The authors are sincerely grateful for the careful reading of the work. We'll try to take into account all your comments when finalizing the text.

Experiment
1. Lines 114 f.: Please, provide more information about the fiber (polarization preserving?) and the shutter (coating?).
revised text
Line 127. The signal from the receiver of the near range through the optic fiber *Fb* is fed to the mirror shutter (aluminium coated obturator) *MS* , by means of which the signals of the near and far ranges are alternately switched. The small receiver is closer to the transmitter, so the transition to range-square mode starts earlier (80-100 m) than for the large receiver (800-900 m). During data processing signals from near range (50-1200 m) and far range (400 m-15 km) fit together at a distance of 800-900 m when range-square mode for large receiver starts. Of course, the silica optical fiber (1 mm diameter) destroys the polarization state of the signal, so near-range data cannot be used for polarization analysis.

2. How is background scattering suppressed? There seem to be no filters in the setup, is this correct?
Of course, we use interference filters before each detector. They are depicted in Fig. 2 as narrow rectangles, but were not mentioned in the text.
Line 149. Interference filters (*IF*) with bandwidth about 1 nm are placed in front of the detectors.

3. Lines 149-150: 150 Steps are required for a 45_-turn, which would take 102 ms (according to the information provided) and thus slightly longer than the time period between the 10-Hz laser pulses. Please, comment.
Line 133 - The rotation of the mirror obturator and platforms with phase plates is synchronized with the external trigger of the laser. So laser pulse frequency is about 10 pulse per second, but its exact value is determined by the obturator controller.

4. Lines 159-160: 'Only one: : : channel'. Please, provide more details.
Line 177 - The exact positions of the plates is set separately for plate A and B. We set one plate (e.g. plate B) in its channel (receiver for plate B) and turn on the rotation.

Measurements
1. Lines 242 ff.: It is not obvious what is meant with 'double lines'.
Line 283 - In Fig. 7a we saw clearly expressed single line of maximum signal, because the vertical position was the edge position when scanning. When we scan our lidar from 4° to -1° and back, vertical positions (0°) are close to each other. So in Fig. 8a two lines of maximum signals are close to each other and look like a double line.

2. Line 264: Figs. 7-9 present data from April and June, 2018. Then, suddenly, 1 October is mentioned. Please, provide earlier on in the section an overview of the measurements to be discussed.
It is a mistake. October 1 is not need here. Below we present the data obtained on 2 June.

3. Paragraph, lines 286 ff.: This information must be provided before the measurement are presented, because otherwise the interested reader is waiting for the linear depolarization ratios to be shown.
Thank you, I moved this lines to the beginning of Sect. 4.1

4. Paragraph, lines 300 ff.: This information definitely belongs to section 2 or 3!

This lines are moved to Sect. 2 and clarified

Line 111. We have two sets of quarter-wave plates. One set is designed for 532 nm, another set for 1064 nm. For the wavelength of installed plates (below are the results only for installed 1064 nm plates) we can investigate both linear and circular polarizations. For the second wavelength (532 nm) polarization state when turning 45 degrees is not determined. However, in the position where the axis of the rotating phase plate coincides with the plane of polarization of the transmitter, the radiation remains linearly polarized for any wavelength. So the measurements for the wavelength of $\lambda = 532$ nm were carried out only for linear polarization of radiation. Of course, in our lidar we can use a quarter-wave plates for 532 nm if such experiments were planned.

Phrasing

4. Lines 186-188: 'If: : : sounding.'

Line 211. The channel calibration problem is solved in most devices for polarization measurements. An exception is devices where signals of different polarization are sequentially directed to one photodetector (Platt, 1977; Eloranta and Piironen, 1994; McCullough et al., 2017).

6. Line 305: 'thus: : : value.'

Line 345. The relative sensitivity of photodetectors at 532 and 1064 nm was not calibrated. Therefore the intensities of polarization components for 532 nm (both I_{co}^{Lin} and I_{cros}^{Lin}) were normalized so that the intensity maximum of I_{co}^{Lin} (0°) in the vertical position coincided with I_{co}^{Lin} (0°) for 1064 nm.

Typos

3. Line 66 'The authors', **full stop missing**

We did not quite understand what does this means, so I've replaced the sentence:
Line 67. However, we did not find references to such direct experiments in the literature.

Figures.

I substantially reworked all the figures and their captions in accordance with the comments of the reviewers.

References and typos.

Thank you for your comments. Your remarks were very helpful. We tried to take everything into account in the revised text.

Sincerely,
Grigory Kokhanenko