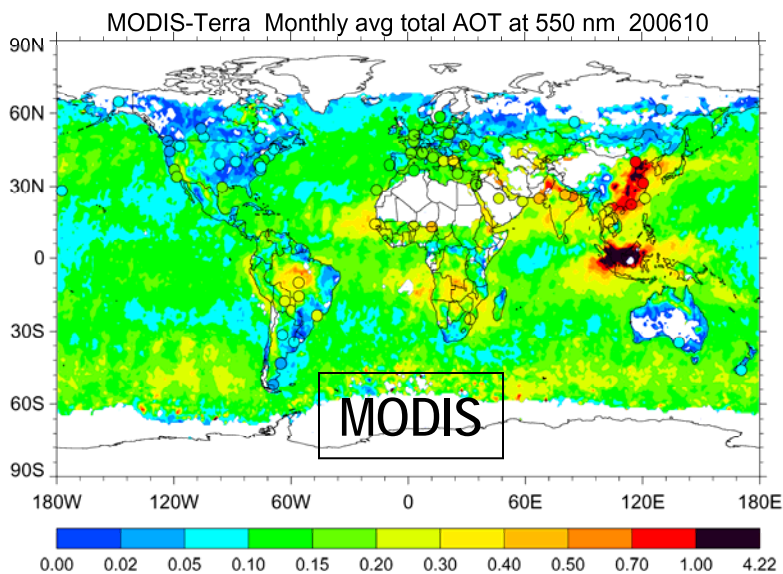
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# Aerosols in 200010 and 200610:

2000010



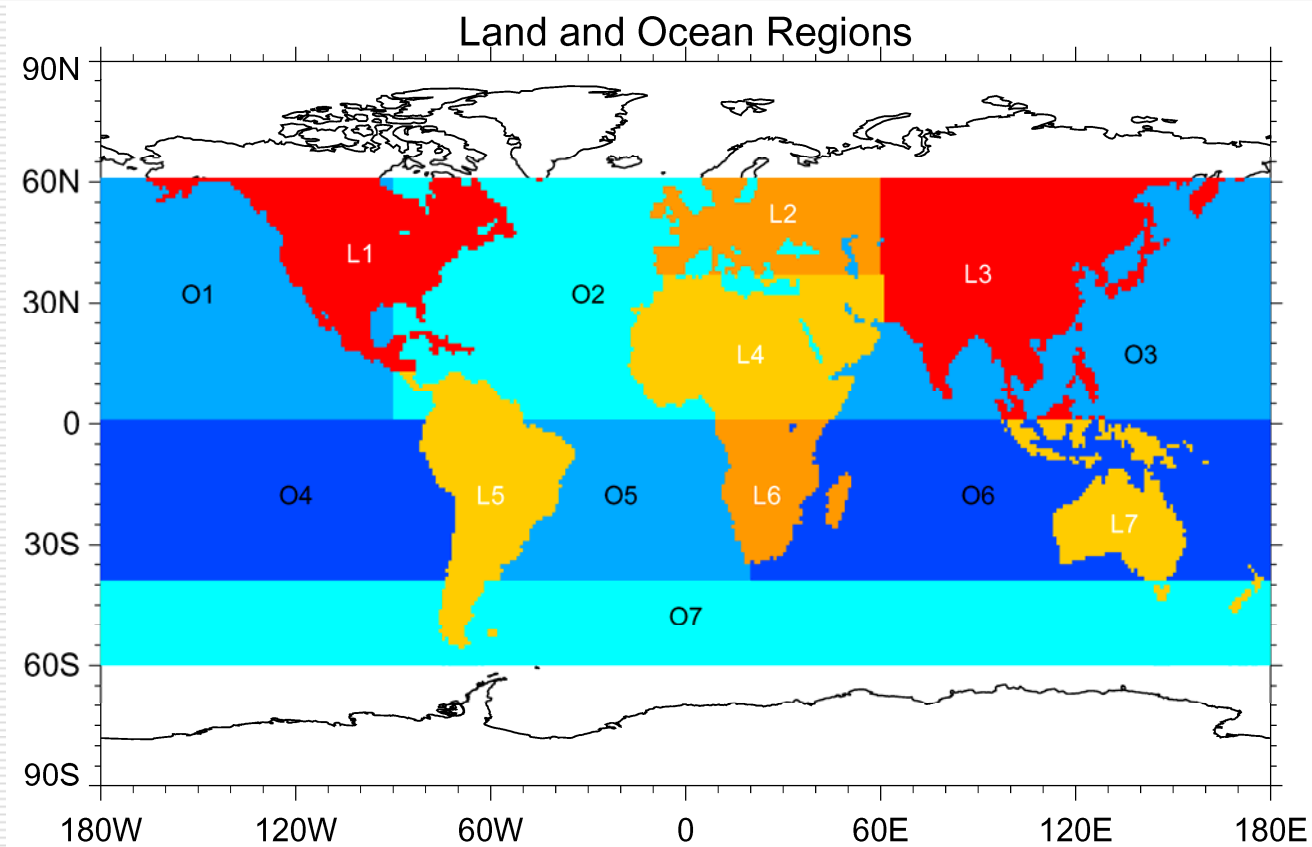
2000610



# Aerosol variations from 2000 to 2006:

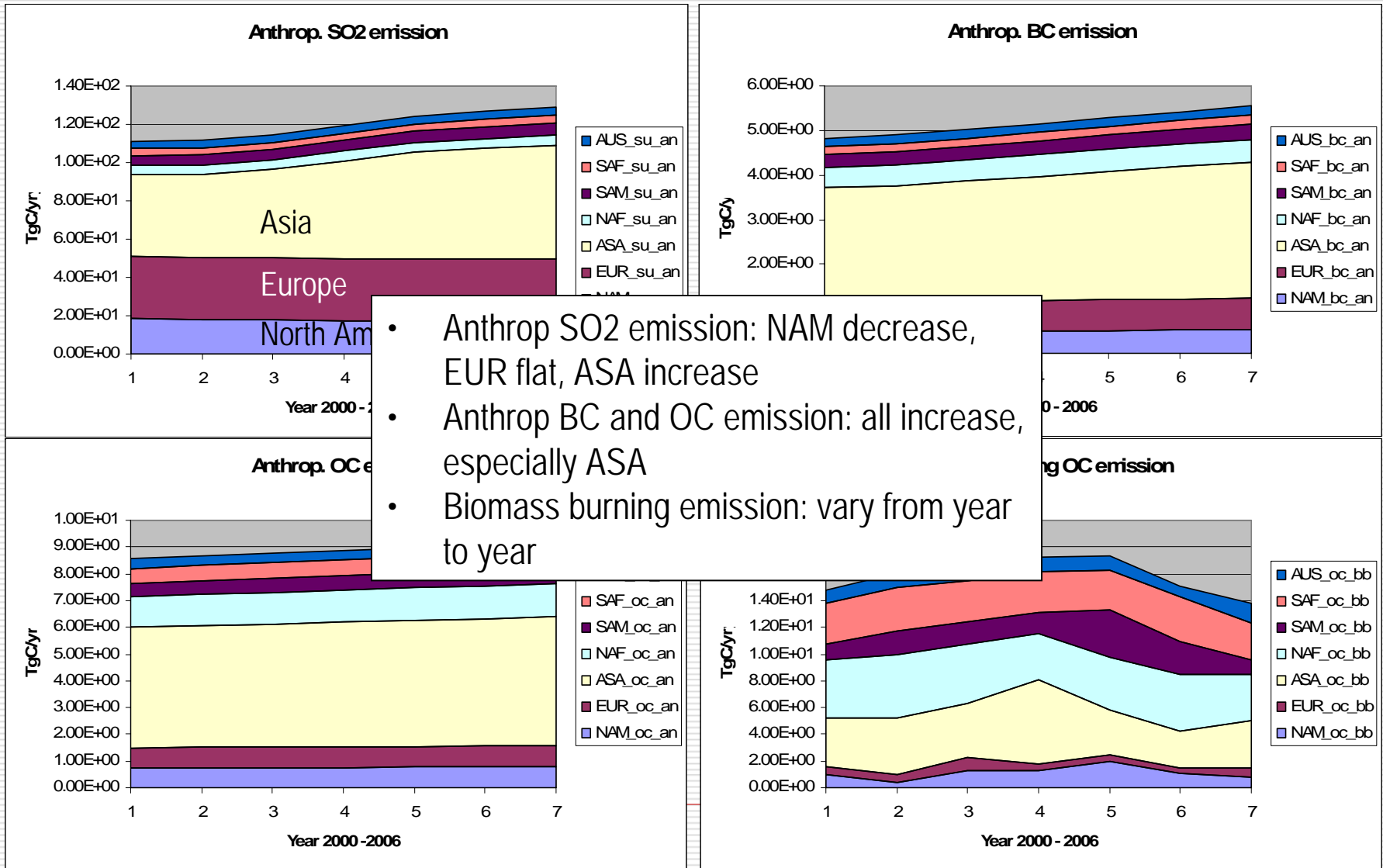
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7 land and 7 ocean regions:



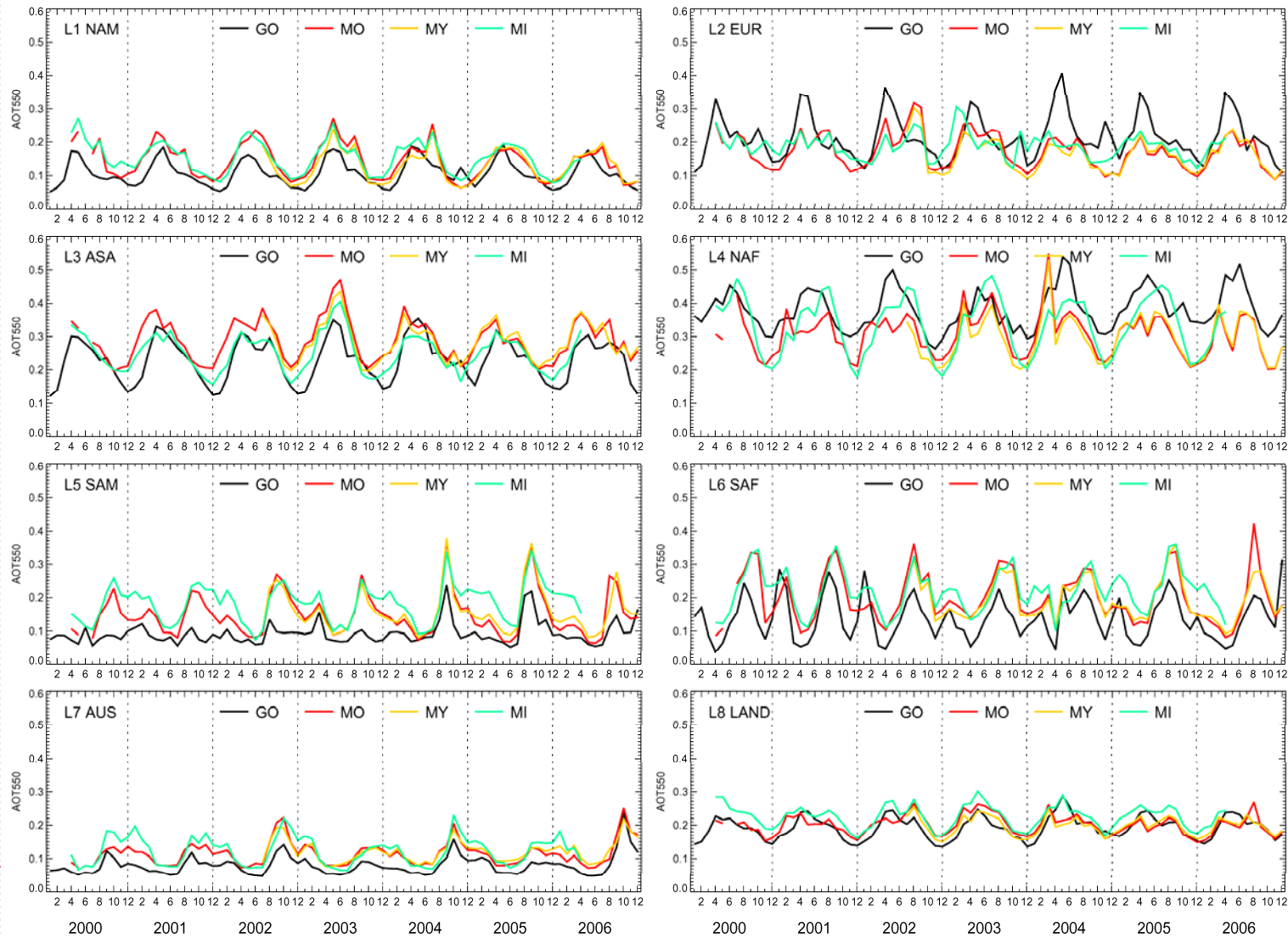
# Pollution and biomass burning emissions, 2000-2006

Anthropogenic emission from David Streets, biomass burning emission from van der Werf et al. 2007



# Variations of AOT over land from MODIS, MISR, GOCART

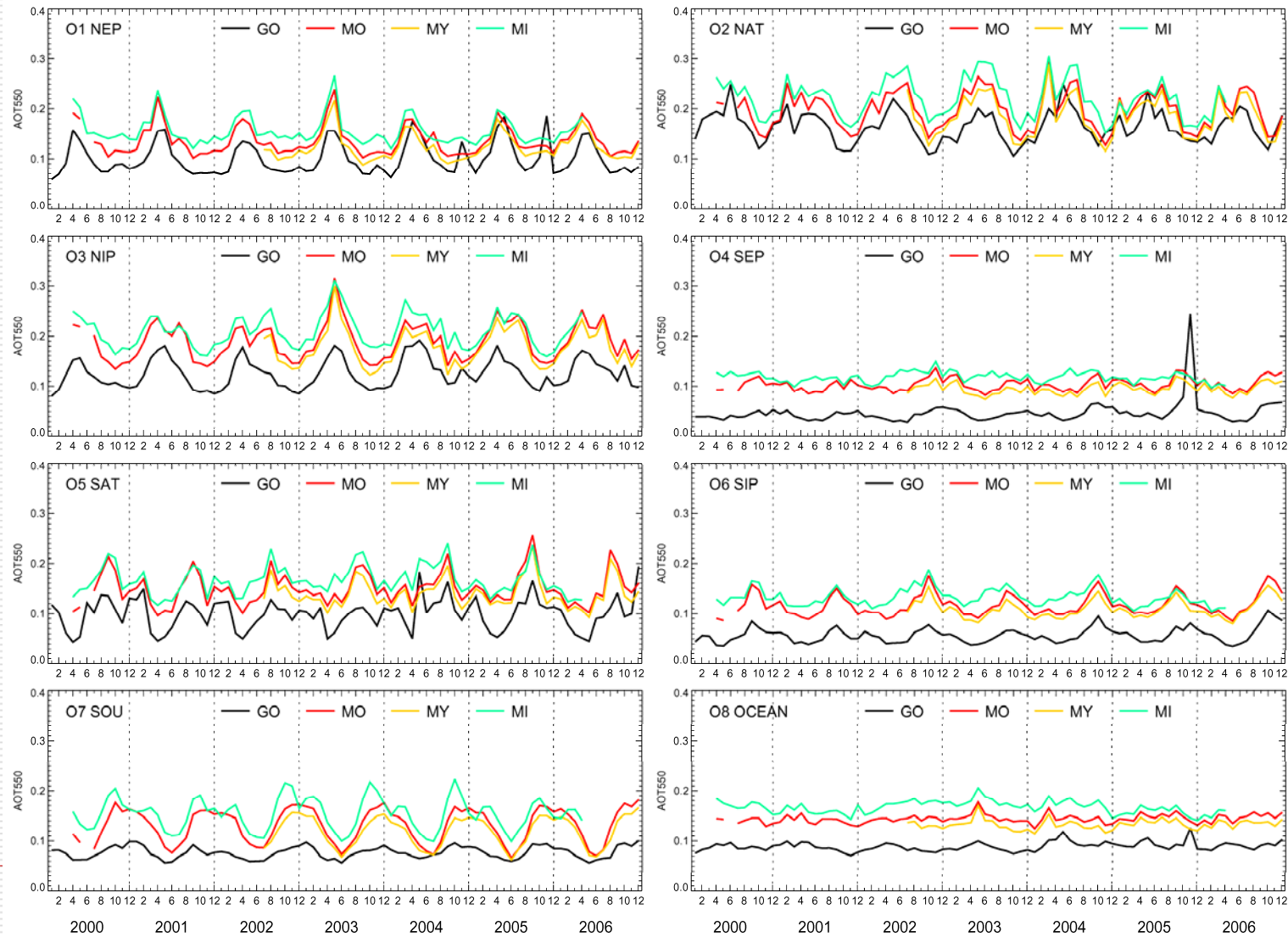
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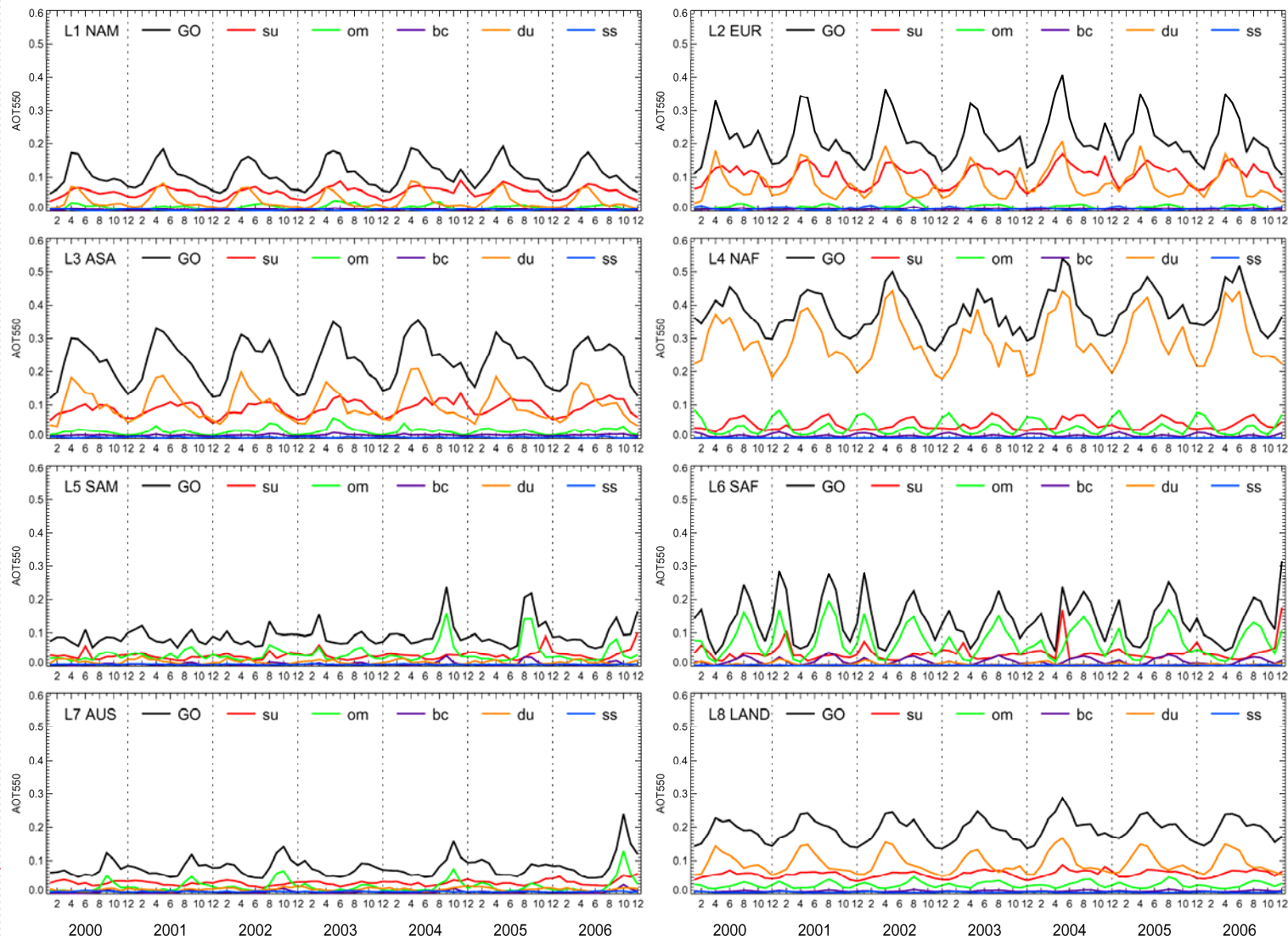


# Variations of AOT over ocean from MODIS, MISR, GOCART

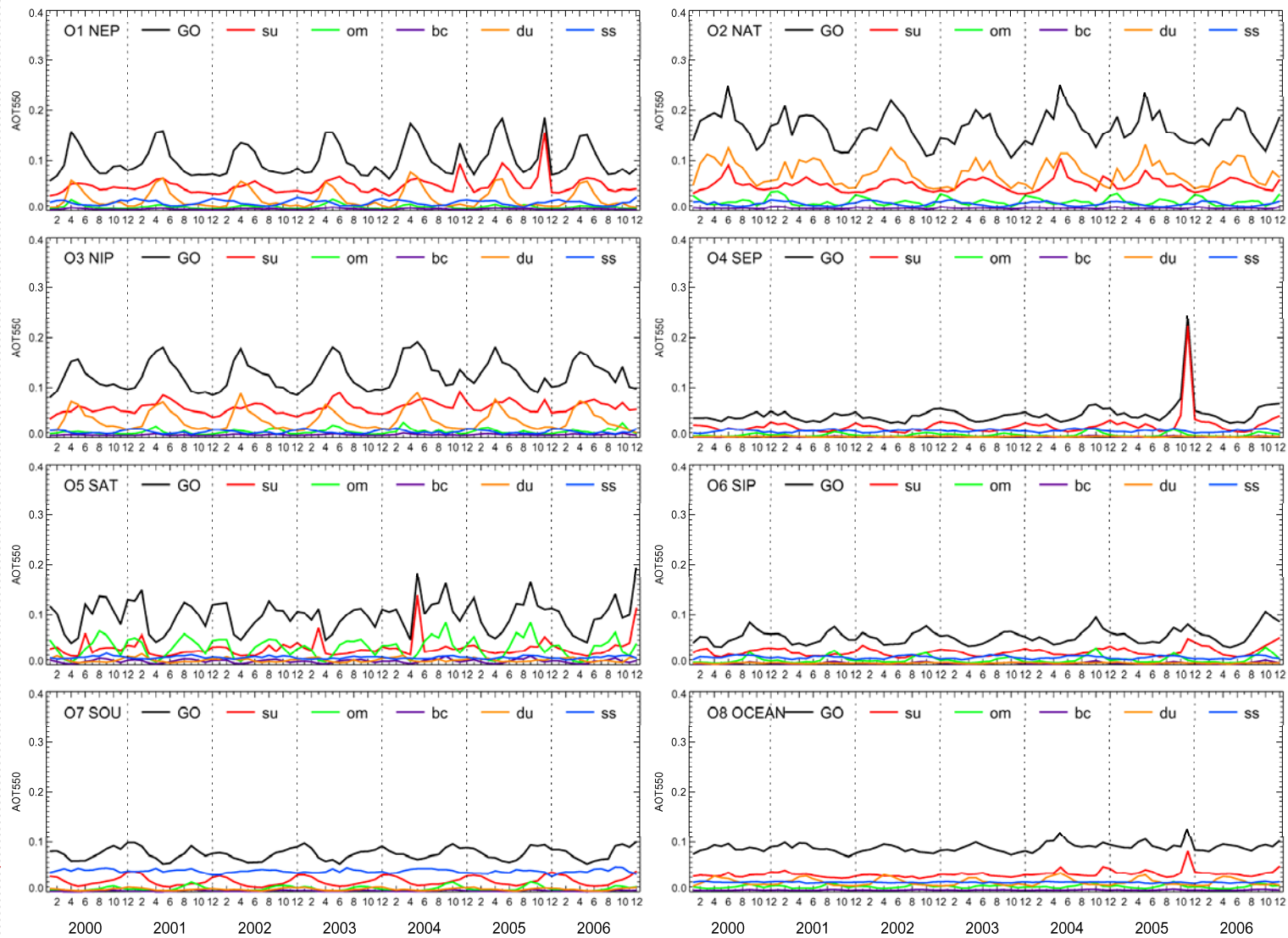
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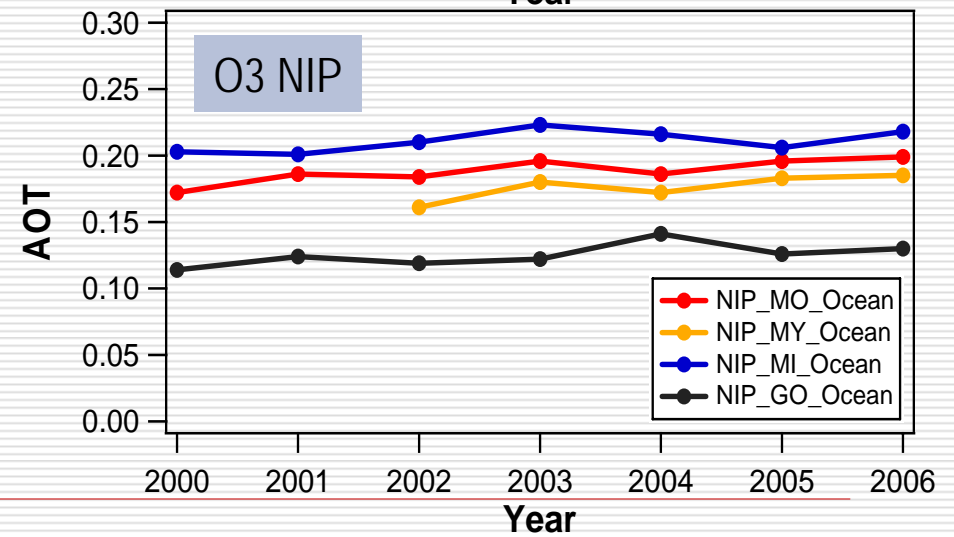
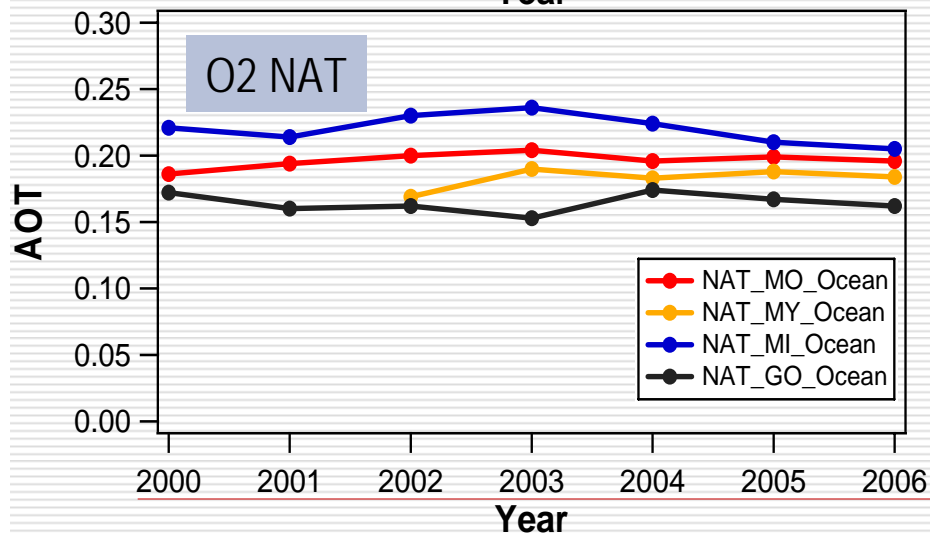
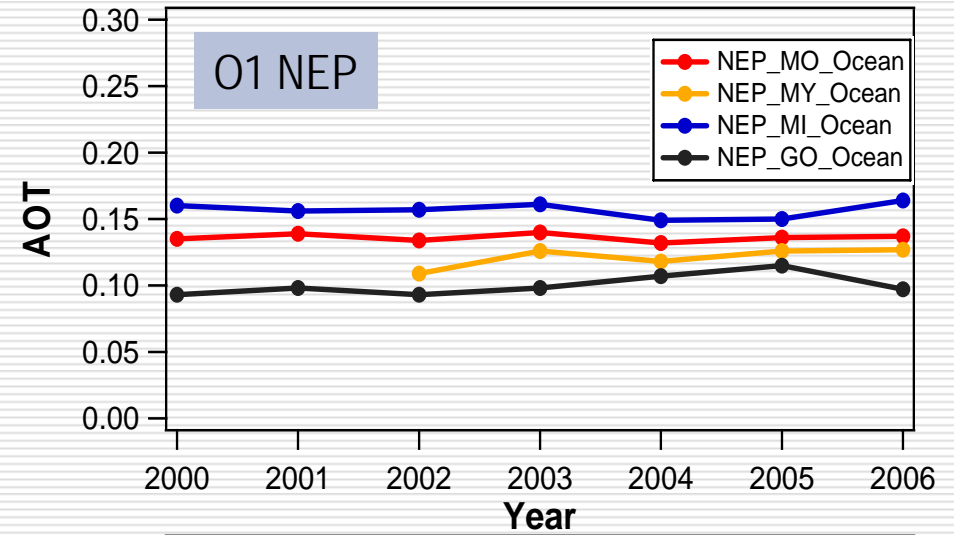
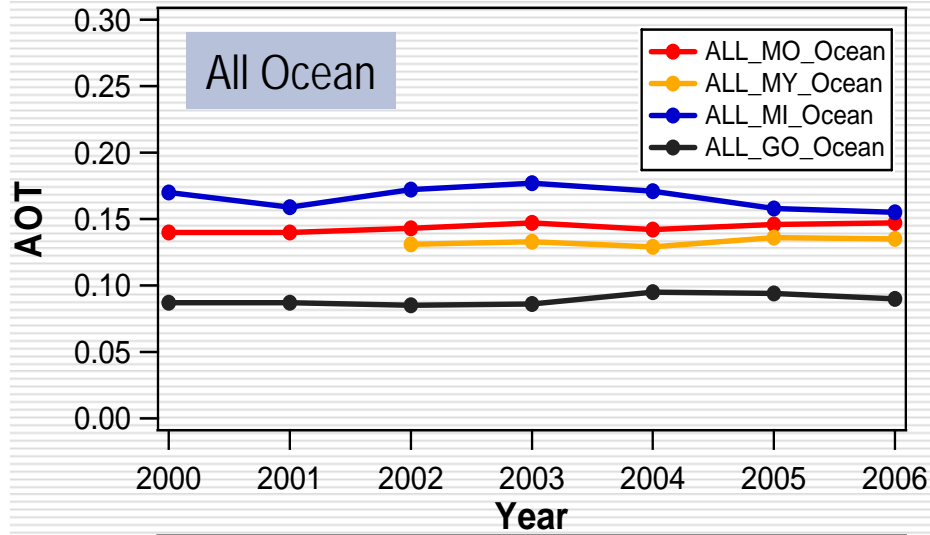
# GOCART composition over land



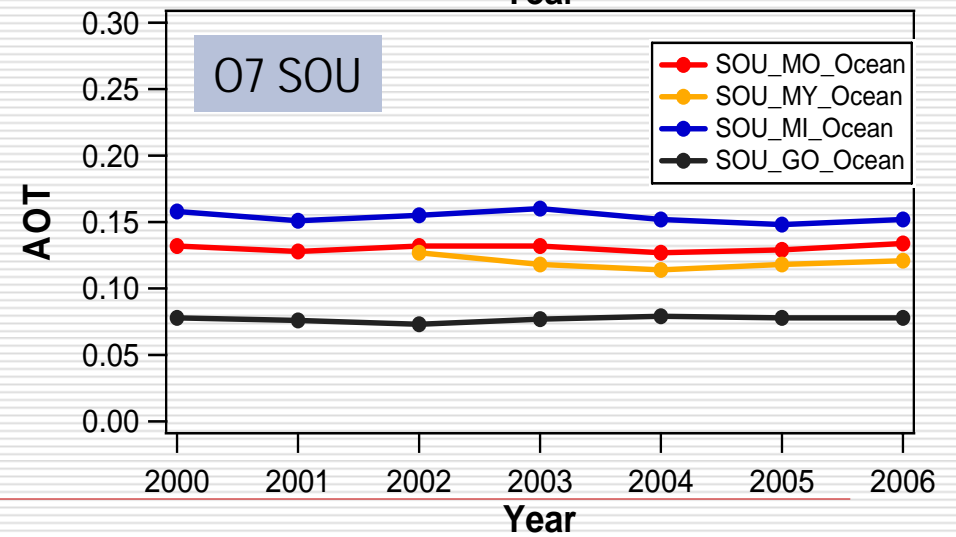
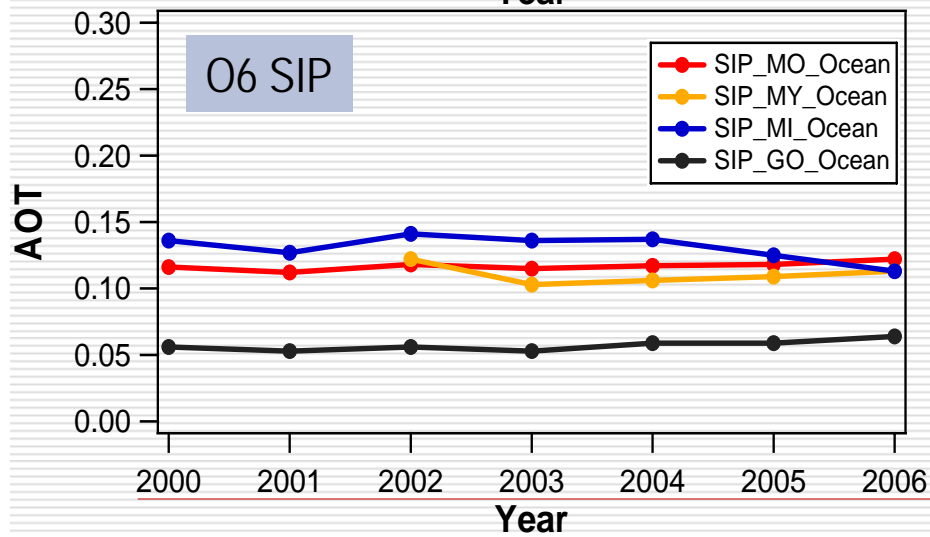
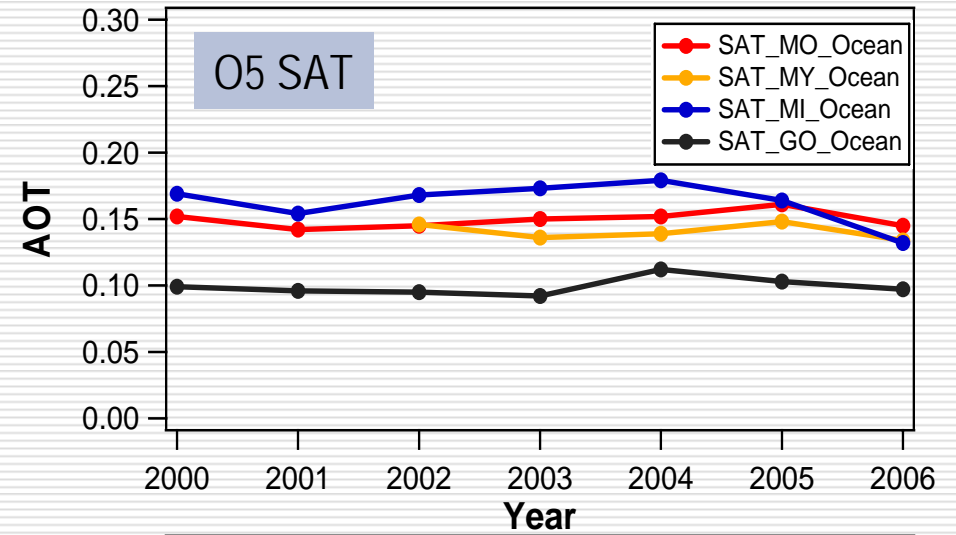
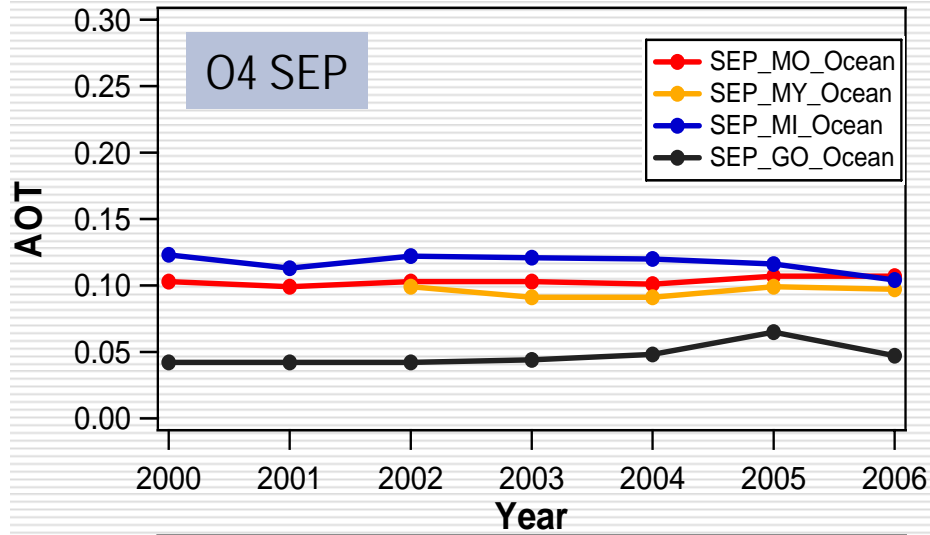
# GOCART composition over ocean



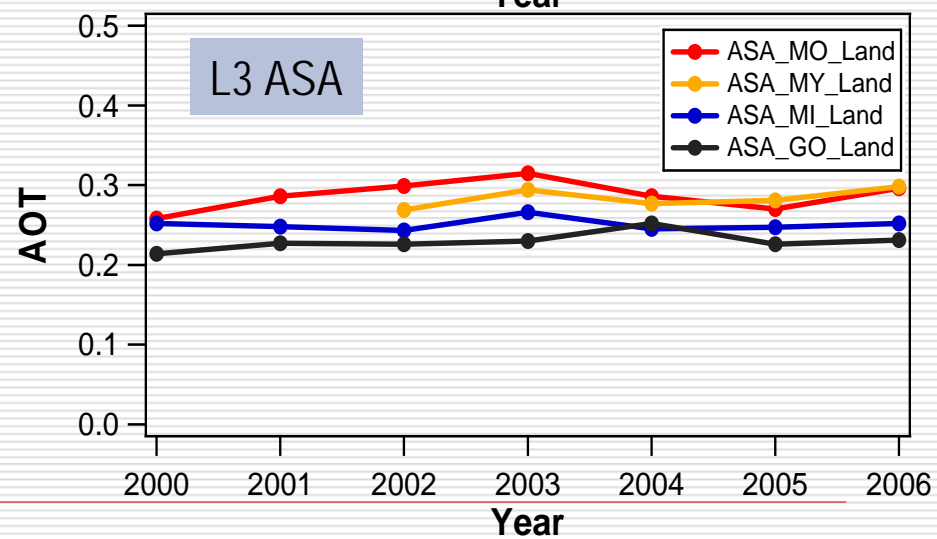
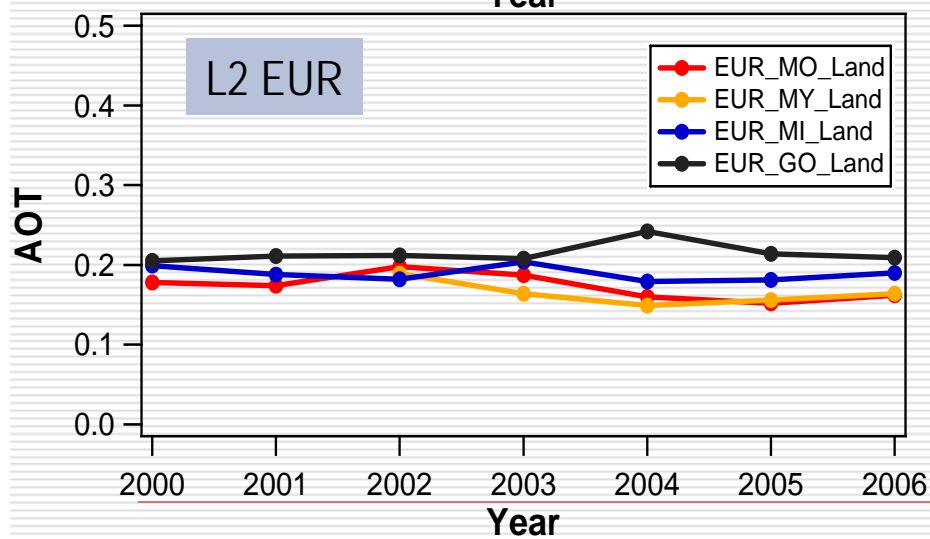
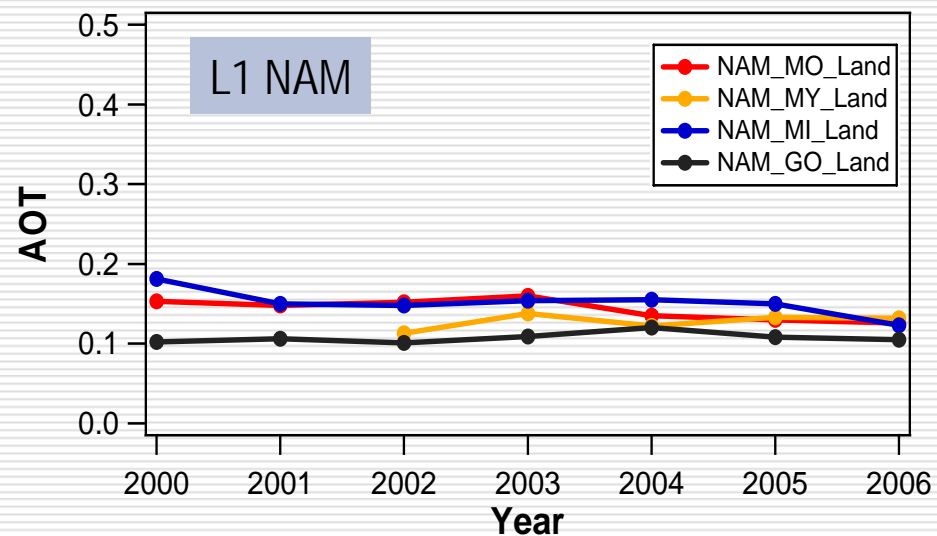
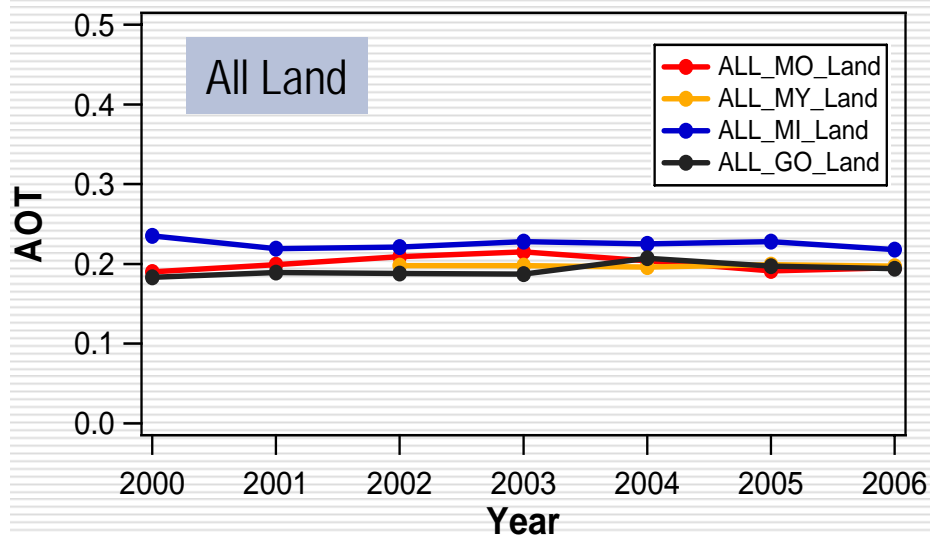
# Ocean region O1 – O3



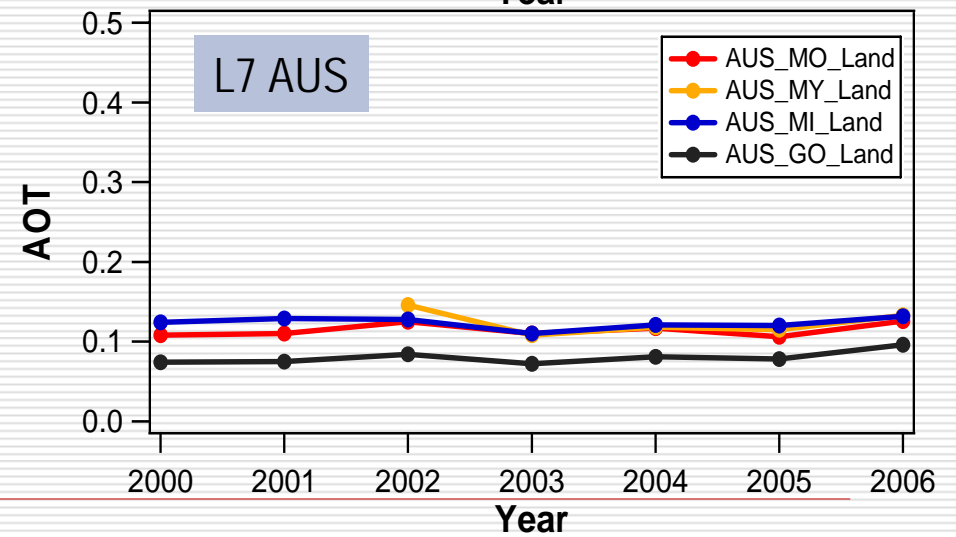
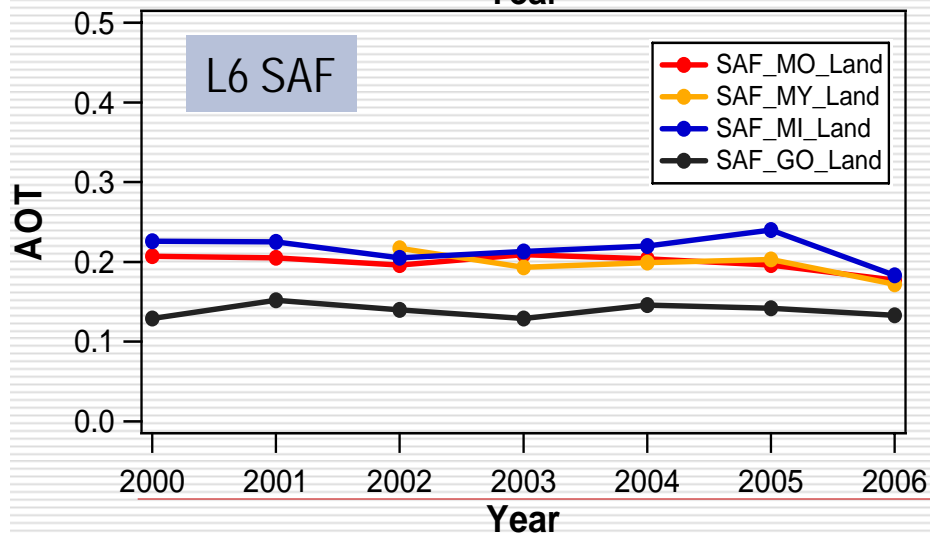
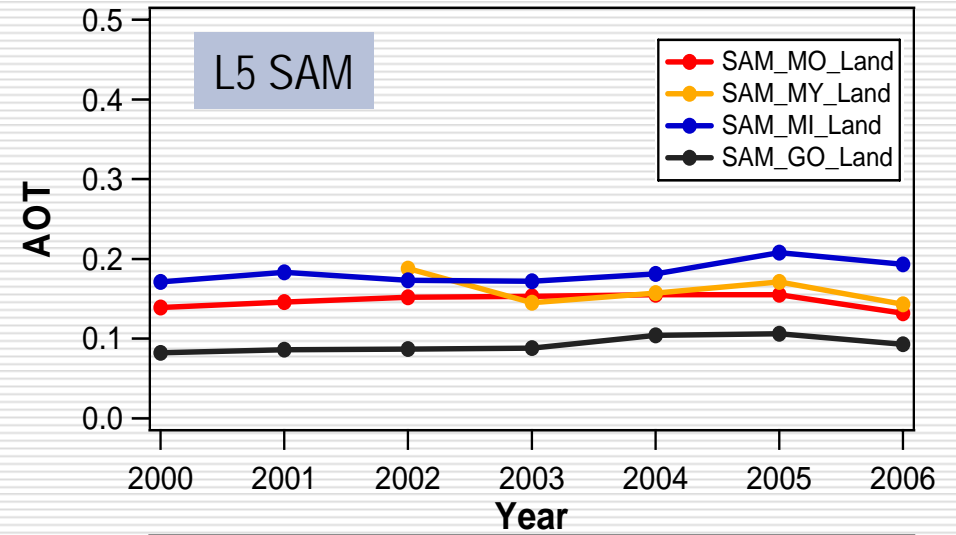
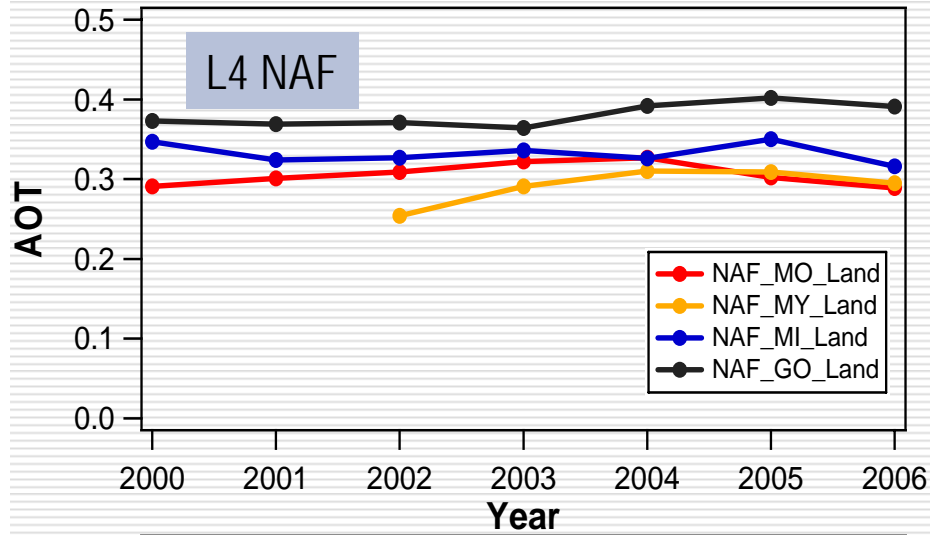
# Ocean region 04 – 07



# Land region L1 – L3



# Land region L4 – L7



Q:

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- How many models will participate?
  - How should we design regional/global analysis?
  - How do we define regions?
    - According to different economic/emission controlling regions
    - According to different aerosol type regimes
  - Data availability?
    - E.g., GEBA/BSRN
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