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The influence of the organic fraction in marine aerosol on the HOBr heterogeneous reaction with natural sea salt and model salt aerosols at 300K and rh = 40-90%

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The HOBr uptake coefficient γ on acidified submicron salt aerosol was measured in an atmospheric flow tube reactor. The interaction time of the trace gas with the aerosol was in the range 15 to 90 s and led to γ values ranging from 10^{-4} to 10^{-2}. The acidity of the aerosol is essential in order to enable heterogeneous reactions on NaCl, recrystallized sea salt (RSS) and natural sea salt (NSS) aerosols for HOBr. Uptake experiments of HOBr on aqueous H_2SO_4 as well as on H_2SO_4-acidified NaCl, RSS or NSS aerosols were performed for rh ranging from 40 to 93%. Specifically, γ(HOBr) is approximately 10^{-2} for relative humidity in the range 77 to 90% on NaCl and RSS acidified aerosol. The γ-value of HOBr on acidified NSS reaches a maximum at rh = 77% and decreases significantly for higher rh in contrast to acidified NaCl and RSS aerosols. This difference in γ is attributed to the presence of an organic phase in NSS aerosols that forms an organic coating at high rh and which prevents the heterogeneous reaction of HOBr on NSS. Comparison between the uptake kinetics (γ) on the different aerosols leads to the conclusion that HOBr is dissolving in all aerosols at rh $<$ 75% beyond which the halogen exchange reaction HOBr + H^+ +Cl^- ? BrCl + H_2O occurs. In addition, the phase separation between the organic film and the aqueous phase for NSS aerosol prevents the dissolution of HOBr as well, at least within the contact time used in this study.