**Supplementary Material: 3D Model Parameters for 2019 and 2020 data compared**

***Table 1: 3D Model General Parameters***

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 3D Model | Number of pictures | picture quality x̄ (1=100% - 0=0%) | Tie Points | Dense Cloud Points | Orthomosaic resolution [cm/pix] |
| 2019 Gepatschferner glacier forefield | 1203 | 0,86 ± 0,02 | 469736 [high preset] | 64309116 [high preset] | 1.8 |
| 2020 Gepatschferner glacier forefield | 825 | 0,85 ± 0,02 | 6122380 [highest preset] | 68798239 [high preset] | 2.4 |

***Table 2: Ground control point precision and error data\****

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Markers | GPC Position |  |  | 3D Model 2019 |  |  | 3D Model 2020 | |  |
|  | Longitude | Latitude | Altitude [m] | Error [m] | Projections | Error [pix] | Error [m] | Projections | Error [pix] |
| GPC 1 | 10.75546533 | 46.87446265 | 2216.6577 | 0.137120492 | 72 | 0.621 | 0.14585291 | 94 | 1.493091 |
| GPC 2 | 10.75588259 | 46.8751941 | 2235.5122 | 0.120995303 | 78 | 1.08 | 0.09259492 | 55 | 3.95236 |
| GPC 3 | 10.75763716 | 46.87472181 | 2242.8625 | 0.086772489 | 75 | 1.011 | 0.16924362 | 22 | 4.549538 |
| GPC 4 | 10.75695351 | 46.87529437 | 2226.8416 | 0.299709611 | 77 | 1.247 | 0.334081 | 51 | 3.392106 |
| GPC 5 | 10.75659964 | 46.87499537 | 2240.3853 | 0.229166807 | 75 | 0.632 | 0.21923208 | 48 | 2.200329 |

*\*Please note- the apparent large deviation of the GPCs with regards to the model is attributable to the steep nature of the narrow valley, with implications for GPS signal in the drone. Of greater importance is the error in pixels which are shown in this table.*