Research Opportunities HALO/Falcon Data Base

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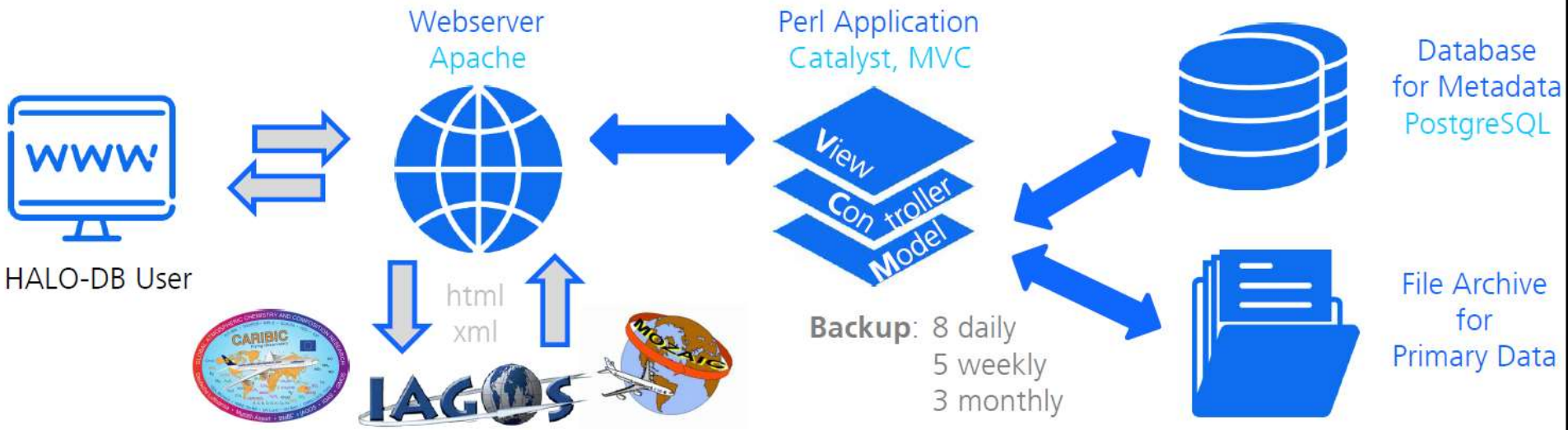
ACAM Workshop, Guangzhou, China, 05-09 June 2017

Structure of HALO/Falcon Data base



HALO database

https://halo-db.pa.op.dlr.de

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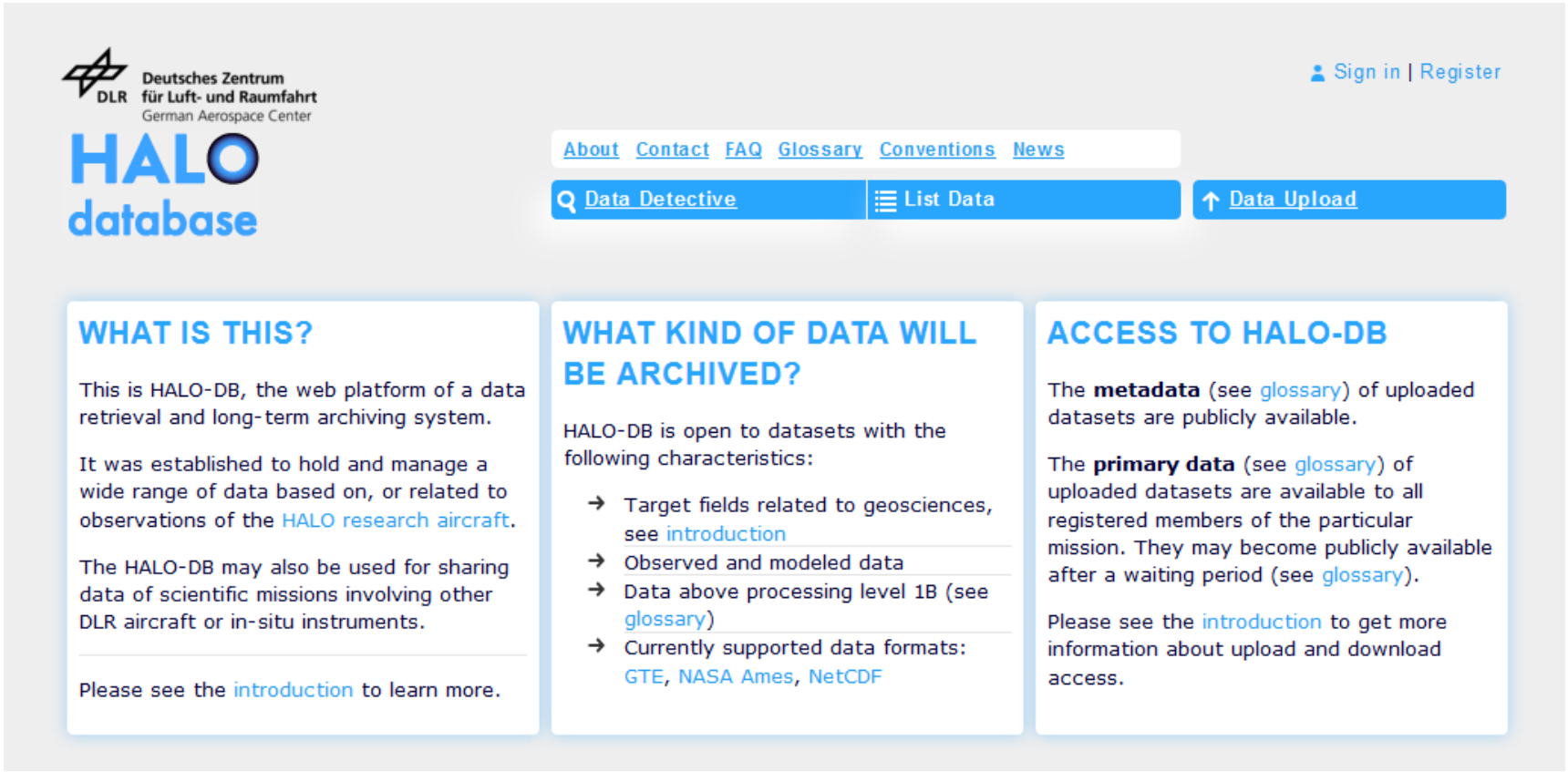
ATMOSPHERIC COMPOSITION & THE ASIAN MONSOON

Data archived and data access



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List of missions

Deutsches Zentrum für Luft- und Raumfahrt
German Aerospace Center

HALO database

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LIST OF ALL MISSIONS

You see the available missions in HALO-DB.

Name	Start	End	No. of associated datasets
OMO	2015-07-21	2015-08-26	356
OMO-EU	2015-01-21	2015-01-27	12
POLARCAT	2008-06-30	2008-07-18	
POLINAT-1A	1994-11-02	1994-11-13	71
POLINAT-1S	1995-06-21	1995-07-05	133
POLINAT-2	1997-09-19	1997-10-23	343
POLSTAR-1	1997-01-24	1997-02-06	39
POLSTAR-2	1998-01-21	1998-02-04	53
POLSTRACC	2015-12-07	2016-03-21	472
QUANTIFY	2007-06-04	2007-06-17	
RACEPAC	2014-04-24	2014-05-23	93
RECONCILE	2010-01-01	2010-01-01	

Showing 1 to 75 of 75 rows

MISSION: OMO

RSS 2.0 Atom 1.0

DESCRIPTION

Full mission name: Oxidation Mechanism Observations

Description:

Oxidation Mechanism Observations in the extrattropical free TS.

MAP OF THE MEASURING AREA

FLIGHTS

Flights	Category	Start	Stop
150716a	HALO	2015-07-16 09:59:50	12:38:43
150721a	HALO	2015-07-21 09:01:58	12:28:44
150725a	HALO	2015-07-25 05:54:08	11:09:06

OMO
OXIDATION MECHANISM OBSERVATIONS

MISSION INFO

- **Start:** 2015-07-21
- **Stop:** 2015-08-26
- **Region:**
  - Asia

DATA ORIGIN

Genesis of the data (see glossary).

INSTRUMENTS

1. Platform HALO
   - Instrument PeRCEAS
   - Instrument CPC
   - Instrument TRIHOP
   - Instrument HKMS
   - Instrument CI-ITMS
   - Instrument BAHAMAS
   - Instrument HALO-SR-A
   - Instrument SOFIA
   - Instrument AirLIF
   - Instrument FAIRO-CI
   - *Instrument not specified.*
   - Instrument AENEAS
   - Instrument mini-DOAS
   - Instrument FAIRO
   - Instrument MIRAH

MODELS

1. Model type GCM

FLIGHTS

Flights	Category	Start	Stop
150716a	HALO	2015-07-16 09:59:50	12:38:43
150721a	HALO	2015-07-21 09:01:58	12:28:44
150725a	HALO	2015-07-25 05:54:08	11:09:06
150728a	HALO	2015-07-28 06:12:09	13:59:09
150801a	HALO	2015-08-01 05:52:29	14:34:21
150806b	HALO	2015-08-06 07:48:02	12:56:57
150808a	HALO	2015-08-08 07:30:13	11:24:13
150809a	HALO	2015-08-09 01:52:14	06:32:19
150809b	HALO	2015-08-09 07:41:49	12:35:08
150810a	HALO	2015-08-10 04:50:37	09:34:34
150810b	HALO	2015-08-10 10:54:05	14:30:05

Table 1: Flights

Showing 1 to 18 of 18 rows

- Instrument AENEAS
- Instrument mini-DOAS
- Instrument FAIRO
- Instrument MIRAH

MODELS

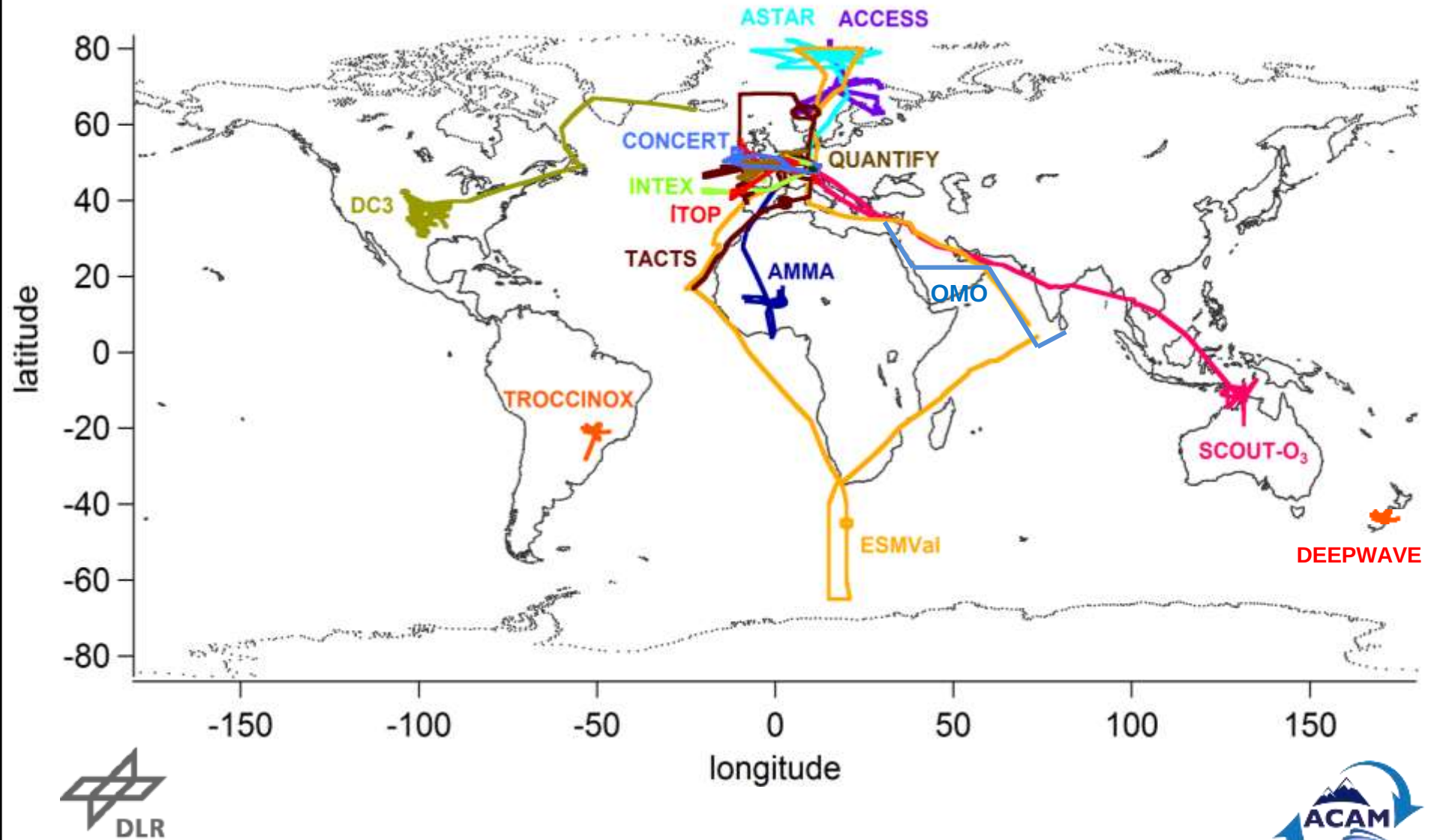
1. Model type GCM
   - Model EMAC

AVAILABLE DATASETS

Dataset	Category	Data source	Institute	Revision
#3674 | adlr_20150809a1_v01.nas	HALO	BAHAMAS	DLR	2016-02-25
#3675 | adlr_20150809b1_v02.nas	HALO	BAHAMAS	DLR	2016-02-25
#3676 | adlr_20150810a1_v02.nas	HALO	BAHAMAS	DLR	2016-02-25
#3677 | adlr_20150810b1_v02.nas	HALO	BAHAMAS	DLR	2016-02-25
#3678 | adlr_20150813a_v01.nas	HALO	BAHAMAS	DLR	2016-02-25

Data base: SO_2 aircraft measurements (2004 – 2015)

15 field campaigns (Falcon, HALO), ~ 800 measurement hours



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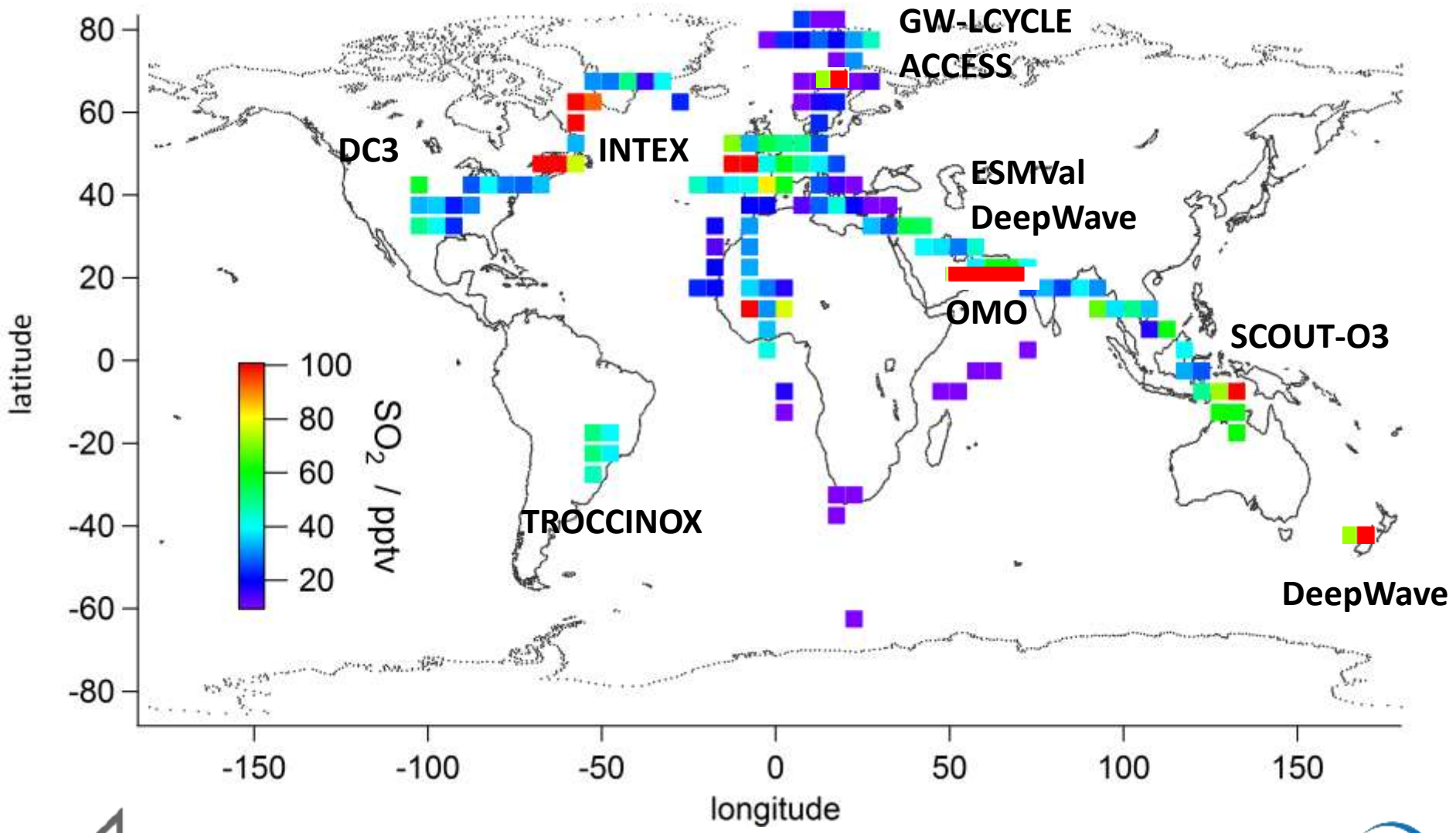
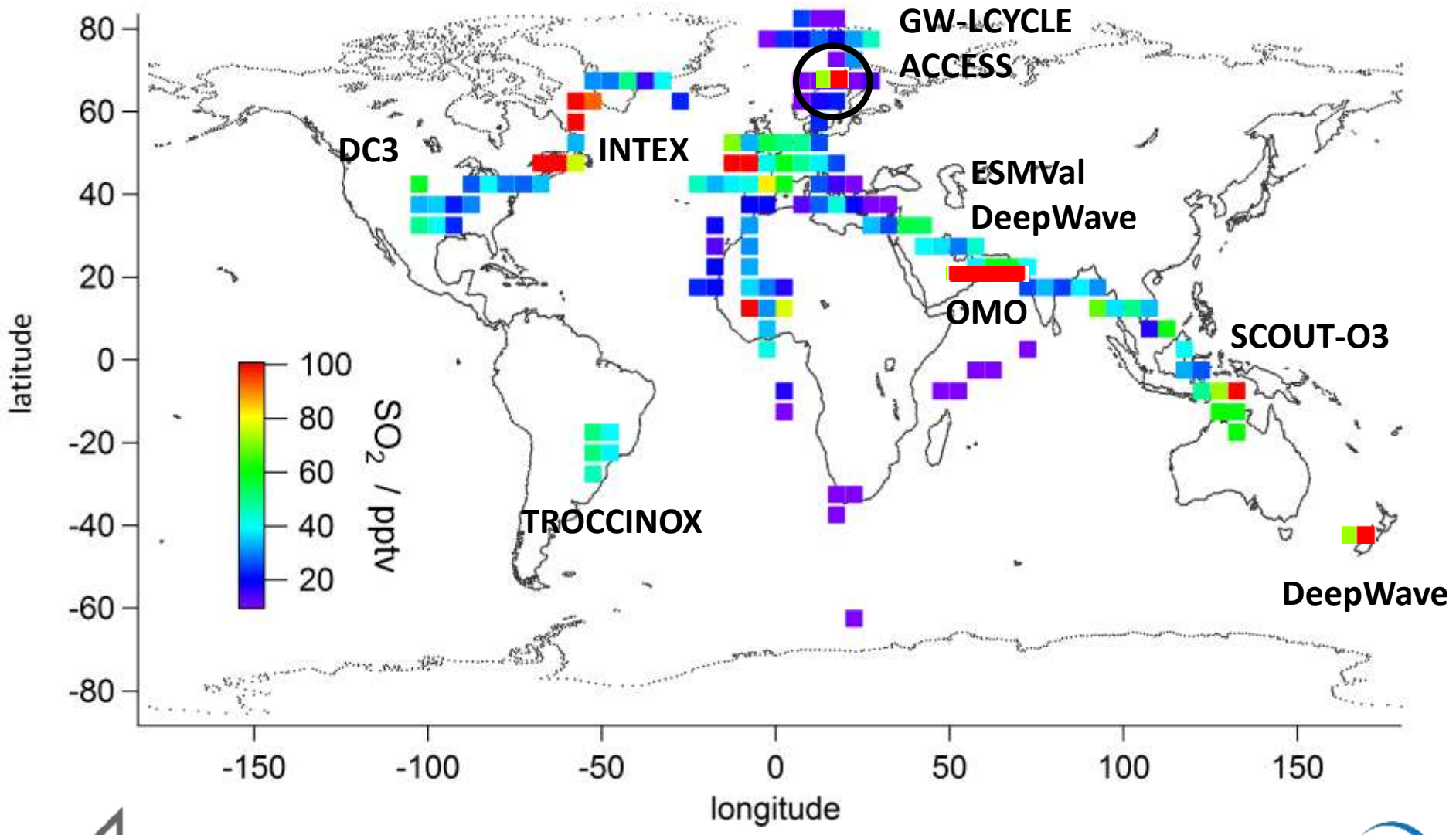
SO_2 Composites (8 – 15 km, 5°X 5°Bins)



DLR

ACAM

SO_2 Composites (8 – 15 km, 5°X 5°Bins)



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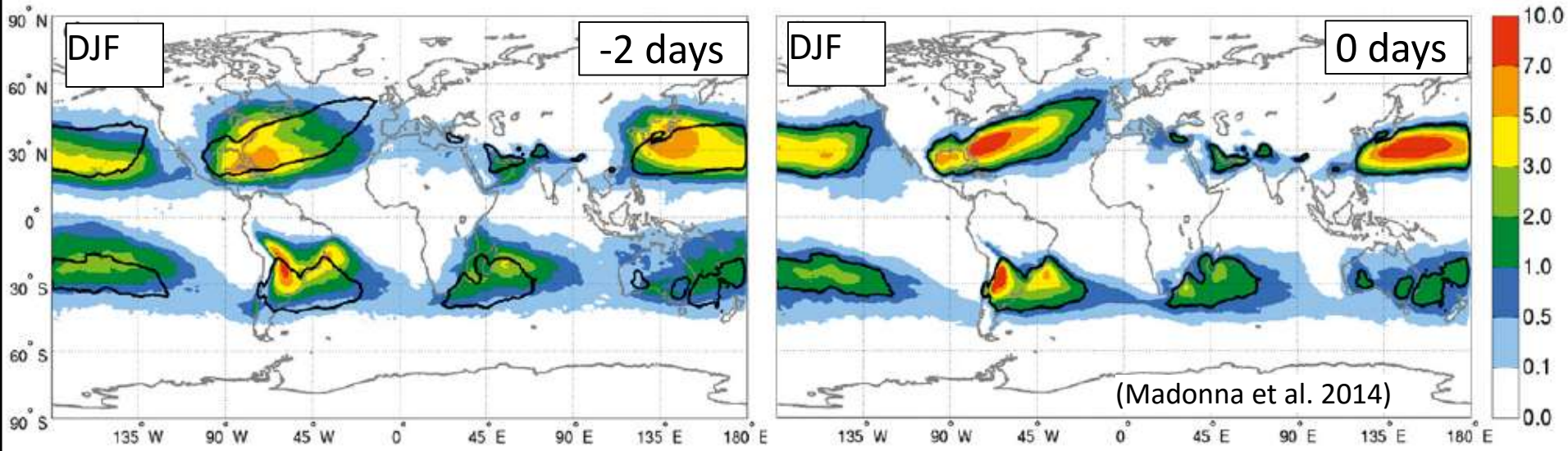
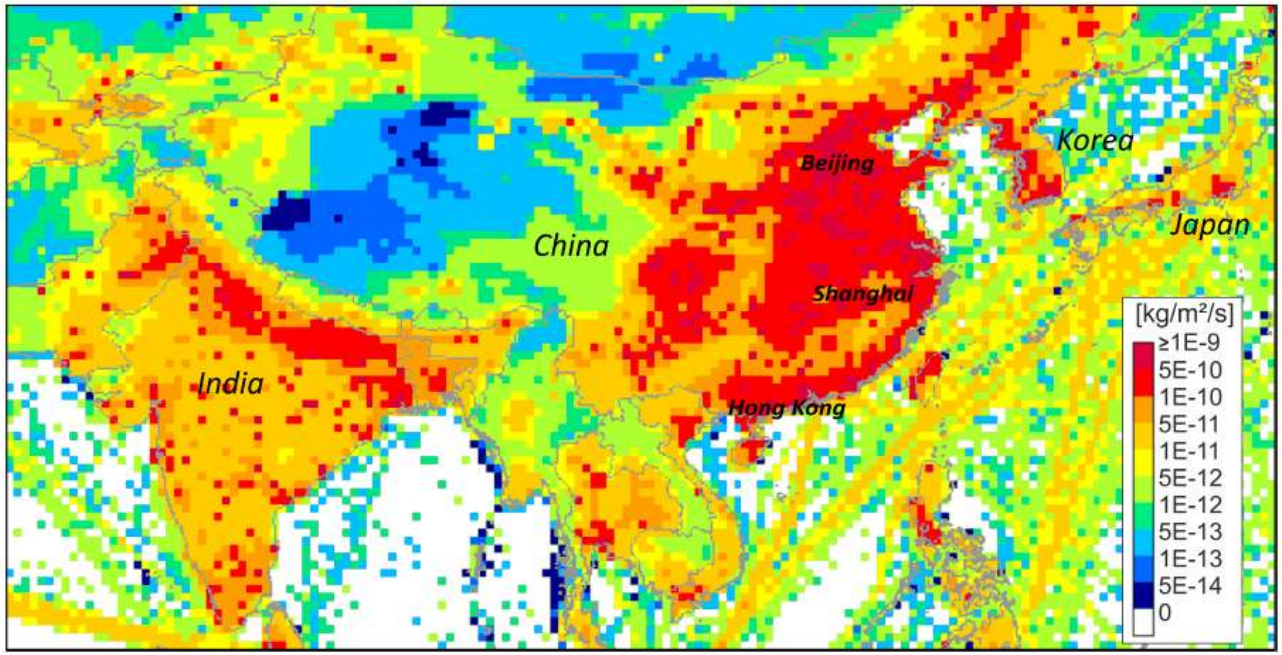
Relative frequencies (%) of WCB trajectories



MACCity anthropogenic SO_2 emissions (December 2013)



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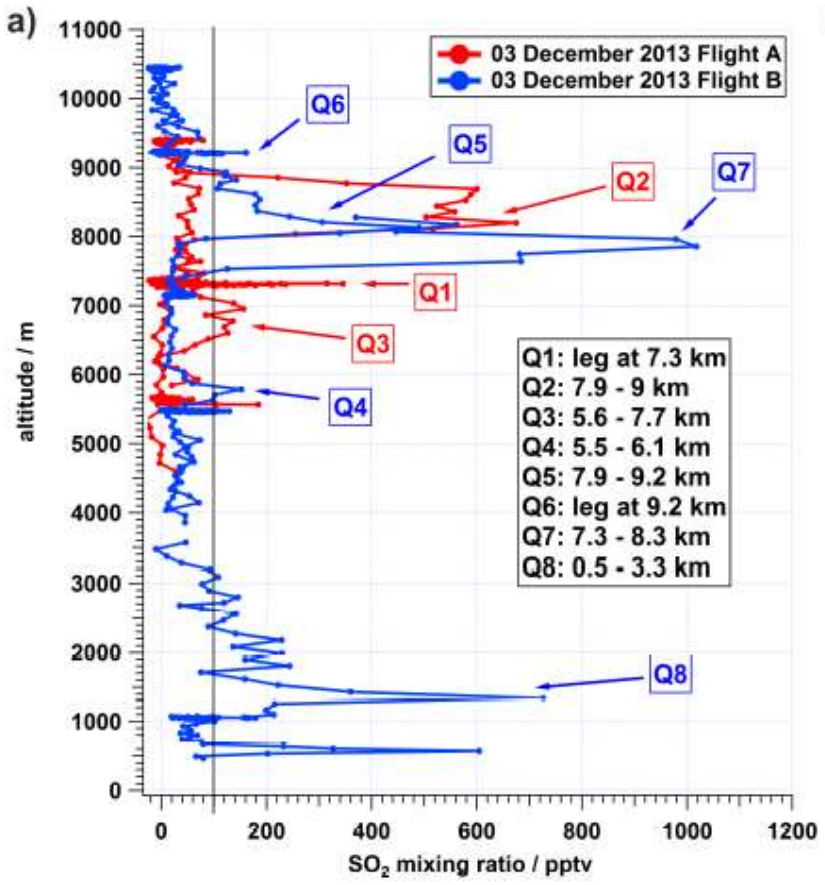
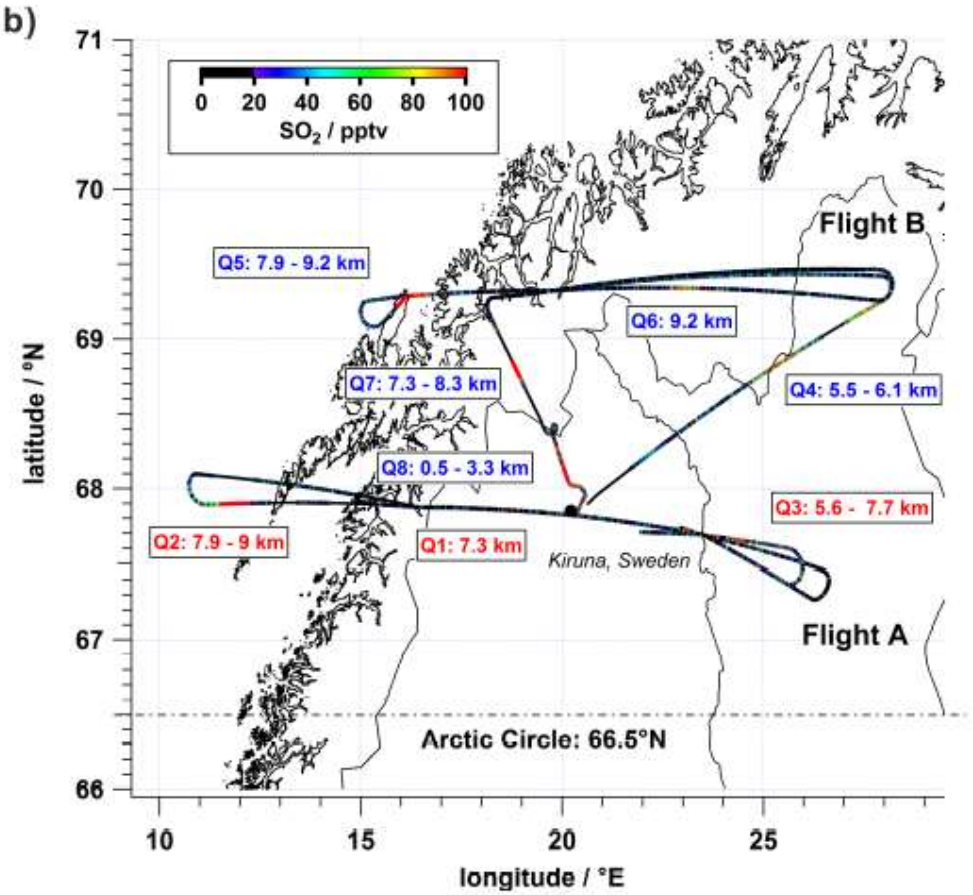
Sampling of East-Asien pollution in the Arctic UTLS on 03 Dec 2013





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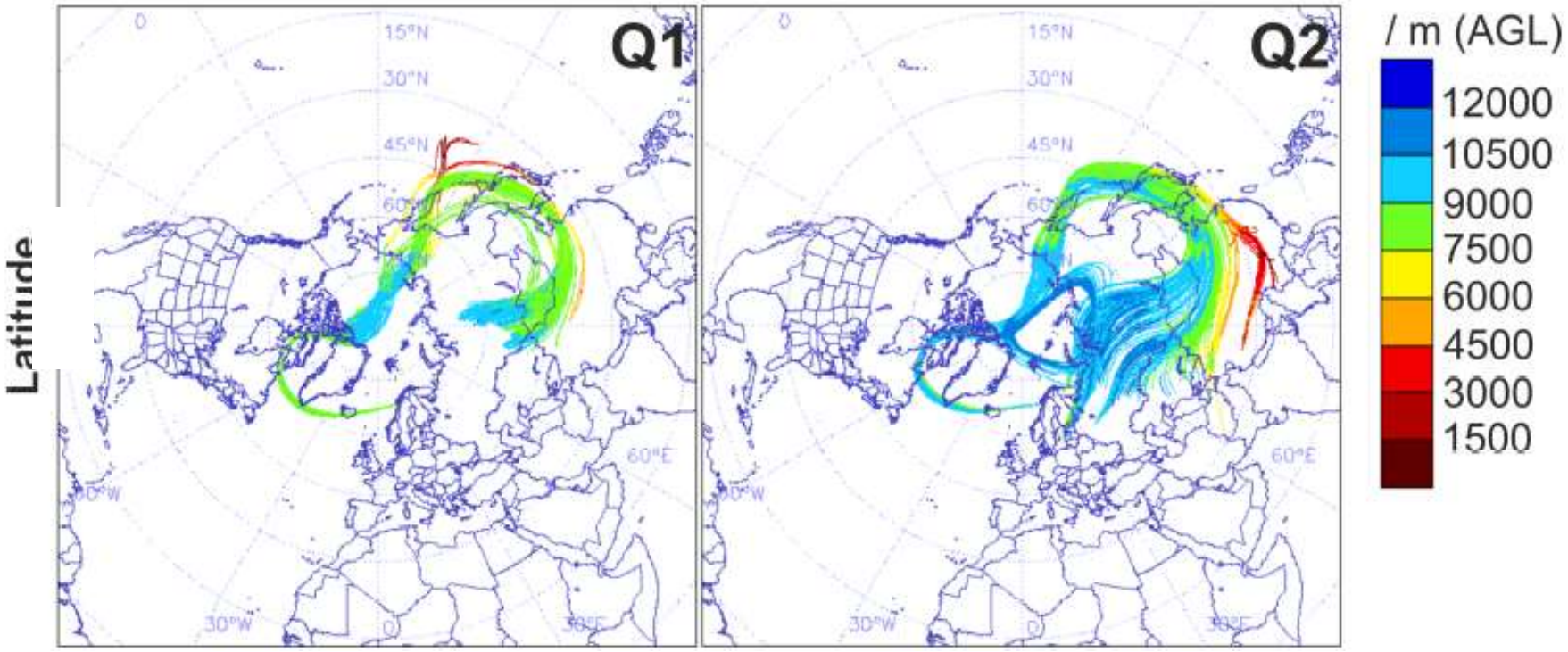
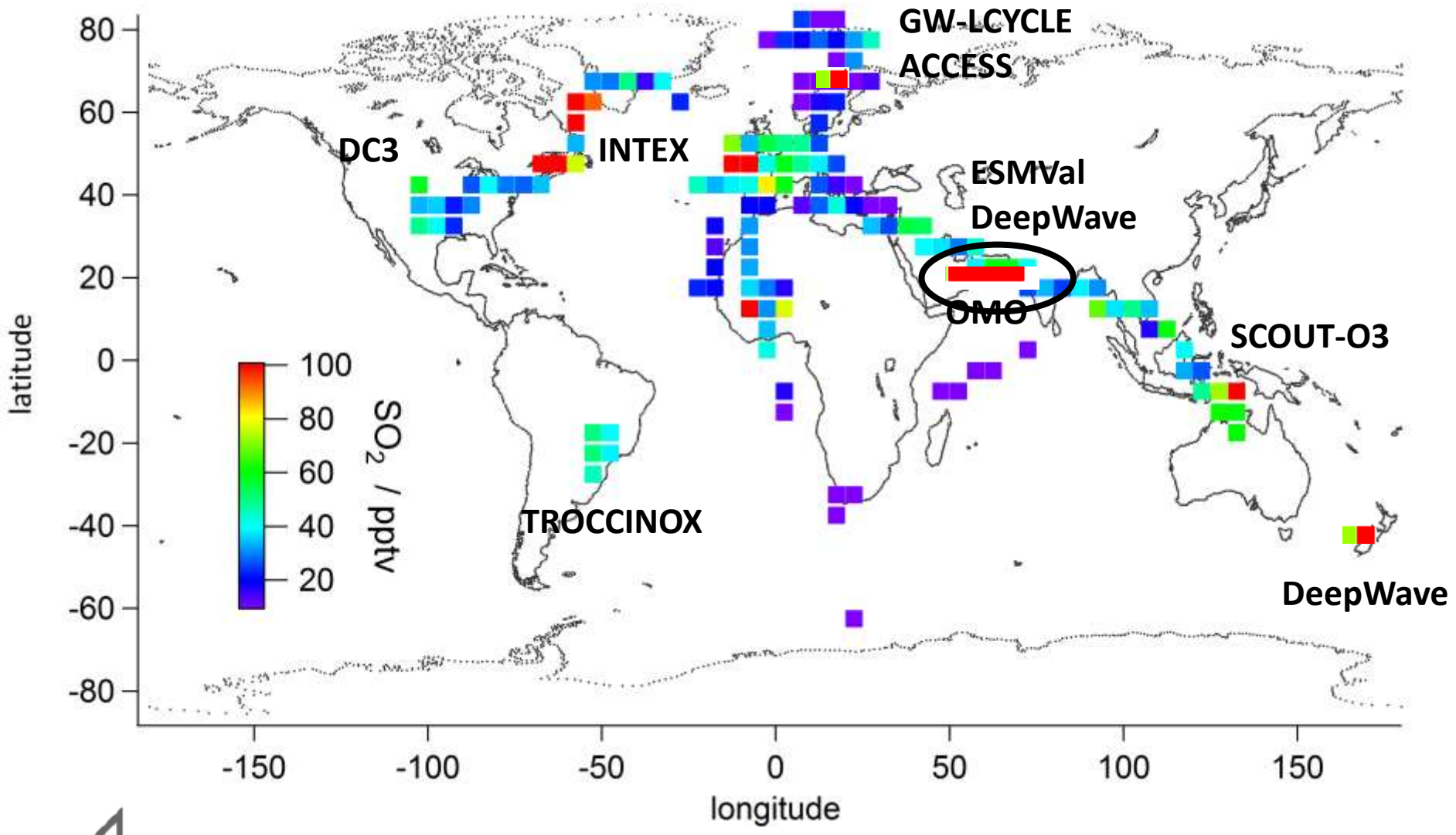
Backward trajectories from air masses with enhanced SO_2 in the Arctic UTLS



Source regions: Japan and China

SO_2 Composites (8 – 15 km, 5°X 5°Bins)



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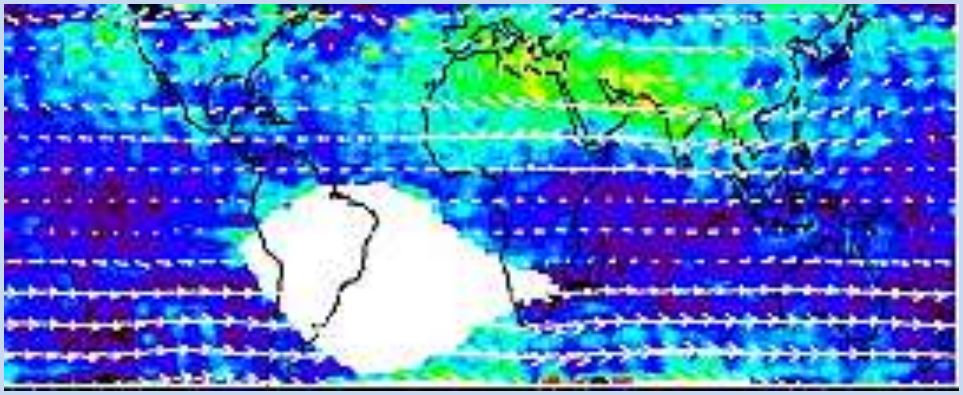
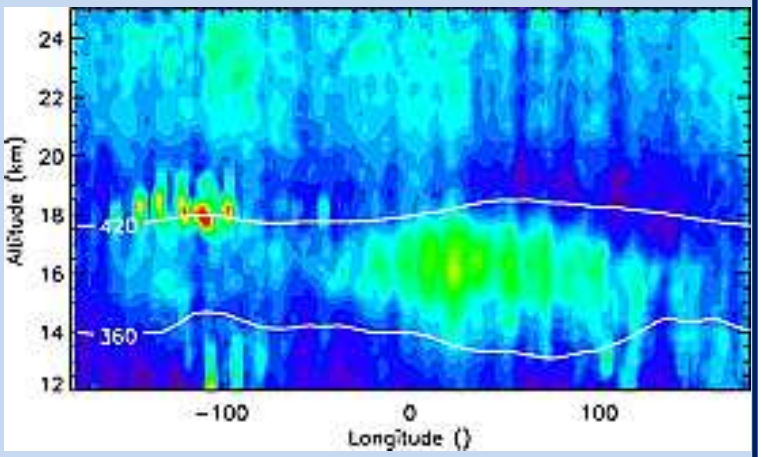
Asian Tropopause Aerosol Layer (ATAL)

Vertical transport of aerosol or aerosol precursors (likely of anthropogenic origin) in the AM anti-cyclone regularly lead to formation of an "*Asian Tropopause Aerosol Layer*" detected by CALIPSO and SAGE-II. ATAL may constitute a primary source of non-volcanic aerosol for global UT and LS.





Vernier et al., GRL, 2011

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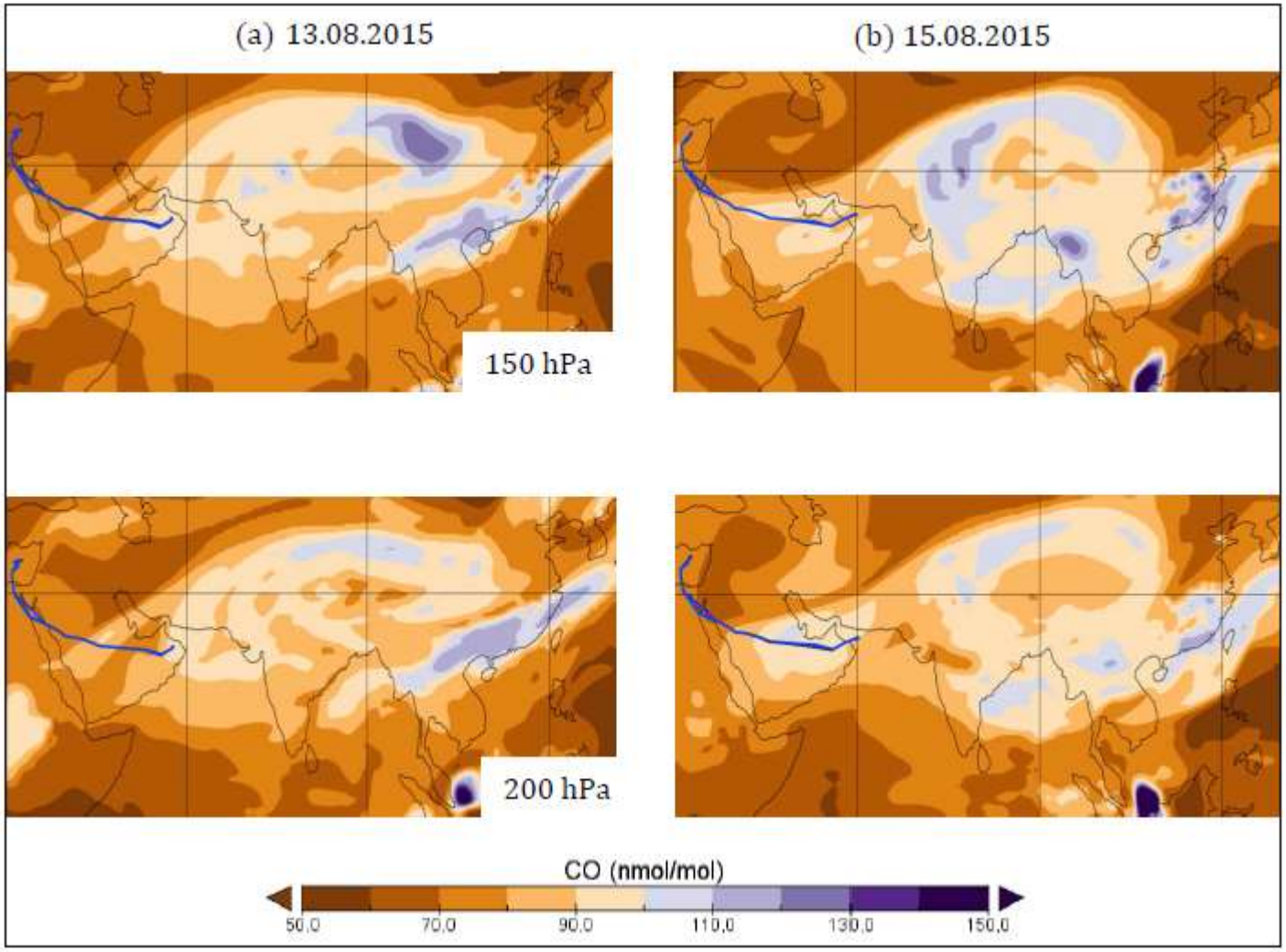
OMO flight routes



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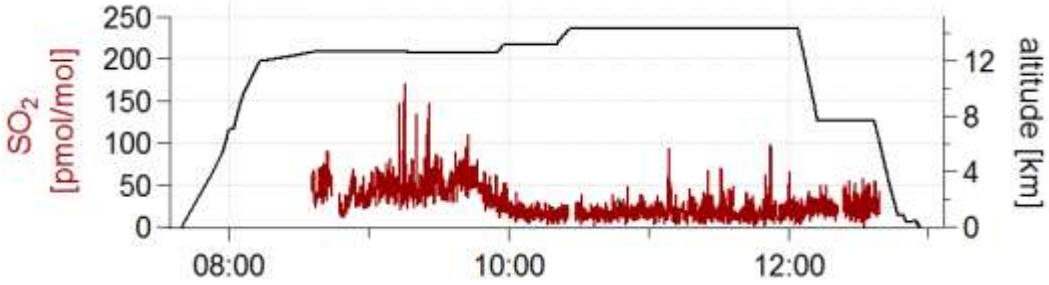
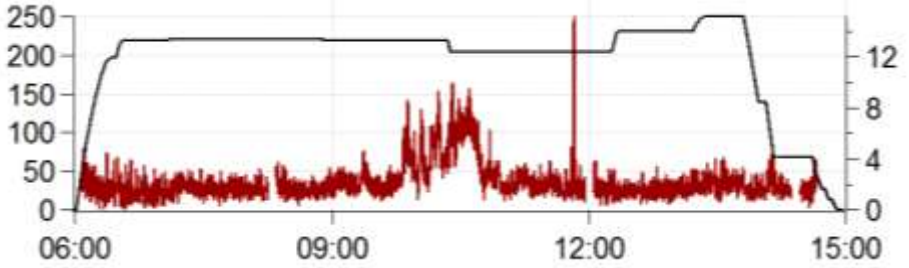
Measurements in the ASM Anticyclone during OMO in Aug. 2015

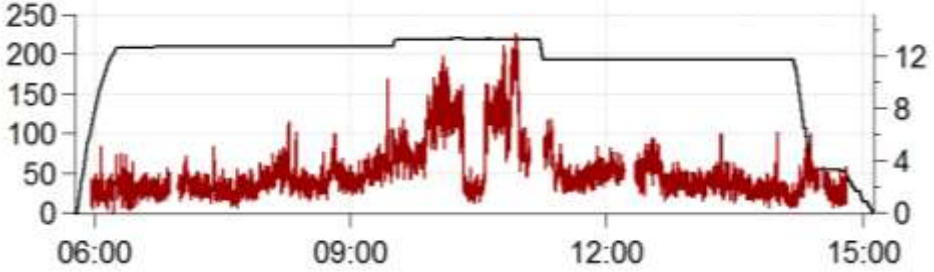
F 13: August 6th up to 100 ppt, 12.6 km



F 19: August 13th up to 164 ppt, 13.3 + 12.4 km



F 20: August 15th up to 226 ppt, 13.3 km



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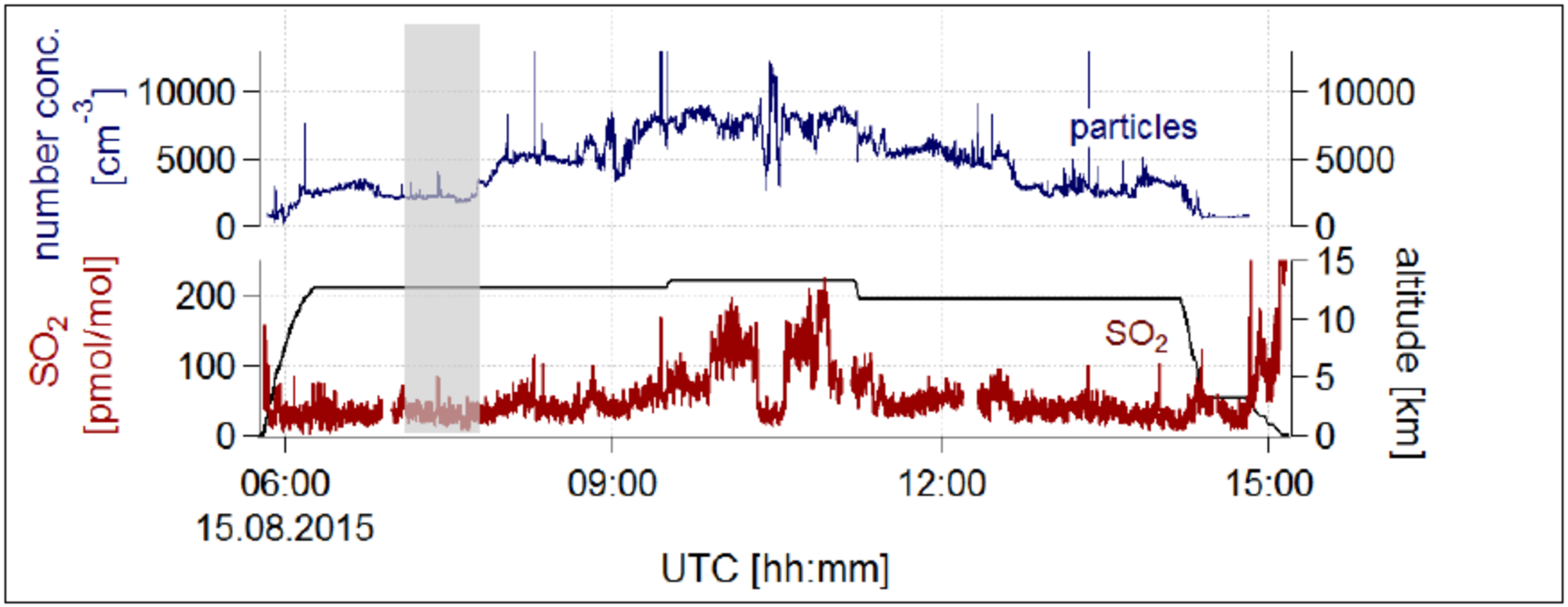
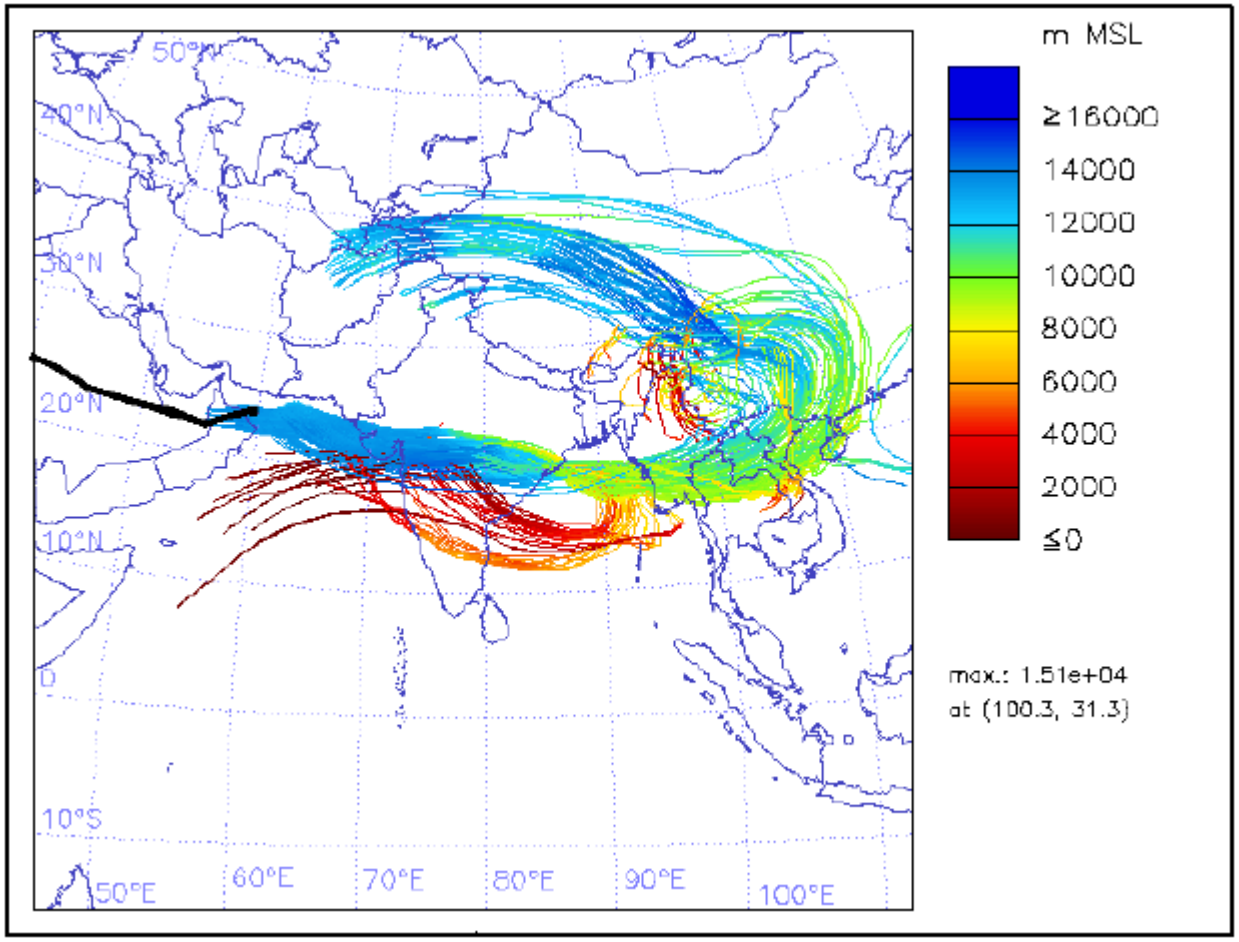
HALO measurements of SO_2, and Aitken particles in ASM anticyclone



Backward trajectories from air masses with enhanced SO_2 and CN



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Conclusions

- The HALO/Falcon data bank includes unique measurements related to ACAM
- SO_2 pollution transport into the UTLS by WCBs and AS monsoon from main SA & EA SO_2 source regions observed
- sulfate aerosol is formed in WCB plume and ASM anticyclone represents surface for heterogeneous reactios (e.g. N_2O_5 hydrolysis: NO_x -> HNO_3) and may affect UT cirrus