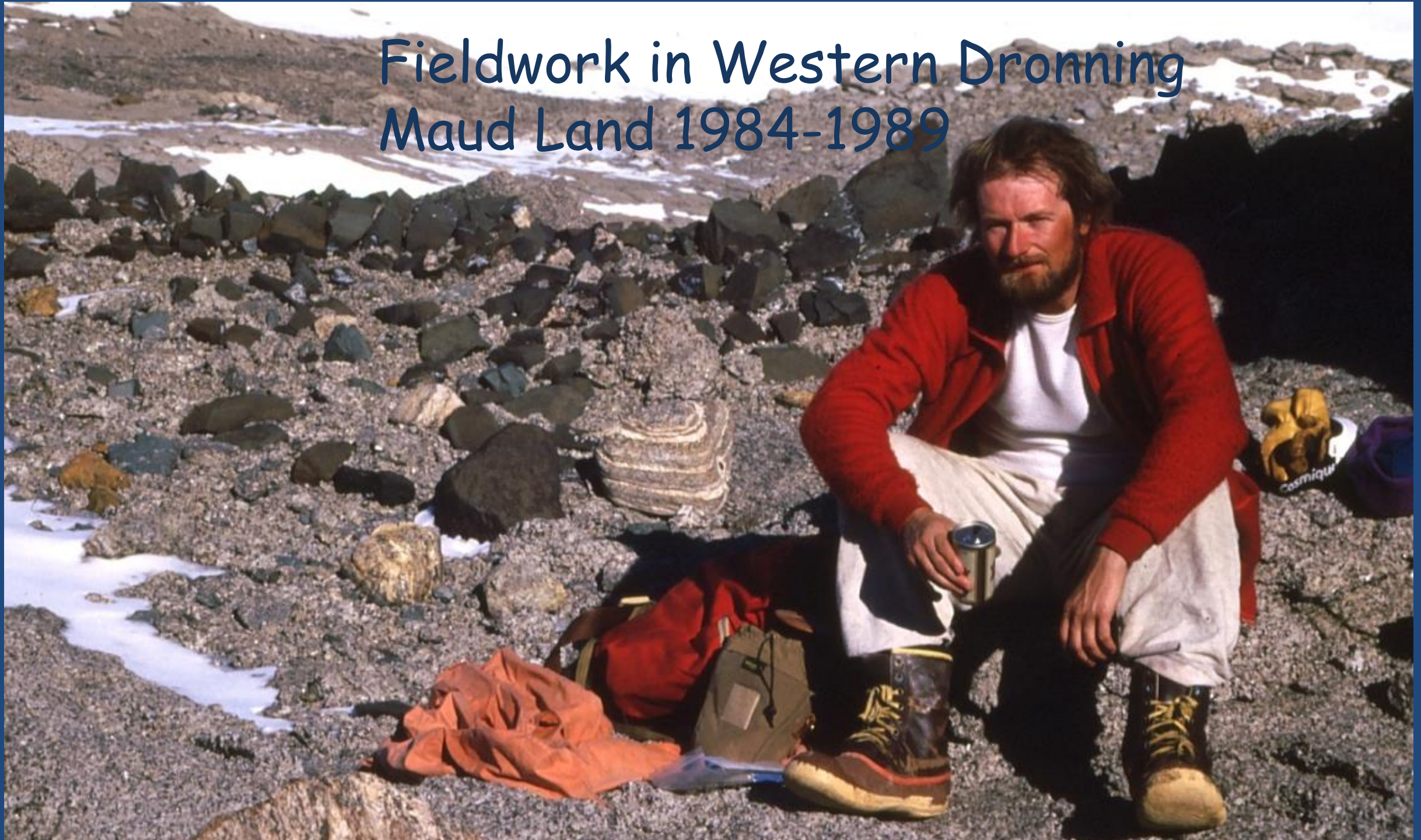


Doing geology in Antarctica



Fieldwork in Western Dronning Maud Land 1984-1989

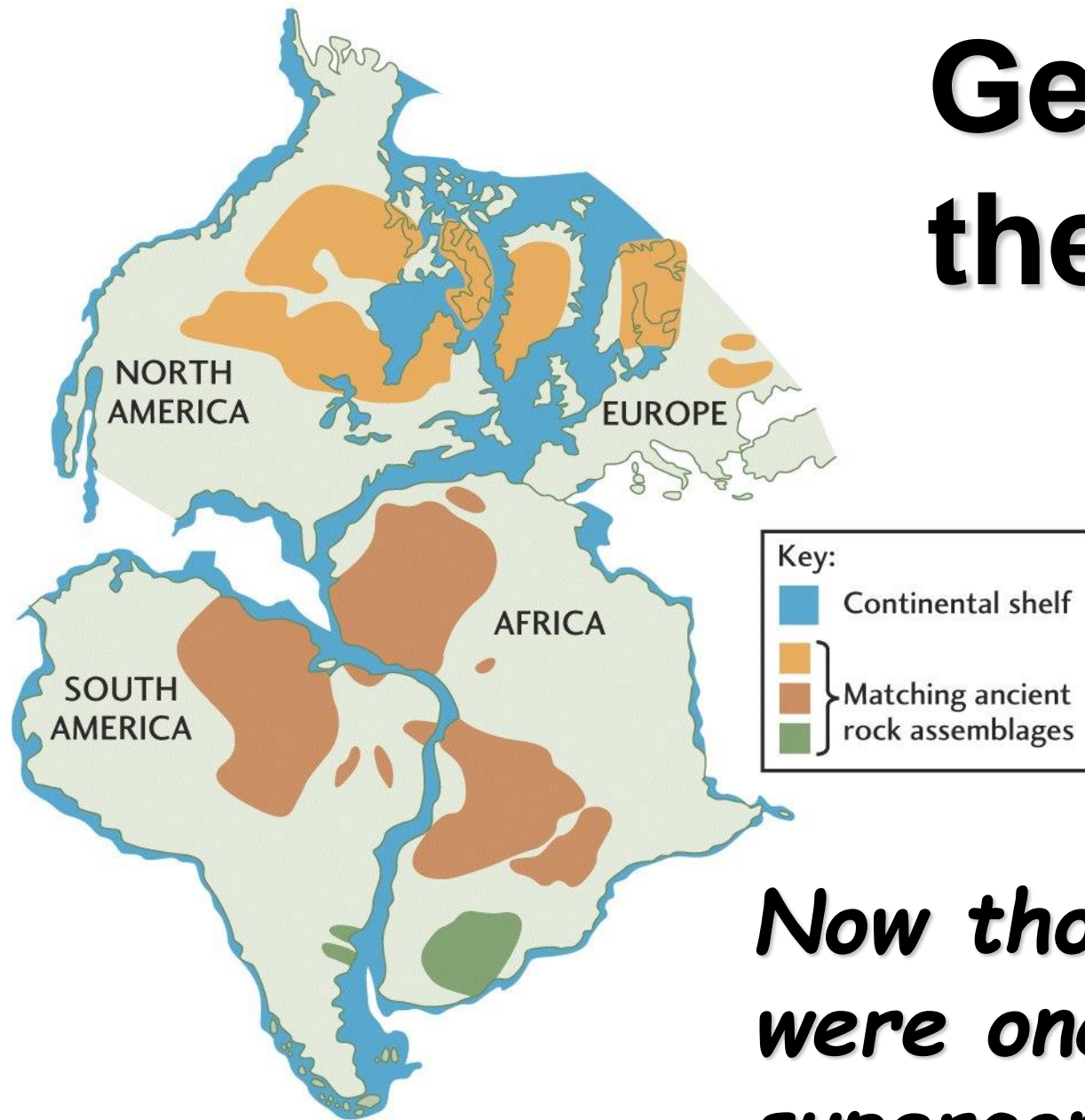


Continental Drift

The concept that large-scale horizontal movements of the outer portions of the Earth are responsible for the major topographical features such as mountains and ocean basins.

Proposed by Alfred Wegner in 1912 based on his observation of drifting sheets of ice.

Geographic Fit of the Continents



One of the first pieces of evidence used to argue for continental drift

Now thought that all continents were once together in a single supercontinent called Pangea

OUR WANDERING CONTINENTS

AN HYPOTHESIS OF CONTINENTAL
DRIFTING

BY
ALEX. L. DU TOIT, D.Sc., F.G.S.

WITH 48 DIAGRAMS

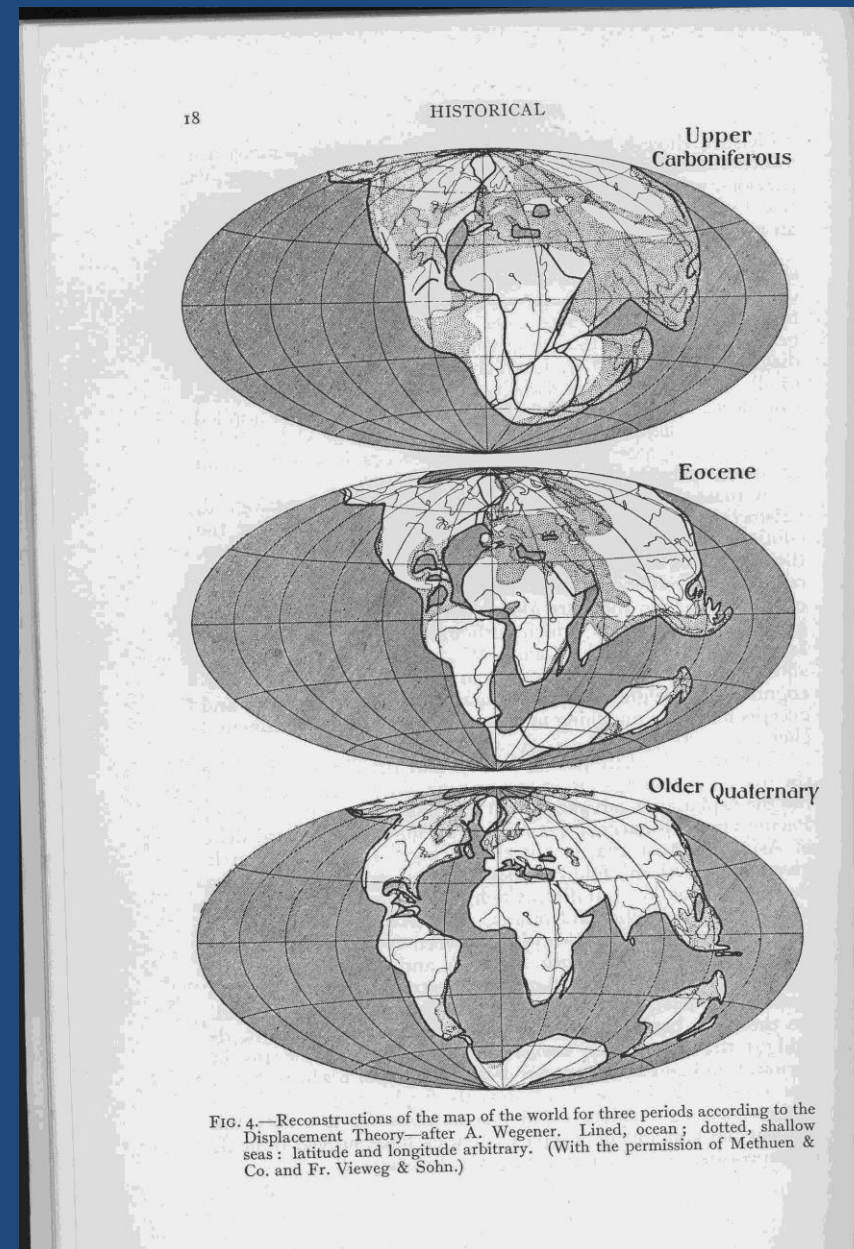
"Africa forms the Key"

OLIVER AND BOYD
EDINBURGH: TWEEDDALE COURT
LONDON: 33 PATERNOSTER ROW, E.C.
1937



AL Du Toit

1878-1948



Historical context

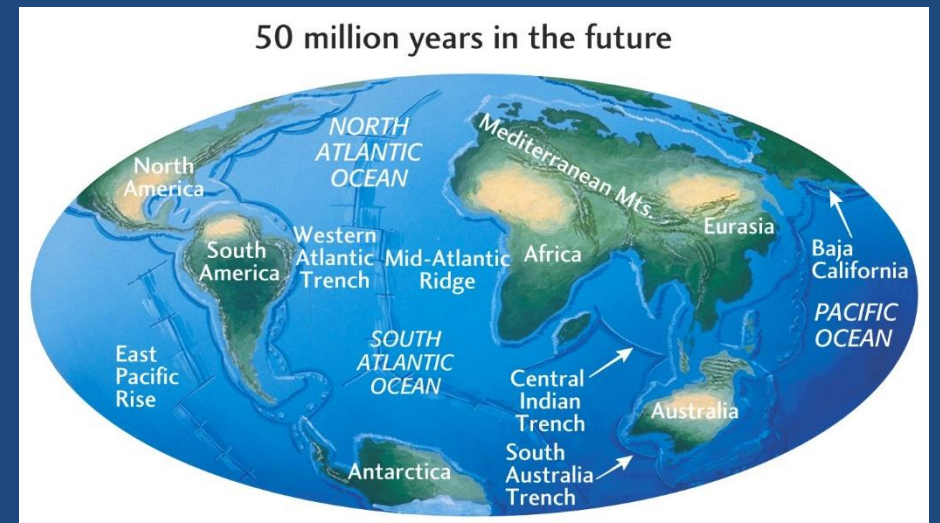
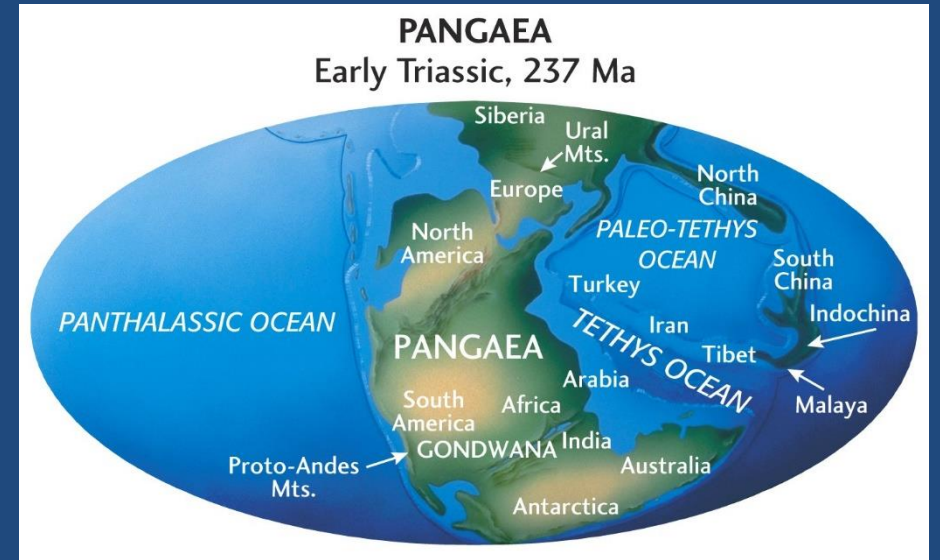
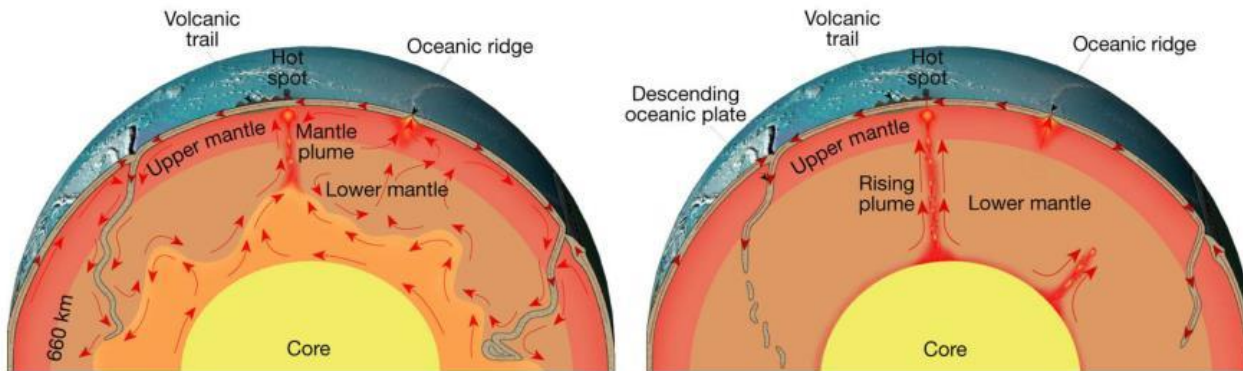
"Only du Toit continued to amass further evidence. In fact, a sort of polarization occurred; through du Toit's efforts it remained quite respectable in the Southern Hemisphere to profess oneself a supporter of continental drift whereas in the Northern Hemisphere one would have been exposed to ridicule"

"Arthur Holmes, a professor of geology at Edinburgh University pointed out that the lack of a driving force was hardly sufficient grounds to scuttle the entire concept."

The mechanism

Past and future

Mantle Convection Models



Getting there





Pack ice from
about 60°S

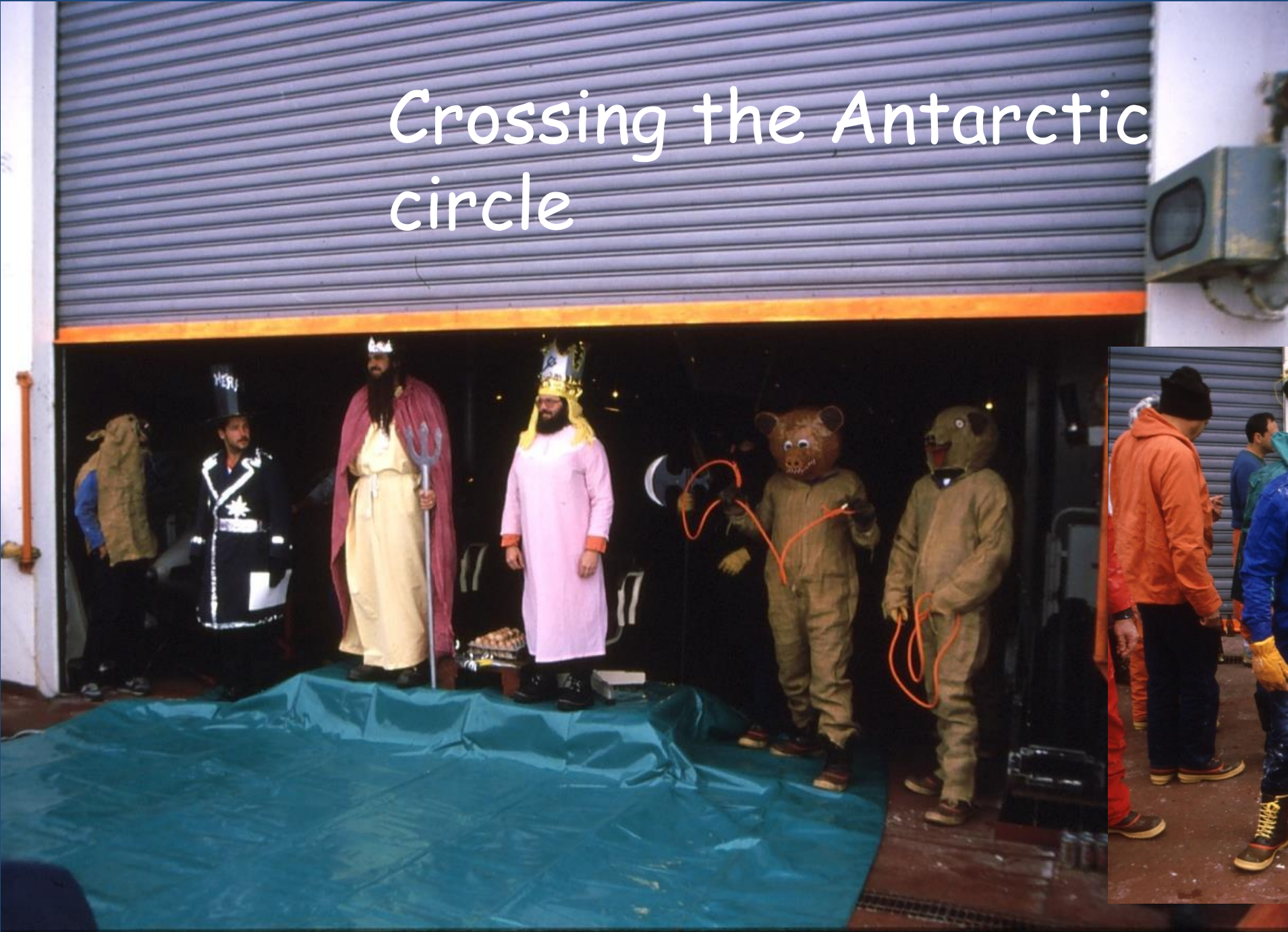




Small, illegible text on a piece of paper pinned to the wall.

Clifton
Beer

Crossing the Antarctic circle



Arrival





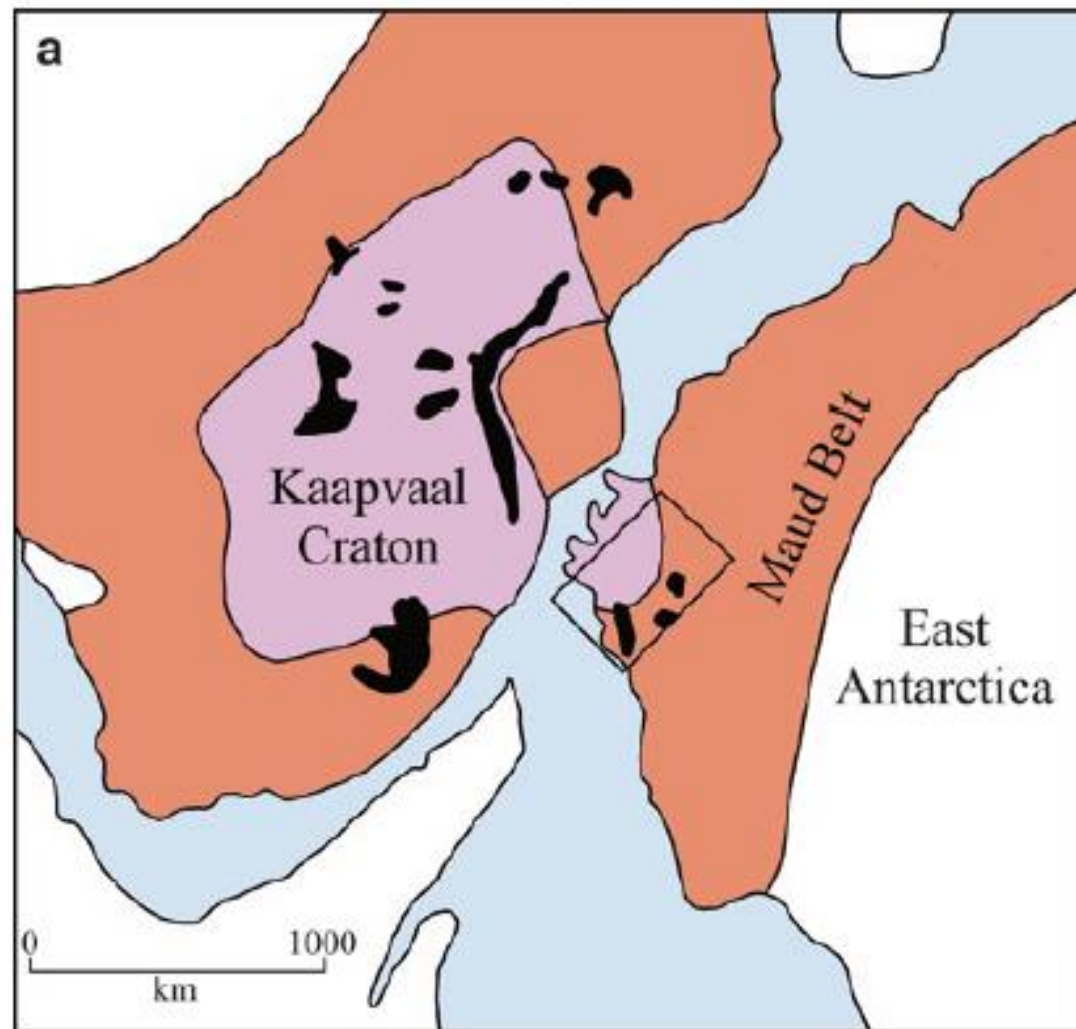




Gondwana before the Break-up



Africa



Queen Maud Land

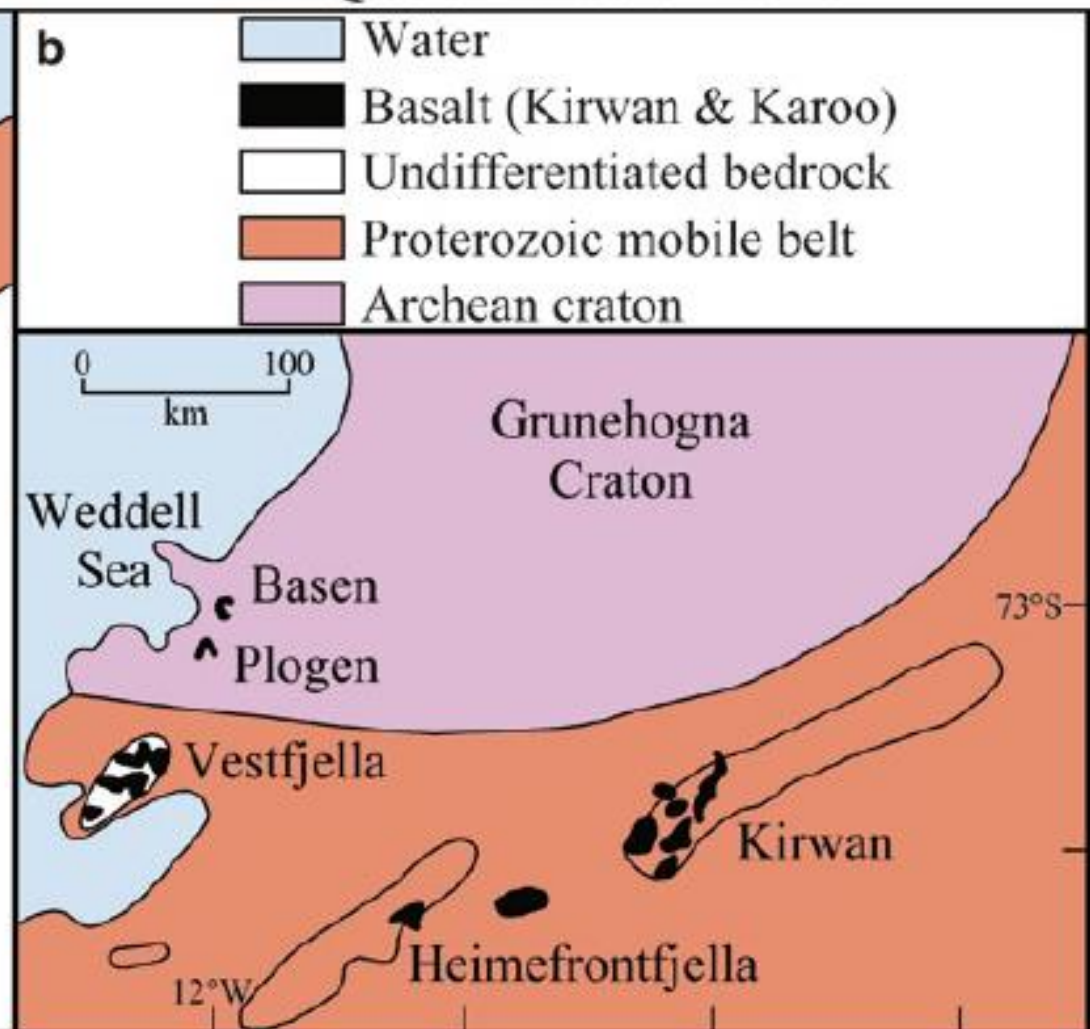
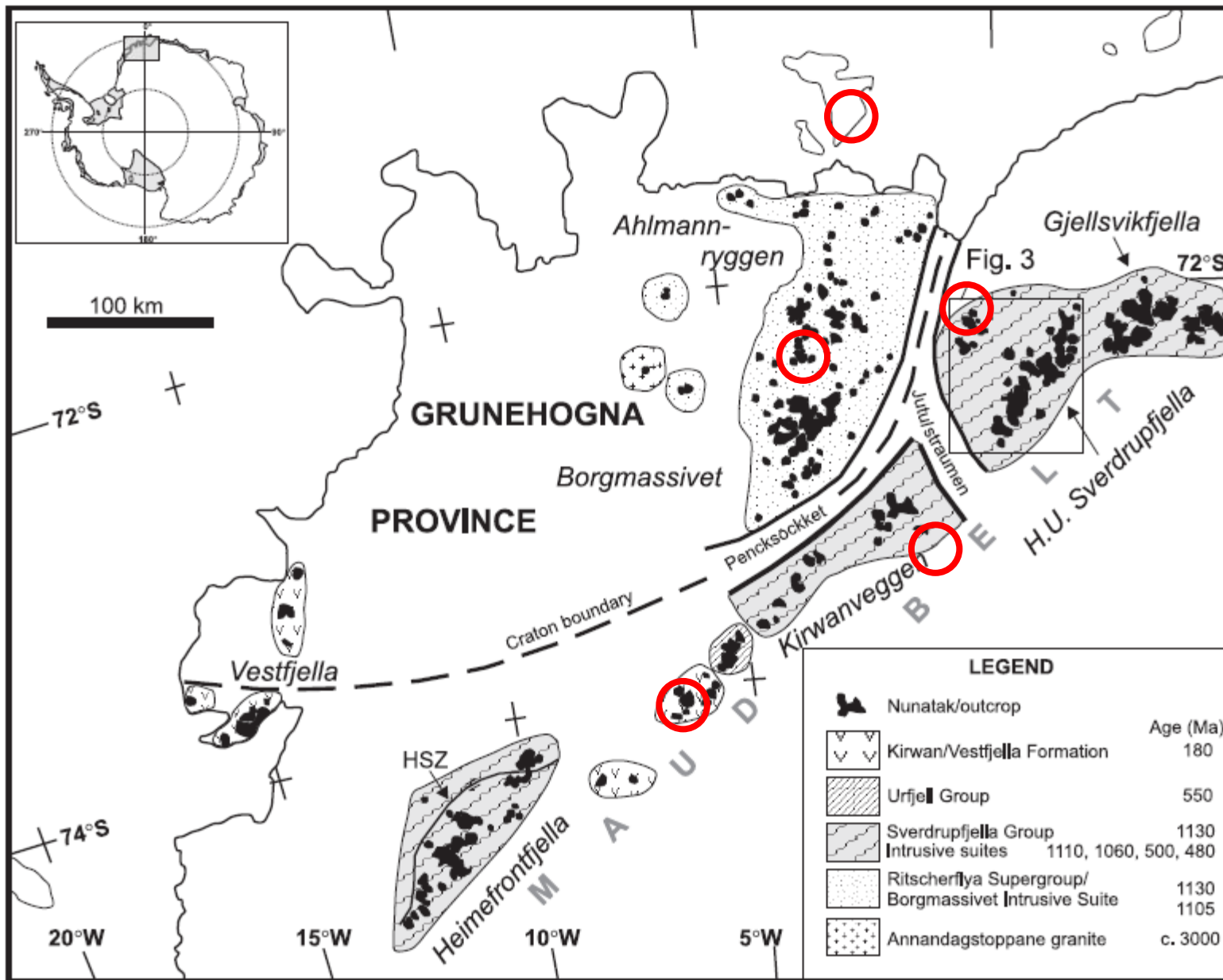


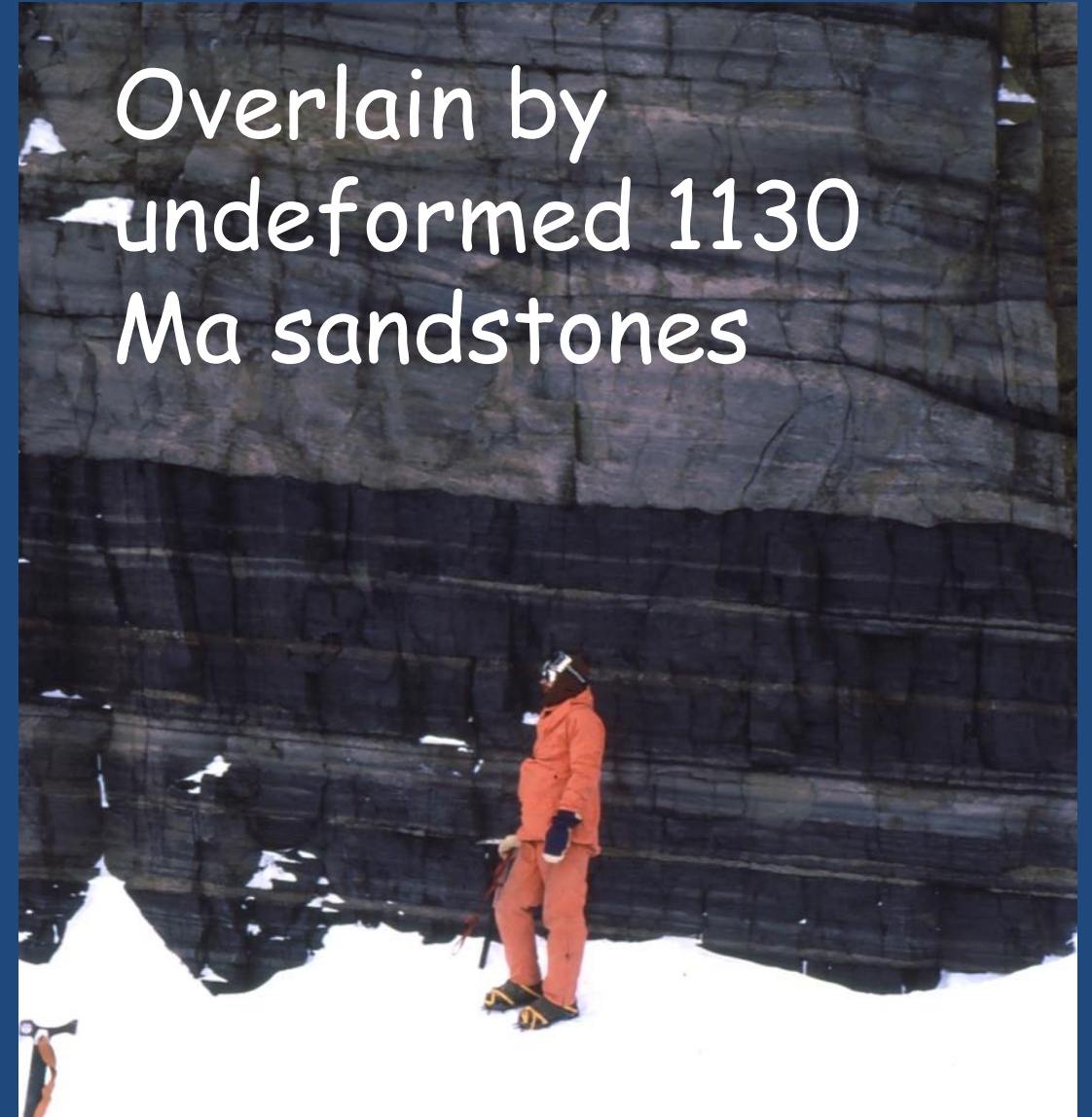
Fig. 14.16 (a) The Archean gneisses of the Grunehogna craton in Queen Maud Land of East Antarctica are an extension of the Kaapvaal craton of southern Africa when both are restored to the positions they occupied when the Kirwan Basalt and the Karoo

Basalt were extruded during the Jurassic Period. (b) The continental flood basalts of the Kirwan Volcanics are exposed on the nunataks of Plogen and Basen which continue the northeasterly trend of the nunataks of Vestfjella (Adapted from Luttinen et al. (1998))



Grunehogna 'Craton' is the oldest part of Antarctica

Oldest rocks are the Annandagstoppane granite , 3067 million years old



Once there, what is it like? SANAE IV Base in 1985



German base - Georg von Neumayer (200 km E
of SANAE IV)







POLARSTERN



Grunehogna base









How granite
magmas are
emplaced

Magma (pink)
rises up and
encounters the
sandstone
(layers). The
magma is less
dense and the
sandstone
sinks down into
the magma.
This is called
'stoping'

Transport









Overland deployment







Beware of windscoops

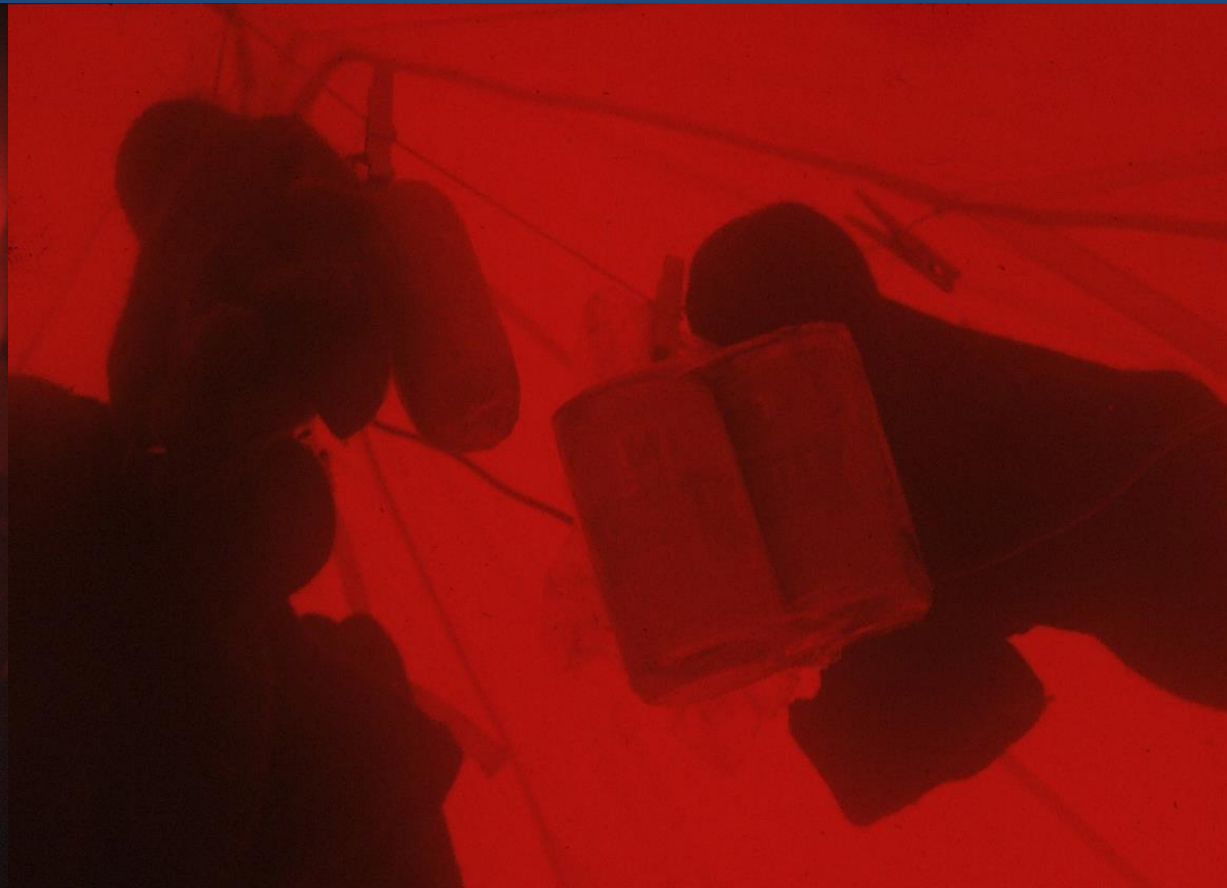


Living in the field





Accommodation in the field - radio, paraffin stove very important, top part of the tent is warm provided the sun shines on the tent



Cuisine - diet depended on who in the organisation chose the food.
These steaks were liberated from an underground store buried 25 years before

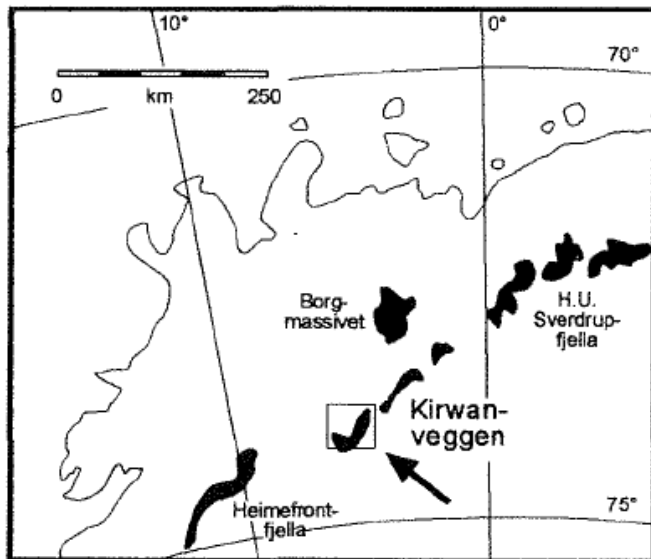


Washing?



Toilet?

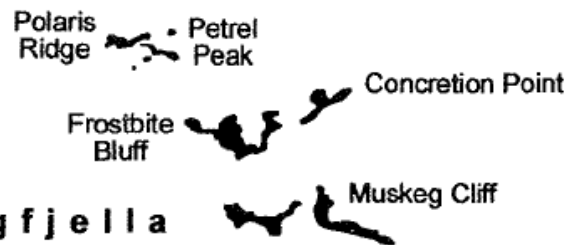




6°30' W 6° W

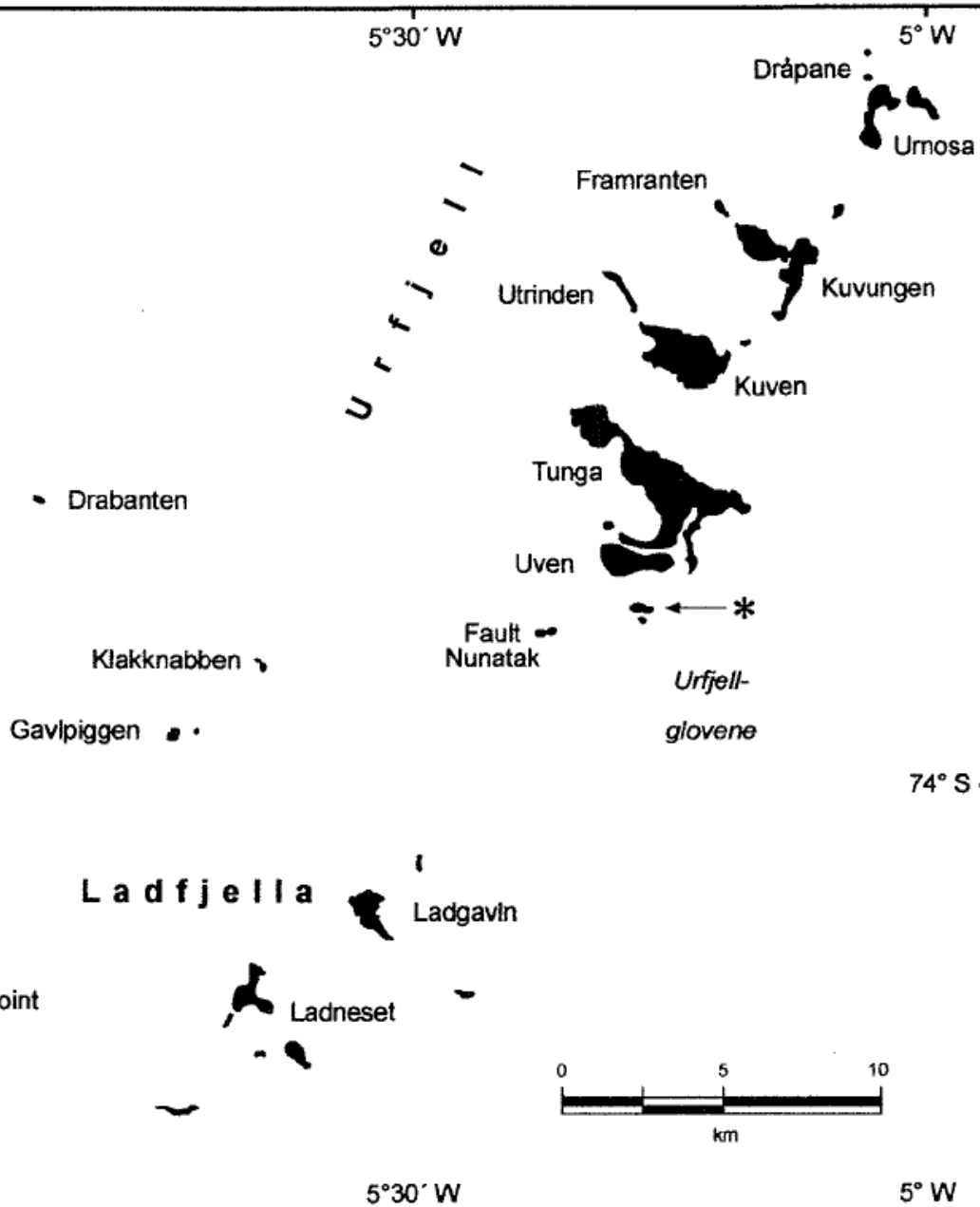


74° S



6°30' W

6° W



5°30' W

5° W

74° S

5°30' W

5° W

1100 Ma
metamorphic
rocks



The Kirwan Basalts



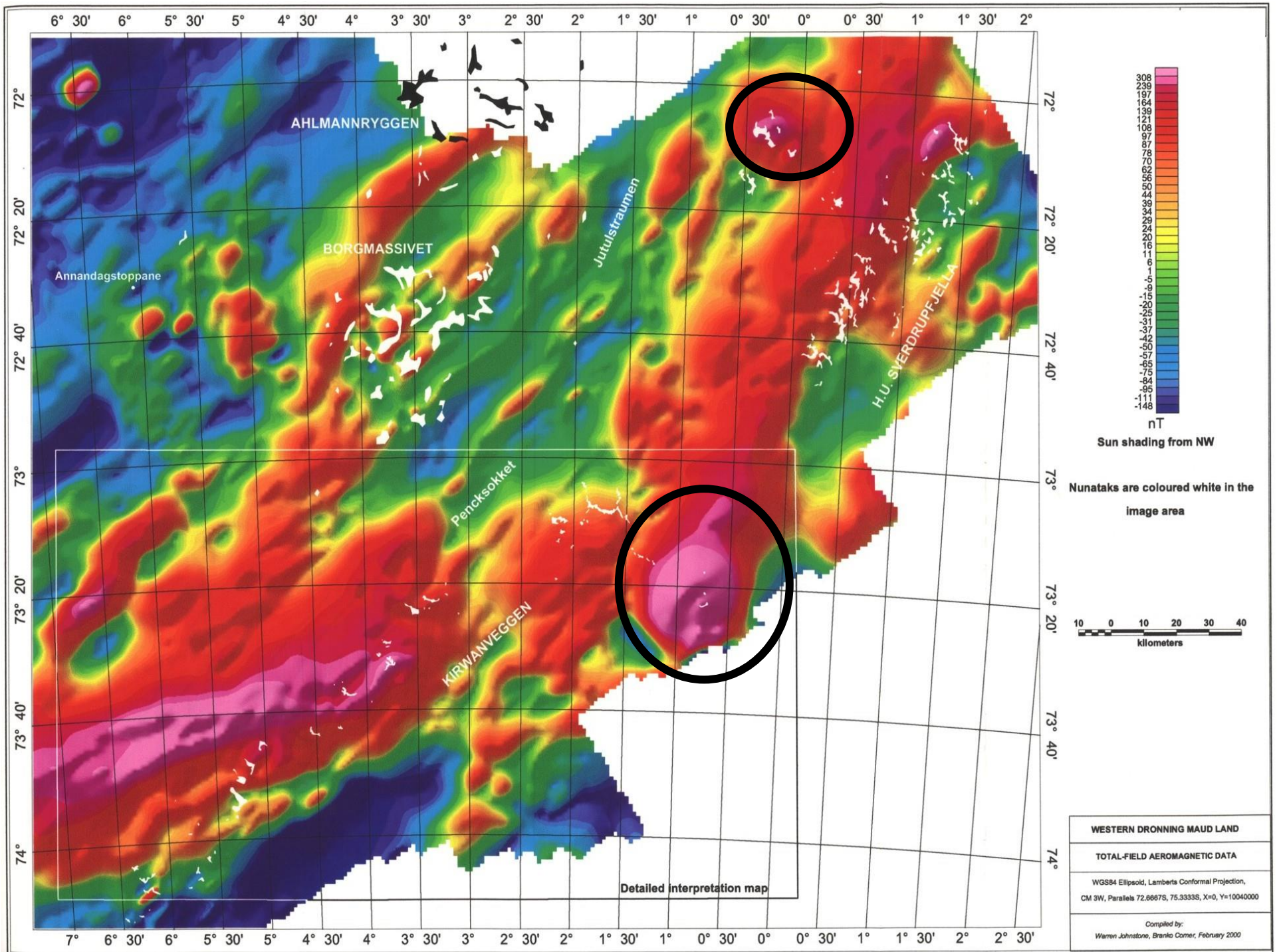
Mt Alex du Toit



Concretion point







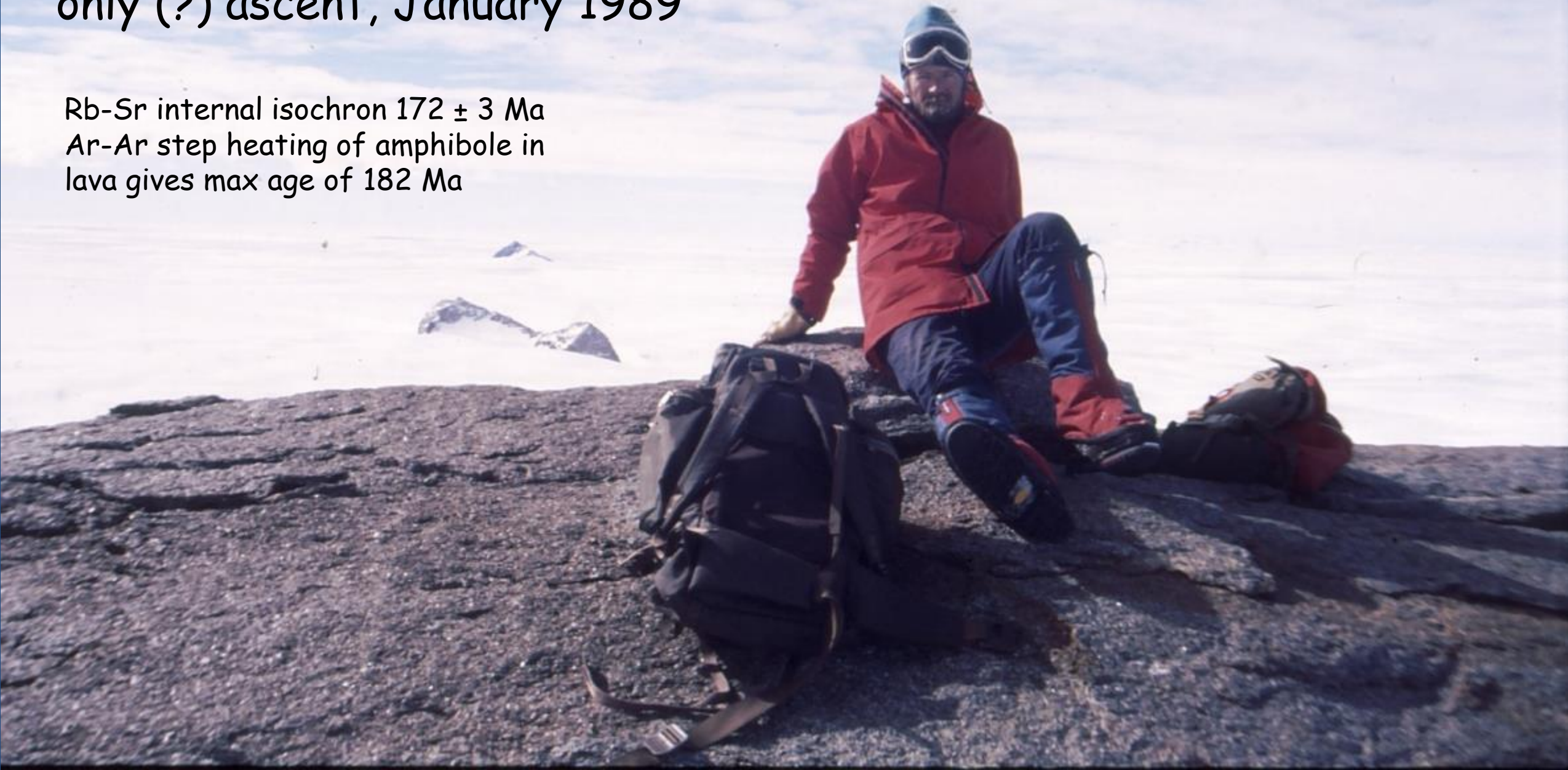
The Sistefjell Complex



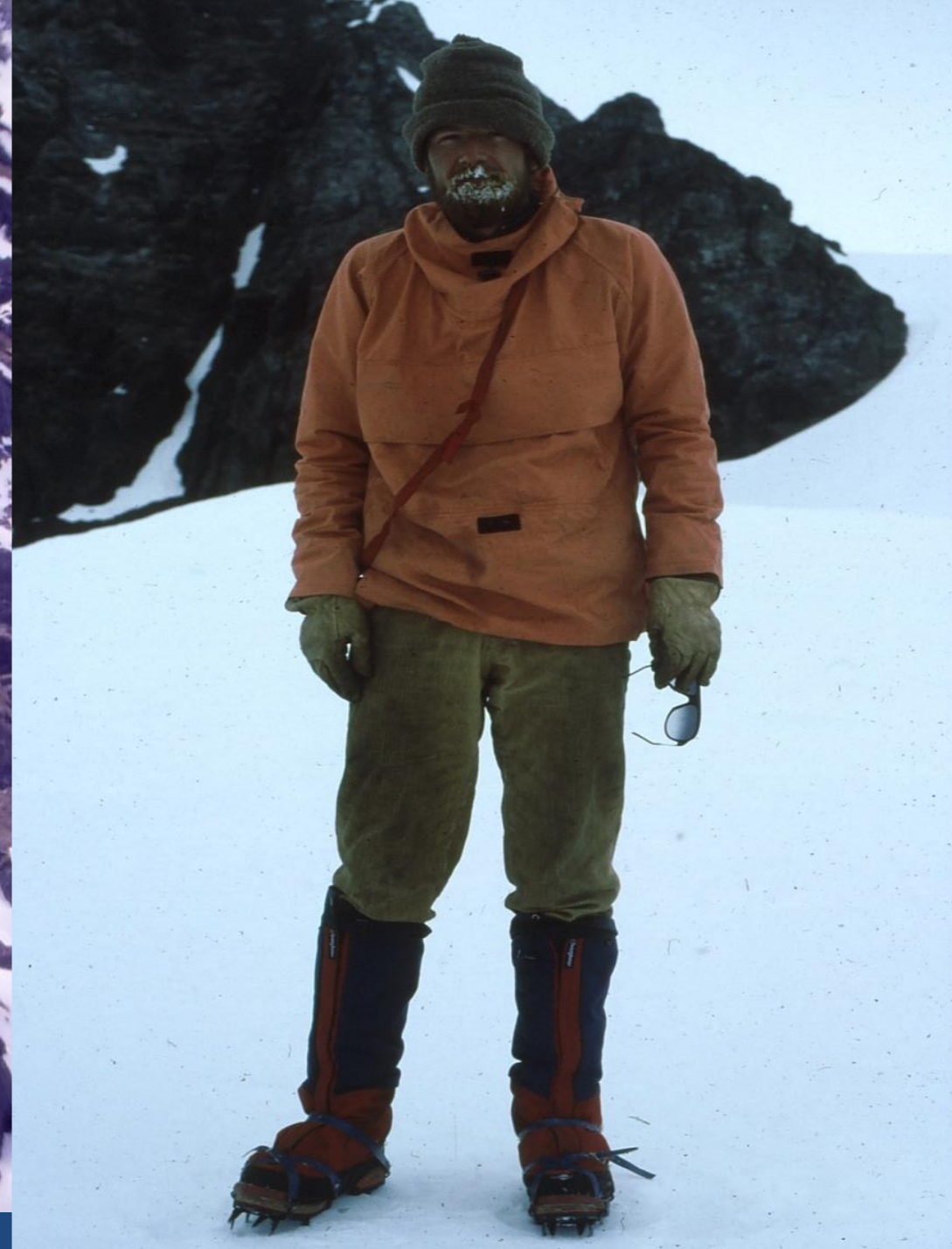


Sistefjell 2465 m: First and only (?) ascent, January 1989

Rb-Sr internal isochron 172 ± 3 Ma
Ar-Ar step heating of amphibole in
lava gives max age of 182 Ma



Intrusion margins



Straumsvola Nepheline Syenite



Granite dykes

One of <5
granites in
world to contain
eudialyte

Eudialyte has up
to 8 wt.% REE

Flora and fauna







Dead seal 240 km from sea at 1200 m altitude

Interestingly, Seppelt and Green also reported a discovery by the South Africans Harris and Watkins of a mummified carcass, tentatively identified as that of a Crabeater seal, ~~found 240 km inland~~ and at 1200m altitude on Tvora in West Dronning Maude Land. If an accurate report, this would appear to set a new record both for distance from the sea and altitude. It is certainly an extraordinary distance for an animal clumsy on land to

Seal carcass at Tvora (0°5'W, 72°12'S), western Dronning Maud Land, Antarctica

C. Harris¹ and R.T. Watkins²
 Departments of ¹Geochemistry and ²Geology, University of Cape Town
 Rondebosch 7700

A seal carcass, tentatively identified as that of a crabeater seal (Lobodon carcinophagus), was discovered on Tvora (0°5'W, 72°12'S) just to the east of the Jutulstraumen in western Dronning Maud Land, Antarctica. Either the carcass was discarded by a previous expedition, or the seal wandered from the coast to its death, a journey of some 240 km from the present day ice shelf, and 1200 m above sea level. There are difficulties with both these explanations, the first as the location of the carcass is highly inaccessible, the second because of the distances and the nature of the terrain.

'n Robkarkas, voorlopig geïdentifiseer as 'n krabvreterrob (Lobodon carcinophagus), is by Tvora (0°5'W, 72°12'S), net oos van die Jutulstraumen in westelike Dronning Maudland, Antarktika, ontdek. Die karkas is of deur 'n vorige ekspedisie agtergelaat, of die rob het van die kus af oorland na sy dood getrek, 'n reis van ongeveer 240 km vanaf die huidige ysplaat, en 1 200 m bokant seevlak. Daar bestaan probleme met albei verduidelikings, die eerste omdat die vindplek moeilik bereikbaar is, en die tweede as gevolg van die afstand en die terrein.

Introduction

A seal carcass was discovered by the authors on 15 January 1988 during a geological investigation of the Straumsvola area, on a scree slope on the south-east side of the nunatak Tvora (Fig. 1).

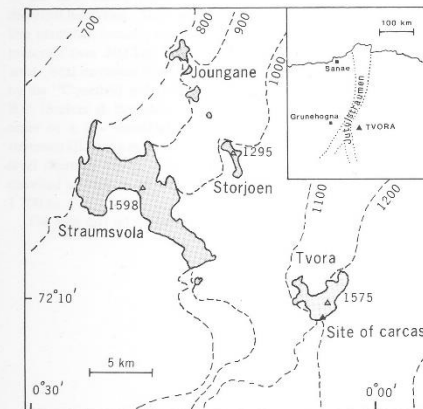


Fig. 1. Sketch map of the Straumsvola region showing the location of Tvora and the seal carcass. The ice shelf is presently over 200 km to the north. The lower ground in the north-west corner of the map forms the edge of the Jutulstraumen. All contour and spot heights are given in metres. The map is based on that produced by the Norsk Polarinstittutt, Oslo, 1961.

The carcass was measured and photographed. Since neither of the authors is a zoologist the examination of the seal was brief. The carcass was not collected because there were no facilities to preserve such a sample on board the S.A. Agulhas.

Location

Figure 1 shows the location of the carcass on Tvora in the Sverdrupfjella Mountains. The carcass was found partly concealed under a large boulder on a scree slope leading down from the summit cliffs of the south-east face of Tvora. Figure 2 shows the carcass resting on the boulder under which it was found. The south-east face of Tvora has a deep windscoop at its base. This windscoop has steep sides up to about 30 m in height which



Fig. 2. Carcass at the site at which it was found. The figure (RTW) is 1.73 m tall. The seal is resting on the boulder under which it was found. Note that the terrain is not suitable for a campsite. The area is not normally subject to snow accumulation; the photograph was taken after a period of unusually heavy snowfall.

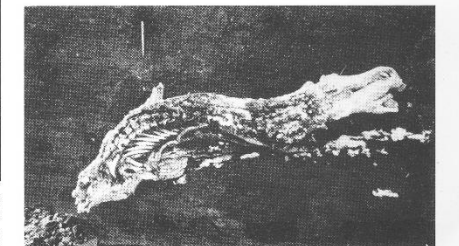
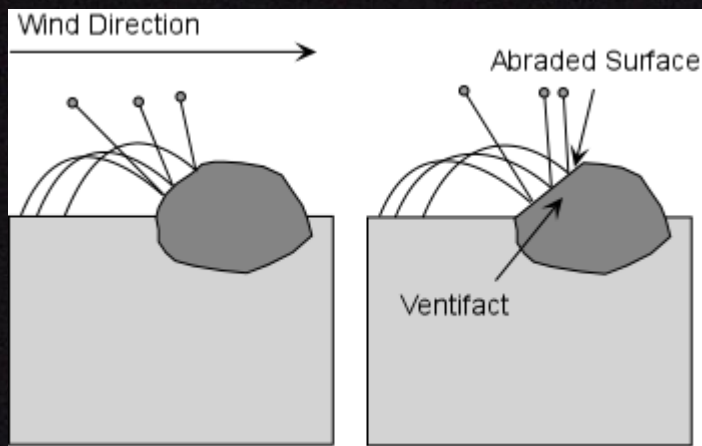


Fig. 3. Close up of the dorsal surface showing the exposed skeleton.



Large ventifacts



March 1985 -
getting late in the
season



Thank you!

