

Reply to a critical review by Dr. Wilfried Schroeder
on the paper by P.A. Dalin, N.N. Pertsev and V.A. Romejko
"Significance of lunar impact on noctilucent clouds".

1. **Reply to the comment: “In general the observations which have been used by Dalin et. al. are very few inhomogeneous and not valid statistically. The observers were mostly amateurs without much experience in atmospheric physics, and it is known that the Russian data often are questionable.”**

It is a little bit surprising for us to get such a comment. Validity a Russian, more exactly Moscow, dataset was repeatedly confirmed by the world scientific community. (see **Dalin et al., 2006; Romejko et al., 2003; Romejko et al., 2002**). Nevertheless we can repeat general and well known points on the validity of the Moscow database:

1. There are no PROFESSIONAL observers of noctilucent clouds in the world. No one institute in the world learns to observe noctilucent clouds and there is no a profession “an observer of noctilucent clouds”. All observers of noctilucent clouds are amateurs.
2. An experience of amateur (and in turn, reliability of the data) depends on the two factors: 1) on the experience of supervisor (or teacher, leader) who gives a beginning introduction to the problem of observing of noctilucent clouds. 2) on the length of service (or standing) of amateur in the field on observing of noctilucent clouds. The supervisor of the Moscow Association for NLC observations is Vitaly Romejko who has an experience of about 40 years of NLC observations. Such an experience is hardly achieved by someone in the world. In turn, Romejko’s supervisor was Nikolai Grishin who firstly elaborated the technique of NLC observations (**Grishin, 1957**) and later this technique was translated into other languages and it was commonly accepted in the world. Other Moscow amateurs were trained by a SINGLE and COMMON technique and Moscow amateurs have usually an experience of NLC observations more than 7 years.
3. We repeat that the Moscow database is the longest in the world, since 1962 up to present. This database is unequalled in the world regarding total duration, quantity of observations and volume of accompanying information. For example, the Moscow database includes a registration of weather conditions which are absent in other databases (except of the Danish database). Note that information about the tropospheric cloudiness with and without NLC has proved to be important in the statistical analysis (Dalin et al., 2006; Romejko et al., 2003; Romejko et al., 2002).
4. Dr. W. Schroeder writes: *“One example is the so-called winter observations of NLC which has been pointed only by Russian data...”*. We have no idea what Dr. W. Schroeder means. Our Moscow database has no record on the winter NLC occurrence. No one of our observer noted NLC during winter time. May be Dr. W. Schroeder has heard about this phenomenon from Russian colleagues but we know nothing about it.

5. We want to emphasize the following fact. In 1960-80's there were about **30 groups** in Russia observing NLC. We consider only the Moscow database. Please, do not mix NLC observations made in Russia with these made in Moscow.

Concerning other databases on NLC observations we can rephrase our own words from paper by **Romejko et al., 2003**: "... *all of them have one of the following shortcomings: 1. Rather short data sets (less than for three solar cycles) are subjected to the statistical analysis. 2. Diverse data received by different techniques are treated.*"

2. Reply to comment: "Therefore all conclusion of a Lunar periodicity make no sense physically."

This comment looks unexpected and curious, when coming from Dr. W. Schroeder, who published together with M. Gadsden a curve demonstrating an existence of connection between the Moon and NLC (Gadsden and Schroeder, 1989, pages 104-105). This comment is actually not true. Please, look carefully at the section "Discussion and Conclusions" of the reviewed paper. We provided both "traditional" mechanisms of the influence of lunar gravitational tides on the upper atmosphere (and on NLC) and "exotic" mechanisms that may have a comparable influence. We can repeat that the physical mechanism is probably described via temperature (up to 9 K) and wind variations (vertical speeds at 80-90 km height may be as much as 0.1-1 cm/s) which are caused by the propagation of lunar tides (any tide provides temperature and wind variations). Such changes of atmospheric parameters are crucial for the NLC formation (because changes in the temperature even of 1 K are crucial for the ice particle formation due to the exponential dependence of the pressure of saturated water vapor on temperature).

Dr. W. Schroeder writes: "...*The atmosphere near the mesopause is a dynamical body which is mainly controlled by the wind and temperature and these are components do not physically depend on the position of the Moon. Therefore all conclusion of a Lunar periodicity make no sense physically.*"

This is not true. Any tide produces REGULAR wind and temperature variations by definition because a disturbing body has a REGULAR effect (see fundamentals of tides in the atmosphere: Chapman, S., and Lindzen, R.S., 1970). Exactly the position of the Moon (lunar phase, lunar declination and lunar distance from the Earth) has its effect on the atmosphere. Therefore there are well established different kinds of lunar tides according to the changes in lunar coordinates.

References:

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