



Supplement of

Snow depth mapping from stereo satellite imagery in mountainous terrain: evaluation using airborne laser-scanning data

César Deschamps-Berger et al.

Correspondence to: César Deschamps-Berger (cesar.deschamps-berger@cesbio.cnes.fr)

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Table S1. Identification number of the Pléiades images.

| Date | ID |
|--------------------|--|
| 2017-08-08 | DS_PHR1A_201708081845505_FR1_PX_W120N37_0624_00746 |
| 2017-08-13 | DS_PHR1A_201708131857059_FR1_PX_W120N38_0603_01804 |
| 2017-05-01 (North) | DS_PHR1A_201705011856454_FR1_PX_W120N38_0602_02334 |
| 2017-05-01 (South) | DS_PHR1A_201705011856454_FR1_PX_W120N38_0602_02334 |

| Option name in ASP | Local-search | SGM-binary | SGM-ternary | |
|------------------------|--------------|------------|-------------|--|
| prefilter-mode | 2 | 0 (None) | 0 (None) | |
| prefilter-kernel-width | 1.4 | - | - | |
| corr-seed-mode | 1 | 1 | 1 | |
| corr-max-levels | 3 | 2 | 2 | |
| cost-mode | 2 | 3 | 4 | |
| corr-kernel | 25 25 | 77 | 77 | |
| subpixel-mode | 2 | 9 | 9 | |
| subpixel-kernel | 35 35 | - | - | |
| stereo-algorithm | 0 | 1 | 1 | |
| filter-mode | 1 | 0 (None) | 0 (None) | |
| rm-half-kernel | 5 5 | - | - | |
| max-mean-diff | 3 | - | - | |
| rm-min-matches | 60 | - | - | |
| rm-threshold | 3 | - | - | |
| rm-cleanup-passes | 1 | - | - | |

Table S2. Options used in *stereo*.



Figure S1. Hillshades of the snow-on Pléiades DEM calculated with the stereo options Local-Search (a), SGM-binary (b) and SGM-ternary (c). Artifacts around isolated tree were observed with Local-Search (arrow in hillshade (d) and pan-chromatic ortho-image (g)). Geometrical artifacts were observed in south facing slopes with SGM-ternary (arrow in hillshade (f)). © CNES 2017, Distribution Airbus DS

Table S3. Comparison of the snow depth residual (HS Pléiades minus HS ASO) and stable terrain elevation difference (Pléiades). All metrics are in meters. The bold line is common to this table and Table 2.

| | Area (km²) | Mean | Median | NMAD | RMSE | standard deviation |
|--|---------------|-------|--------|------|------|--------------------|
| difference of elevation difference (HS _{Pléiades} minus HS _{ASO}) | 138.02 | +0.08 | +0.10 | 0.69 | 0.80 | 0.79 |
| difference of elevation SNOW OFF (DEM _{Pléiades} minus DEM _{ASO}) | 138.02 | +0.13 | +0.01 | 0.80 | 0.96 | 0.95 |
| difference of elevation SNOW ON ($DEM_{Pléiades}$ minus DEM_{ASO}) | 138.02 | +0.21 | +0.13 | 0.93 | 1.09 | 1.07 |



Fig S2. Snow-off DEMs difference (red), snow-on DEMs difference (black), HS difference (Pléiades minus ASO, white) against elevation (top), slope (middle) and aspect (bottom).

Fig S3. Location of the transect of snow depth of Fig. S4 seen on pan-chromatic image (© CNES 2017, Distribution Airbus DS), surface classification and Pléiades HS. White areas in HS are forest or stable terrain.









