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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Mesospheric Anomalous Diffusion During Noctilucent Clouds" *by* Fazlul I. Laskar et al.

Anonymous Referee #2

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The manuscript is dedicated to study of the relation between NLC events and ambipolar diffusion behavior at heights of mesopause. The subject is quite interesting as well as results, but there are some questions before publication.

1. The authors report the difference between mean log10(Da) profiles for yNLC and nNLC. They used three stations (two in region of NLC - Andenes (69N,16E), Juliusruh (55N,13E)) and one is out of that region - (1S,136E)). So one can expect significant difference between profiles for yNLC and nNLC for midlatitude stations and no difference for equatorial. Accords to fig. 3 we can see differences for all three stations.

2. NLC maximum is at height near 83km (fig.3). But significant distinction in Da for NLC and non-NLC time can be seen at lower heights. Why? Juliusruh Da profiles show less affection of NLC effect than Andenes. Why? Juliusruh is situated in middle of band of

NLC occurance so we have to expect major effect?

3. The manuscript is dedicated to revealing the connection between NLC and Da. However, the major affection (as authors admitted) to Da for proposed segregation is due to temperature oscillations. It's good idea to exclude diurnal and semidiurnal oscillation (for ex. with help of harmonic fitting) from produced times series of log10(Da). After that one can expect removing the affection of "temperature" and we will see pure results.

4. The authors consider the total relation between ambipolar diffusion coefficient and half decay time of meteors by skiymet radar (eq. 2). But it maybe not totally correct. Some effects may bias estimates of log10(Da) to greater values. Besides, height determination at edge of meteor band near 80km and 100km is quite unreliable due to possible jumps from middle of meteor band (90km) due to ambiguity of phase measurements. Thus significant increase of log10(Da) at lower heights seems to unreliable. Besides, the RMS error is increasing here. Why? Looks like distribution of log10(Da) at these heights is quite wide and not Gaussian. What's the result of simple averaging of log10(Da) in this case?

5. Experimental Data. No references to descriptions, no explanation. Just "data". Why should one know what those data are? How did they get them? How processed? Ok, Andenes and Juliusruh MR are quite familiar and results are already published before. As for Biak, results are quite rare as well as data maybe quite unreliable. I have downloaded MPD data from http://database.rish.kyoto-u.ac.jp/arch/iugonet/mwr_bik/index_mwr_bik.html and found a great percentage of ambiguous meteors. It says about illness of system. Such data should be used carefully.

6. NLC mainly observed in mid-latitudes (43-65 latitude's degree, or 50-70 latitude's degree by other sources). Why to use lidar for detection of NLC located in high-latitude (69N)? How it affects on detection of NLC? How it affects on segregation for other stations (Juliusruh and Biak)? In other words, if we see NLC event at current time at

certain station should we expect it at other stations in same hours?

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