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*Supplement of*

## **Mesospheric anomalous diffusion during noctilucent cloud scenarios**

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Andenes (69° N)

Juliusruh (55° N)

Biak (1° S)

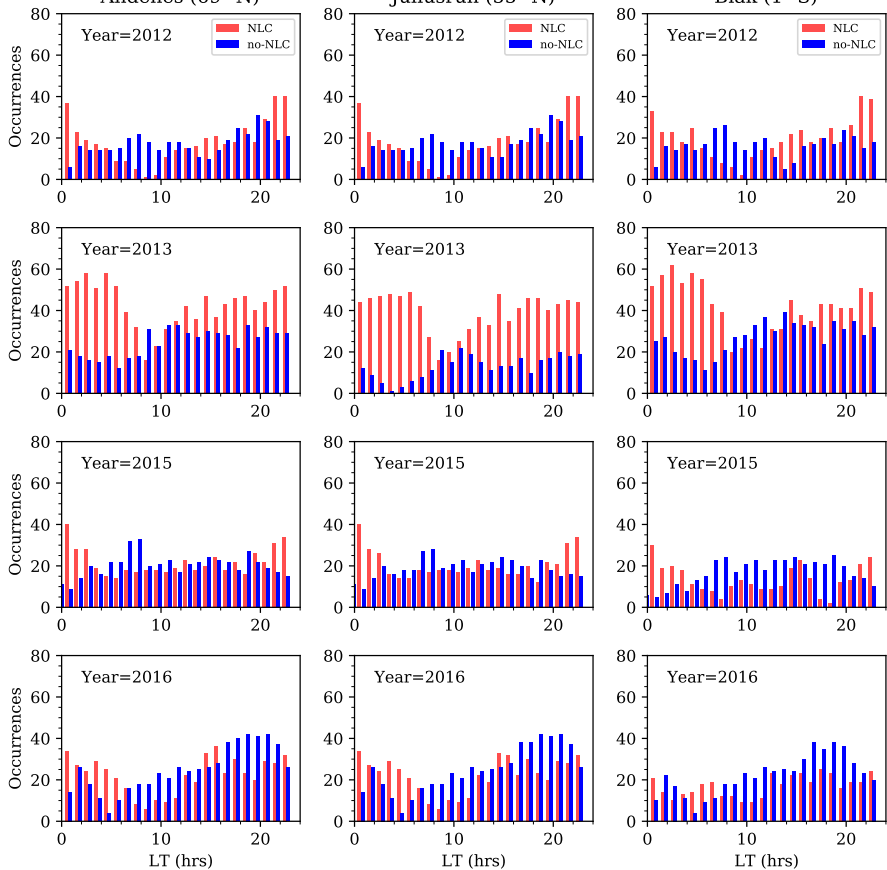


Figure S1: Same as Figure 5 but considering the common time intervals where NLC was observed at high-latitudes and Da was measured at respective stations. It shows that the NLC variations over local time are not very significant, except in the year 2013. Also the variations are nearly alike over the three stations/latitudes.

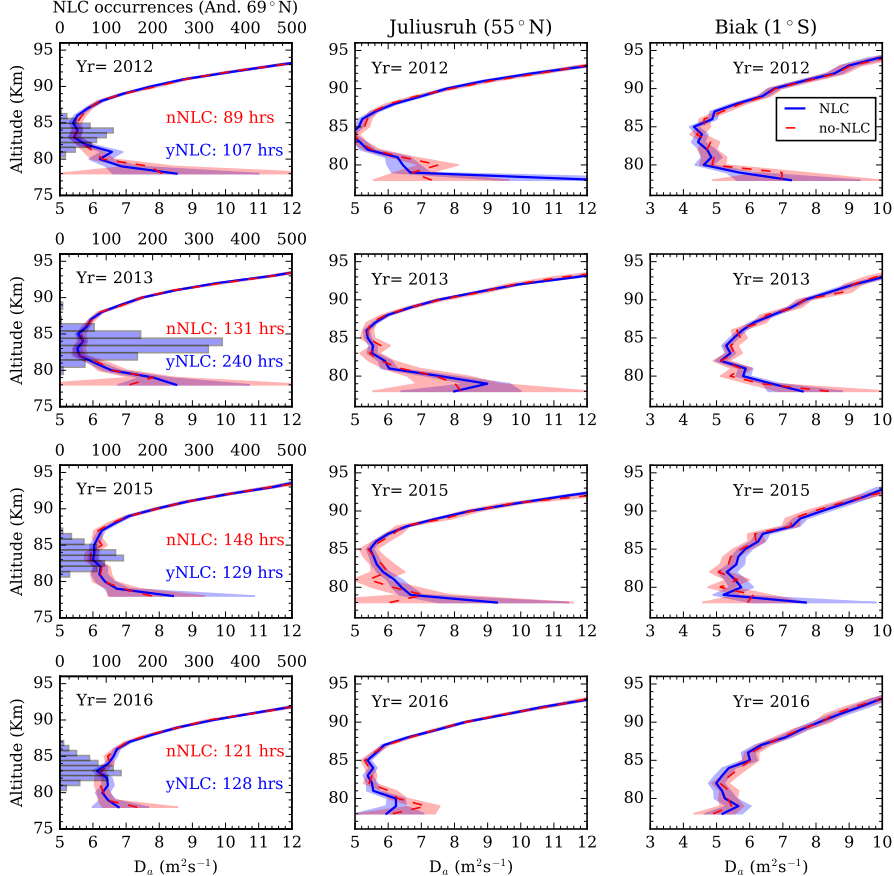


Figure S2: Same as Figure 3, but with random samples of  $D_a$  over the lidar observation windows. It implies that the random samples do not show any difference between the two groups of samples. Here yNLC and nNLC represent just two random samples after combining all the observations during lidar operation.

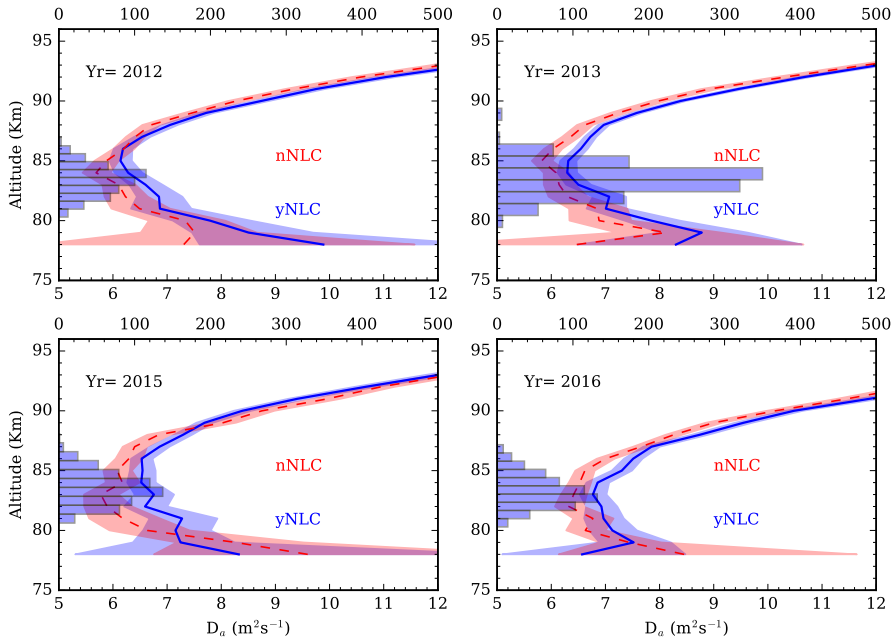


Figure S3: Same as Figure 3, leftmost column (Andenes station), but with those meteors having  $\text{SNR} > 12$  dB (strong meteors). This shows that even for the strong meteors the grouping criteria with NLC presence and no-NLC still have some separation that is above the significance level, signifying that strong and weak meteors are not responsible for the differences seen between diffusion with presence and absence of NLC.