

# SHORT-LIVED CLIMATE FORCERS: IMPORTANT FOR AIR QUALITY AND CLIMATE

CONTRIBUTION OF SCIENTISTS TO REDUCE AIR POLLUTION AND COMBAT CLIMATE CHANGE



FORSCHUNGSZENTRUM JÜLICH, GERMANY

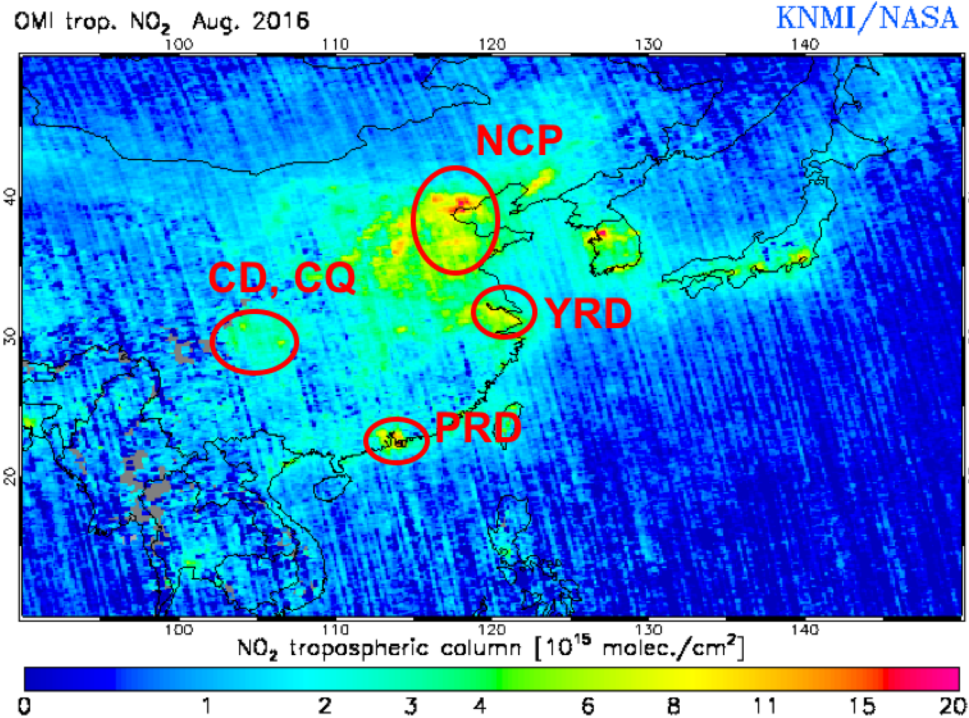
ANDREAS WAHNER

Mitglied der Helmholtz-Gemeinschaft

COP 24; EU Side Event 335 Pavilion; 03/12/2018



# MOTIVATION – AIR POLLUTION



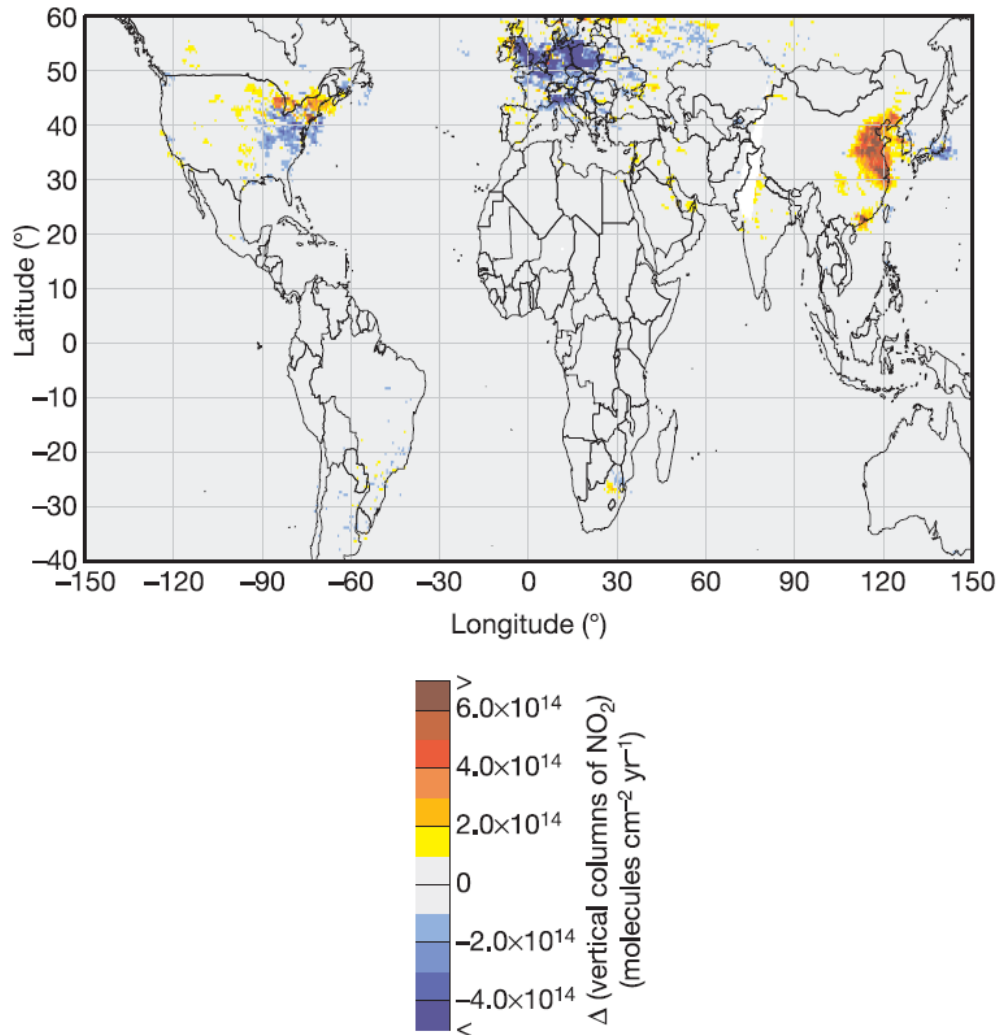
## Air pollution complex

- Widely spread
- Co-existence of O<sub>3</sub> and PM<sub>2.5</sub> pollution

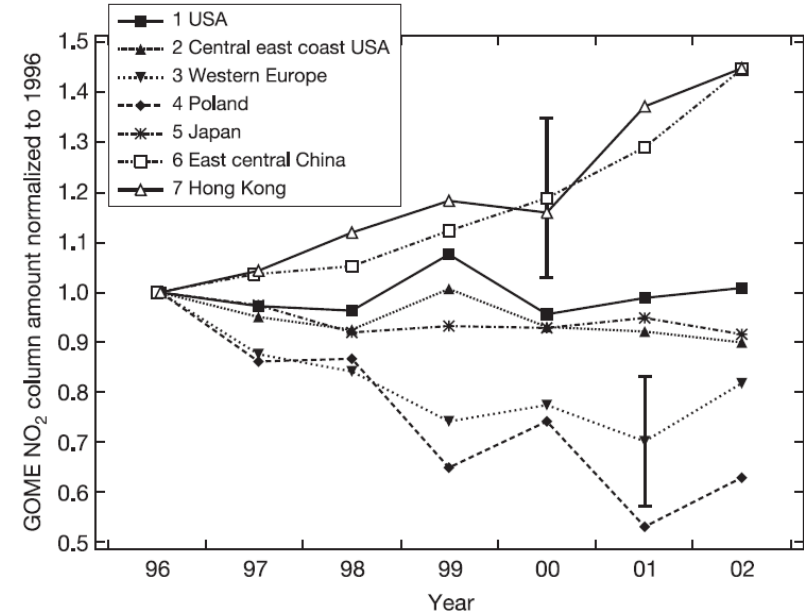


Regional air pollution control

# Regional Anthropogenic NO<sub>x</sub> Change !



**Figure 1 | Average annual changes in tropospheric NO<sub>2</sub> as observed by GOME from 1996 to 2002. The gradient obtained from a linear regression**

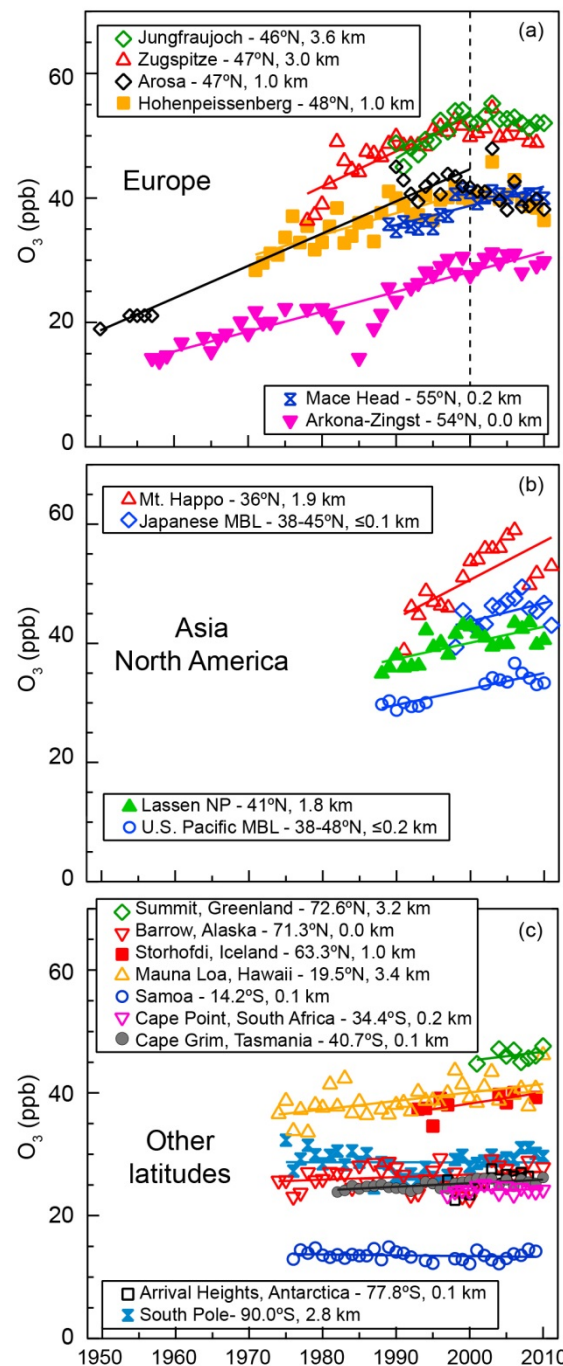


**Figure 3 | The temporal evolution of tropospheric NO<sub>2</sub> columns from GOME**

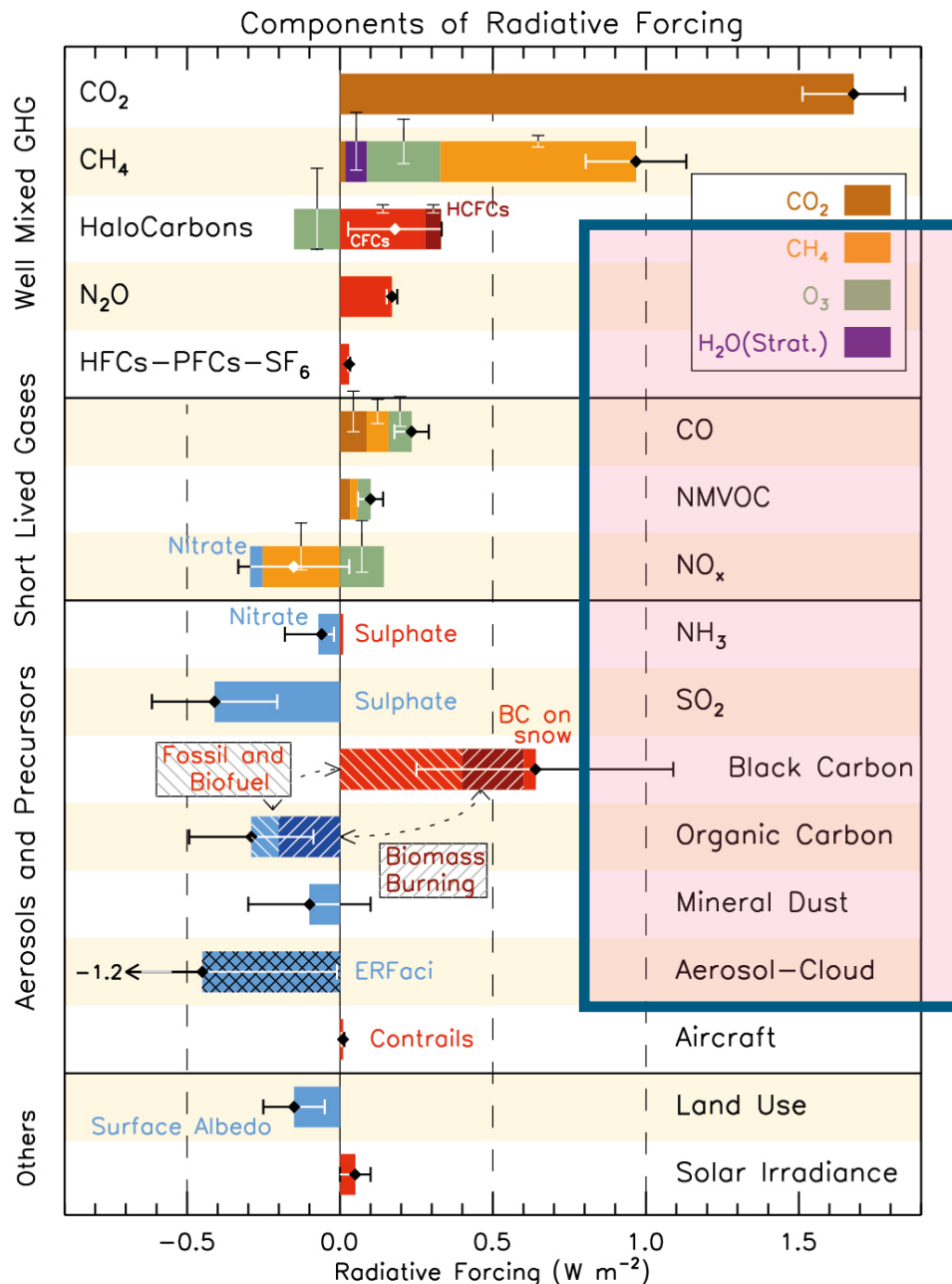
A. Richter et al.,  
Vol 437|1 September 2005|  
doi:10.1038/nature04092



# Increase of Tropospheric Ozone

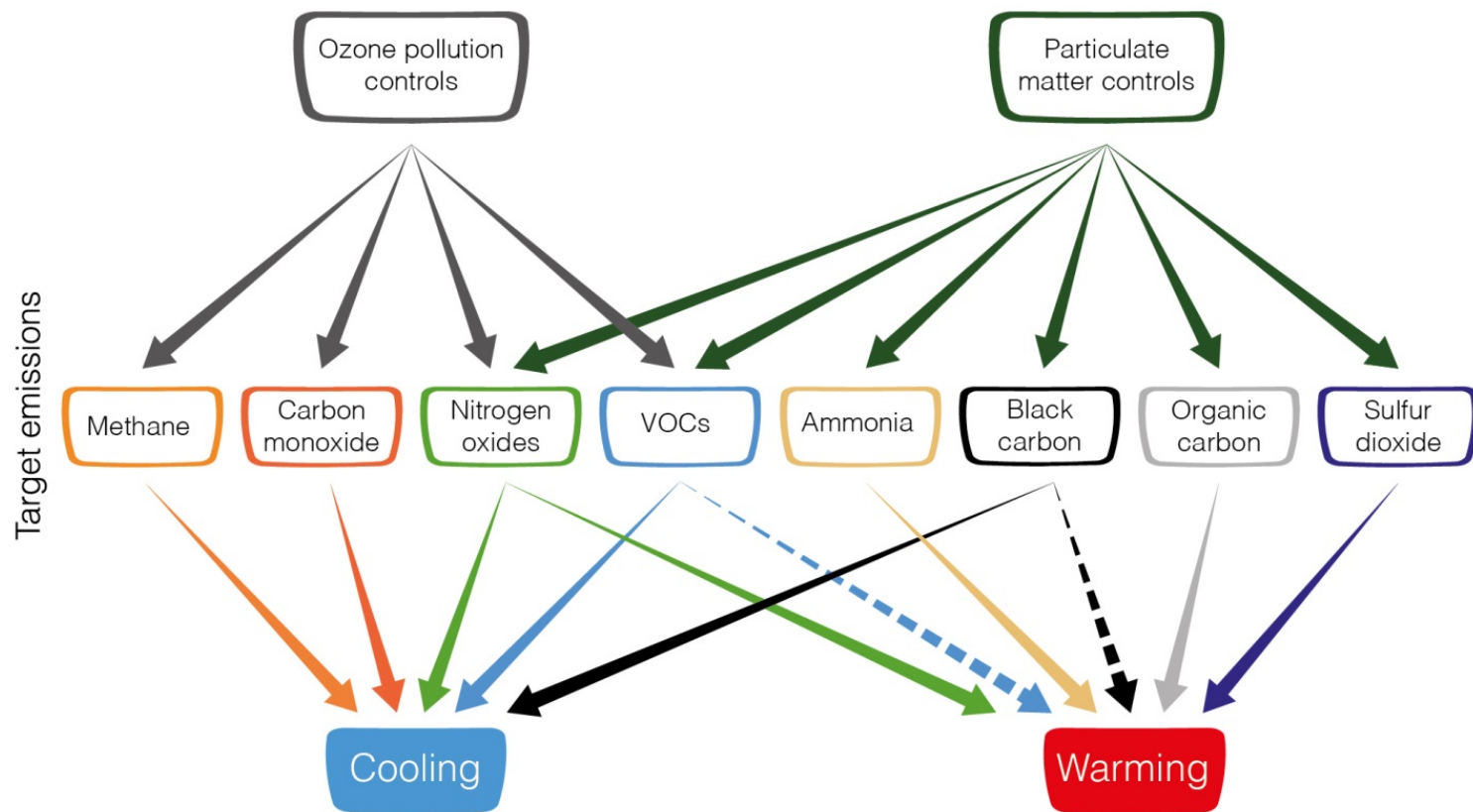




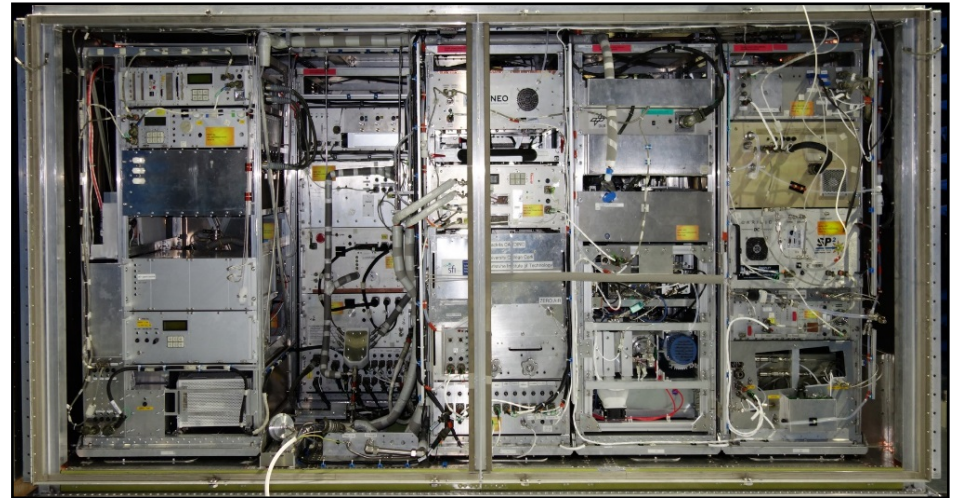


**Climate change depend on short lived climate forcers(SLCFs)**

# Air Quality Controls on SLCFs Impact Global Warming



## IAgos as a strong Consortium of Europe's Leading Atmospheric Research Institutes and Universities





## with a strong Partnership of Airlines



**Lufthansa**

**AIRFRANCE**



**CHINA AIRLINES**



**CATHAY PACIFIC**

**IBERIA**



**HAWAIIAN  
AIRLINES.**



Lufthansa D-AIHE



CARIBIC, Dez. 2004

Lufthansa D-AIGT



CORE-1, July 2011

China Airlines B-18806



CORE-2, June 2012

Air France F-GLZU



CORE-3, June 2013

Cathay Pacific B-HLR



CORE-4, Aug 2013

Iberia EC-GUQ



CORE-5, Feb 2014

Lufthansa D-AIKO



CORE-6, March 2015

China Airlines B-18317



CORE-7, July 2016

Hawaiian Airlines N384HA



CORE-8, Feb 2017

Air France F-GZCO



CORE-9, Apr 2017

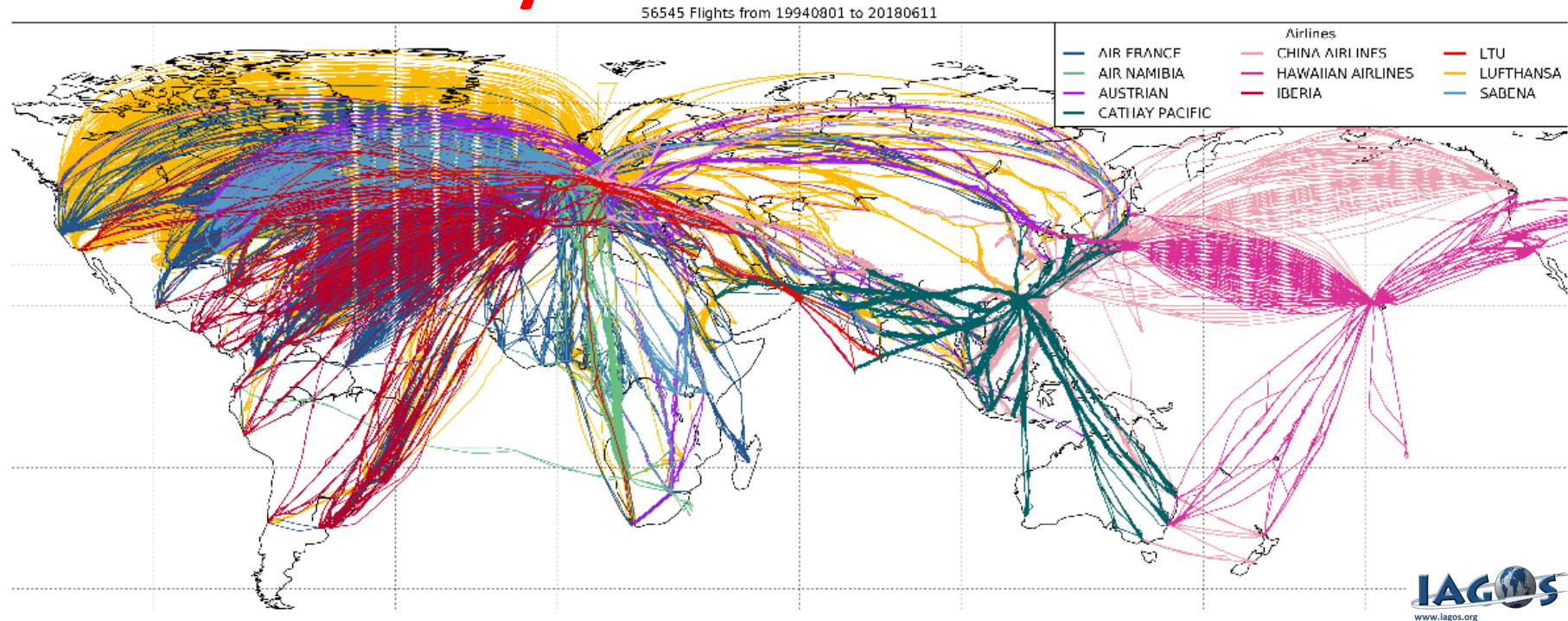
China Airlines B-18316



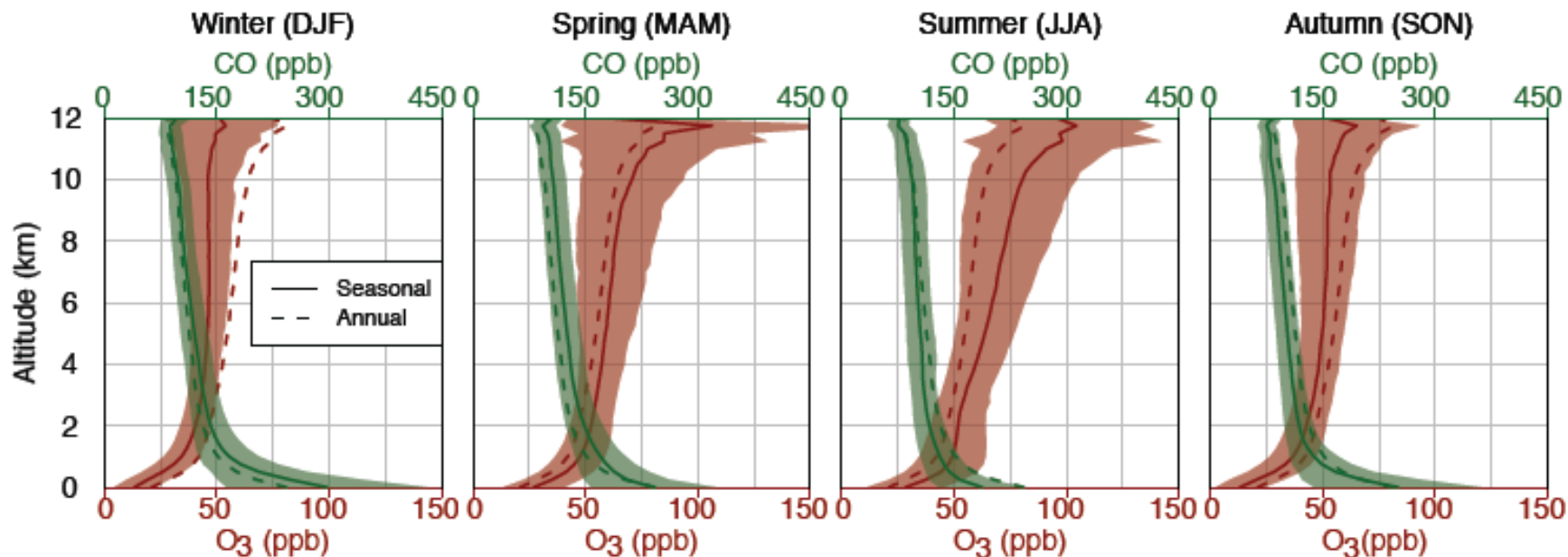
CORE-10, July 2017



**provides global, long term data on  
key climate variables**



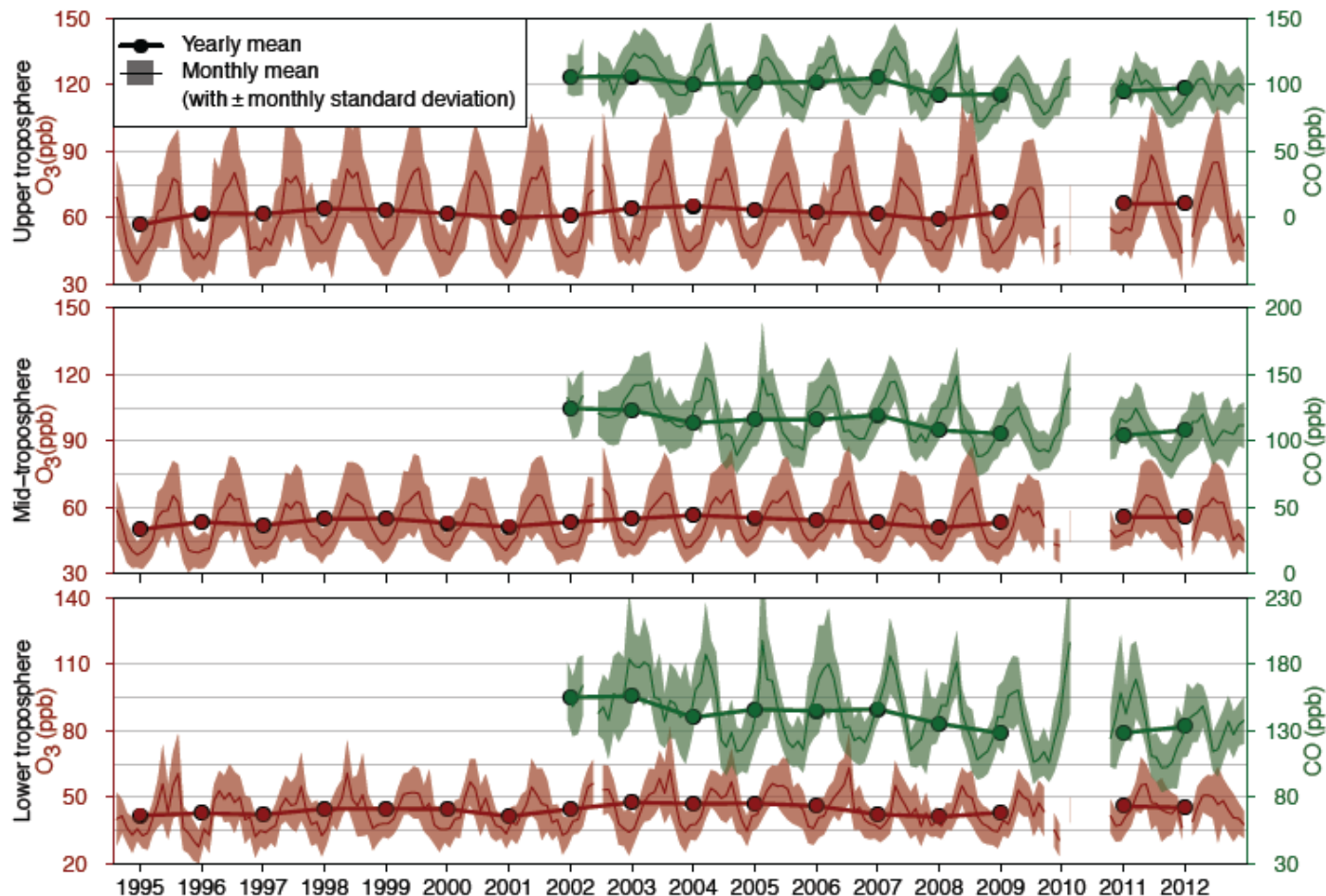
Research Infrastructure of Global Interest Approved by the Group of Senior Officials on  
Global Research Infrastructures – GSO of G7



**IAGOS provides essential information on long-term changes around the tropopause (10-13 km). Data record over Frankfurt/Munich covers 20 yrs of O<sub>3</sub> and 12 yrs of CO profiles.**

**Climatological vertical profiles of O<sub>3</sub> and CO mixing ratios above Frankfurt/Munich per season.**





**Over Europe, CO concentrations decreased significantly,  
while ozone remained relatively constant.**

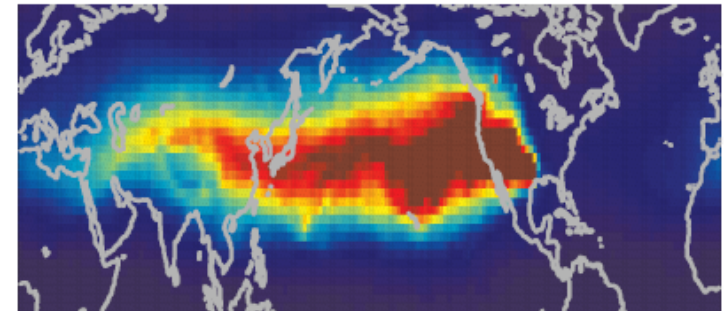
## LETTERS

### Increasing springtime ozone mixing ratios in the free troposphere over western North America

O. R. Cooper<sup>1,2</sup>, D. D. Parrish<sup>2</sup>, A. Stohl<sup>3</sup>, M. Trainer<sup>2</sup>, P. Nédélec<sup>4</sup>, V. Thouret<sup>4</sup>, J. P. Cammas<sup>4</sup>, S. J. Oltmans<sup>2</sup>, B. J. Johnson<sup>2</sup>, D. Tarasick<sup>5</sup>, T. Leblanc<sup>6</sup>, I. S. McDermid<sup>6</sup>, D. Jaffe<sup>7</sup>, R. Gao<sup>2</sup>, J. Stith<sup>8</sup>, T. Ryerson<sup>2</sup>, K. Aikin<sup>1,2</sup>, T. Campos<sup>9</sup>, A. Weinheimer<sup>9</sup> & M. A. Avery<sup>10</sup>

**Springtime ozone levels in the lower atmosphere over western North America are rising.**

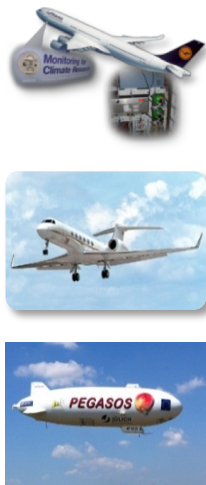
**The source of this pollution may be Asia, a finding that reaffirms the need for international air-quality control.**



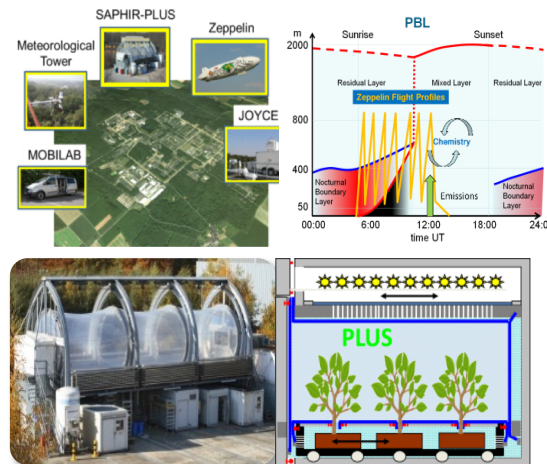
# Atmospheric Chemistry Research

- Role of chemistry and physics in climate variability and change
- Interaction between air quality and climate change
- Facilitating technology transfer and education in atmospheric and climate science

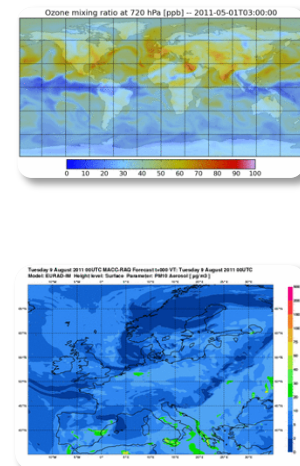
## Observation



## Simulation / Prozess Understanding



## Modell



Innovation and scientific basis for societal and political decisions:  
energy options, mitigation- and adaption strategies





Thank you !

