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	30 3 MRI-ESM2 asuca

	10km - -

a) 4D-VAR b)
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asuca

D4

	D3 D3 SKYNET AD-Net 2D/3D-Var LETKF D3 C3 AI
	MDA

	GitHub MRI.COMv5 SST (R3) R3 CPS3 CPS4 M1 JRA-3Q JRA-3Q

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	asuca

	asuca 10km CCN IN
	(JMA-NHM) (asuca)

LES Direct Numerical Simulation (DNS)

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MODIS

Tera/Aqua SGLI GCOM-C

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SMAP

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LES

	IN CCN CCN IN CCN, IN IN
	2km 125m NHM asuca LES 1km asuca

asuca

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	CCN CCN IN IN

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	8 9 (a) 0SSE (b) (a) (b) (c)

	(a) OCA (b) NOAA/NESDIS VOLCAT OCA 8/9 OVAA (c) 8/9 (d) (a) GNSS GNSS (b) GNSS c
	(a) Aeolus CYGNSS TROPICS FY4 OSSE (b) 4

(a) (b)

2 3 P M

T1

(a)

LETKF

asuca-Var

(b)

SAR

AI

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1DVar

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VOLCAT

VOLCAT

2

OCA 8 9

OVAA VOLCAT

OVAA VOLCAT

(c)

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	OSSE MRI-NAPEX MRI-NAPEX NAPEX NOAA/NESDIS VOLCAT (OCA) OCA 10/11

GNSS

OCA

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GNSS

OSSE

MRI-NAPEX

3 4 NAPEX

	1 30 SIP 2020-2022 2019 -2022 30 8 GNSS 2018-2020 GNSS 2020-2022 GNSS
	(a) Aeolus OSSE (b) 4 a NAPEX LETKF 4 b SAR c

	(　　) (a) OCA OCA (b) /GCOM-C VOLCAT (c) (d) 2　　3 (　　) (a)　GNSS (1)　GNSS (2)　GNSS (3) (4)　GNSS (b) (1) (2) (3) (4)　DIAL (c) (d)　3

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	(a) (b) (c) (a) (b) 1km

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	(RSMC) ” ” 31 2015 7

	WMO (ESCAP) (RSMC) (a) (b) (c) H31 (a), (b)
	(a) 8 (b) (c) 2022

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1km

(b)

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C-band

(d)

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	WMO/GAW

	d4PDF

	CMIP WCRP 6 CMIP6 CMIP6 CMIP5 ^{222}Rn pH
	JMA/MRI-CPS2 JRA-3Q d4PDF

A3

JRA-3Q

M4 M

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CMIP
CMIP6 2

3

^{222}Rn O_2/N_2 CO_2
$\delta^{13}C$ $\delta^{18}O$ H_2

CO_2 CH_4

^{222}Rn

CO_2 CH_4

CO_2 O_2

M5 C4

GSAM-TM CO_2

pH

137 165
CO_2

CMIP

CO_2

2020

WMO IPCC WCRP

JRA-3Q

100 150

CMIP6 CMIP

/ WMO/GAW

WDCGG

WMO/GAW-WCC

	IPCC CO_2 SOCAT GLODAP
	CPS2 CPS3 CMIP CMIP6 DAMIP CMIP

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	DAS
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	SAR GNSS

	SAR GNSS ambient noise

	B7 H28-32

	SAR GNSS

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	asuca

	asuca SST 2 RCP2.6 TIGGE(The International Grand Global Ensemble,) S2S(Subseasonal to Seasonal, 1) GFCS Global Framework for Climate Services 5 ( ) ( )

	High Impact Weather Project TIGGE　S2S IPCC AR6 WMO
	asuca

	2.1
	X MP MRI-XMP 2 2DVD XRAIN Draft 2000

	2.2
	MEPS MEPS MEPS
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	15 GPV asuca JRA-55 JMA-NHM
	15 GPV asuca JRA-55 JMA-NHM

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	BC Light Absorbing Particles; LAP 1980 LAP LAP
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	10 LAP NHM-Chem-SMAP MRI-ESM MRI-ESM SMAP 1900 2100 LAP
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Ishimoto et al., 2018 LAP

SMAP Niwano et al., 2014, 2015

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NHM-Chem MRI-ESM

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NHM-Chem-SMAP

SMAP NHM-Chem

LAP SMAP

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NHM-Chem LAP on/off

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2 LAP

LAP SMAP

NHM-Chem

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JRA-55 BC

	ESM-SMAP NHM-Chem MRI-ESM2 GSM MASINGAR the Model of Aerosol Species IN the Global AtmospheRe NHM-Chem-SMAP MRI-ESM SMAP LAP 1900 2100 NHM-Chem BC
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	BC OC LAP CALIPSO LAP LAP LAP LAP LAP 1 NHM-Chem-SMAP ESM-SMAP 1

	[ ]
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	Ge 90Sr 137Cs
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	1960 ^{90}Sr ^{137}Cs

	AI 1 2 AI 3
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	3 (1) AI 2010 AI AI (2) AI (3) AI
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	AI AI( )
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