Continuous borehole optical televewing reveals variable englacial debris concentrations at Khumbu Glacier, Nepal

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Supplementary Tables and Figures for:

“Continuous borehole optical televiewing reveals variable englacial debris concentrations at Khumbu Glacier, Nepal”

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**Supplementary Table 1. Details of boreholes logged by OPTV.** Borehole naming convention (e.g. BH17-01) consists of the year drilled, followed by the borehole number (for that year). OPTV log depths are depths below the surface and were limited to 150 m by the winch capacity.

| Borehole ID | Site | Length (m) | Date drilled | Log date   | Log direction | Top depth (m) | Base depth (m) | Lighting (%) | Exposure (%) |
|-------------|------|------------|--------------|------------|---------------|---------------|---------------|--------------|--------------|
| BH17-01     | 1    | 31.2       | 08.05.2017   | 11.05.2017 | Down          | 2.03          | 31.04         | 50           | 66           |
|             |      |            |              |            | Up            | 1.89          | 30.88         | 50           | 66           |
| BH17-09     | 2    | 22.0       | 16.05.2017   | 18.05.2017 | Down          | 2.03          | 22.01         | 50           | 66           |
|             |      |            |              |            | Up            | 1.90          | 21.68         | 50           | 66           |
| BH17-13     | 3    | 155.0      | 21.05.2017   | 23.05.2017 | Down          | 1.98          | 149.99        | 50           | 66           |
|             |      |            |              |            | Up            | 2.01          | 149.66        | 75           | 66           |
| BH18-04     | 4    | 192.0      | 02.05.2018   | 05.05.2018 | Down          | 2.03          | 150.78        | 75           | 66           |
|             |      |            |              |            | Up            | 2.13          | 150.65        | 75           | 100          |
Supplementary Figure 1. Unrolled raw up-direction OPTV image log of BH17-01 (Site 1).

Supplementary Figure 2. Unrolled raw up-direction OPTV image log of BH17-09 (Site 2).
Supplementary Figure 3. Unrolled raw up-direction OPTV image log of BH17-13 (Site 3).
Supplementary Figure 4. Unrolled raw up-direction OPTV image log of BH18-04 (Site 4).
Supplementary Figure 5. Example section of log with drilling artefacts and partly obscured by turbid water. a) Raw OPTV image log section from BH17-01 (Site 1). b) A sketch of the same section of log, demonstrating the areas obscured by turbid water (black waves) and vertical saturated (all RBG channels at or close to 255, the maximum brightness) reflections (grey lines), interpreted as artefacts left on the borehole wall from the drill stem during off-vertical drilling. Both OPTV logs are unrolled to progress North–East–South–West–North from left to right.
Supplementary Figure 6. Example sample of log used to determine the high debris concentration category. a) Raw OPTV image log section from BH17-01 (Site 1). b) The same log showing all delineated debris clasts (in blue) within a sample area of the log (in purple). Both OPTV logs are unrolled to progress North–East–South–West–North from left to right.
Supplementary Figure 7. Englacial debris category concentrations plotted against depth for 0.01 m borehole sections from upglacier (left) to downglacier (right): a) Site 3; b) Site 4; c) Site 2; and d) Site 1. Black dots show the englacial debris category concentration for each 0.01 m section of the borehole. Red lines show the cumulative debris thickness (assuming a bulk porosity of 0.33) that would be left if the ice above were to be melted (incrementing in the same 0.01 m sections) and thick blue lines represent the base of each borehole (Site 4 is at 192 m). Note the varying y-axis limits. The uppermost ~2 m of each borehole was not logged as this is the length of probe above the camera.
Supplementary Figure 8. Layers of basal ice observed at the glacier’s surface, close to Site 2.