Supplement of
Towards ice-thickness inversion: an evaluation of global digital elevation models (DEM) in the glacierized Tibetan Plateau
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Table S1. Statistics of elevation difference (m) between six DEMs and ICESat-2 over four glacierized sub-zones (defined in Fig. 7e).

| Item          | Zone | AW3D30 | SRTM-GL1 | NASADEM | TanDEM-X | SRTM v4.1 | MERIT |
|---------------|------|--------|----------|---------|----------|-----------|-------|
| Mean difference | 1    | 8.1    | 10.6     | 9.1     | 3.9      | 9.2       | 10.1  |
|               | 2    | 3.0    | 2.5      | 1.5     | 0.3      | 1.7       | 2.9   |
|               | 3    | -1.1   | -3.7     | -4.4    | -2.1     | -3.2      | -2.0  |
|               | 4    | -3.6   | -7.1     | -8.4    | -6.0     | -6.8      | -5.9  |
| Absolute Mean  | 1    | 10.8   | 14.9     | 13.6    | 10.1     | 16.2      | 15.8  |
| Mean difference | 2    | 7.6    | 9.0      | 8.5     | 7.9      | 10.5      | 10.1  |
|               | 3    | 7.3    | 8.3      | 7.9     | 9.4      | 10.9      | 9.8   |
|               | 4    | 8.5    | 10.4     | 10.3    | 13.8     | 15.4      | 13.6  |
| Standard Deviation | 1  | 12.3   | 16.2     | 15.6    | 15.1     | 20.2      | 18.7  |
| Mean difference | 2    | 10.0   | 11.7     | 11.1    | 13.3     | 14.5      | 13.5  |
|               | 3    | 9.6    | 9.9      | 8.8     | 16.3     | 15.4      | 13.5  |
|               | 4    | 10.9   | 11.6     | 9.6     | 22.6     | 21.8      | 17.7  |
| RMSE          | 1    | 14.7   | 19.4     | 18.1    | 15.5     | 22.2      | 21.2  |
|               | 2    | 10.5   | 12.0     | 11.2    | 13.4     | 14.6      | 13.8  |
|               | 3    | 9.7    | 10.6     | 9.8     | 16.4     | 15.7      | 13.7  |
|               | 4    | 11.4   | 13.6     | 12.8    | 23.4     | 22.9      | 18.7  |
Table S2. Weights of different models required to achieve minimum mean absolute error in ten experiments.

| Exp. No. | GlabTop2 | HF | ITIBOV | OGGM | MAE | GlabTop2 | HF | ITIBOV | OGGM | MAE  |
|----------|----------|----|--------|------|-----|----------|----|--------|------|-----|
|          |          |    |        |      |     |          |    |        |      |     |
| 1        | 0.00     | 0.41| 0.50   | 0.09 | 46.71| 0.00     | 0.17| 0.16   | 0.67 | 54.68|
| 2        | 0.00     | 0.31| 0.39   | 0.30 | 42.83| 0.00     | 0.24| 0.15   | 0.61 | 50.41|
| 3        | 0.00     | 0.54| 0.30   | 0.16 | 45.26| 0.00     | 0.01| 0.32   | 0.67 | 50.51|
| 4        | 0.00     | 0.34| 0.47   | 0.19 | 42.64| 0.00     | 0.07| 0.27   | 0.66 | 53.47|
| 5        | 0.00     | 0.46| 0.28   | 0.26 | 40.79| 0.00     | 0.25| 0.16   | 0.59 | 53.46|
| 6        | 0.00     | 0.43| 0.29   | 0.28 | 41.26| 0.00     | 0.11| 0.21   | 0.68 | 54.94|
| 7        | 0.00     | 0.47| 0.29   | 0.24 | 44.28| 0.00     | 0.25| 0.16   | 0.59 | 58.75|
| 8        | 0.00     | 0.47| 0.29   | 0.24 | 47.99| 0.00     | 0.12| 0.29   | 0.59 | 56.47|
| 9        | 0.00     | 0.44| 0.26   | 0.30 | 47.02| 0.00     | 0.26| 0.13   | 0.61 | 48.95|
| 10       | 0.00    | 0.41| 0.50   | 0.09 | 42.04| 0.00     | 0.01| 0.41   | 0.58 | 53.13|
| Weight   | 0.00    | 0.43| 0.36   | 0.22 | 44.08| -       | 0.00| 0.15   | 0.23 | 63.53|

| Exp. No. | GlabTop2 | HF | ITIBOV | OGGM | MAE | GlabTop2 | HF | ITIBOV | OGGM | MAE  |
|----------|----------|----|--------|------|-----|----------|----|--------|------|-----|
|          |          |    |        |      |     |          |    |        |      |     |
| 1        | 0.00     | 0.76| 0.01   | 0.23 | 38.37| 0.00     | 0.65| 0.31   | 0.04 | 37.29|
| 2        | 0.00     | 0.67| 0.01   | 0.32 | 34.52| 0.00     | 0.67| 0.32   | 0.01 | 33.03|
| 3        | 0.00     | 0.67| 0.04   | 0.20 | 39.67| 0.00     | 0.68| 0.31   | 0.01 | 32.53|
| 4        | 0.00     | 0.85| 0.01   | 0.14 | 32.63| 0.00     | 0.66| 0.33   | 0.01 | 41.37|
| 5        | 0.00     | 0.86| 0.01   | 0.13 | 37.80| 0.00     | 0.66| 0.31   | 0.03 | 35.95|
| 6        | 0.00     | 0.47| 0.01   | 0.52 | 43.81| 0.00     | 0.53| 0.35   | 0.12 | 40.24|
| 7        | 0.00     | 0.71| 0.07   | 0.22 | 37.59| 0.00     | 0.66| 0.33   | 0.01 | 39.03|
| 8        | 0.00     | 0.73| 0.01   | 0.26 | 31.54| 0.00     | 0.68| 0.31   | 0.01 | 41.47|
| 9        | 0.00     | 0.77| 0.03   | 0.20 | 34.51| 0.00     | 0.64| 0.32   | 0.04 | 42.39|
| 10       | 0.00    | 0.85| 0.01   | 0.14 | 36.11| 0.00     | 0.64| 0.35   | 0.01 | 41.11|
| Weight   | 0.00    | 0.74| 0.02   | 0.24 | 36.66| -       | 0.00| 0.65   | 0.32 | 38.44|

| Exp. No. | GlabTop2 | HF | ITIBOV | OGGM | MAE | GlabTop2 | HF | ITIBOV | OGGM | MAE  |
|----------|----------|----|--------|------|-----|----------|----|--------|------|-----|
|          |          |    |        |      |     |          |    |        |      |     |
| 1        | 0.00     | 0.20| 0.10   | 0.70 | 53.66| 0.00     | 0.01| 0.15   | 0.84 | 47.32|
| 2        | 0.00     | 0.28| 0.11   | 0.61 | 51.83| 0.07     | 0.00| 0.01   | 0.92 | 51.17|
| 3        | 0.00     | 0.19| 0.10   | 0.71 | 48.95| 0.00     | 0.03| 0.06   | 0.91 | 45.13|
| 4        | 0.00     | 0.25| 0.11   | 0.64 | 53.77| 0.00     | 0.02| 0.01   | 0.97 | 52.50|
| 5        | 0.00     | 0.28| 0.11   | 0.61 | 52.71| 0.13     | 0.02| 0.00   | 0.85 | 49.88|
| 6        | 0.00     | 0.22| 0.20   | 0.58 | 58.19| 0.15     | 0.05| 0.00   | 0.80 | 48.80|
| 7        | 0.00     | 0.21| 0.15   | 0.64 | 51.56| 0.00     | 0.33| 0.04   | 0.63 | 49.50|
| 8        | 0.00     | 0.19| 0.10   | 0.71 | 49.35| 0.00     | 0.11| 0.22   | 0.67 | 44.28|
| 9        | 0.00     | 0.20| 0.13   | 0.67 | 48.62| 0.00     | 0.01| 0.16   | 0.83 | 53.20|
| 10       | 0.00    | 0.25| 0.11   | 0.64 | 48.12| 0.01     | 0.00| 0.05   | 0.94 | 52.27|
| Weight   | 0.00    | 0.23| 0.12   | 0.65 | 51.68| -       | 0.04| 0.06   | 0.07 | 49.41|
Fig. S1 Mean monthly ice velocity from Global Land Ice Velocity Extraction by Landsat 8 (GoLIVE) in path 147 and row 038 where Chhota Shigri is located.