

## Characteristics of the maritime periods during Gosan 2006 and Gosan 2008

The time periods when the HYSPLIT (Draxler et al., 2002) back trajectories for 500, 1000 and 1500 m experienced apparently no contact with land surface for five days were classified as maritime.

Such periods were found only during Gosan 2006 and Gosan 2008: for Gosan 2006, 15:00, Aug. 21 - 03:00, Aug. 22 (Maritime 1) and 21:00, Aug. 26 - 09:00, Aug. 27 (Maritime 2); for Gosan 2008, 15:00, Aug. 10 - 12:00, Aug. 11 (Maritime 3), 21:00, Aug. 12 - 06:00, Aug. 14 (Maritime 4) and 21:00, Sep. 14 - 03:00, Sep. 15 (Maritime 5). Typical back trajectories are shown in Fig. S1.

The  $N_{CCN}/N_{CN}$ ,  $\kappa$  (GF) and  $\kappa$  ( $S_c$ ) averages for each maritime period are compared with the campaign averages in Table S1 and Table S2. During such periods,  $N_{CN}$  and  $N_{CCN}$  are commonly lower than the half of the campaign average values.

Even among the maritime air masses, there was clear difference between the trajectories that came from the South China Sea or the Philippine Sea (Maritime 1, 3 and 4) and from the North Pacific Ocean that lies southeast of Japan (Maritime 2 and 5). The  $N_{CN}$  and  $N_{CCN}$  were much higher for the former, implying that the former air mass is still influenced by emissions from southern Asia even after five days.

$\kappa$  (GF) was mostly larger than the campaign averages except for 50 nm during Maritime 1.  $\kappa$  ( $S_c$ ) was mostly larger than the campaign averages except for 50 nm during Maritime 3 and 5. However,  $N_{CCN}/N_{CN}$  during the maritime periods is not notably different from the campaign average. This may be related to the fact that  $N_{CCN}/N_{CN}$  ratio depends also on the sizes of aerosol population, which differs for each maritime period as different  $D_g$  values in the table indicate.

### Reference

Draxler, R.R., and G.D. Hess: An overview of the HYSPLIT\_4 modeling system of trajectories, dispersion, and deposition. *Aust. Meteor. Mag.*, 47, 295-308, 1998.

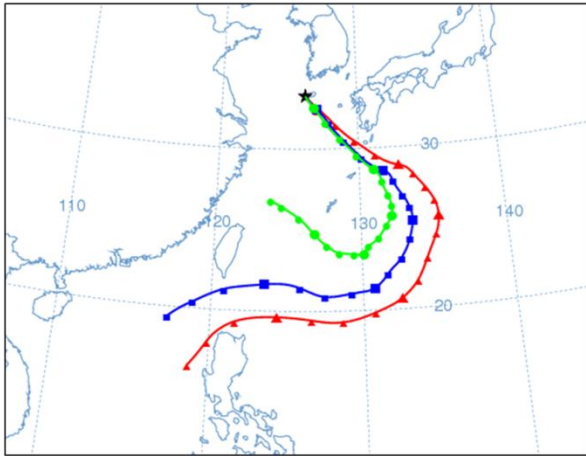
Table S1. Average and standard deviation of  $N_{CN}$ ,  $N_{CCN}$ ,  $N_{CCN} / N_{CN}$ ,  $D_g$ ,  $\kappa$  (GF) for maritime periods 1 and 2 in comparison to campaign average and standard deviation during Gosan 2006.

Gosan 2006	Maritime 1	Maritime 2	Campaign avg.
$N_{CN}$	2096±994	1473±1225	4697±1823
$N_{CCN}$ (0.2%)	806±201	607±203	1550±659
$N_{CCN}$ (0.6%)	1112±316	887±333	2803±1545
$N_{CCN}$ (1.0%)	1223±363	1033±520	3290±1964
$N_{CCN}/N_{CN}$ (0.2%)	0.46±0.14	0.41±0.08	0.40±0.06
$N_{CCN}/N_{CN}$ (0.6%)	0.62±0.16	0.61±0.11	0.67±0.12
$N_{CCN}/N_{CN}$ (1.0%)	0.67±0.16	0.71±0.1	0.77±0.16
$D_g$	74±15	N/A	98±25
$\kappa$ (GF, 50nm)	0.25±0.01	0.53±0.06	0.34±0.13
$\kappa$ (GF, 100nm)	0.54±0.02	0.67±0.04	0.51±0.10
$\kappa$ (GF, 150nm)	0.59±0.00	0.76±0.06	0.58±0.13
$\kappa$ (GF, 200nm)	0.63±0.03	0.77±0.08	0.58±0.12

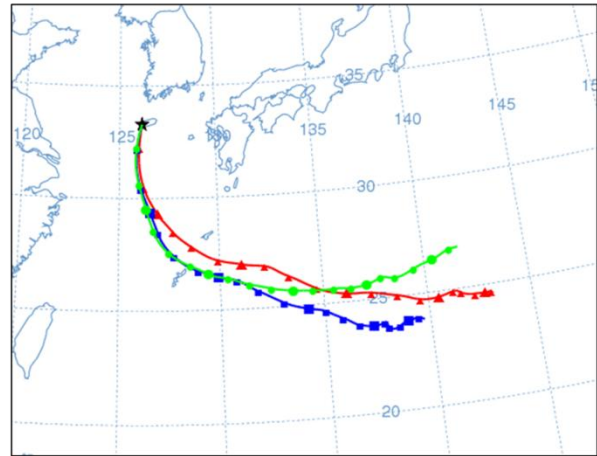
Table S2. Same as Table S2 but for maritime periods 3, 4 and 5 in comparison to campaign average and standard deviation during Gosan 2008.

Gosan 2008	Maritime 3	Maritime 4	Maritime 5	Campaign avg.
$N_{CN}$	1364±1565	1439±617	470±123	3890±1808
$N_{CCN}$ (0.2%)	218±89	582±184	117±36	1043±646
$N_{CCN}$ (0.6%)	435±121	989±195	239±43	2076±989
$N_{CCN}$ (1.0%)	654±167	1288±535	376±29	2713±1271
$N_{CCN}/N_{CN}$ (0.2%)	0.18±0.11	0.42±0.15	0.25±0.05	0.29±0.15
$N_{CCN}/N_{CN}$ (0.6%)	0.41±0.2	0.69±0.13	0.56±0.11	0.60±0.25
$N_{CCN}/N_{CN}$ (1.0%)	0.77±0.24	0.87±0.17	0.93±0.16	0.83±0.31
$D_g$	63±13	112±23	57±7	81±24
$\kappa$ (GF, 50nm)	N/A	N/A	0.21±0.01	0.18±0.04
$\kappa$ (GF, 100nm)	N/A	N/A	0.21±0.01	0.16±0.03
$\kappa$ (GF, 150nm)	N/A	N/A	0.33±0.00	0.21±0.04
$\kappa$ (GF, 200nm)	N/A	N/A	0.30±0.00	0.22±0.05
$\kappa$ ( $S_c$ , 50nm)	0.53±0.06	0.74±0.23	0.47±0.05	0.53±0.36
$\kappa$ ( $S_c$ , 100nm)	0.54±0.18	0.47±0.16	0.45±0.05	0.40±0.07

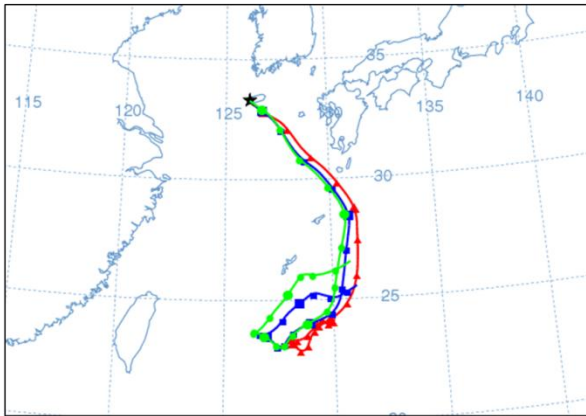
Maritime 1



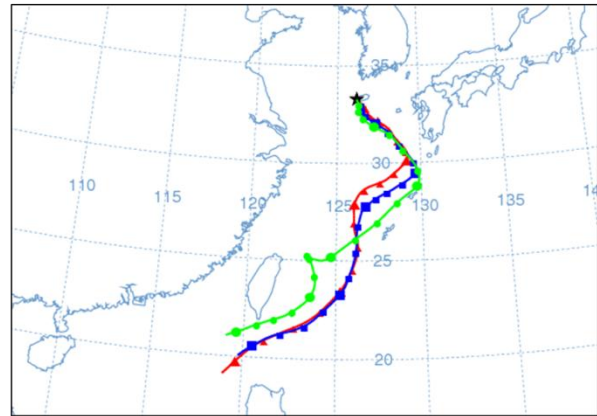
Maritime 2



Maritime 3



Maritime 4



Maritime 5

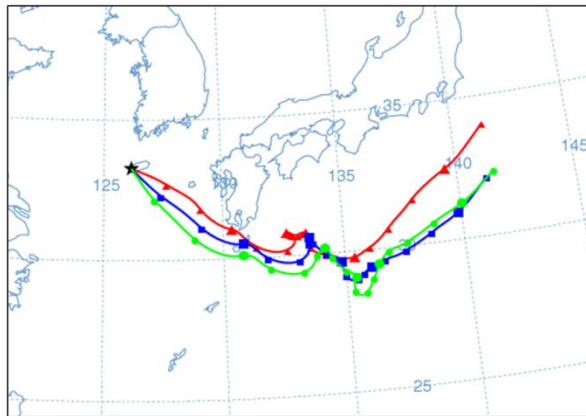


Figure S1. Five day back trajectories for each maritime period. Red, blue and green lines correspond to back trajectories of 500, 1000 and 1500 m above sea level at Gosan, respectively.