Response to Reviewer 4

Authors are grateful to the reviewer for a careful reading of the work and valuable comments

1. Provide a full description of the various symbols in Figure 2, in the caption of the figure.

I expanded the caption to the figure

Figure 2. Optical circuit of the LOSA-M3 lidar. PP: phase plates; GP: Glan prism; BE: achromatic beam expander; AL: achromatic lens 40 mm diameter; CL: Cassegrain mirror lens *CL* 200 mm diameter; VC: video camera; FS1, FS2: iris diaphragms; Fb: optic fiber; MS: mirror shutter; L: lense; WP: Wollaston prism; BS: beamsplitters; APD: avalanche photodiodes; PMT: photomultiplier tubes.

2. Provide a full description of the measurement sequence, in terms of the measurements at near and far zones, measurements at different wavelengths, measurements with linearly- and circularly-polarized emission (and corresponding detection), so the sequence of the measurements and their time resolution is clear. The use of a new figure to provide this sequence visually would help.
3. The system relies heavily on its rotating parts, but in the text there is not much information about their synchronization. Please provide your comments on this and/or the tests you performed to check for this.

I think that the addition of a new figure is difficult, since there are already 13 figures. Some information about the synchronization of laser pulses and plate rotation is shown in Figs. 4, 6. I have reworked some pieces of the text related to the obturator and phase plates where the alternation of near and far ranges is described.
Line 134. Shutter controller sets the obturator rotation frequency, the rotation speed of the phase plates and externally triggers the laser. So laser pulse frequency is about 10 pulse per second, but its exact value is synchronized with the rotation of the mirror obturator and platforms with phase plates.

There may be times when we are only interested in distant objects, such as high-level clouds. In this case, the obturator's rotation speed doubles, and the laser only starts when the shutter is open. The frequency of the laser pulses remains the same (10 Hz), but only far range signals are recorded.
Line 195. The diagrams indicated in Figs. 4, 6 refer to the cases of registration only the far range signals. If we register both near and far range signals, the plates rotate through the angle 22.5° between laser pulses. Intermediate positions correspond to the near range signals and have an undefined polarization.

Some more comments:
1. Make Fig. 4a and 4b two different figures. It is confusing to be in the same figure, because the first refers to the rotation of the phase plates and the second refers to the definition of their initial position.

This is a reasonable offer. Moreover, in the last version of the text (uploaded 28 Oct) I first refer to Fig. 4a, then Fig 5, and then 4b. Therefore now Fig. 4b will be Fig. 6.

2. Change caption of Fig. 5a to "lidar signal used to mount the plates at their initial position"

Now the caption of Fig. 5 is:

Figure 5. (a) Lidar signals from two photodetectors (P_{co} and P_{cros}), summarized over all positions of plate B (red and green lines). A height range 6-9 km with constant depolarization ratio (blue line) is chosen to adjust the plates. (b) Depolarization ratio for each pulse (bottom) and averaged over a 30 minute record (top).

I believe that the new caption takes into account the need to show the lidar signal in the figure 5a.

Sincerely
Grigory Kokhanenko