Figure.s1 Correlation of rBC mass concentration between TD and ambient sample.
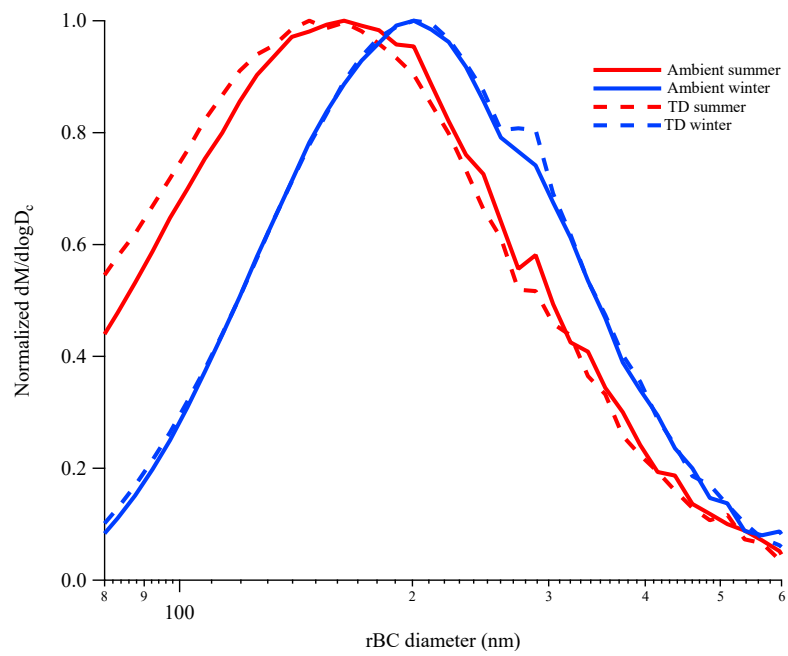
Figure.s2 Mass size distribution of rBC core from ambient and TD sample in summer and winter
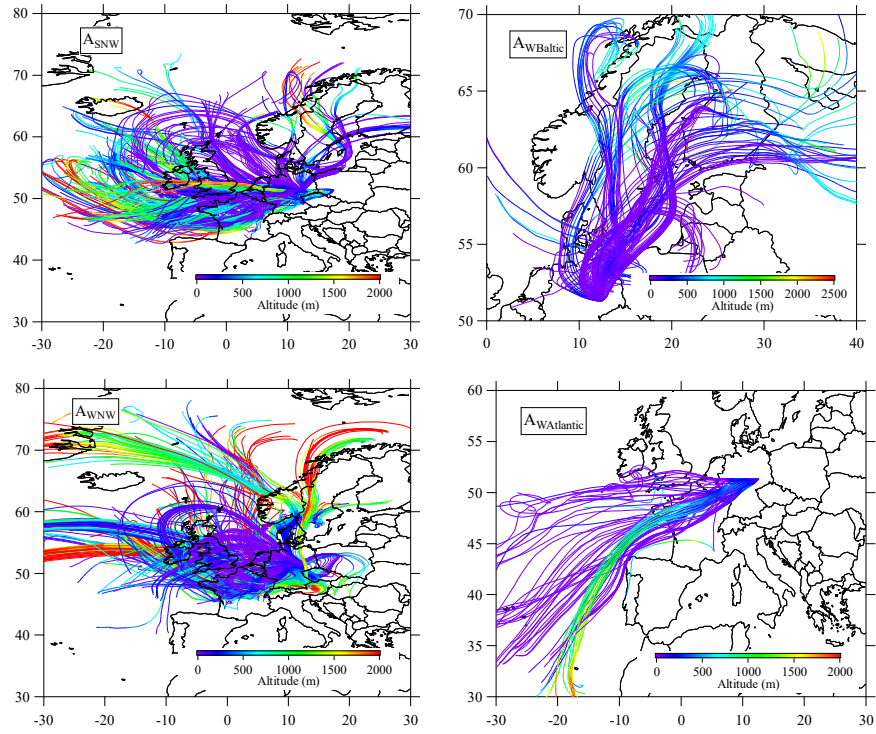
Figure.s3 Track trajectory traces with altitude for each air mass in winter and summer.
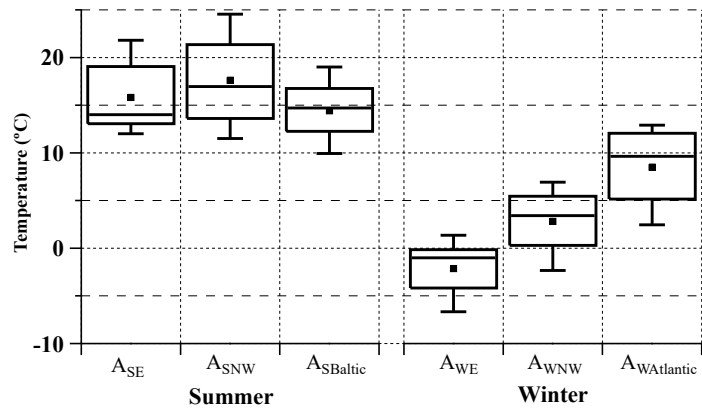
Figure.s4 Statistical analysis of temperature for each air mass in summer and winter.
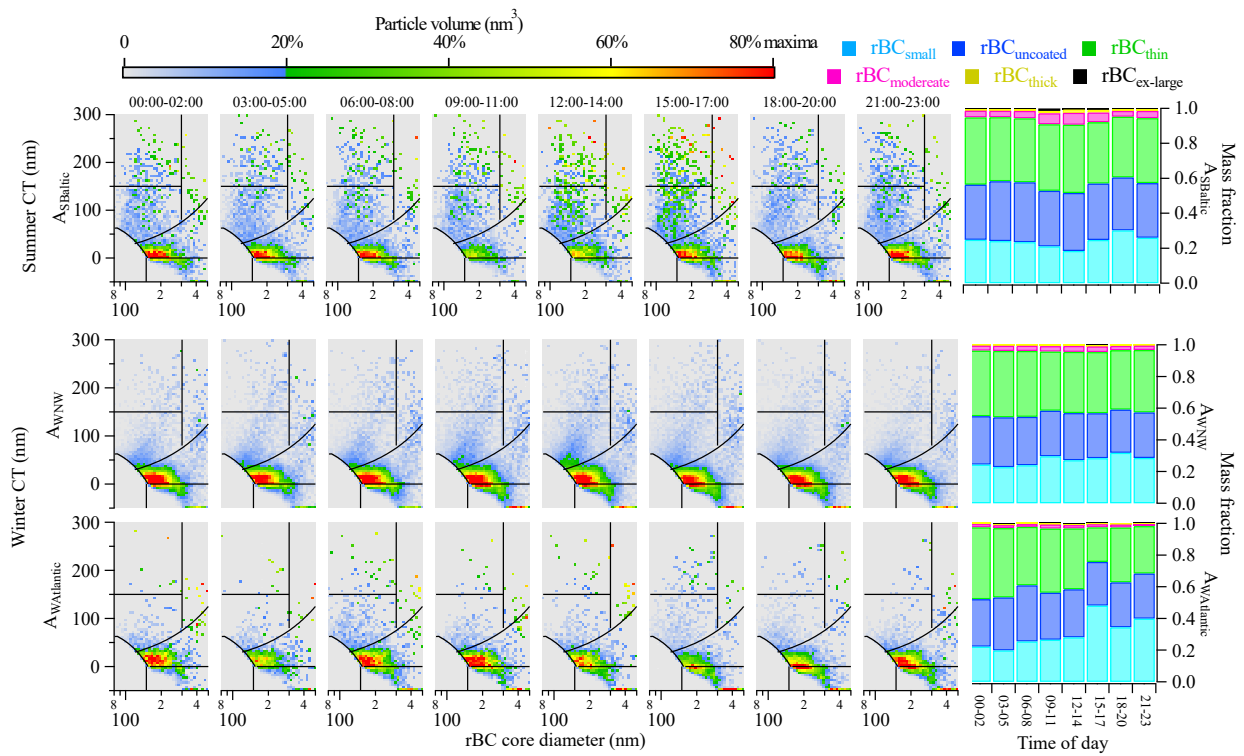
Figure.s5 Diurnal variation of size resolved coating thickness and mass fraction of each types of rBC in the TD sample during $A_{SBaltic}$, A_{WNW} and $A_{WAtlantic}$.