

Supporting Information for ”Surface runoff impact on ice dynamics varies with altitude and location”

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1. Figures S1 to S10

Introduction

The supporting information contains 11 figures that support the findings of the associated paper. We display information that is not paramount for the understanding of the results, but that provides information for the reader that wants more detail about the data used such as the velocity anomalies maps used in Figure S1, and the typical runoff signal in Figure S2 and S3 for all 9 years of the study. We also display in the main manuscript smoothed curves for all altitudes with varying altitude bins and chose to display bins of 100 m in the main manuscript as it is a compromise between not too many bins but without aggregating too much data. We display here in Figures S4a and S4b the smoothing curves for altitude bins of 25 m (requiring two separate figures), in Figure S5 altitude bins of 50 m, and in Figure S6 altitude bins of 200 m. Finally, we display in the

main manuscript all altitudes bins combined on the same plot for all basins but display smoothed curves separated by altitude only for Russel Gletscher. We display the other separated smoothed curves for 100 m altitude bins for the other 4 basins in Figures S7, S8, S9, and S10.

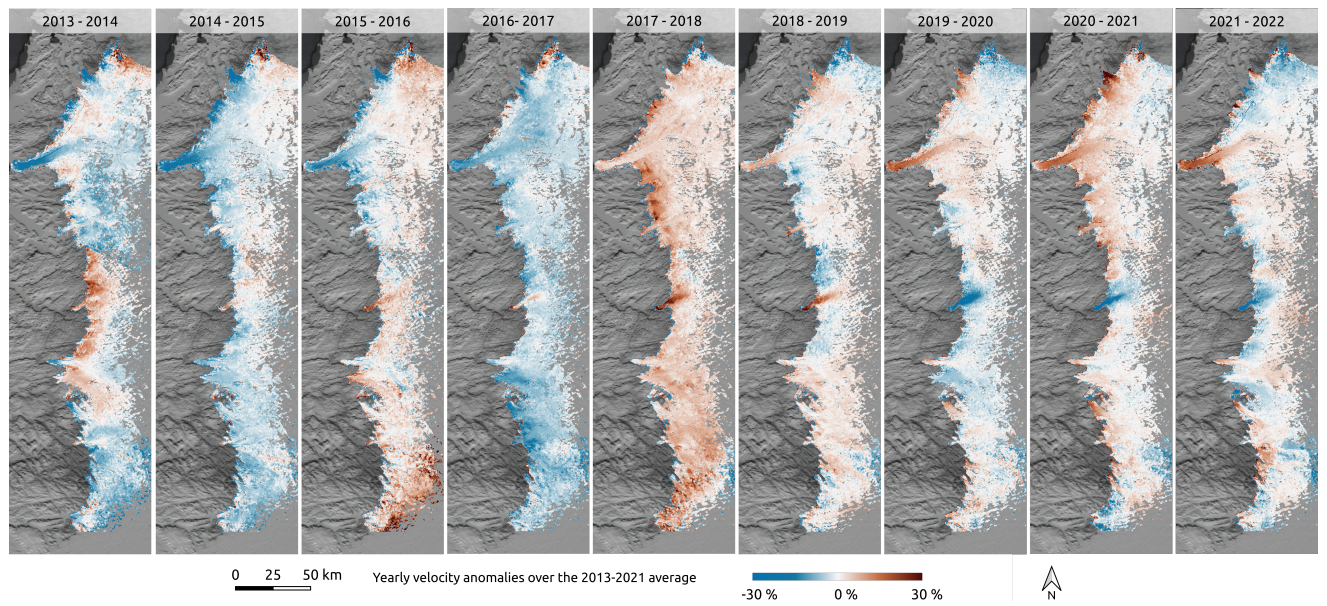


Figure S1. Yearly ice velocity anomalies map compared to the average over the 9 years.

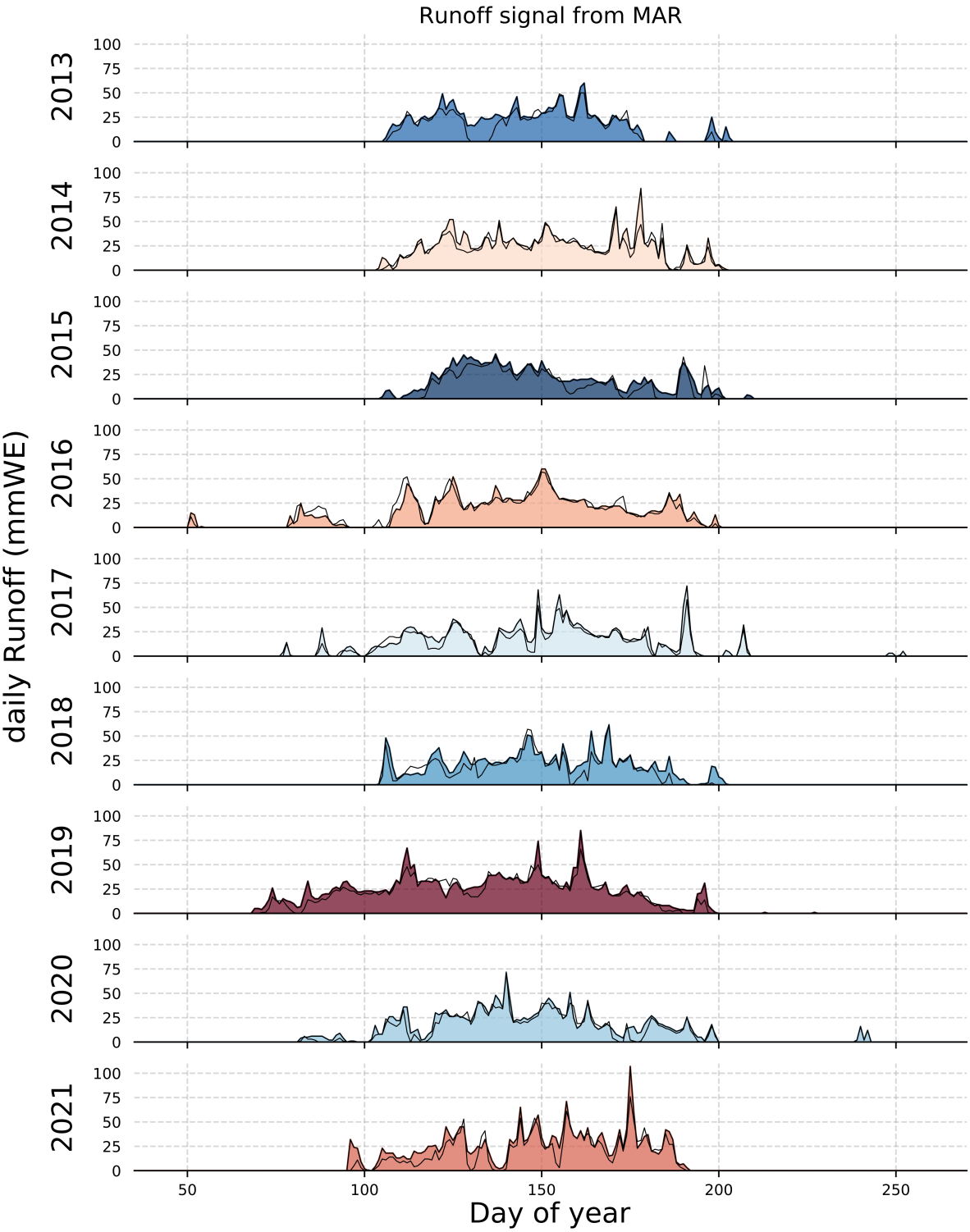


Figure S2. Daily runoff signal from MAR for all 9 years, representative of our area. We color each year of the daily runoff signal depending on how much the integrated melt on the given year is compared to the average over the 9 years. The thin black line is the signal at 1000 m.

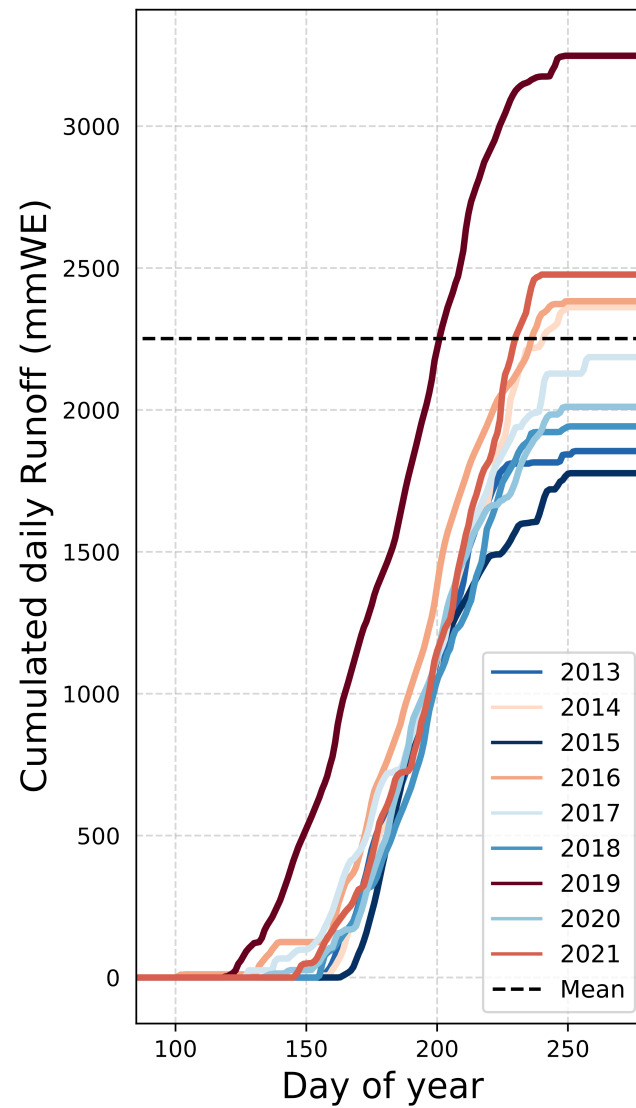


Figure S3. Daily cumulated runoff from MAR for all 9 years. We color each year of the daily runoff signal depending on how much the integrated melt on the given year is compared to the average over the 9 years.

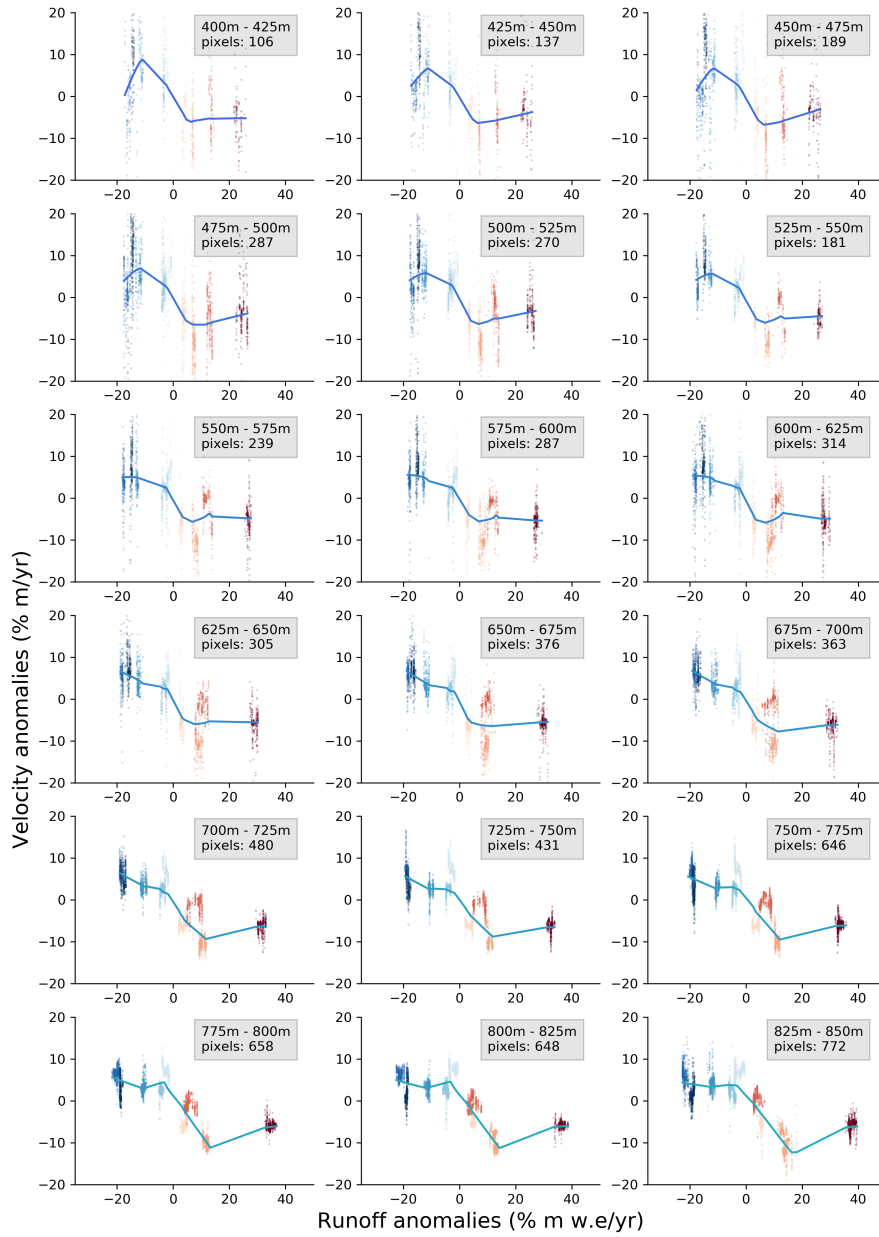


Figure S4a. Velocity anomalies against runoff anomalies over 2013-2021 for 25 m altitude bins for Russel Gletscher for altitudes between 400 m and 850 m. The colors indicate the year corresponding to the data. The color gradient is defined depending on the total runoff anomalies over the given year; negative anomalies are in shades of blue and positive anomalies are in shades of red. Solid lines indicate the statistical relationship between runoff and velocity anomalies (calculated using LOWESS).

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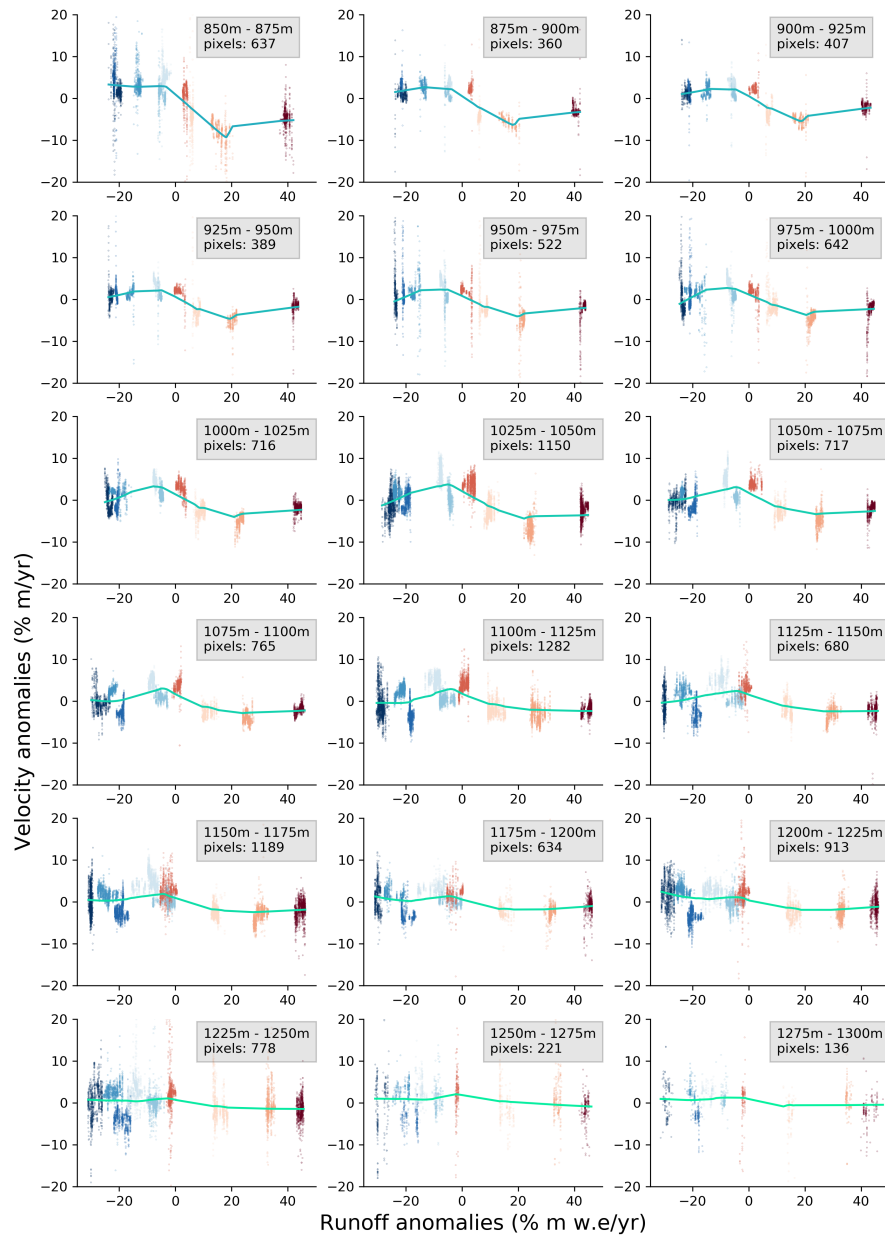


Figure S4b. Velocity anomalies against runoff anomalies over 2013-2021 for 25 m altitude bins for Russel Gletscher for altitudes between 850 m and 1300 m. Solid lines indicate the statistical relationship between runoff and velocity anomalies (calculated using LOWESS).

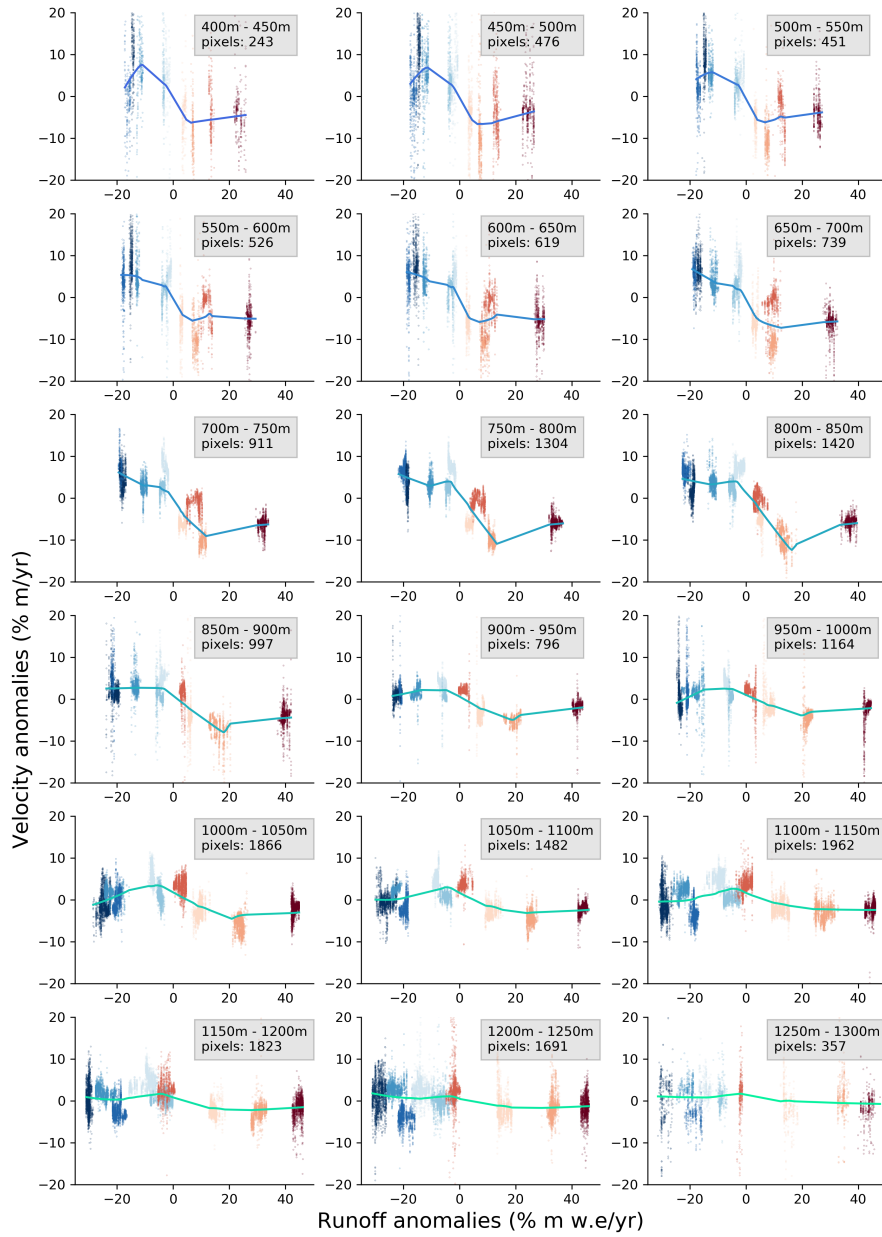


Figure S5. Velocity anomalies against runoff anomalies over 2013-2021 for 50 m altitude bins for Russel Gletscher. Solid lines indicate the statistical relationship between runoff and velocity anomalies (calculated using LOWESS).

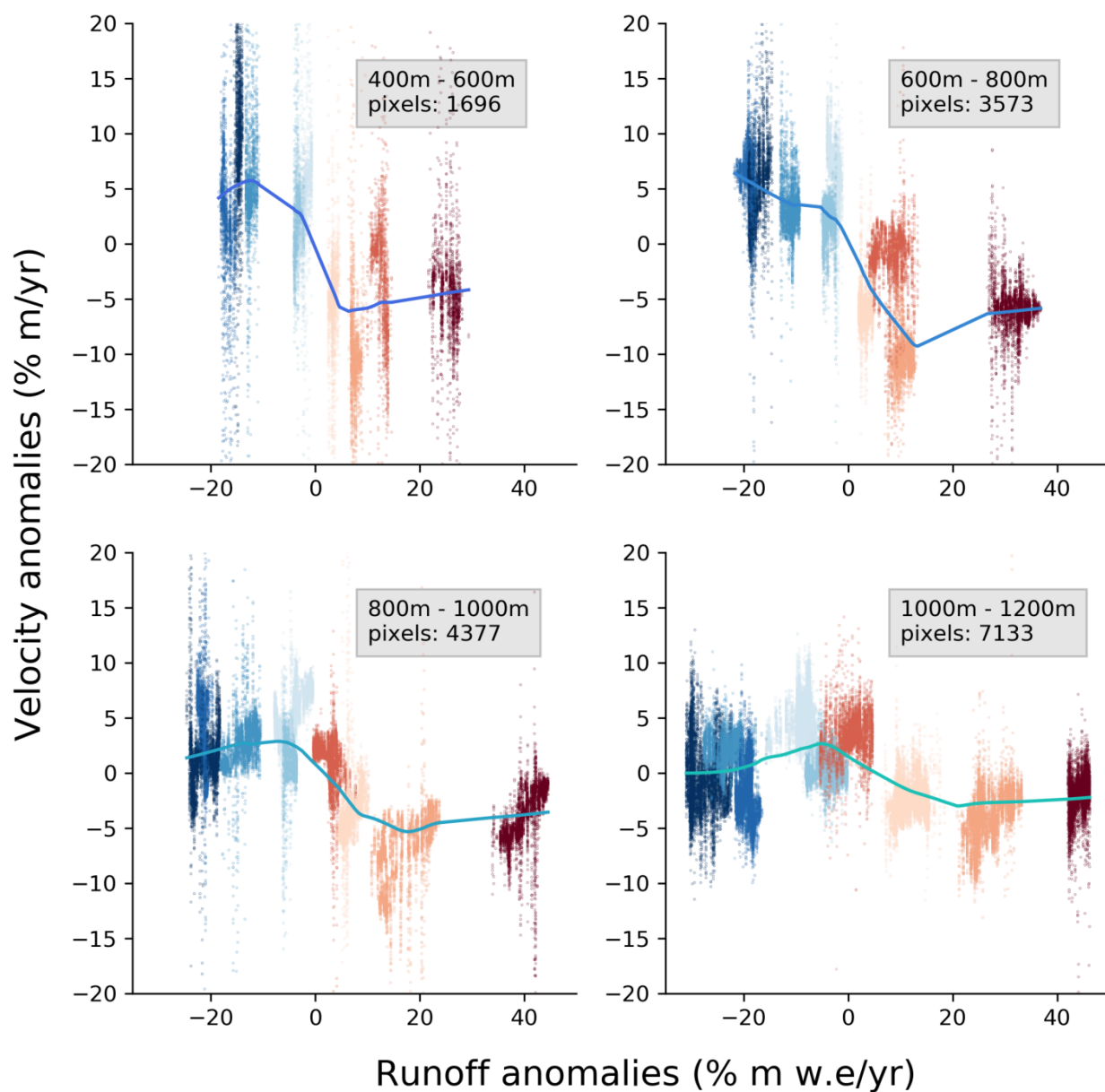


Figure S6. Velocity anomalies against runoff anomalies over 2013-2021 for 200 m altitude bins for Russel Gletscher. Solid lines indicate the statistical relationship between runoff and velocity anomalies (calculated using LOWESS).

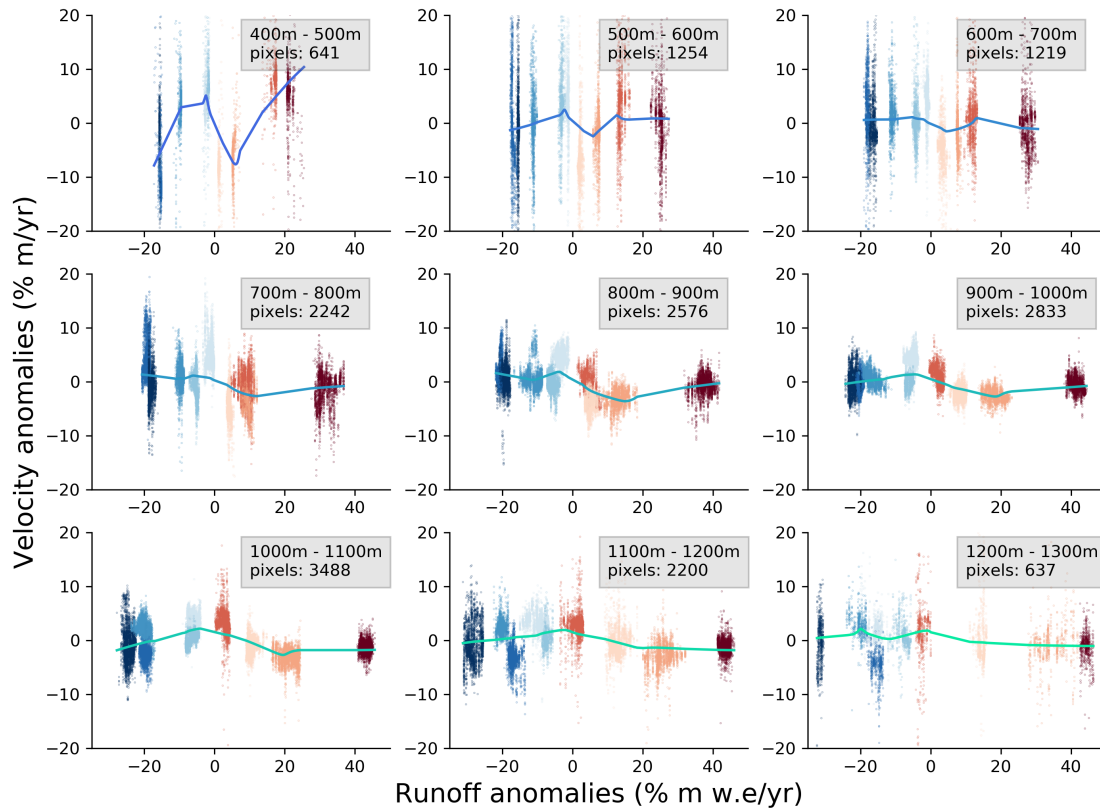


Figure S7. Velocity anomalies against runoff anomalies over 2013-2021 for 100 m altitude bins for Isunnguata Sermia. Solid lines indicate the statistical relationship between runoff and velocity anomalies (calculated using LOWESS).

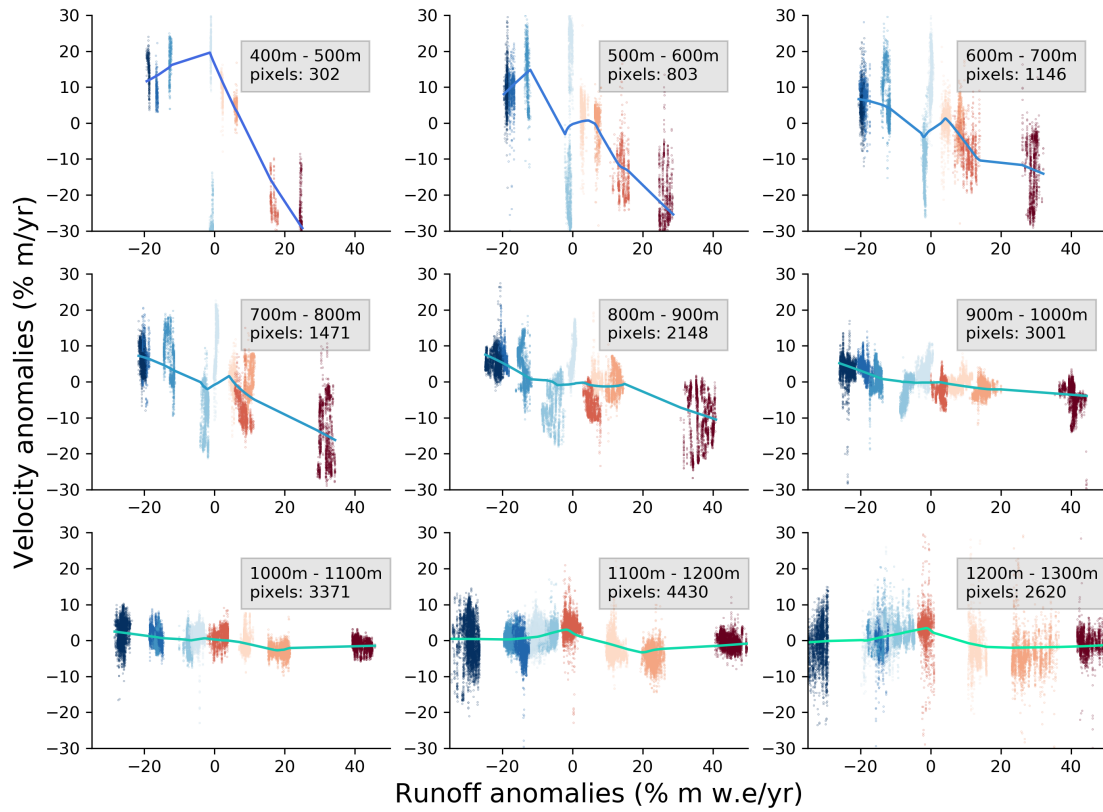


Figure S8. Velocity anomalies against runoff anomalies over 2013-2021 for 100 m altitude bins for Inuppaat Quuat. Solid lines indicate the statistical relationship between runoff and velocity anomalies (calculated using LOWESS).

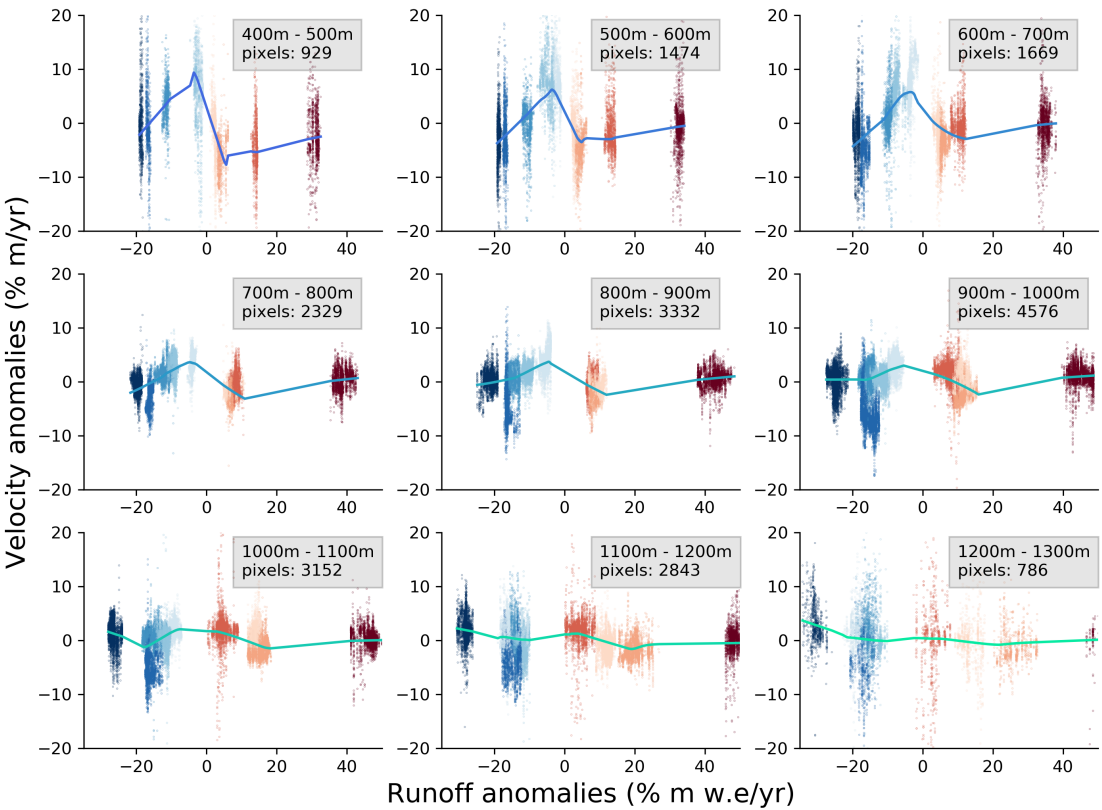


Figure S9. Velocity anomalies against runoff anomalies over 2013-2021 for 100 m altitude bins for Usulluup Sermia. Solid lines indicate the statistical relationship between runoff and velocity anomalies (calculated using LOWESS).

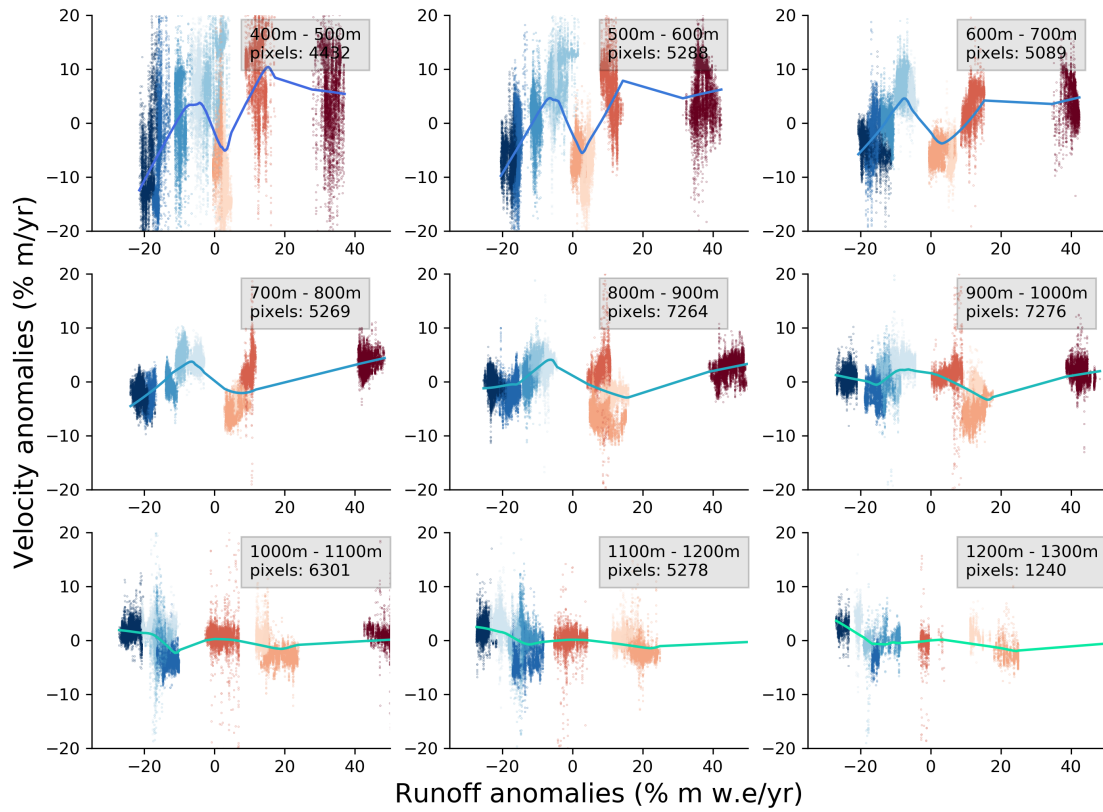


Figure S10. Velocity anomalies against runoff anomalies over 2013-2021 for 100 m altitude bins for Nordenskiöld Gletscher. Solid lines indicate the statistical relationship between runoff and velocity anomalies (calculated using LOWESS).