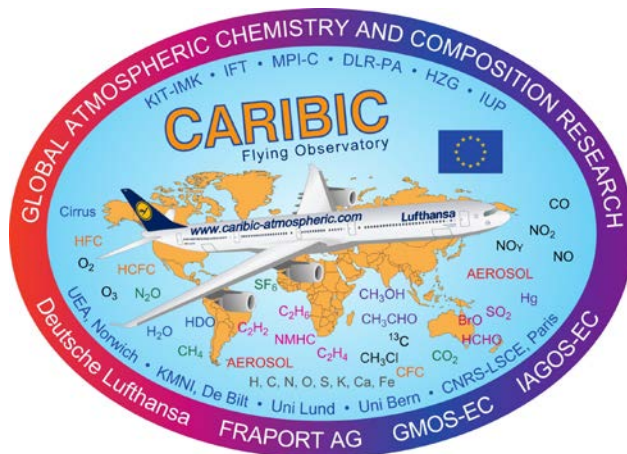


CARIBIC: Export of pollutants from the South Asian monsoon anticyclone

Carl Brenninkmeyer, Angela Baker, Max Planck Institute for Chemistry

www.caribic-atmospheric.com



GLOBAL ATMOSPHERIC CHEMISTRY AND COMPOSITION RESEARCH

KIT-IMK • IFT • MPI-C • DLR-PA • HZG • IUP

CARIBIC

Flying Observatory



Deutsche Lufthansa • UEA, Norwich • KMNI, De Bilt • Uni Lund • Uni Bern • CNRS-LSCE, Paris • IAGOS-EC

FRAPORT AG

GMOS-EC

Cirrus

HFC

O₂

HCFC

O₃

N₂O

H₂O

CH₄

HDO

AEROSOL

C₂H₂

NMHC

C₂H₆

C₂H₄

SF₆

CH₃OH

CH₃CHO

CH₃Cl

¹³C

CFC

AEROSOL

BrO

SO₂

HCHO

CO₂

Hg

CO

NO₂

NO_y

NO

H, C, N, O, S, K, Ca, Fe

CARIBIC Partner Institutes:



Karlsruhe Institute of Technology



LEIBNIZ-INSTITUT FÜR
TROPSPHÄRENFORSCHUNG



FORSCHUNGSZENTRUM
in der HELMHOLTZ-GEMEINSCHAFT



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RUPRECHT-KARLS-UNIVERSITÄT
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University of East Anglia



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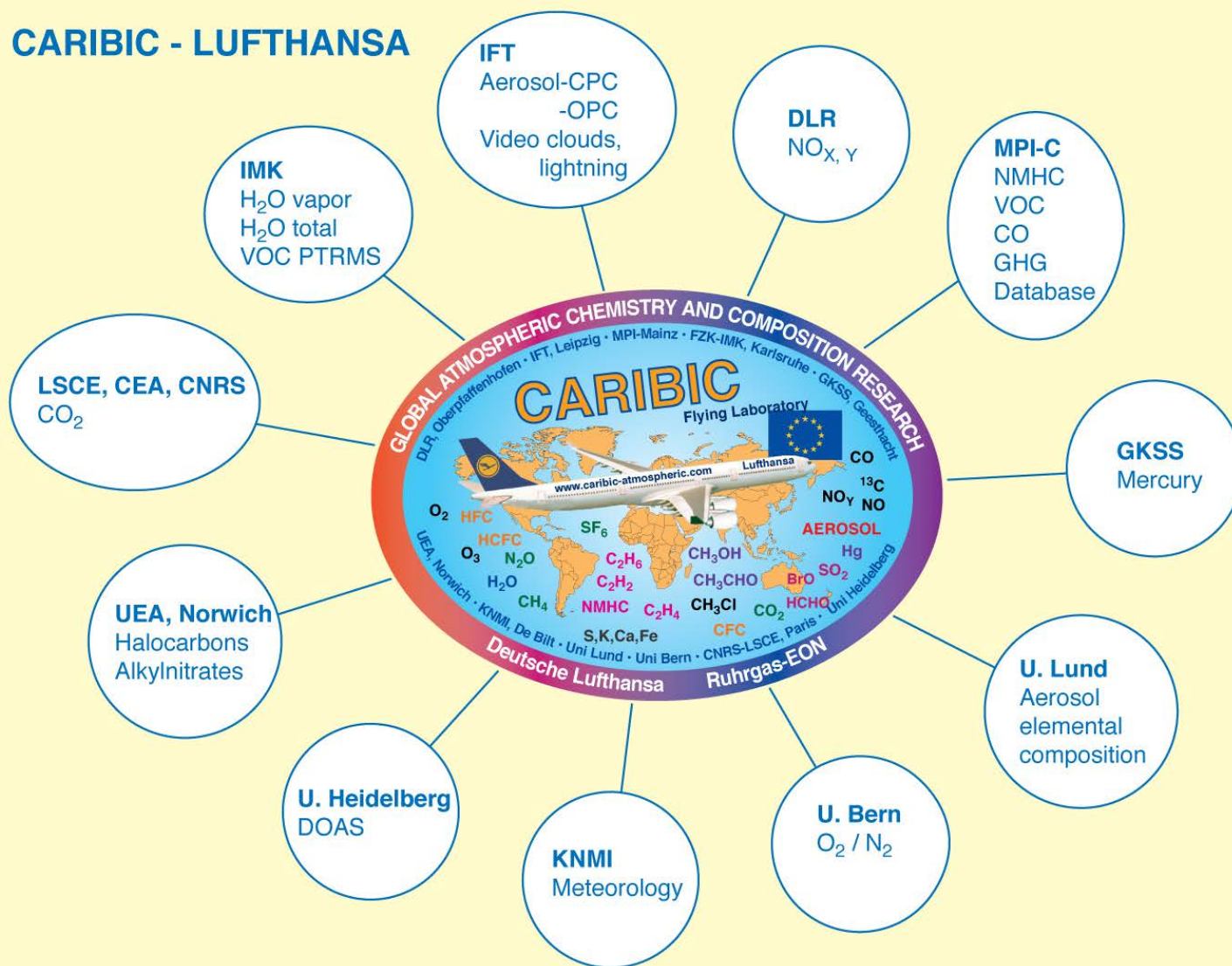


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Royal Netherlands
Meteorological Institute
Ministry of Transport, Public Works
and Water Management

CARIBIC - LUFTHANSA



Previous Work Monsoon

- 2010 ACP, Schuck et al:
 - GHG observations in the anticyclone
 - simple emission estimates for CH₄ N₂O CO
- 2011 ACP, Baker et al:
 - NMHC observations in the anticyclone
 - chemical clock
- 2011 ACP, Patra et al:
 - CO₂ inversion
 - CO₂ flux estimate for South Asia during summer monsoon
- 2012 GRL, Baker et al:
 - methane/ethane/CO
 - biogenic methane emissions from South Asia
- 2012 JGR, Schuck et al:
 - methane in the UT (all flights into tropical regions)
 - seasonality and regional contributions (tropical Asia)

New Study:

Export from the South Asian Monsoon Region
(Where does the air go ?)

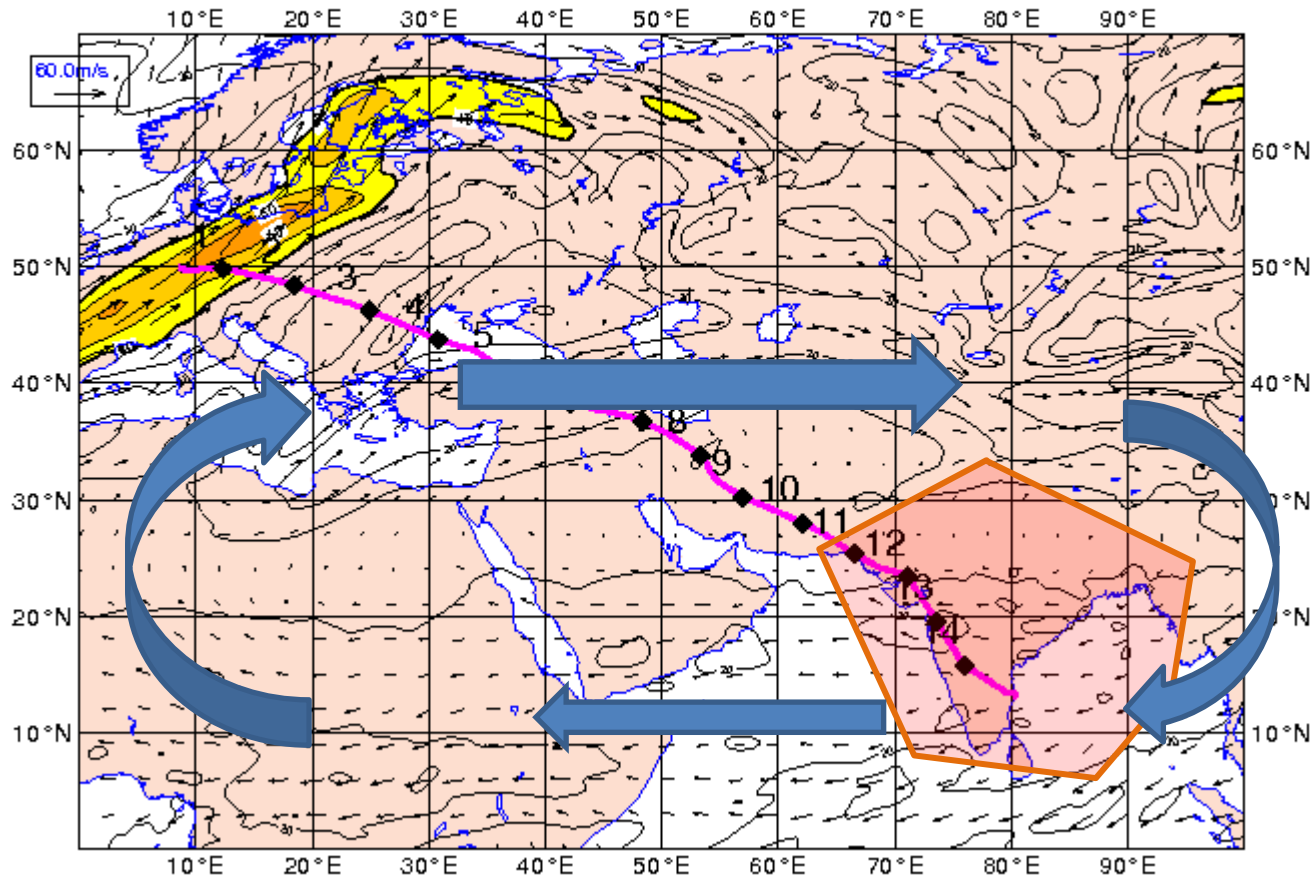
- measurements during MINOS
- Middle East ozone maximum
- special case 206/207: monsoon “signature” observed over eastern Canada
- how long do air masses stay in the anti-cyclonic circulation ?
- can we link receptor and source regions?
- what’s the vertical structure of the monsoon plume ?
- does the monsoon influence chemical composition over North America?
- using FLEXPART forward trajectories for classification of by receptor region
- looking at forward transport and chemical processing of polluted air masses

Reminder: the circulation

Analysis: Wednesday 13 August 2008 12 GMT

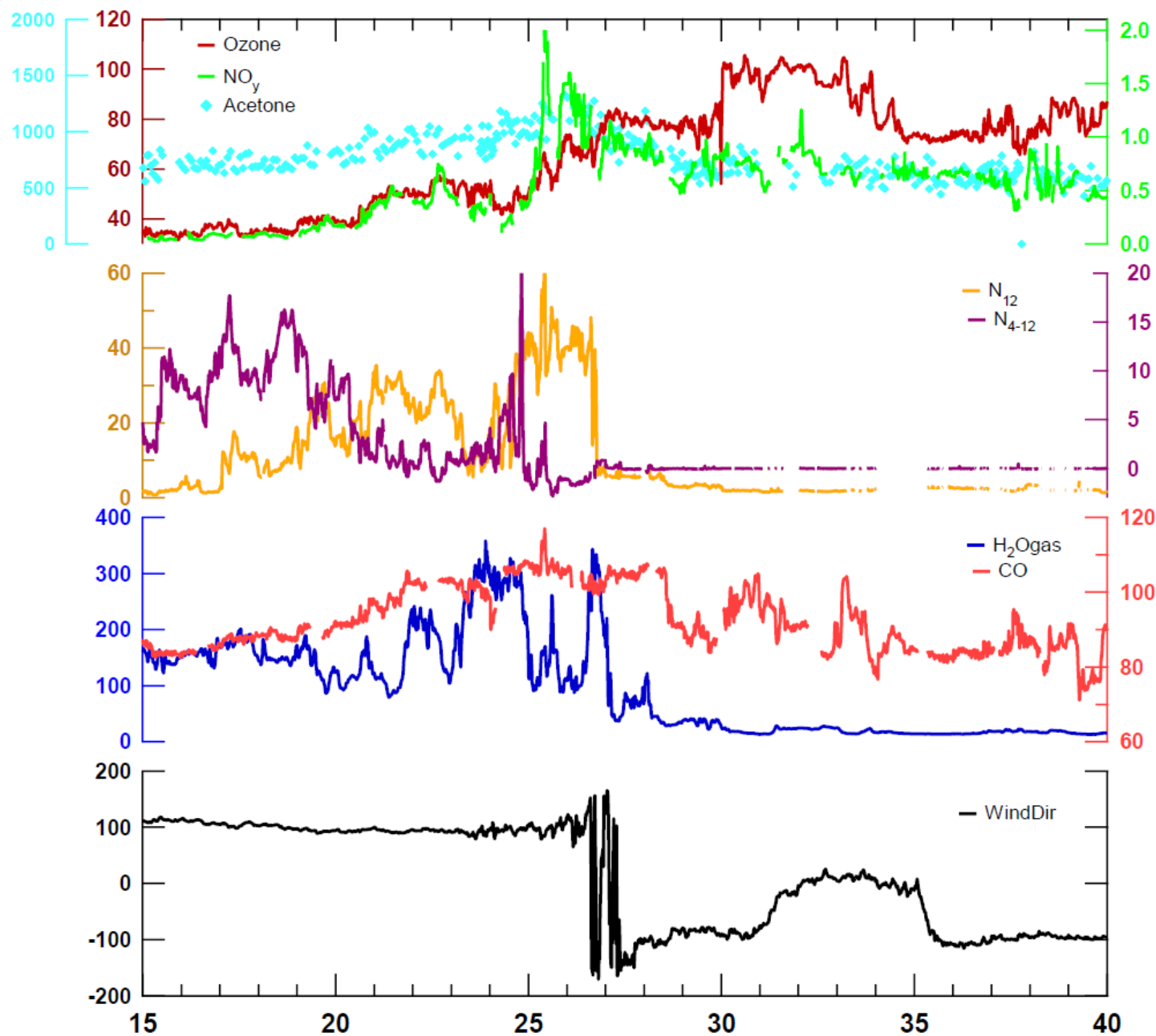
250 hPa isobaric surface: Wind (m/s)

KNMI/ECMWF CARIBIC



- low level inflow over Arabian Sea
- convection over subcontinent/ BOB
- anticyclone in the UT
- westerly jet shifted north
- easterly jet in the south

Flight 244 FRA-MAA August



latitude