SUPPLEMENTARY INFORMATION

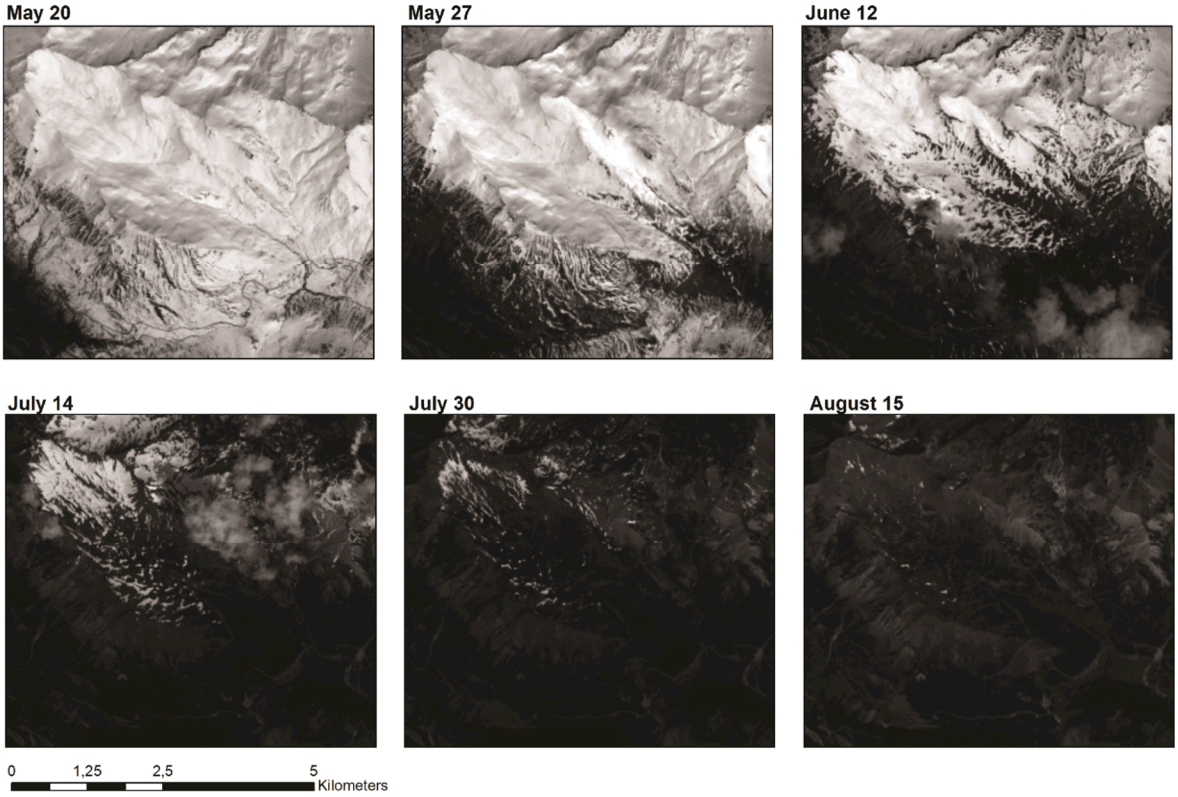


Figure S1. Landsat 8 scenes from 2013 cropped to the study area. Images are from the pancromatic band 8 (15m resolution).

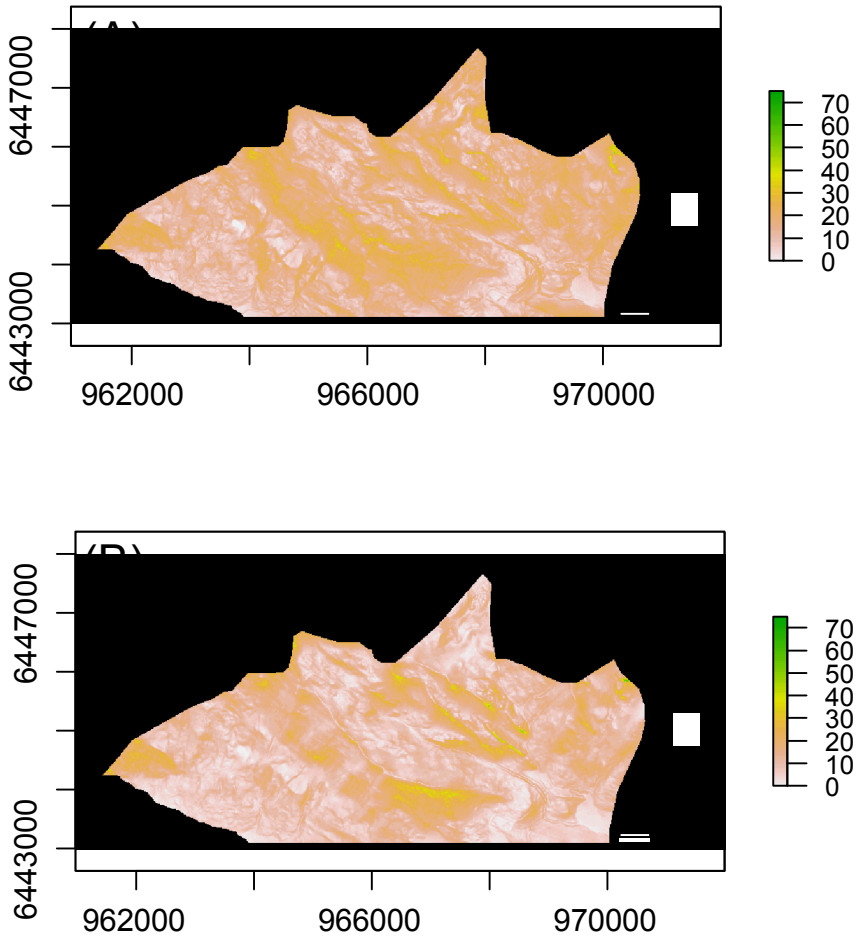


Figure S2. Combined slope and topographic position index maps derived for a 45m moving window (A) and for a 225m moving window (B).

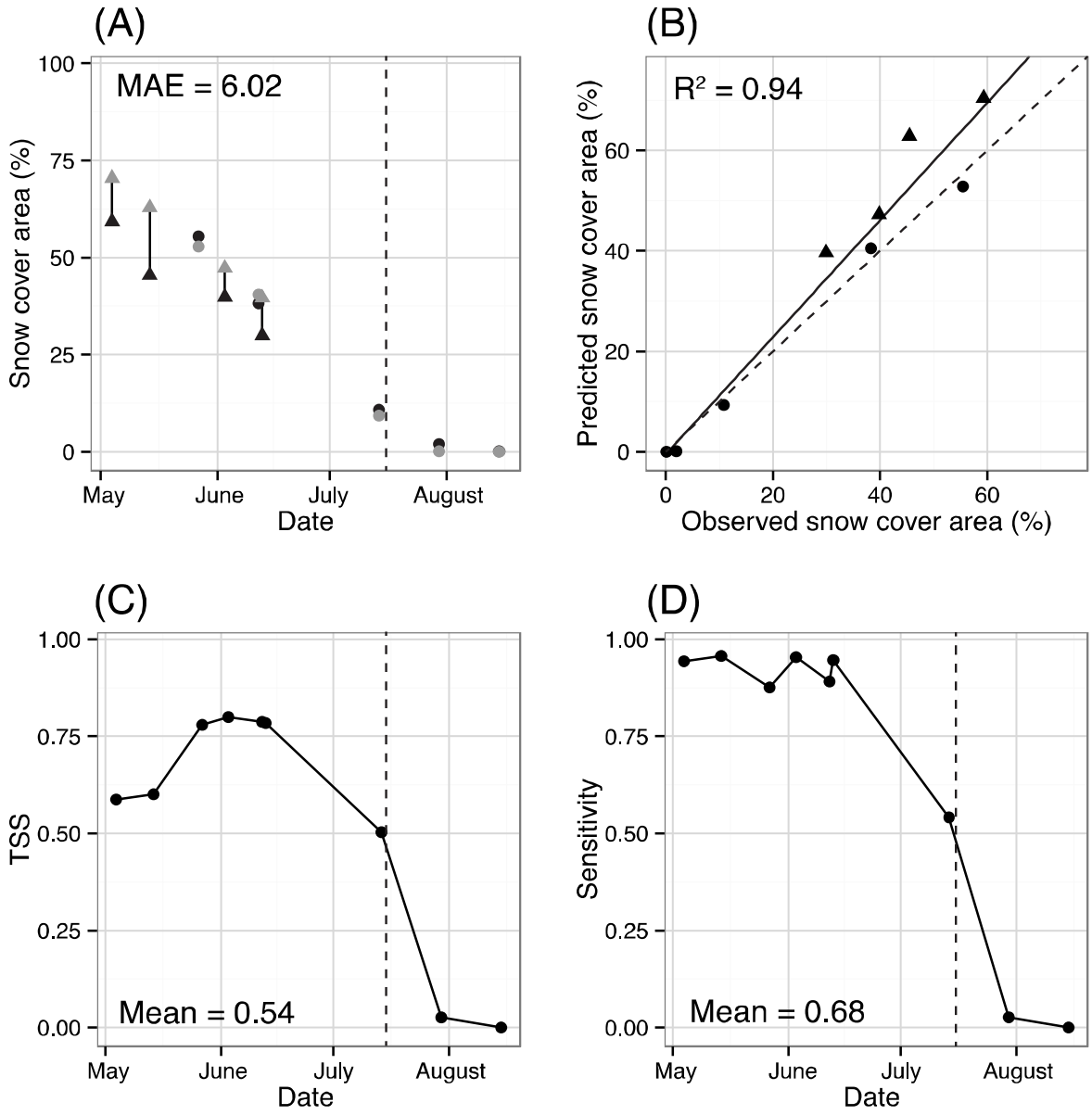


Figure S3. (A) Observed (black) and predicted (grey) snow cover area for 2013 Landsat and SPOT acquisition dates. MAE = mean absolute error; triangles correspond to SPOT 4 imagery, while circles correspond to Landsat 8. (B) Observed and predicted snow cover area estimates for the nine image acquisition dates. The dashed line indicates a perfect relationship, while the solid line shows the OLS best fit. (C) Agreement, estimated by the True Skill Statistic (TSS), between observed and predicted snow cover area maps. (D) Proportion of observed snow-covered pixels detected by the GAM model, as measured by Sensitivity. The dashed line in panels A, C and D corresponds to July 15.

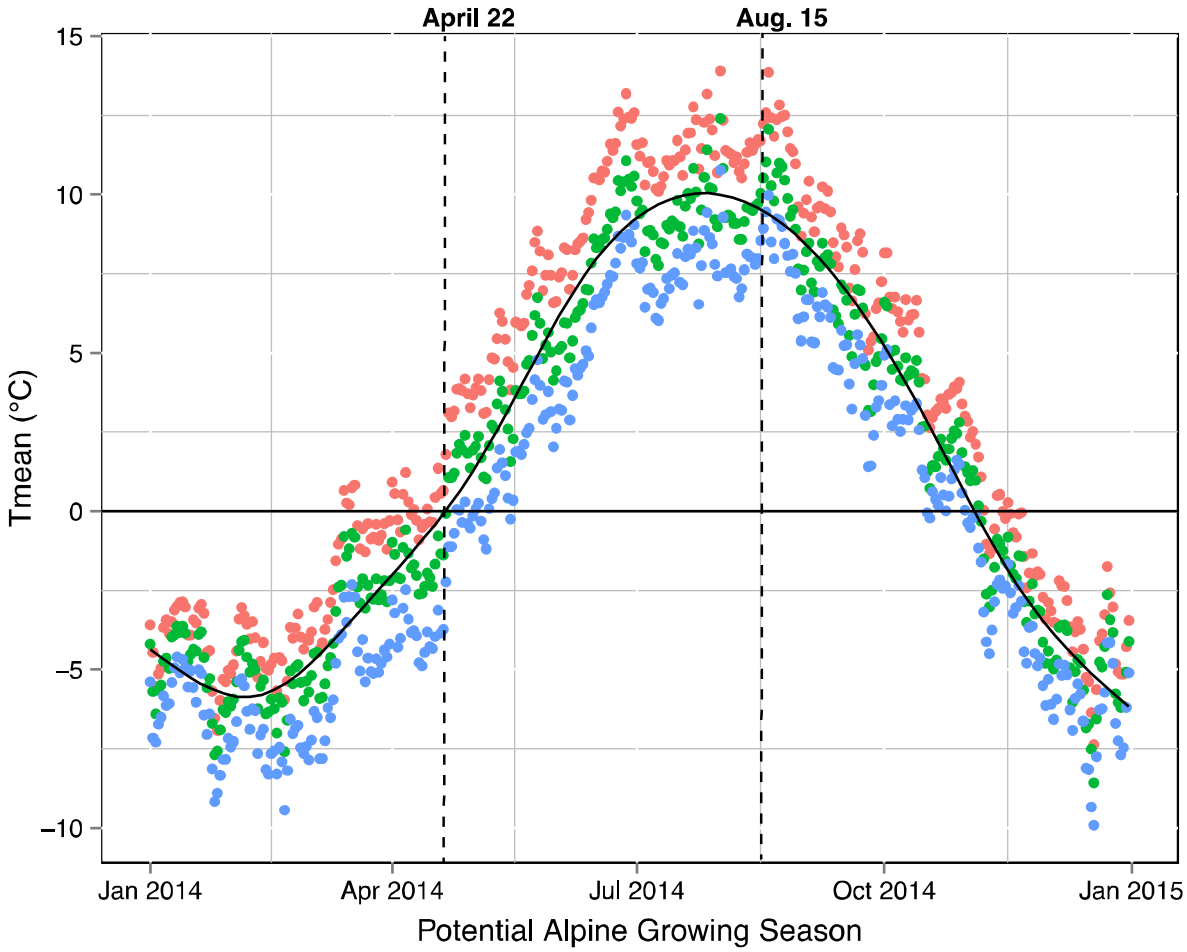
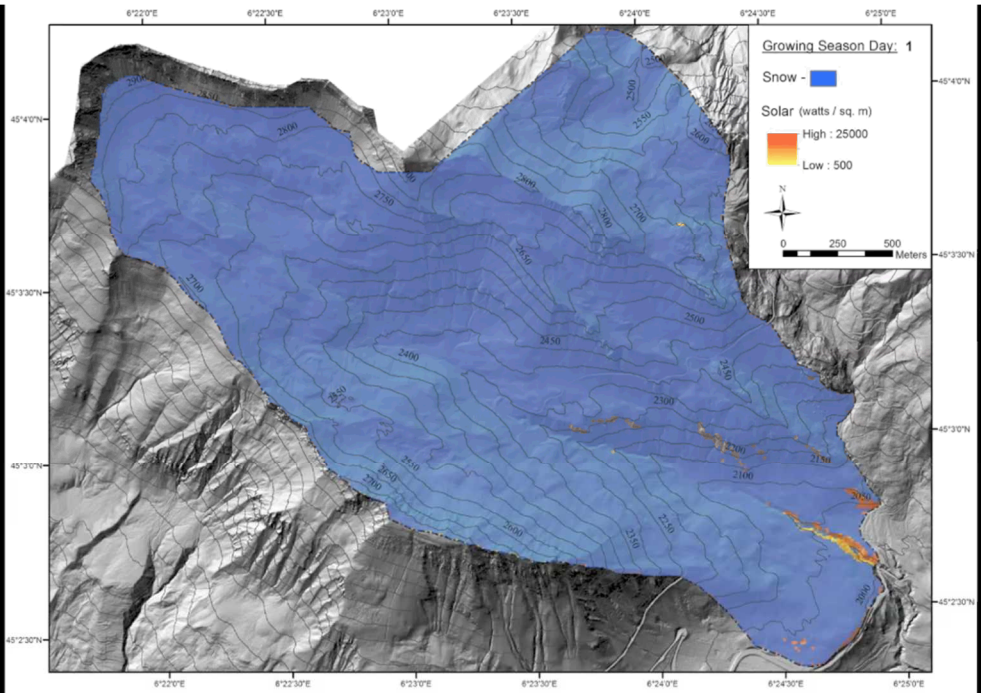


Figure S4. Daily mean air temperatures for the 2000-2013 period. Snowmelt timing and growing season energy gradients were estimated for calendar days falling between the two dashed vertical lines. Red points = 2100 – 2400 m a.s.l. ; green points = 2400 – 2700 m a.s.l; blue points = 2700 – 3000 m a.s.l. The trend line represents a smooth loess function.



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Video. Animation of daily snow melt combined with daily maps of solar radiation (growing season day 1 = April 22, 2013; growing season day 110 = August 10, 2013.