

Supplement

Table S1: List of datasets used from Obspack for surface stations

Site code	Dataset
ABT	abt_surface-insitu_6_allvalid
ALT	alt_surface-flask_1_representative
ALT	alt_surface-flask_426_representative
ALT	alt_surface-flask_2_representative
ALT	alt_surface-insitu_6_allvalid
ALT	alt_surface-flask_4_representative
AME	ame_surface-insitu_60_allhours
AMS	ams_surface-insitu_11_allvalid
AMS	ams_surface-flask_1_representative
AMT	amt_tower-insitu_1_allvalid-30magl
AMT	amt_surface-pfp_1_allvalid-107magl
AMT	amt_tower-insitu_1_allvalid-107magl
AMT	amt_tower-insitu_1_allvalid-12magl
AZV	azv_tower-insitu_20_allvalid-29magl
AZV	azv_tower-insitu_20_allvalid-50magl
BAO	bao_tower-insitu_1_allvalid-22magl
BAO	bao_tower-insitu_1_allvalid-100magl
BAO	bao_surface-pfp_1_allvalid-300magl
BAO	bao_tower-insitu_1_allvalid-300magl
BCK	bck_surface-insitu_6_allvalid
BRA	bra_surface-insitu_6_allvalid
BRM	brm_tower-insitu_49_allvalid-72magl
BRM	brm_tower-insitu_49_allvalid-12magl
BRM	brm_tower-insitu_49_allvalid-45magl
BRM	brm_tower-insitu_49_allvalid-212magl

BRM	brm_tower-insitu_49_allvalid-132magl
BRW	brw_surface-flask_1_representative
BRW	brw_surface-flask_4_representative
BRW	brw_surface-flask_426_representative
BRW	brw_surface-insitu_1_allvalid
BRZ	brz_tower-insitu_20_allvalid-20magl
BRZ	brz_tower-insitu_20_allvalid-80magl
BRZ	brz_tower-insitu_20_allvalid-5magl
BRZ	brz_tower-insitu_20_allvalid-40magl
BU	bu_surface-insitu_59_allhours
CBW	cbw_tower-insitu_445_allvalid-27magl
CBW	cbw_tower-insitu_445_allvalid-127magl
CBW	cbw_tower-insitu_445_allvalid-67magl
CBW	cbw_tower-insitu_445_allvalid-207magl
CBY	cby_surface-insitu_6_allvalid
CHL	chl_surface-insitu_6_allvalid
CIT	cit_surface-insitu_115_allhours-200magl
COP	cop_tower-insitu_59_allhours
CPS	cps_surface-insitu_6_allvalid
CPT	cpt_surface-insitu_36_marine
CPT	cpt_surface-flask_1_representative
CRV	crv_surface-pfp_1_allvalid-32magl
CRV	crv_tower-insitu_1_allvalid-5magl
CRV	crv_tower-insitu_1_allvalid-32magl
CRV	crv_tower-insitu_1_allvalid-17magl
DEC	dec_surface-insitu_431_allvalid
DEM	dem_tower-insitu_20_allvalid-45magl
DEM	dem_tower-insitu_20_allvalid-63magl
EGB	egb_surface-insitu_6_allvalid

ENA	ena_surface-insitu_64_allvalid-10magl
ESP	esp_surface-insitu_6_allvalid
ESP	esp_surface-flask_2_representative
ETL	etl_surface-insitu_6_allvalid
FNE	fne_surface-insitu_6_allvalid
FSD	fsd_surface-insitu_6_allvalid
GCI05	gci05_tower-insitu_60_allvalid
GIC	gic_surface-insitu_431_allvalid
GIF	gif_surface-insitu_11_allvalid
GOULD	gould_shipboard-insitu_1_allvalid
HDP	hdp_surface-insitu_3_nonlocal
HEI	hei_surface-insitu_22_allvalid
HNP	hnp_surface-insitu_6_allvalid
HUN	hun_tower-insitu_35_allvalid-115magl
HUN	hun_tower-insitu_35_allvalid-10magl
HUN	hun_tower-insitu_35_allvalid-48magl
HUN	hun_tower-insitu_35_allvalid-82magl
HUN	hun_surface-flask_1_representative
IGR	igr_tower-insitu_20_allvalid-47magl
IGR	igr_tower-insitu_20_allvalid-24magl
INU	inu_surface-insitu_6_allvalid
INX01	inx01_surface-insitu_60_allhours
INX02	inx02_surface-insitu_60_allhours
INX03	inx03_surface-insitu_60_allhours
INX04	inx04_surface-insitu_60_allhours
INX06	inx06_surface-insitu_60_allhours
INX07	inx07_surface-insitu_60_allhours
INX09	inx09_surface-insitu_60_allhours
INX10	inx10_surface-insitu_60_allhours

INX13	inx13_surface-insitu_60_allhours
JFJ	jfj_surface-insitu_5_allvalid
JFJ	jfj_surface-insitu_49_allvalid
KAS	kas_surface-insitu_53_allvalid
KCMP	kcmp_tower-insitu_102_allhours-200magl
KRS	krs_tower-insitu_20_allvalid-35magl
KRS	krs_tower-insitu_20_allvalid-67magl
KUM	kum_surface-flask_426_representative
KUM	kum_surface-flask_4_representative
KUM	kum_surface-flask_1_representative
LAN	lan_surface-insitu_33_allvalid
LEF	lef_surface-pfp_1_allvalid-244magl
LEF	lef_tower-insitu_1_allvalid-396magl
LEF	lef_surface-pfp_1_allvalid-396magl
LEF	lef_tower-insitu_1_allvalid-11magl
LEF	lef_tower-insitu_1_allvalid-122magl
LEF	lef_tower-insitu_1_allvalid-76magl
LEF	lef_tower-insitu_1_allvalid-244magl
LEF	lef_tower-insitu_1_allvalid-30magl
LFS	lfs_surface-insitu_33_allvalid
LLB	llb_surface-flask_1_representative
LLB	llb_surface-insitu_6_allvalid
MBO	mbo_surface-pfp_1_allvalid-11magl
MBO	mbo_surface-insitu_1_allvalid-11magl
MHD	mhd_surface-insitu_11_representative
MHD	mhd_surface-flask_1_representative
MLO	mlo_surface-insitu_1_allvalid
MLO	mlo_surface-flask_4_representative
MLO	mlo_surface-flask_426_representative

MLO	mlo_surface-flask_2_representative
MLO	mlo_surface-flask_1_representative
MNM	mmn_surface-insitu_19_representative
MRC	mrc_surface-pfp_1_allvalid-east
MRC	mrc_tower-insitu_60_allvalid-south
MRC	mrc_surface-pfp_1_allvalid-south
NOR	nor_tower-insitu_424_allvalid-100magl
NOR	nor_tower-insitu_424_allvalid-59magl
NOR	nor_tower-insitu_424_allvalid-32magl
NOY	noy_tower-insitu_20_allvalid-43magl
NOY	noy_tower-insitu_20_allvalid-21magl
NWR	nwr_surface-pfp_1_allvalid-3magl
NWR	nwr_surface-flask_1_representative
NWR	nwr_surface-insitu_3_nonlocal
OFR	ofr_surface-insitu_68_allhours
OLI	oli_surface-insitu_64_allvalid-10magl
OMP	omp_surface-insitu_68_allhours
OMT	omt_surface-insitu_68_allhours
ONG	ong_surface-insitu_68_allhours
OPE	ope_tower-insitu_11_allvalid-120magl
OSI	osi_tower-insitu_68_allhours-269magl
OSI	osi_tower-insitu_68_allhours-31magl
OWA	owa_surface-insitu_68_allhours
OYQ	oyq_surface-insitu_68_allhours
PAL	pal_surface-insitu_30_marine
PAL	pal_surface-flask_1_representative
PAL	pal_surface-insitu_30_continental
PAL	pal_surface-insitu_30_nonlocal
PDM	pdm_surface-flask_11_representative

PDM	pdm_surface-insitu_11_allvalid
POC	poc_shipboard-flask_1_representative
PRS	prs_surface-insitu_21_allvalid
PUY	puy_surface-insitu_11_allvalid
RGL	rgl_tower-insitu_160_allvalid-90magl
RGL	rgl_tower-insitu_160_allvalid-45magl
RYO	ryo_surface-insitu_19_representative
SCT	sct_tower-insitu_1_allvalid-61magl
SCT	sct_surface-pfp_1_allvalid-305magl
SCT	sct_tower-insitu_1_allvalid-31magl
SCT	sct_tower-insitu_1_allvalid-305magl
SGP	sgp_surface-flask_1_representative
SGP	sgp_surface-insitu_64_allvalid-60magl
SMO	smo_surface-insitu_1_allvalid
SMO	smo_surface-flask_1_representative
SMO	smo_surface-flask_426_representative
SMO	smo_surface-flask_4_representative
SMR	smr_tower-insitu_421_allvalid-67magl
SMR	smr_tower-insitu_421_allvalid-17magl
SMR	smr_tower-insitu_421_allvalid-125magl
SNP	snp_surface-insitu_1_allvalid-5magl
SNP	snp_surface-insitu_1_allvalid-10magl
SNP	snp_surface-insitu_1_allvalid-17magl
SPL	spl_surface-insitu_3_nonlocal
SPO	spo_surface-flask_426_representative
SPO	spo_surface-insitu_1_allvalid
SPO	spo_surface-flask_1_representative
SPO	spo_surface-flask_4_representative
SPO	spo_surface-flask_2_representative

SSL	ssl_surface-insitu_107_allvalid
STR	str_surface-pfp_1_allvalid-232magl
SYO	syo_surface-flask_1_representative
SYO	syo_surface-insitu_8_allvalid
TAC	tac_tower-insitu_160_allvalid-54magl
TAC	tac_surface-flask_1_representative
TAC	tac_tower-insitu_160_allvalid-100magl
TAC	tac_tower-insitu_160_allvalid-185magl
TIK	tik_surface-insitu_30_allvalid
TIK	tik_surface-flask_1_representative
TPD	tpd_surface-insitu_6_allvalid
TRN	trn_tower-insitu_11_allvalid-180magl
UTDBK	utdbk_tower-insitu_432_allvalid
UTMUR	utmur_tower-insitu_432_allvalid
UTRPK	utrpk_tower-insitu_432_allvalid
UTSUG	utsug_tower-insitu_432_allvalid
UTUOU	utuou_tower-insitu_432_allvalid
WAO	wao_surface-insitu_13_allvalid
WBI	wbi_tower-insitu_1_allvalid-99magl
WBI	wbi_tower-insitu_1_allvalid-379magl
WBI	wbi_tower-insitu_1_allvalid-31magl
WBI	wbi_surface-pfp_1_allvalid-379magl
WGC	wgc_surface-pfp_1_allvalid-91magl
WGC	wgc_tower-insitu_1_allvalid-91magl
WGC	wgc_tower-insitu_1_allvalid-30magl
WGC	wgc_surface-pfp_1_allvalid-483magl
WGC	wgc_tower-insitu_1_allvalid-483magl
WKT	wkt_tower-insitu_1_allvalid-457magl
WKT	wkt_tower-insitu_1_allvalid-62magl

WKT wkt_tower-insitu_1_allvalid-30magl
WKT wkt_tower-insitu_1_allvalid-9magl
WKT wkt_surface-pfp_1_allvalid-457magl
WKT wkt_tower-insitu_1_allvalid-122magl
WKT wkt_surface-pfp_1_allvalid-122magl
WKT wkt_tower-insitu_1_allvalid-244magl
WSA wsa_surface-insitu_6_allvalid
YAK yak_tower-insitu_20_allvalid-77magl
YAK yak_tower-insitu_20_allvalid-11magl
YON yon_surface-insitu_19_representative

Table S2: List of aircraft datasets used from Obspack and their respective aircraft campaign

Campaign code	Dataset
AAO	aao_aircraft-pfp_1_allvalid
ACG	acg_aircraft-insitu_1_allvalid
ACG	acg_aircraft-pfp_1_allvalid
ACT	act_aircraft-pfp_1_allvalid-c130
ACT	act_aircraft-pfp_1_allvalid-b200
ACT	act_aircraft-insitu_428_allvalid-b200
ACT	act_aircraft-insitu_428_allvalid-c130
AOA	aoa_aircraft-flask_19_allvalid
ARCPAC2008	arcpac2008_aircraft-insitu_114_allvalid
BRZ	brz_aircraft-insitu_20_allvalid
CALNEX2010	calnex2010_aircraft-insitu_114_allvalid
CAR	car_aircraft-pfp_1_allvalid
CMA	cma_aircraft-pfp_1_allvalid
COB	cob_aircraft-pfp_1_allvalid
COB	cob2004_aircraft-insitu_59_allvalid
COB	cob2003b_aircraft-insitu_59_allvalid
COB	cob_aircraft-flask_1_allvalid

COB	cob_aircraft-insitu_59_allvalid
CRV	above_aircraft-pfp_1_allvalid
CRV	crv_aircraft-pfp_1_allvalid
CRV	above_aircraft-insitu_1_allvalid
DND	dnd_aircraft-pfp_1_allvalid
ECO	eco_aircraft-insitu_1_allvalid
ESP	esp_aircraft-pfp_1_allvalid
ETL	etl_aircraft-pfp_1_allvalid
GSFC	gsfc_aircraft-insitu_430_allvalid
HIL	hil_aircraft-pfp_1_allvalid
HIP	hip_aircraft-insitu_59_allvalid
HUAC	start08_aircraft-insitu_59_allvalid
IAGOS	iagos-caribic_aircraft-insitu_457_allvalid
IAGOS	iagos-caribic_aircraft-flask_457_allvalid
LARC	trace-p_aircraft-insitu_428_allvalid-p3b
LARC	dc3_aircraft-insitu_428_allvalid-dc8
LARC	seac4rs_aircraft-insitu_428_allvalid-ER2
LARC	arctas_aircraft-insitu_428_allvalid-dc8
LARC	intex-b_aircraft-insitu_428_allvalid-dc8
LARC	discover-aq_aircraft-insitu_428_allvalid-p3b-ca
LARC	discover-aq_aircraft-insitu_428_allvalid-p3b-co
LARC	dc3_aircraft-insitu_428_allvalid-falcon
LARC	korus-aq_aircraft-insitu_428_allvalid-dc8
LARC	trace-p_aircraft-insitu_428_allvalid-dc8
LARC	discover-aq_aircraft-insitu_428_allvalid-c130-co
LARC	seac4rs_aircraft-insitu_428_allvalid-dc8
LARC	discover-aq_aircraft-insitu_428_allvalid-p3b-tx
LARC	intex-na_aircraft-insitu_428_allvalid-dc8
NHA	nha_aircraft-pfp_1_allvalid

ORC	orc_aircraft-insitu_3_allvalid-merge10
PFA	pfa_aircraft-pfp_1_allvalid
RTA	rta_aircraft-pfp_1_allvalid
SAN	san_aircraft-pfp_1_allvalid
SAN	san_aircraft-pfp_26_representative
SCA	sca_aircraft-pfp_1_allvalid
SGP	sgp_aircraft-pfp_1_allvalid
SONGNEX2015	songnex2015_aircraft-insitu_114_allvalid
TEXAQS2006	texaqs2006_aircraft-insitu_114_allvalid
TGC	tgc_aircraft-pfp_1_allvalid
THD	thd_aircraft-pfp_1_allvalid
TOM	tom_aircraft-insitu_1_allvalid