

Status of operational AMV from GEO-KOMPSAT-2A(GK2A) at KMA

2021.04.12

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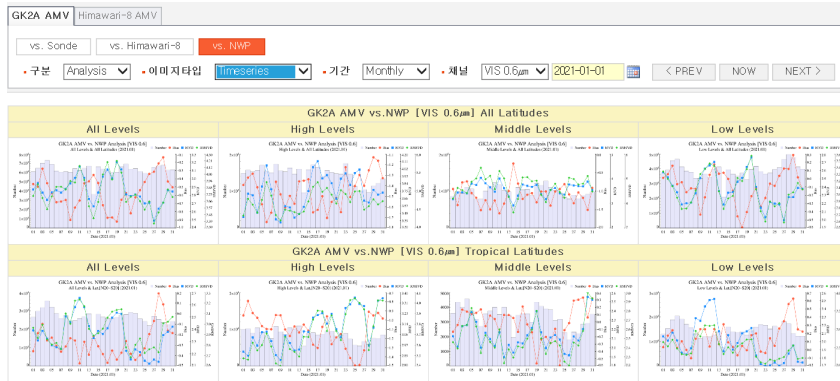
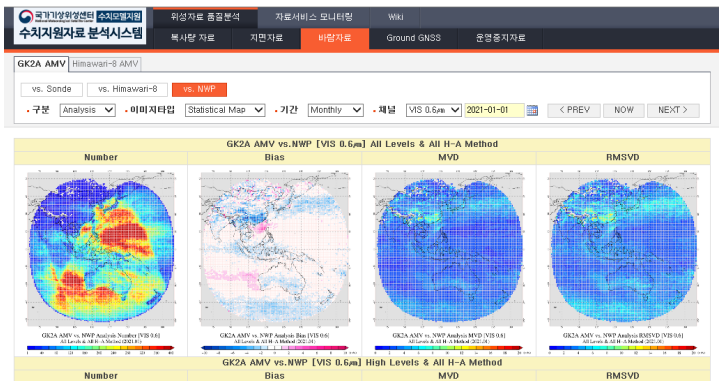


Korea Meteorological Administration (KMA)
National Meteorological Satellite Center (NMSC)

15th International Wind Workshops (12-16 April, 2021)

Status of data service

- GK2A AMV in operation since November 2019
- The end of the mission of COMS satellite at March 2020 → Now GK2A only!
- Generate GK2A AMV products in NetCDF4
- Serviced in BUFR format via GTS - working on the applying the new BUFR template (~ in May 2021)
- Operates managing system to monitor the quality of GK2A AMV (only for KMA internal users)



NWP Impact



Impacts of GK2A AMVs in KIM Global NWP Model

- Assimilation of GK2A AMV data into KIM global NWP model since October 2020
- **Model :**
KIM Global NWP Model (Operational)
- **DA Method :**
Hybrid-4D Ensemble VAR (H4DEV)
- **Used channels :** VIS, IR, WV
- **Temporal/Spatial resolution :**
30 min. / 32km(16x16)

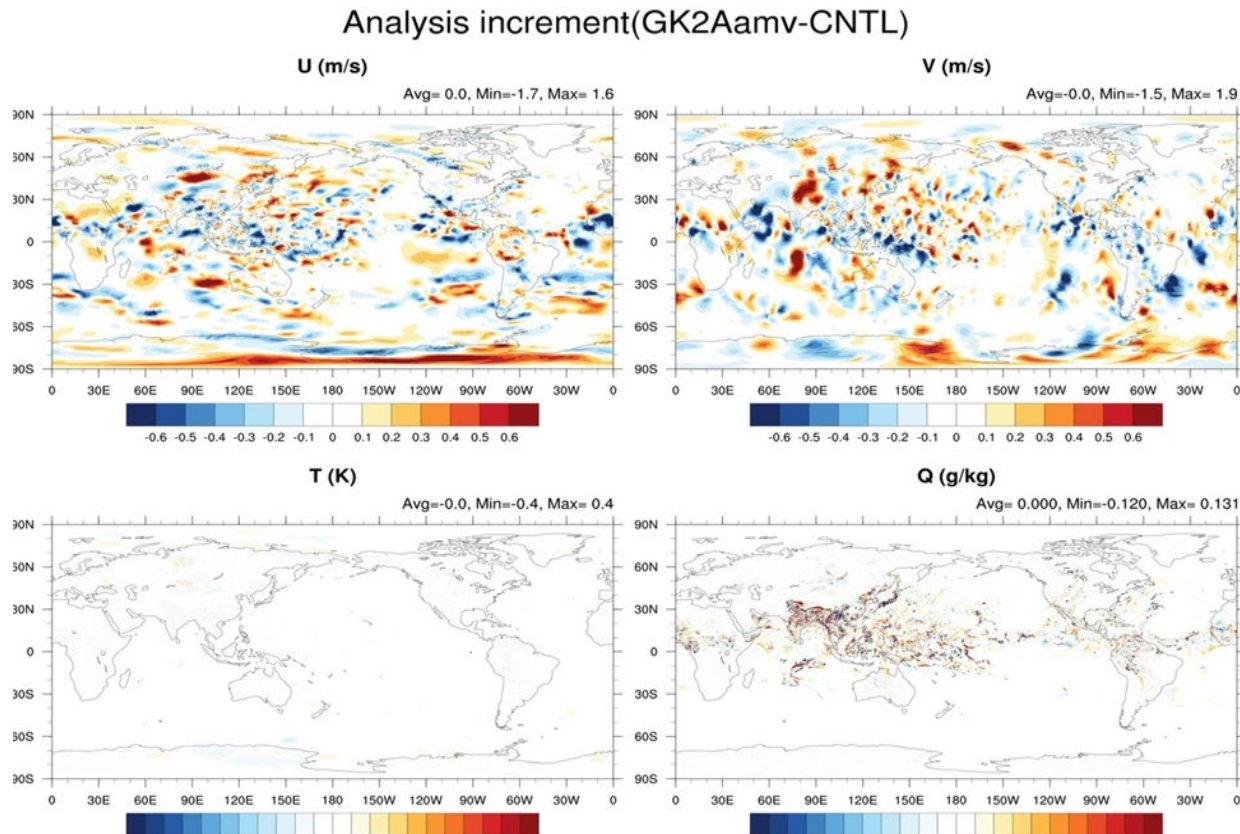


Figure 1. dafdafdsfda

Impacts of GK2A AMVs in KIM Global NWP Model

Difference of RMSE between control and analysis(initial) against IFS
[Control – Experiment]

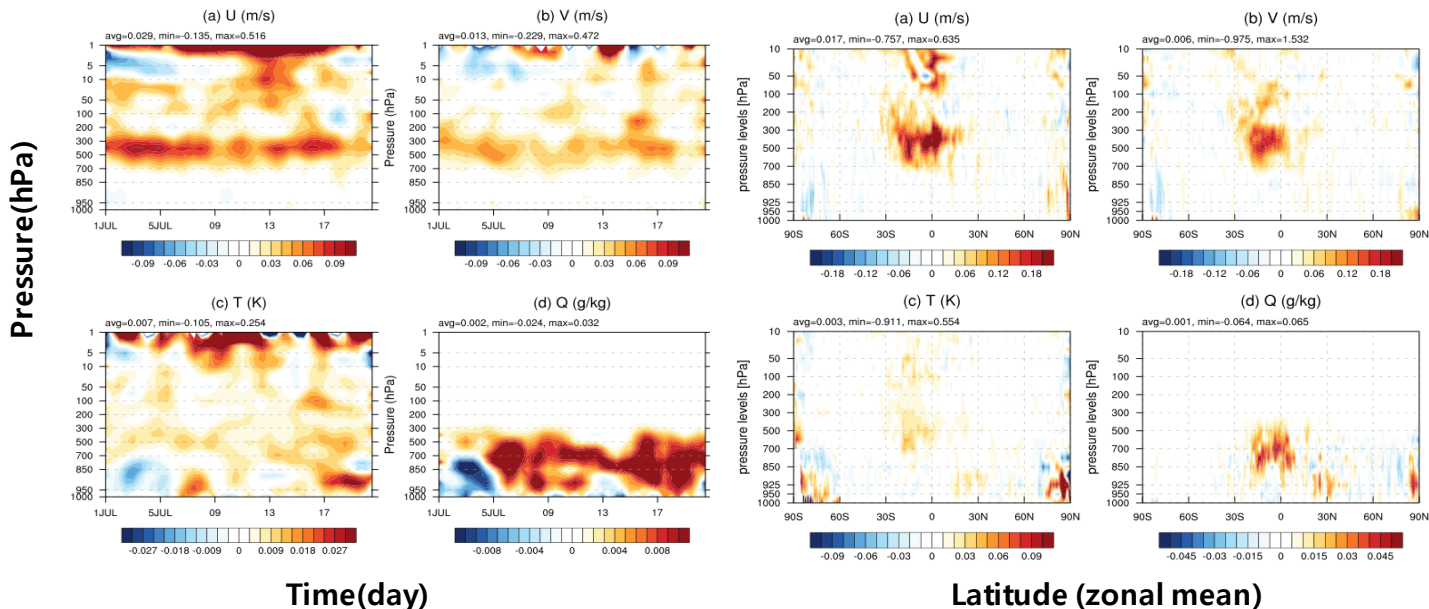


Figure 2. dafdafdsfda

Large positive Impacts for analysis and forecast over Northern hemisphere and Tropics

Impacts of GK2A AMVs in KIM Global NWP Model

Improved rate of RMSE between control and forecast(1~5day) against IFS [Control – Experiment]

Improved Rate of RMSE(00UTC)

	NH						SH						TR						ASIA					
fcst time (hr)	00	24	48	72	96	120	00	24	48	72	96	120	00	24	48	72	96	120	00	24	48	72	96	120
s700hPa	-0.07	0.14	0.73	0.24	1.3	0.76	0.18	0.4	1.38	0.97	0.22	0.32	1.99	1.78	1.16	1.25	0.35	-0.02	0.85	-0.5	0.56	0.33	1.56	0.79
w250hPa	0.49	0.21	0.7	0.51	0.68	-1.06	1.48	1.0	0.86	1.9	0.28	0.67	1.03	0.71	-0.59	1.28	0.99	0.49	0.94	0.94	1.54	-0.19	1.24	-1.7
w500hPa	-0.01	0.28	0.99	0.11	0.5	0.52	0.27	0.17	1.07	1.09	-0.05	-0.33	3.71	2.87	2.3	1.76	1.7	2.06	-0.09	-0.33	1.55	-0.6	-0.76	0.7
w850hPa	0.07	0.14	0.33	0.27	0.73	-0.07	-0.07	-0.16	0.61	1.15	0.02	-0.83	-0.33	-0.1	0.78	1.14	0.55	-0.12	-0.56	-1.08	0.33	0.5	1.17	1.2
z250hPa	3.23	1.46	2.46	1.84	1.74	-0.01	2.87	2.36	1.87	2.84	0.79	-0.93	3.33	2.65	1.69	1.18	-0.35	1.3	0.8	0.1	3.26	0.53	1.15	0.54
z500hPa	3.67	3.24	3.12	1.65	2.09	0.87	1.66	1.56	2.03	2.45	0.57	-2.36	5.37	3.74	2.94	0.64	0.55	0.97	-0.09	0.11	2.99	1.83	1.86	2.21
z850hPa	4.69	1.79	1.06	0.91	1.34	0.93	1.68	0.86	2.04	2.17	0.88	-2.7	2.85	0.33	1.29	1.38	-0.25	1.14	2.44	-0.43	1.15	4.66	3.85	3.01
t250hPa	-0.05	0.74	0.87	1.12	0.14	0.13	1.04	0.73	1.24	2.1	0.76	-0.26	1.24	0.47	0.77	0.66	0.74	-0.05	-1.16	1.01	1.45	1.23	0.51	0.54
t500hPa	0.29	0.45	0.63	0.8	0.86	-0.29	0.78	0.56	0.62	1.39	0.45	1.24	3.09	1.5	1.57	0.57	-0.06	0.12	0.09	0.18	-0.09	-0.23	-0.2	-0.15
t850hPa	-0.02	0.57	0.46	0.91	0.83	1.22	-0.41	-0.71	-0.2	0.23	0.39	-0.42	0.54	-0.05	0.28	0.54	1.02	-0.7	0.39	0.93	-0.03	2.52	3.69	2.11

Improved Rate of RMSE (12UTC)

	NH						SH						TR						ASIA					
fcst time (hr)	00	24	48	72	96	120	00	24	48	72	96	120	00	24	48	72	96	120	00	24	48	72	96	120
s700hPa	-0.34	0.06	0.82	1.14	1.43	1.49	0.28	0.39	0.44	0.88	0.84	0.34	2.06	1.85	1.12	0.99	0.86	1.0	0.15	-0.6	0.01	0.04	1.51	0.1
w250hPa	0.01	0.13	1.01	1.14	1.19	1.77	0.38	0.61	0.65	2.31	0.74	0.76	0.68	0.91	0.71	1.16	1.29	1.52	0.15	-0.14	1.33	0.38	-2.96	-0.03
w500hPa	0.19	0.45	0.77	0.42	0.88	2.49	-0.18	0.4	0.12	0.52	0.09	-0.43	4.29	2.94	2.64	3.08	1.88	1.22	0.14	0.22	1.17	1.07	-2.06	1.3
w850hPa	0.26	0.17	0.45	0.99	0.86	2.75	-0.02	-0.41	-0.57	0.69	1.44	-0.02	-0.39	0.43	0.81	0.95	0.53	-0.66	0.09	-0.52	0.54	0.84	-1.37	2.92
z250hPa	4.15	1.23	3.12	2.64	3.45	4.31	1.45	1.04	0.35	2.06	0.75	0.11	6.01	2.64	3.31	2.06	1.2	1.76	2.01	-1.42	3.27	1.62	-2.57	-0.39
z500hPa	2.74	2.29	3.18	2.65	2.58	3.76	1.1	0.59	0.26	1.64	-0.21	-0.77	4.76	3.16	3.19	1.51	1.83	3.24	0.91	0.29	2.26	3.19	-2.85	-1.35
z850hPa	2.93	2.31	1.73	0.41	1.28	3.19	1.08	0.04	-0.5	1.25	1.27	0.97	4.32	1.49	1.07	0.36	0.36	2.53	2.65	1.91	0.59	0.09	-4.46	-6.38
t250hPa	0.25	0.46	1.14	1.19	0.02	2.05	0.19	0.58	-0.11	1.51	2.07	1.63	1.23	0.18	0.5	0.95	-0.05	0.48	-0.37	1.4	2.51	1.13	-1.88	0.28
t500hPa	0.76	0.58	0.77	1.42	1.63	2.8	0.84	0.23	-0.24	0.53	0.83	-0.15	3.05	1.62	1.21	1.57	0.58	0.44	-0.01	-0.08	0.9	1.4	-3.28	1.56
t850hPa	0.46	0.26	0.52	0.73	0.47	0.75	-0.44	-0.58	-0.89	0.06	1.06	0.79	0.26	0.18	0.64	0.74	1.27	1.33	0.5	-0.7	-0.05	2.4	1.73	0.09

Figure 3. dafdafafdsfda

Green : Improvement
Red : Degradation

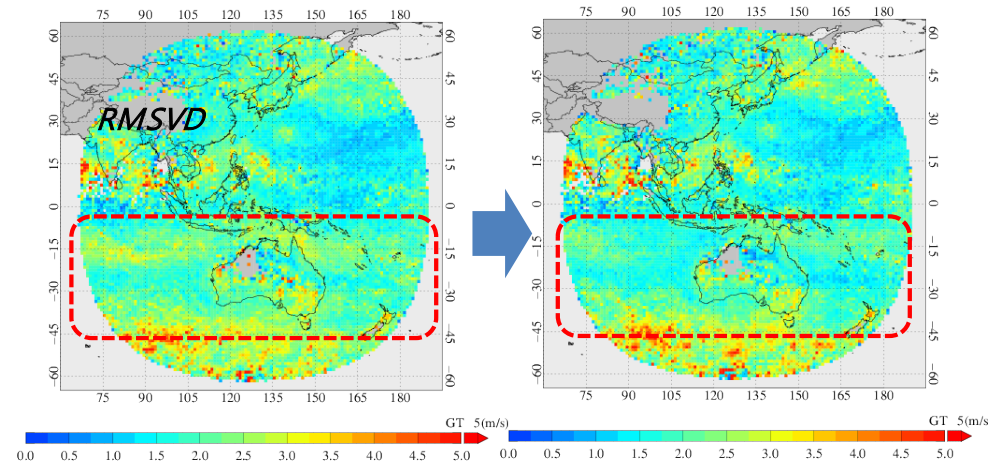
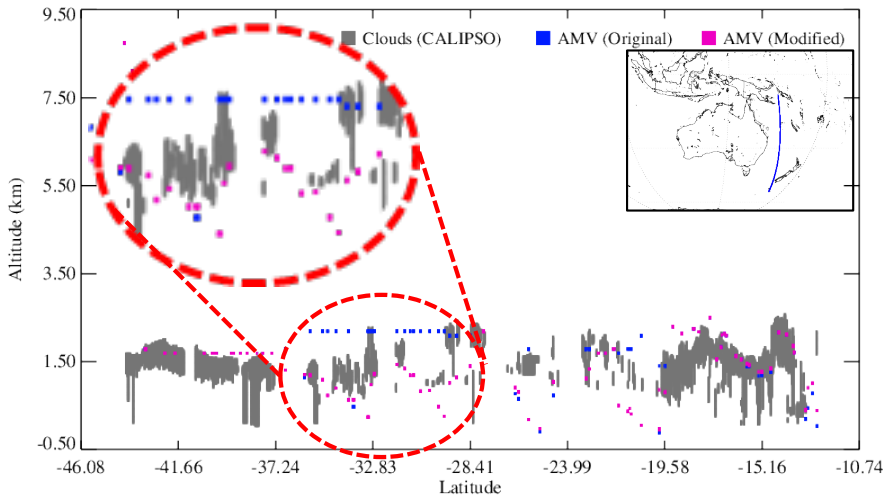
Large positive Impacts for analysis and forecast over Northern hemisphere and Tropics

Updates of AMV algorithm



Low level AMV

- Cloud base correction X
- Inversion layer correction
- Results 1 : validate with CALIPSO
- Results 2 : validate with NWP



Multi-cloud flag

- Slow speed bias of AMV because of multi-layer clouds
- Add multi layer flags – delete bad quality data
- (Method) local mean and std of brightness temperatures of infrared channel in target scenes

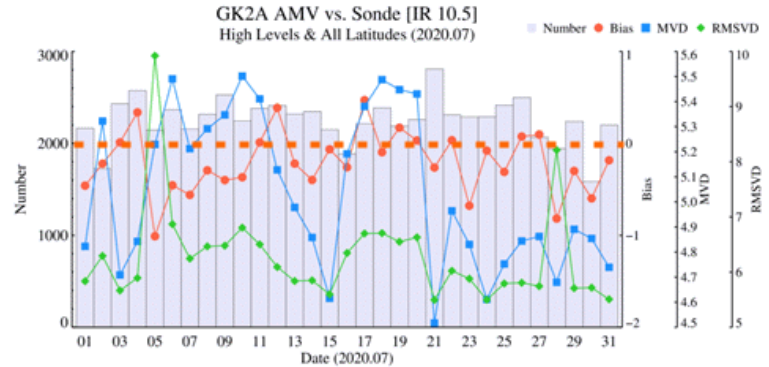


Figure 6. dafdafafdsfda

- (Result 1) slow speed bias improvements
- (Result 2) Is it really effective in distinguish bad quality vectors?
 - (Cause 1) validation results with radiosonde
 - (Cause 2)

Table 1. dafdafafdsfda

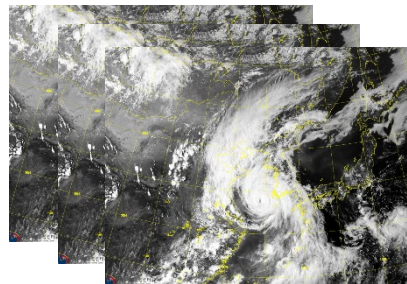
Channel	Statistics	Radiosonde		NWP (UM)	
		All	QC_Flag	All	QC_Flag
SWIR (3.8 um)	Bias	-0.38	0: -0.20 1: -0.67	-0.47	0: -0.39 1: -0.71
	RMSVD	6.44	0: 6.48 1: 6.37	3.41	0: 3.30 1: 3.71
IR (10.5 um)	Bias	0.04	0: 0.20 1: -0.16	-0.21	0: -0.16 1: -0.32
	RMSVD	6.28	0: 6.30 1: 6.25	3.34	0: 3.24 1: 3.58

Development of High Resolution AMV algorithm



Method

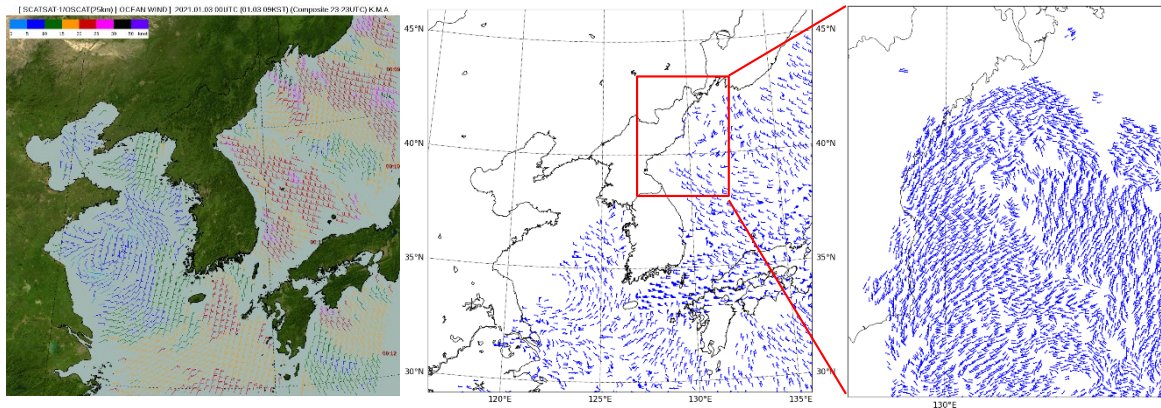
- Input data : VIS (0.5 km) images with 2 minutes interval (ELA area)
- Tracking method : Optical flow
(using OpenCV library in Python, Farneback algorithm)



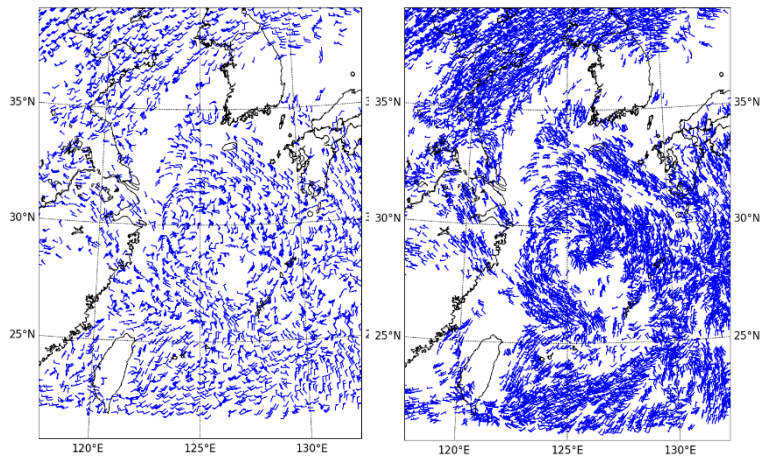
ELA area
Every **2 min.**
3800 * 2400 km

Case study

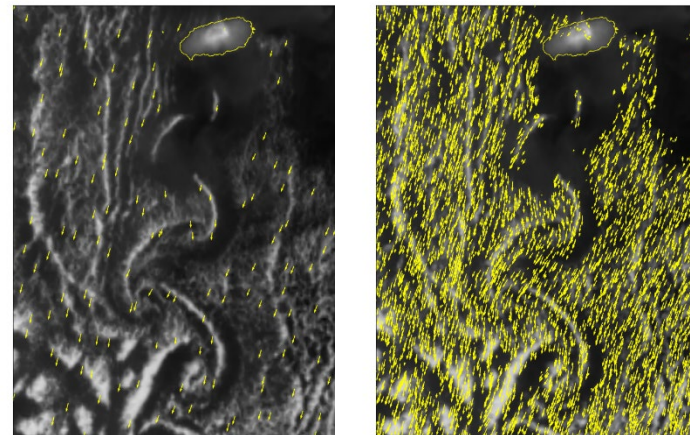
Local circulation



Center of typhoon



Karman vortex

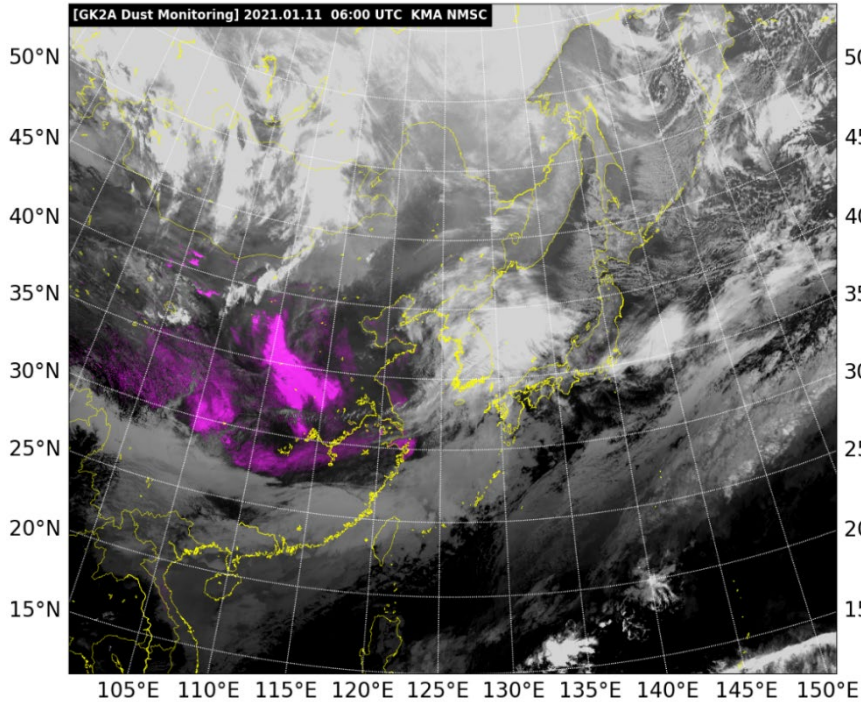


Plans

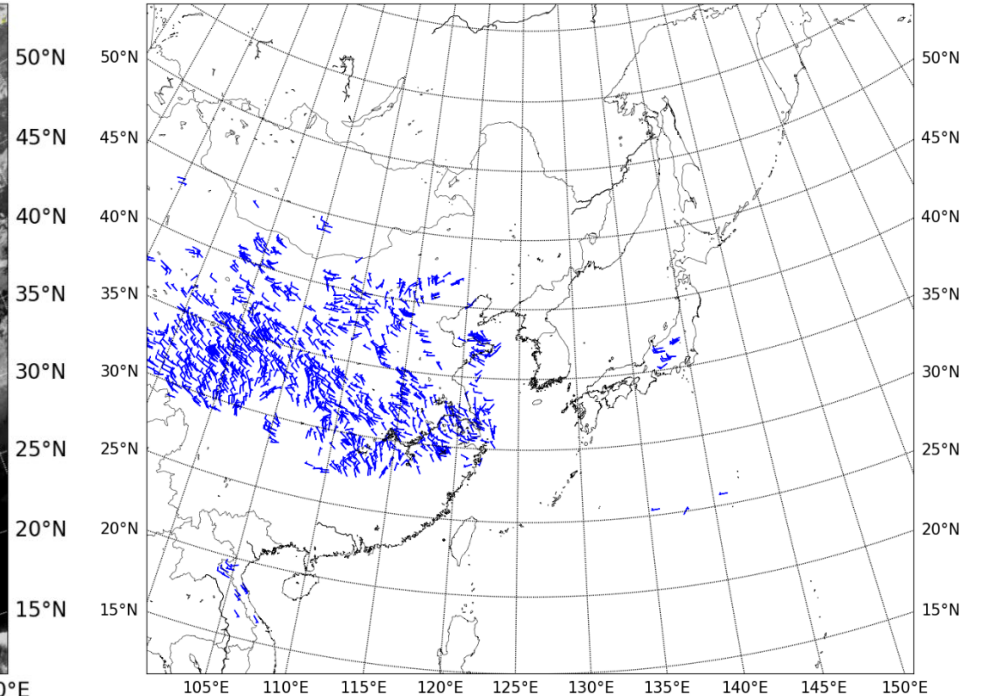


Application of optical flow

DEBRA



Dust vector



Thank you



Korea Meteorological Administration (KMA)
National Meteorological Satellite Center (NMSC)

