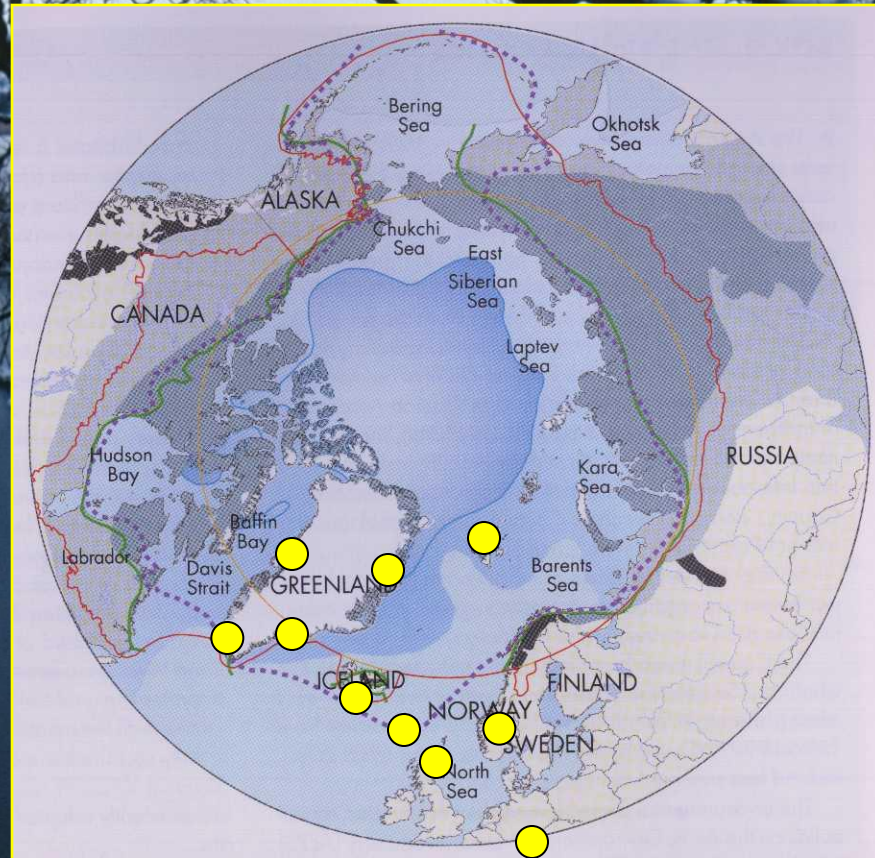


A wide-angle photograph of a glacier flowing through a mountain range towards a body of water under a blue sky with wispy clouds. The glacier is the central focus, appearing as a large, white, textured mass. The mountains are dark and jagged, with patches of snow. The water in the foreground is a calm, greyish-blue.

GEO-4410
Glacial and periglacial geomorphology
Autumn 2009

Introduction





Westliche Karwendelspitze

Birkkarspitze
2749 m

wald

Hoher Gleirsch
2492 m

Praxmarerarkarspitze
2838 m

Großer Lafatscher
2696 m

Brandjochspitze
2599 m

Rumer Spitze
2454 m

Frau Hitt Sattel

Langer Sattel

Klettersteig 5

Hafelekarspitze
2334 m

Pfeishütte
1922 m

AV 221/222

AV 222

AV 215

AV 219

AV 218

Frau Hitt Wartel

Hafelekar
2269 m

Kreuzjoch
2121 m

AV 217

Frau Hitt Wartel
1982 m

Seegrube
1905 m

AV 217

AV 218

Höttinger Alm
1487 m

Bodensteinalm
1661 m

AV 216

AV 218

chhütte
84 m

Achselbodenhütte
1645 m

AV 215

AV 216

AV 216

Vintlalm
1967 m

AV 218

Höttinger Graben

AV 215

AV 216

AV 217/218

Rumer Alm
1243 m

AV 218

hütte
84 m

Rauschbrunnen
1088 m

AV 220

Höttinger Bild
305 m

Gramart

AV 216

Arzler Alm
1067 m

Enzianhütte

AV 218

phof

AV 220

Höttinger Bild
305 m

Gramart

AV 216

Arzler Alm
1067 m

Enzianhütte

AV 218

phof

AV 220

Höttinger Bild
305 m

Gramart

AV 216

Hungerburg
868 m

Enzianhütte

AV 218

phof

AV 220

Höttinger Bild
305 m

Gramart

AV 216

Alpenzoo

Enzianhütte

AV 218

phof

AV 220

Höttinger Bild
305 m

Gramart

AV 216

Alpenzoo

Enzianhütte

AV 218

phof

AV 220

Höttinger Bild
305 m

Gramart

AV 216

Alpenzoo

Enzianhütte

AV 218

phof

AV 220

Höttinger Bild
305 m

Gramart

AV 216

Alpenzoo

Enzianhütte

AV 218

phof

AV 220

Höttinger Bild
305 m

Gramart

AV 216

Alpenzoo

Enzianhütte

AV 218

phof

AV 220

Höttinger Bild
305 m

Gramart

AV 216

Alpenzoo

Enzianhütte

AV 218

Hötting

Arzl

Rum

Inn

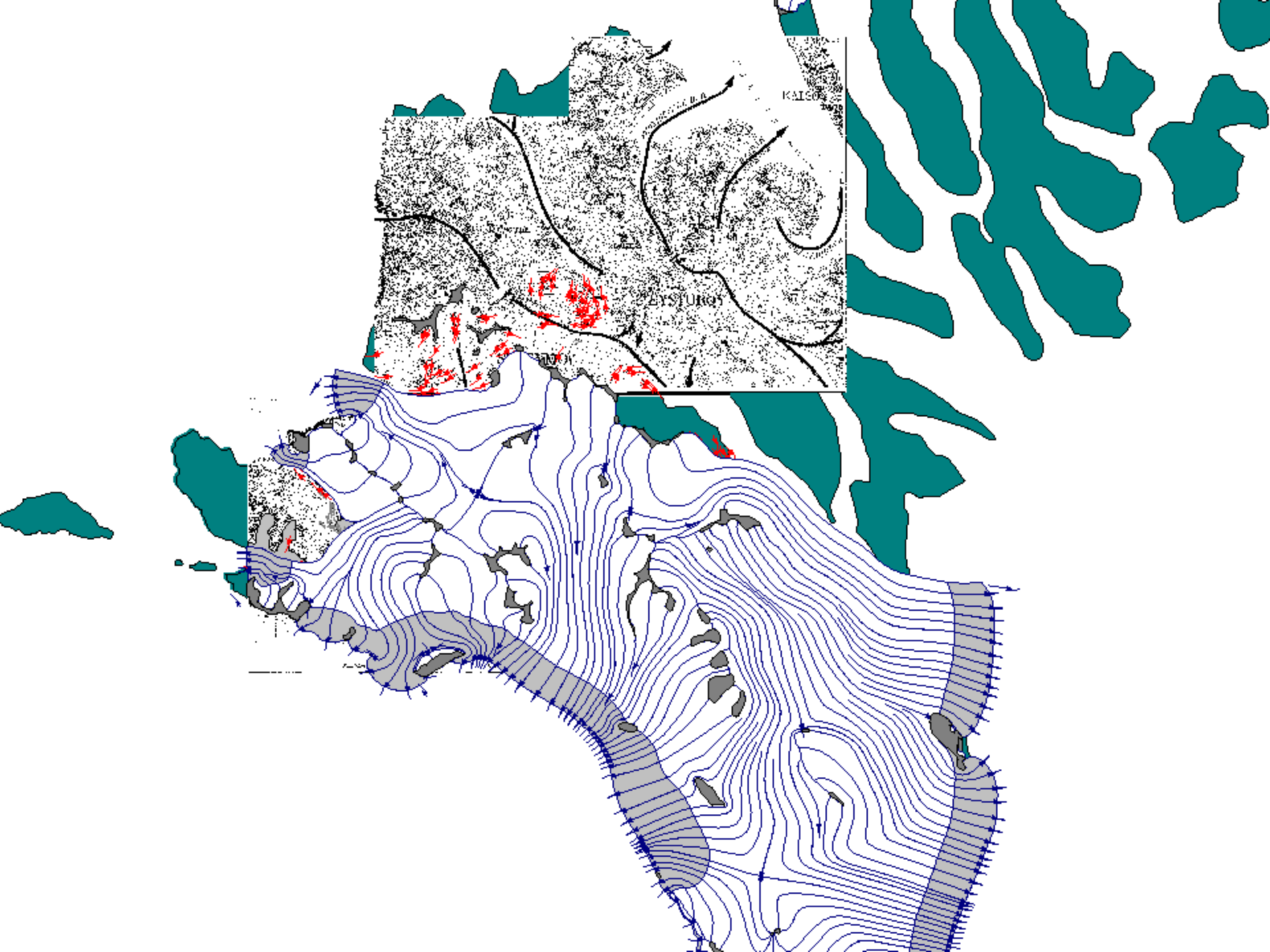
Innsbruck

Schloß Ambras















Glacial and periglacial geomorphology

Content ?





What do you expect to learn from this course ?

Main weekly structure :

- 1 hour lectures
- 2 hour seminar/discussion
 1. Presentation of paper (objective)
 2. Discussion (pro et contras)
 3. The road ahead (what should be done?)

Matthews, J. A. (2005). "'Little Ice Age' glacier variations in Jotunheimen, southern Norway: a study in regionally controlled lichenometric dating of recessional moraines with implications for climate and lichen growth rates."

Holocene 15(1): 1-19.

A new approach to regional lichenometric dating is developed and applied to 'Little Ice Age' moraine- ridge sequences on 16 glacier forelands in Jotunheimen, southern Norway. Lichenometric- dating curves, based on the *Rhizocarpon* subgenus, are constructed independently for west, central and east Jotunheimen. Although there are differences between the subregions, a composite regional moraine chronology for Jotunheimen identifies 12 episodes of moraine formation in AD 1743 - 1750 (the regional ' Little Ice Age ' glacier maximum), 1762 - 1771, 1782 - 1790, 1796 - 1802, 1811 - 1818, 1833 - 1838, 1845 - 1854, 1860 - 1868, 1871 - 1879, 1886 - 1898, 1915 - 1922 and 1927 - 1934. Spatial and temporal patterns in glacier behaviour between the subregions and between Jotunheimen and the neighbouring Jostedalsgreen are explained in terms of the interaction of annual to decadal variations in summer temperature and winter precipitation: glacier advances and moraine- formation events driven primarily by winter- precipitation variations exhibit subregional patterns while summer- temperature forcing affects more synchronous glacier behaviour across the region. Regionally controlled lichenometric dating improves the accuracy of dating by up to about +/- 20 years on relatively old moraines and is dependent on regional patterns in the rate of lichen growth. On relatively young surfaces, mean cumulative growth rate declines from about 0.75 mm yr⁻¹ in maritime west Jotunheimen to about 0.55 mm yr⁻¹ in continental east Jotunheimen (though the differential in growth rate is less on older surfaces).

**Riseborough, D., N. Shiklomanov, et al. (2008). "Recent advances in permafrost modelling."
Permafrost and Periglacial Processes 19(2): 137-156.**

This paper provides a review of permafrost modelling advances, primarily since the 2003 permafrost conference in Zurich, Switzerland, with an emphasis on spatial permafrost models, in both arctic and high mountain environments. Models are categorised according to temporal, thermal and spatial criteria, and their approach to defining the relationship between climate, site surface conditions and permafrost status. The most significant recent advances include the expanding application of permafrost thermal models within spatial models, application of transient numerical thermal models within spatial models and incorporation of permafrost directly within global circulation model (GCM) land surface schemes. Future challenges for permafrost modelling will include establishing the appropriate level of integration required for accurate simulation of permafrost-climate interaction within GCMs, the integration of environmental change such as treeline migration into permafrost response to climate change projections, and parameterising the effects of sub-grid scale variability in surface processes and properties on small-scale (large area) spatial models. Copyright (c) 2008 John Wiley & Sons, Ltd.