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Interactive comment on "Direct evidence for radar reflector originating from changes in crystal-orientation fabric" *by* O. Eisen et al.

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In this short communication we provide two further results in response to the "General Comment" by K. Matsuoka:

1. the c-axes lie in a vertical plane parallel to the ice divide
2. the strength of COF-reflector depends on azimuths.

The accompanying figure will be included in the revision.

The profile recorded at different azimuths mentioned by K. Matsuoka refers to profile 033042 about 500 m downstream from the drill site, used in Eisen et al., 2006 (their

Fig.1). The profile was recorded with the 60 ns pulse with the airplane moving on ground, first describing a circle and then crossing the circle in linear segments in eight different orientations (N, NE, E, SE, S, SW, W, NW). (The 600 ns pulse was not used in that profile.) Airplane heading is equal to polarization of the electric field.

Azimuth dependence for the circle segment is difficult to analyse for individual reflectors (i.e. for short time windows), as the SNR is very low and stacking is not feasible (because of the different azimuths). However, calculation of the internal reflection power (IRP) over the time window 10–30 μs indicates that for heading E to SE and W to NW the IRP is significantly higher than for other headings. The maxima lie in the vertical plane along the ice divide (along ESE–WNW). This is interpreted as a confirmation that c-axes in the girdle-type fabric lie in that plane (**= result 1**). As c-axis orientations in the girdle-type fabric show small variations with depth, the dielectric properties also vary slighlty with depth. When the electric field is polarized in that plane (that is, when the airplane's heading is parallel to the ice divide), these variations cause a generally higher incoherent backscatter. If electric polarization is perpendicular to the plane containing the c-axes (i.e. airplane's heading perpendicular to the ice divide), the variations in c-axis orientation have no effect, resulting in an overall lower level of backscatter.

Along each of the eight linear segments (= constant heading) of profile 033042, 70-fold stacking of radar traces was carried out to increase SNR. The reflector originating from changes in conductivity at 1865 m at the EPICA DML ice core does not show any systematic variation in backscatter with azimuth. At the depth of the change in COF at about 2035 m at the drill site, a reflection is visible for heading E and SE, and in the opposite directions W and NW. Along the other headings not reflection is visible. We take this azimuth-dependence of reflectivity as an independent confirmation that the reflector discussed in the paper indeed originates from changes in COF (**= result 2**).

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