The Cryosphere
Discussions

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Interactive comment on "Observation of an optical anisotropy in the deep glacial ice at the geographic South Pole using a laser dust logger" *by* Martin Rongen et al.

Anonymous Referee #1

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General:

The authors present observation on anisotropic light scattering in the ice sheet near South Pole. The results are derived from measurements with an optical dust logger deployed in a 1750-m borehole. The authors attribute the anisotropy to a preferential light diffusion by the birefringent property of ice, which could be the basis for a new technique for in situ logging of ice fabric properties. The paper is a clear description and analysis of the novel observations.

Specific comments:

p. 2, l. 16: "For crystal realizations where the deflection outweighs the additional

diffusion, the photon flux along the flow axis will continuously increase with distance".
I suggest expanding the introduction here: What is additional diffusion? What means
photon flux increases with distance? Probably it (finally) decreases by absorption and
scattering.

p. 4, l. 7: "anti-freeze": general definition of an anti-freeze is an additive that lowers the
freezing point of a water-based liquid. Here, Estisol-140 is a non-freezing drilling fluid.

p. 4, l. 9+13: Voigt (2017) is not in references.

p. 4, l. 11: The accumulation site varies with the depth below the surface. Titan Dome
is the accumulation site only for the deepest ice

p. 6, l. 10: "craigite" was suggested as mineral name in the 1980's but to my knowledge
never approved. Use clathrate hydrate.

p. 6, l. 15 "global offsets". As the logs are from the same hole, the "global" offsets do
not have an external origin. They are rather caused by the logging instrument(?) If so,
the term "global" seems inadequate to me.

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