

## Patterns of Ice Retreat – Dr Adrian Palmer

### Summary

In the short-video presentation, we explore the importance of glacial systems as stores of water and how they sustain societies within their immediate catchment. There is a need to better understand the current store of water within glacier systems and better understand their behaviour in relation to abrupt climate change, particularly as long-term glacier retreat caused by melting leads to rising sea level, which is one of the major global challenges in the present and near future. Understanding the rate of glacier retreat in the past provides crucial evidence for predicting how glacial systems will evolve in the short-term where the climate is warming and how this will impact societies e.g. glacial geohazards. The talk discusses mass balance in glacial systems where positive mass balance is likely to be linked to accumulation exceeding ablation and negative mass balance where ablation is greater than accumulation. The climatic causes of changes in mass balance are discussed as the balance between accumulation (precipitation) and ablation (temperature).

The second part of the lecture explains how records of glacier retreat are constructed using different records of glacier extent. We use the case study of the Mer de Glace (France) record and explore how periods of maximum glacier extent (positive mass balance) appear to be linked to the Little Ice Age, a period of reduced temperatures during the 16<sup>th</sup> to 19<sup>th</sup> Centuries and a switch to negative mass balance during the 20<sup>th</sup> Century and early 21<sup>st</sup> Century, perhaps as temperatures recover after the Little Ice Age and through human-induced warming.

Two exercises are provided to give practical experience of constructing glacier retreat records: the first looks at four records from Switzerland spanning the 20<sup>th</sup> Century and explores the consistency of the retreat rates in a single area. The second practical looks at two glaciers with several centuries of glacier retreat recorded. Again the students can examine the consistency between the two records, consider the mass balance characteristics in different time periods and the rates of advance and retreat. Finally they can also explore the links to the downturn in temperatures during the Little Ice Age.

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