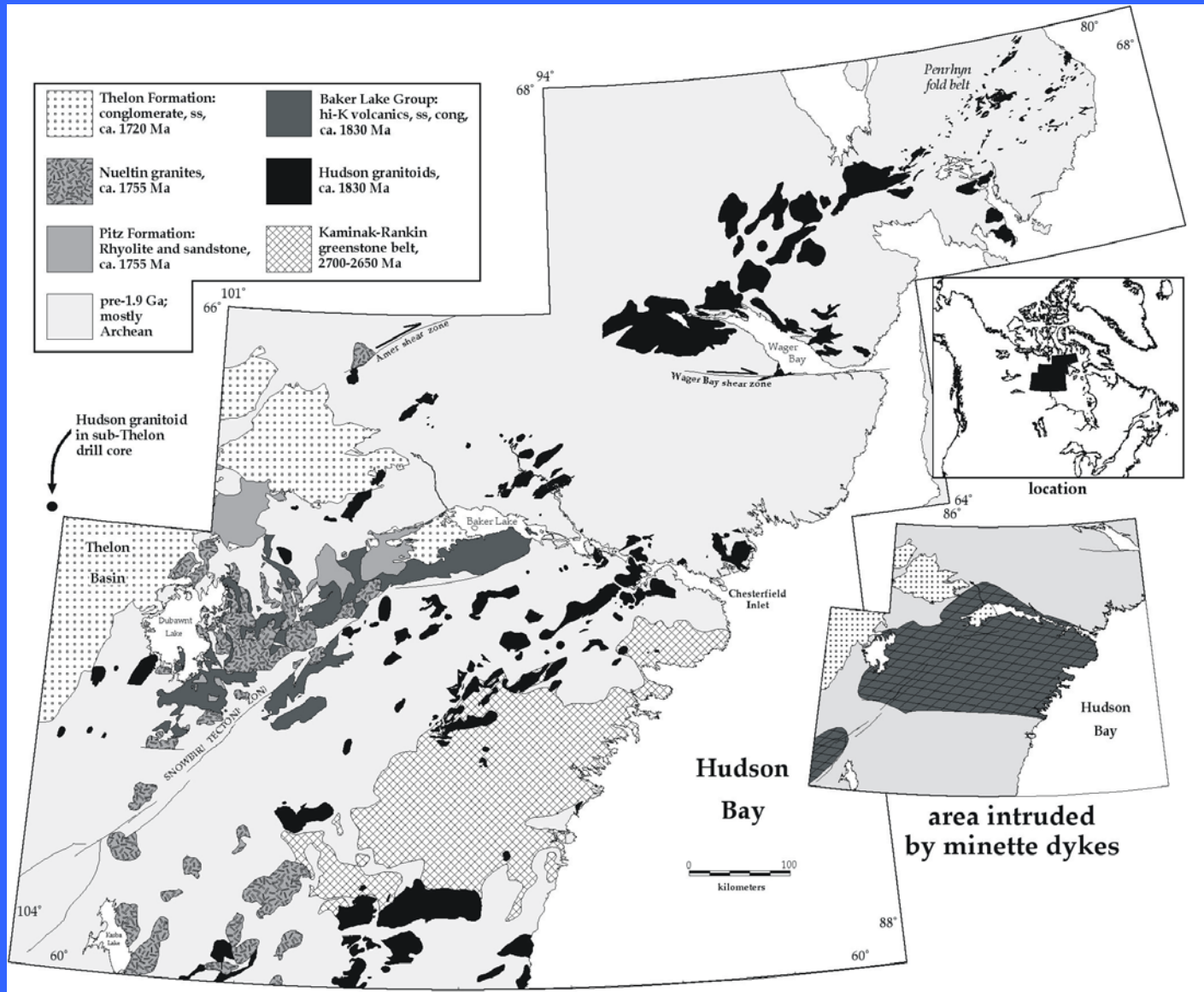


**U-Pb Zircon Geochronology
and Nd Isotope Geochemistry
of Proterozoic Granitoids in the
Western Churchill Province**

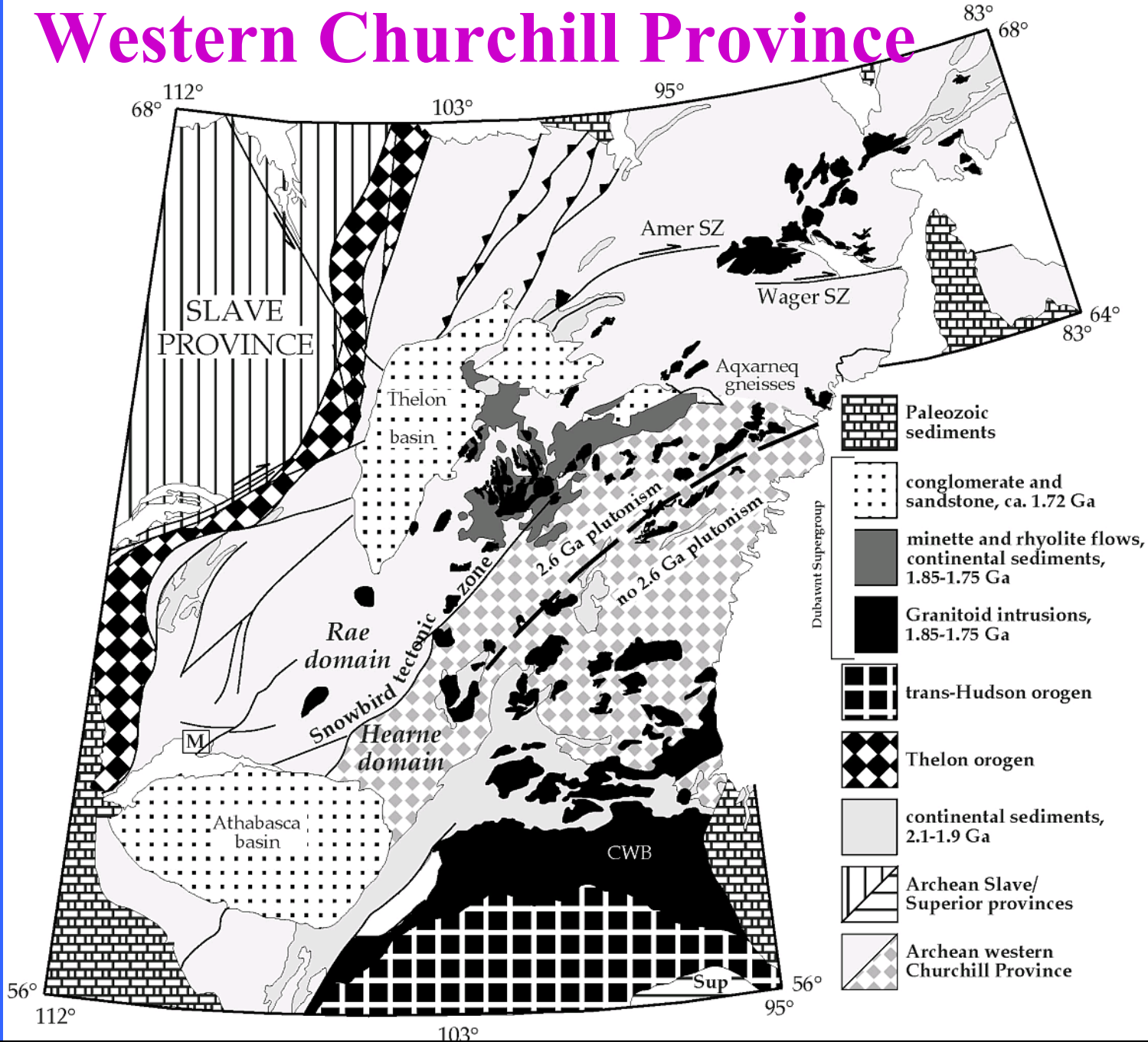
Otto van Breemen, Tony Peterson and Hamish Sandeman

NATMAP study area



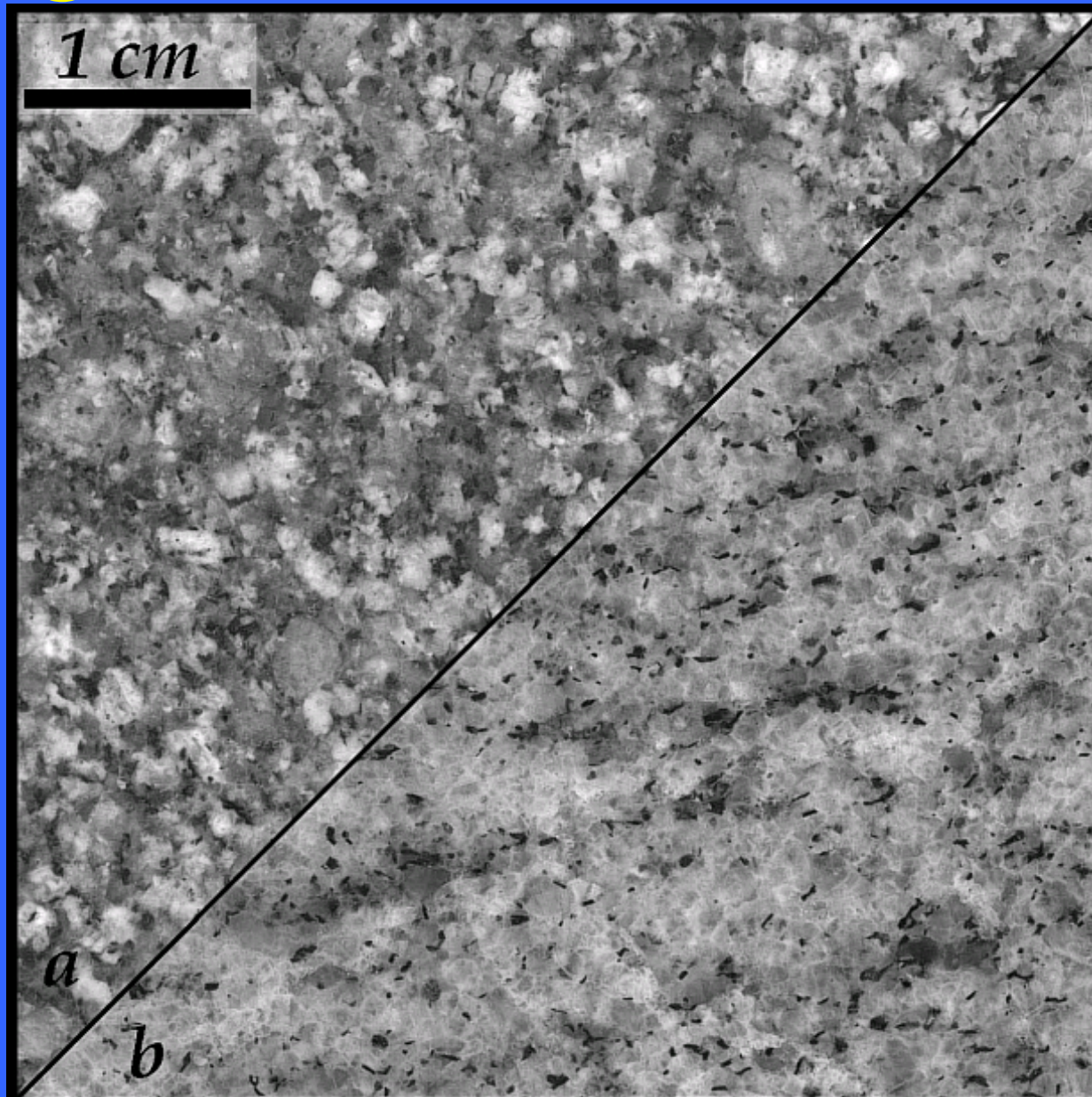
NATMAP study area (south of 64° latitude) plus the Wager Bay and Penrhyn fold belt areas.

Western Churchill Province



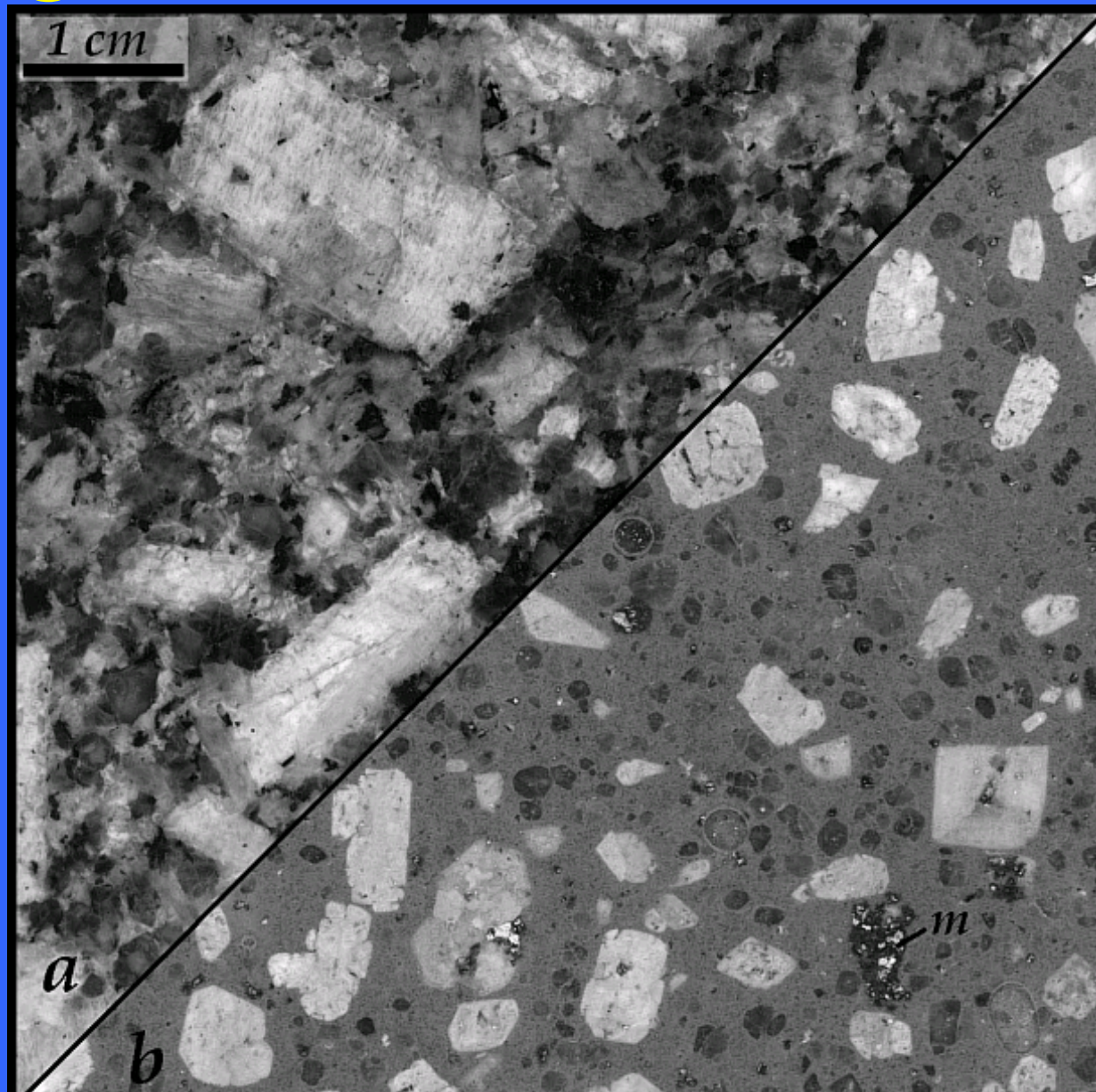
Simplified geology of the Western Churchill Province. CWB=Chipewyan-Wathaman batholith; M=Martin Group (correlative with Baker Lake Group). □

Hudson granite



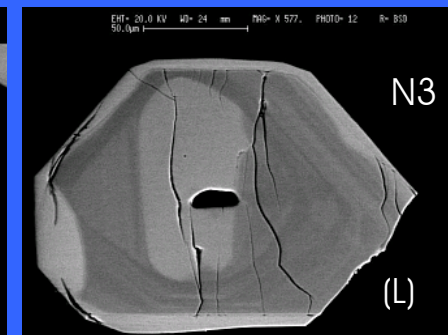
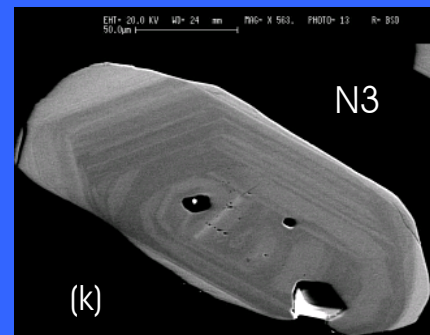
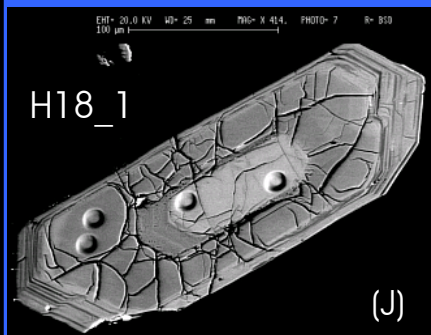
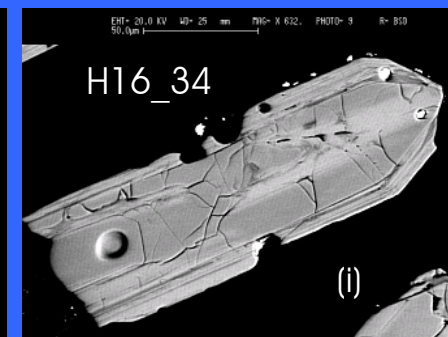
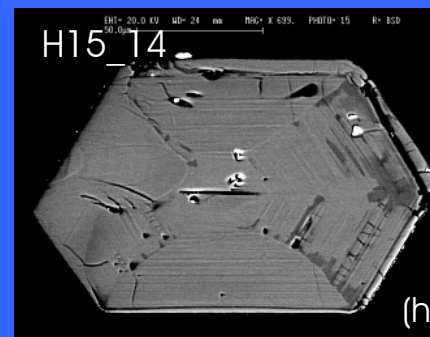
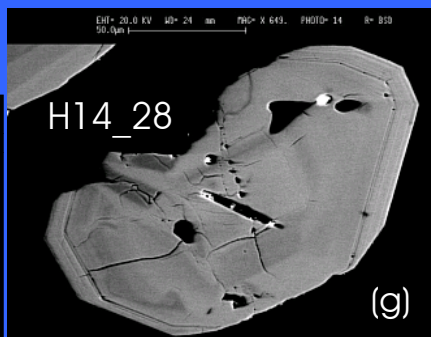
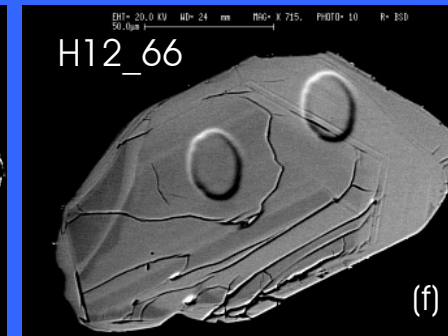
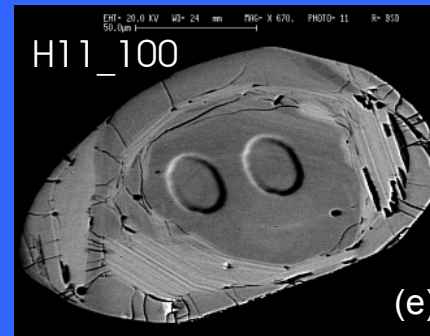
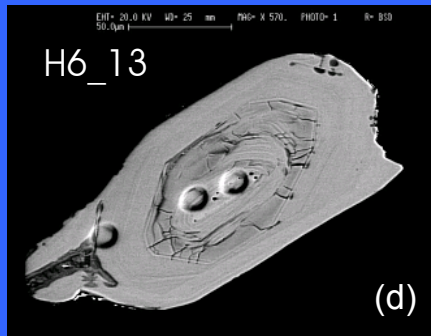
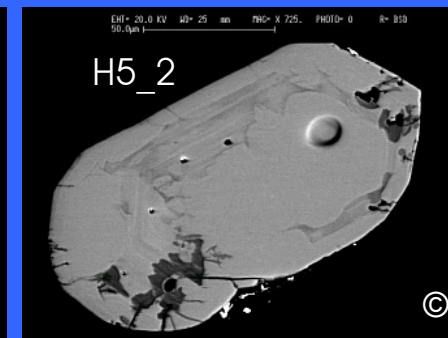
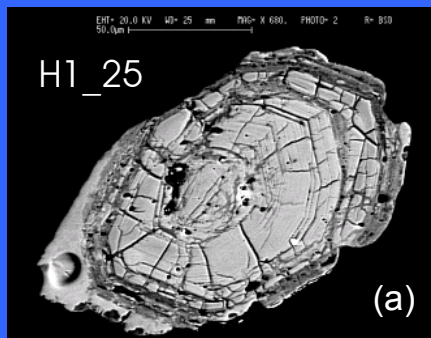
Photos (polished slabs) of representative Hudson granites. (a): typical of pluton centers; (b) typical of pluton margins, showing weak relict foliation defined by xenocrystic biotite.

Nueltin granite



Photos (polished slabs) of (a) Nueltin granite, and (b) Pitz rhyolite, both with □ phenocrysts of sanidine and quartz. Note the blebs of basaltic melt (m) in the rhyolite.

SEM images



Photomicrograph in backscattered electron mode showing examples of Proterozoic magmatic zircons and Proterozoic rims on Archean cores that were analysed, with probe locations marked by ion beam pits.

SEM images

A (sample H1) Proterozoic remnant tip of unzoned rim on xenocryst, zoned subhedral ovoid prism.

B (sample H3) Proterozoic unzoned rim on euhedral prism containing unzoned core

C (sample H5) Proterozoic center of unzoned stubby prism with rounded corners

D (sample H6) 3.5 Ga ovoid zoned core in Proterozoic unzoned subhedral prism

E (sample H11) 2.5 Ga rounded core in inferred Proterozoic elongate ovoid

F (sample H12) 2.64 Ga well zoned prismatic center surrounded by partial Proterozoic overgrowth. This core is characterised by a low Th/U ratio of 0.0002.

G (sample H14) Proterozoic subhedral stubby prism surrounded by thin euhedral rim

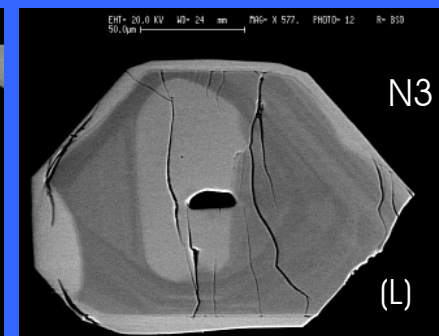
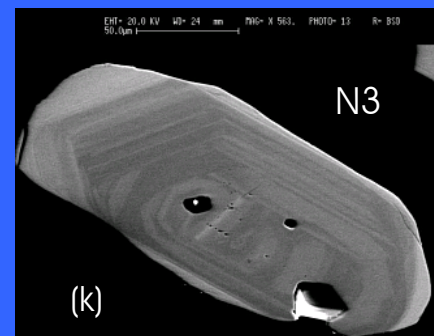
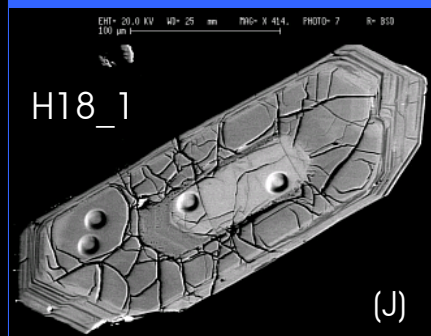
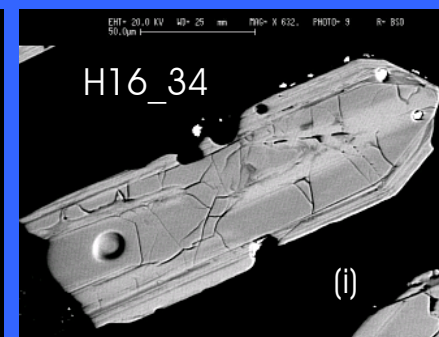
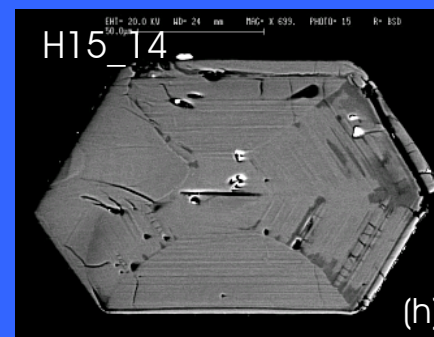
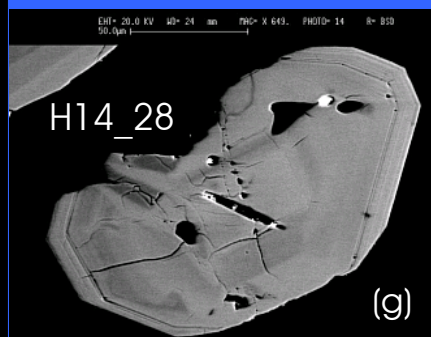
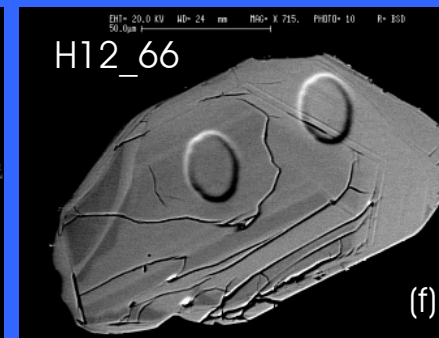
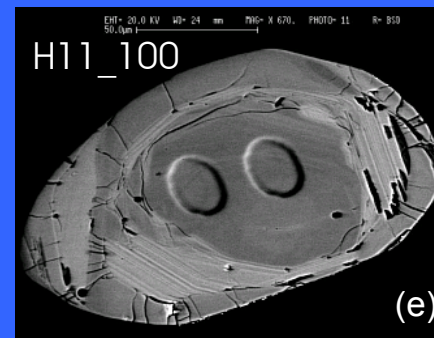
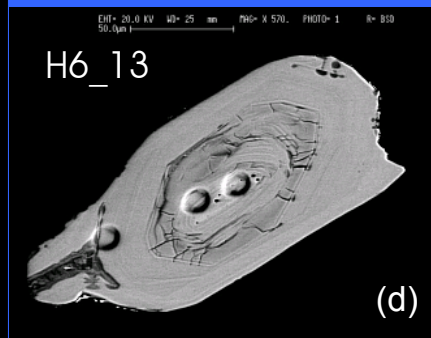
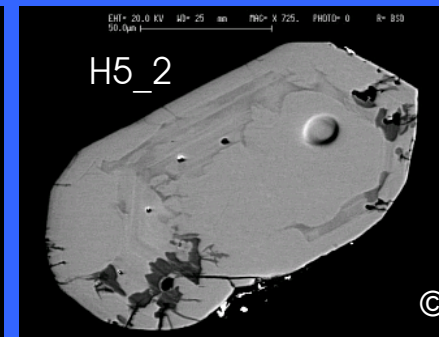
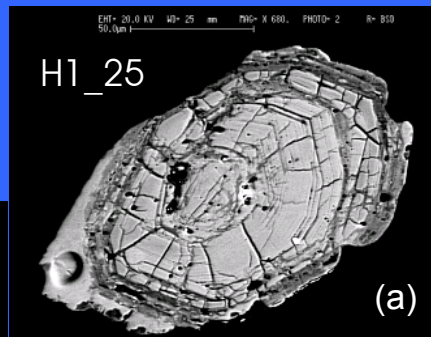
H (sample H15) Proterozoic stubby euhedral prism with sharp simple pyramids and fine regular igneous zoning. This euhedral crystal is typical of sample H15, but not of zircons from the Hudson granites in general.

I (sample H16) Proterozoic unzoned interior of elongate subhedral prism with outer zoning

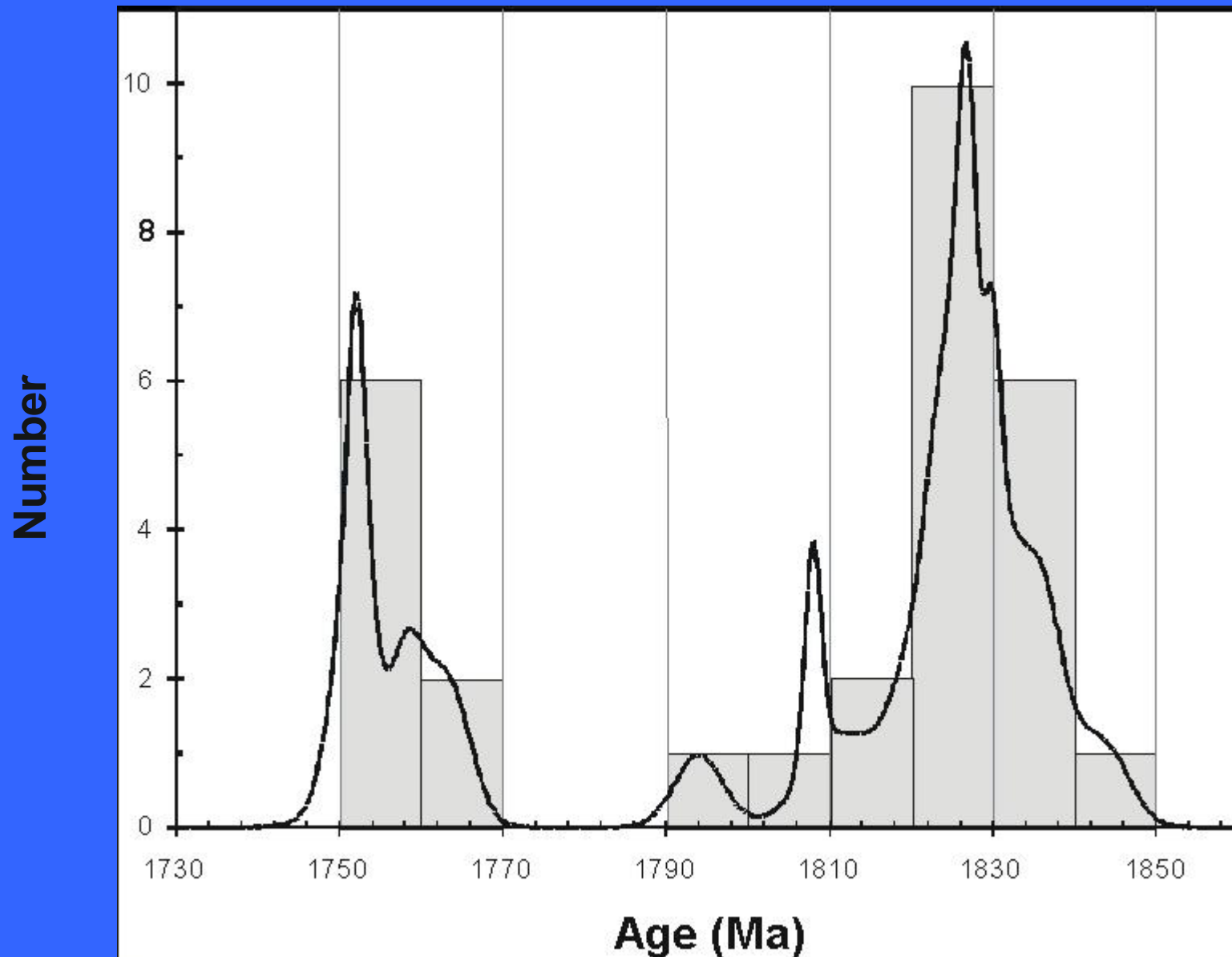
J (sample H18) Proterozoic internal smooth interior in euhedral prism with sharp terminations and zoned outer margin. The small core is late Archean in age.

K (sample N3) Igneous prism from Nueltin granite showing continuous igneous zoning

L (sample N3) Stubby euhedral prism showing discordant internal zoning

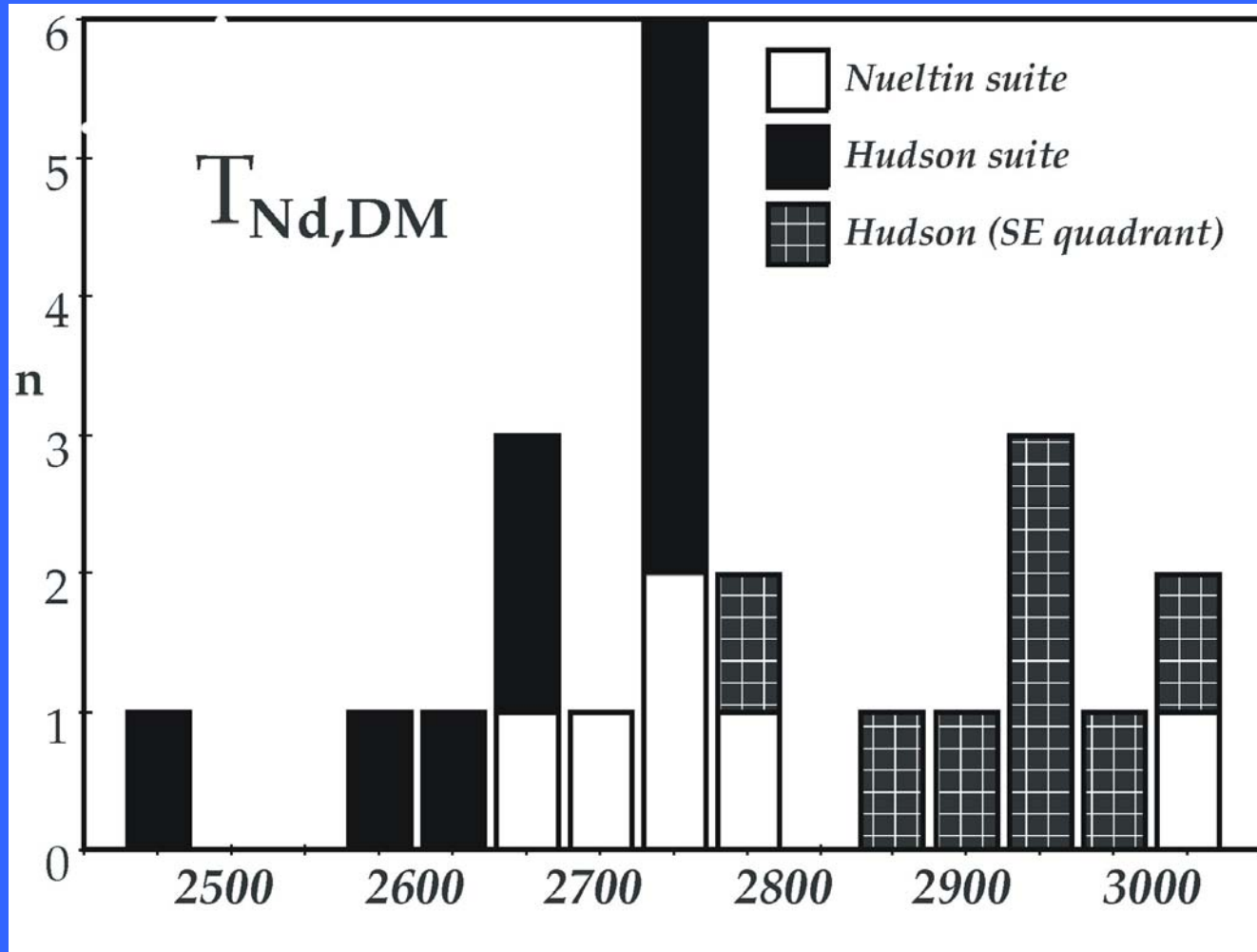


Ages of Hudson and Nueltin granites



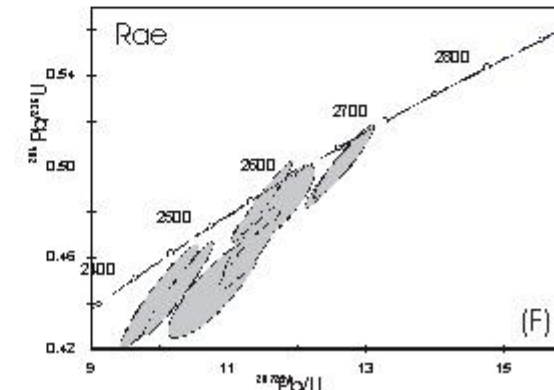
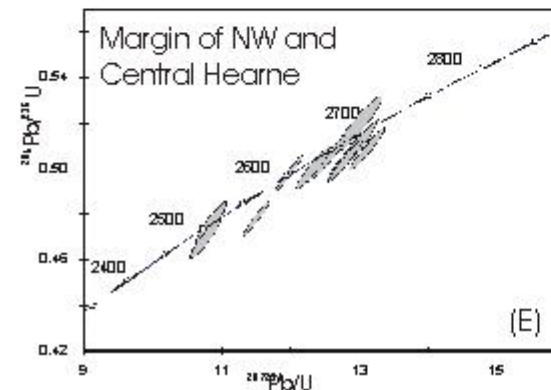
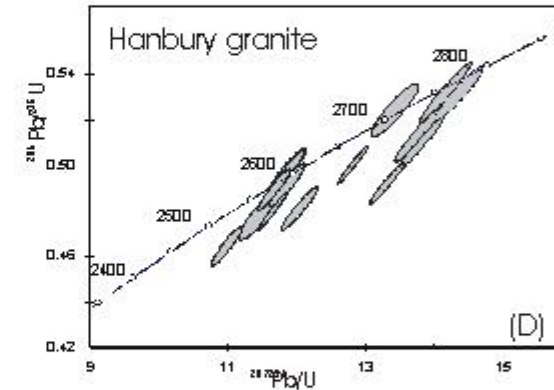
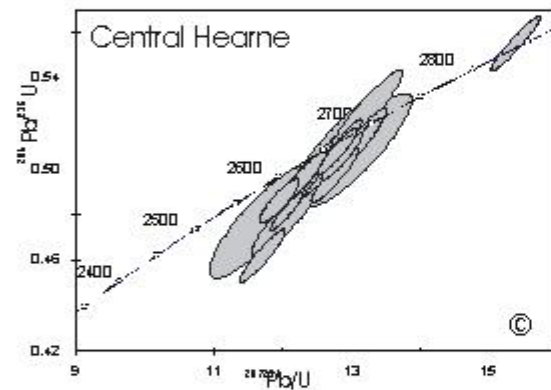
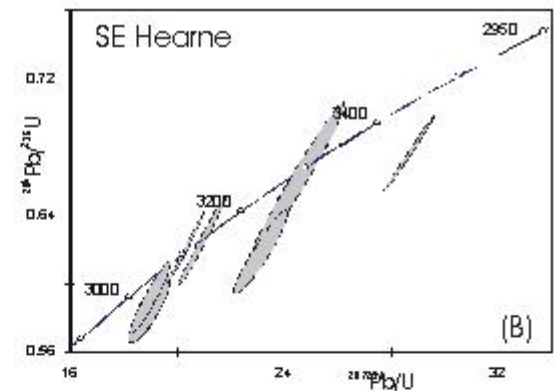
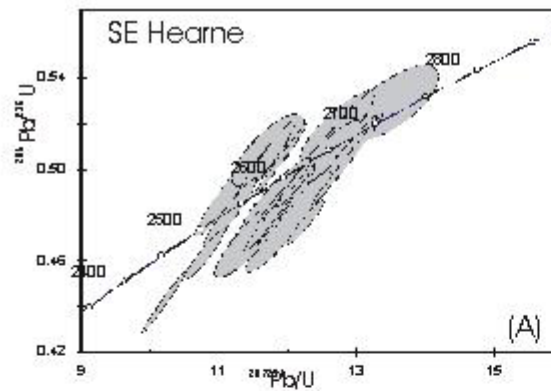
Binned frequency histogram (10 Ma bin width) and probability density distribution for 25 □ Proterozoic granite. Uncertainties are shown at the 2 s level.

Histograms of depleted mantle Nd model ages



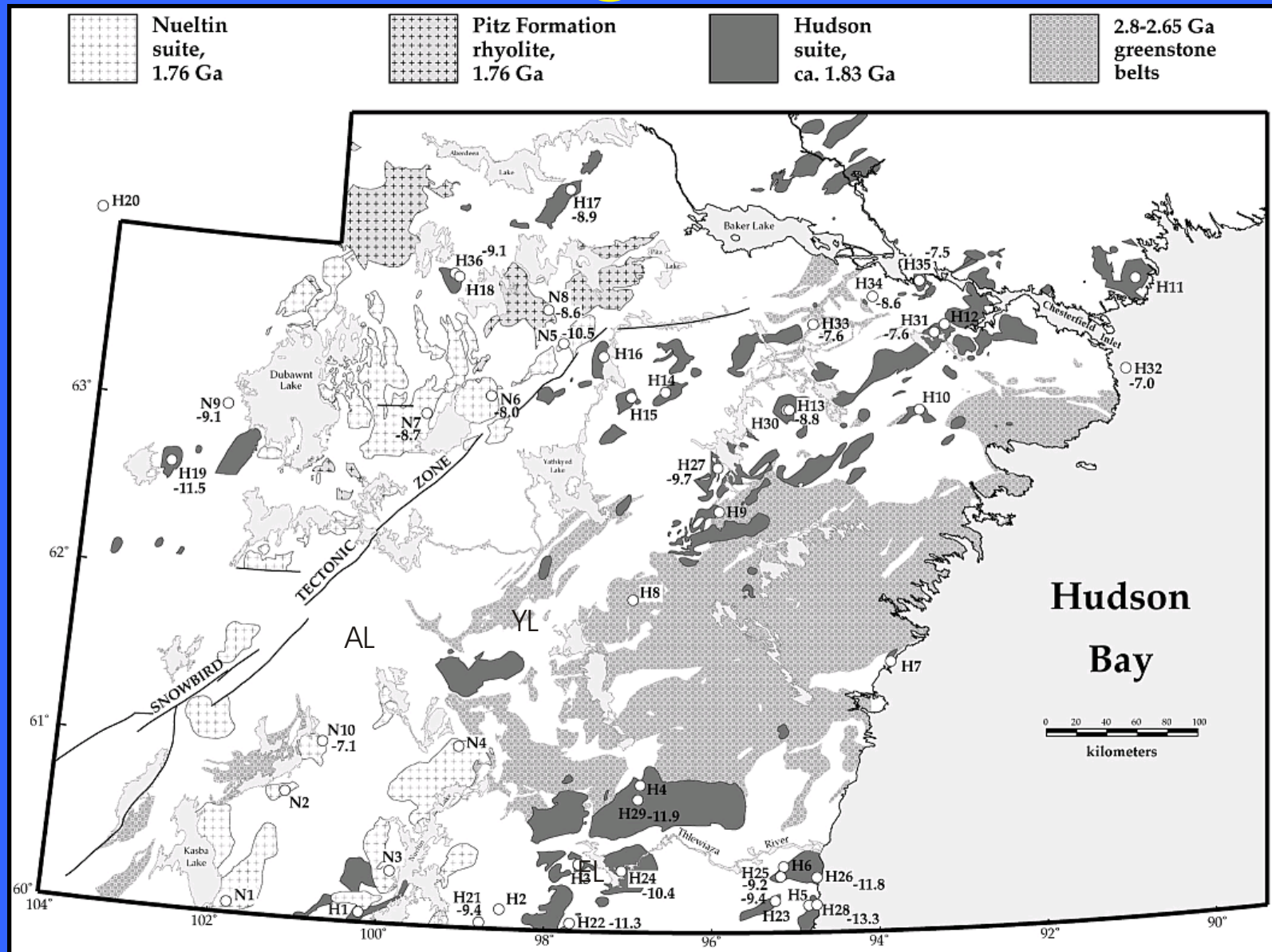
Histograms of depleted mantle Nd model ages (bin width=40 myrs). □

Inherited zircon



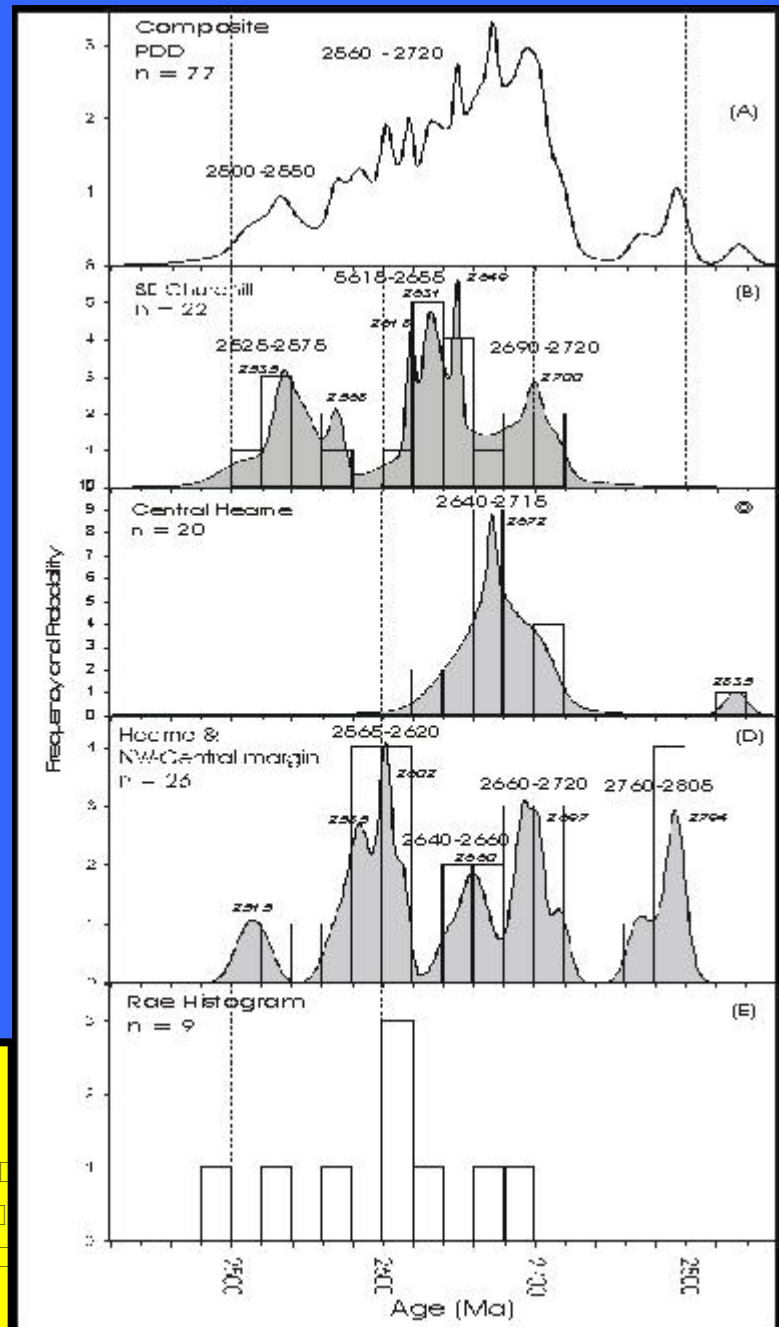
Binned frequency histograms (20 Ma bin width) and probability density distributions (PDD) for Neoproterozoic inherited zircon $^{207}\text{Pb}/^{206}\text{Pb}$ model ages from 13 Hudson granites: a) PDD for the whole study area; b) histogram and PDD for samples H1, H2, H3, H4 and H6; c) histogram and PDD for samples H8, H9 and H10; d) histogram and PDD for samples H11, H12 and H13; and e) histogram for samples H17, H18 and H20.

Hudson and Nueltin granites



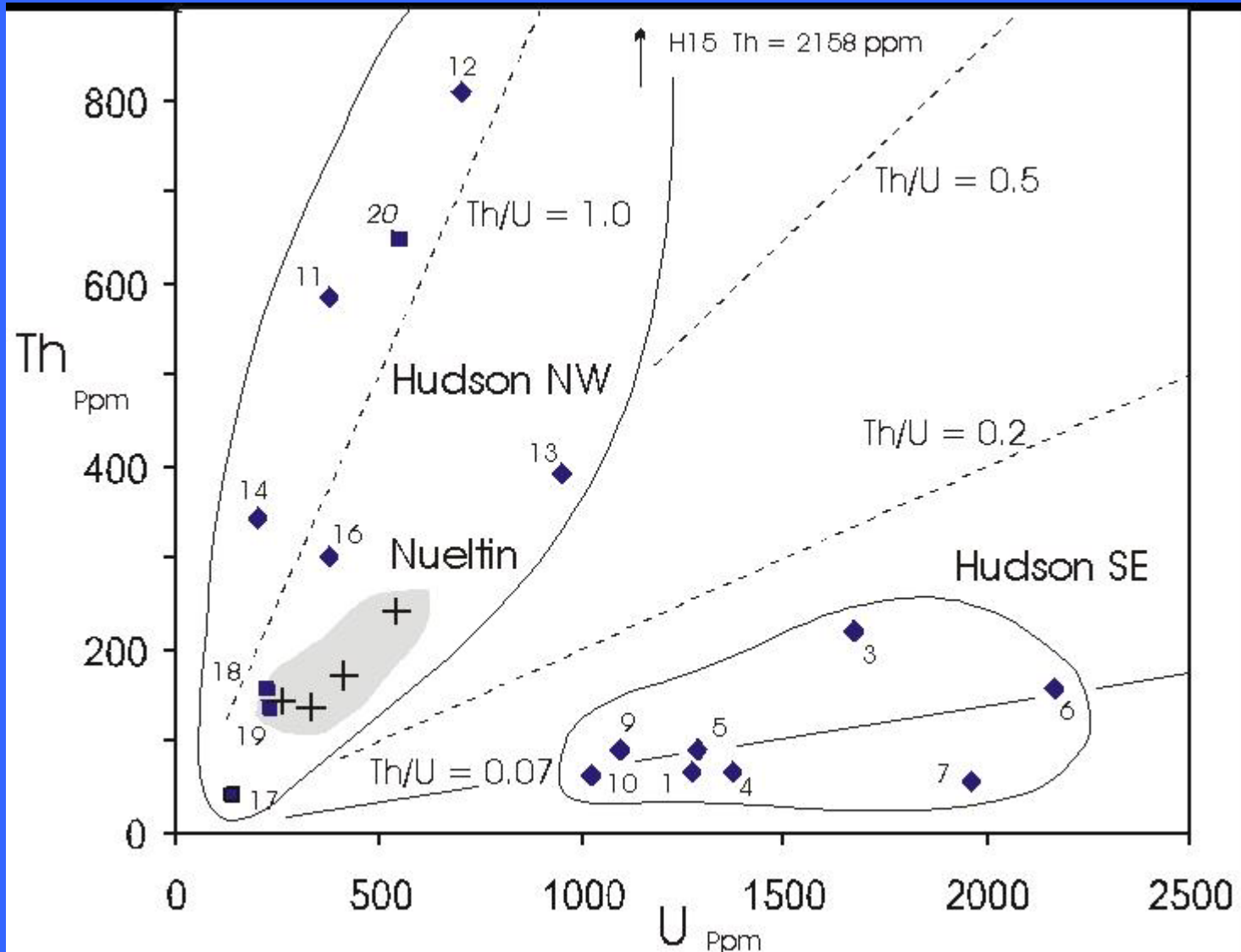
Sample locations. Hudsonian and Nueltin granites analysed for U-Pb zircon are H1-H20 and N1-N4 respectively. Samples analysed for Sm-Nd isotopes (H17, H21-36; N5-N10) have additional epsilon Nd values; calculated at 1.83 Ga (Hudson suite) and 1.76 Ga (Nueltin suite). EL indicates Edehon Lake; Angikuni Lake area; Yathkyed Lake area.

Archean inheritance



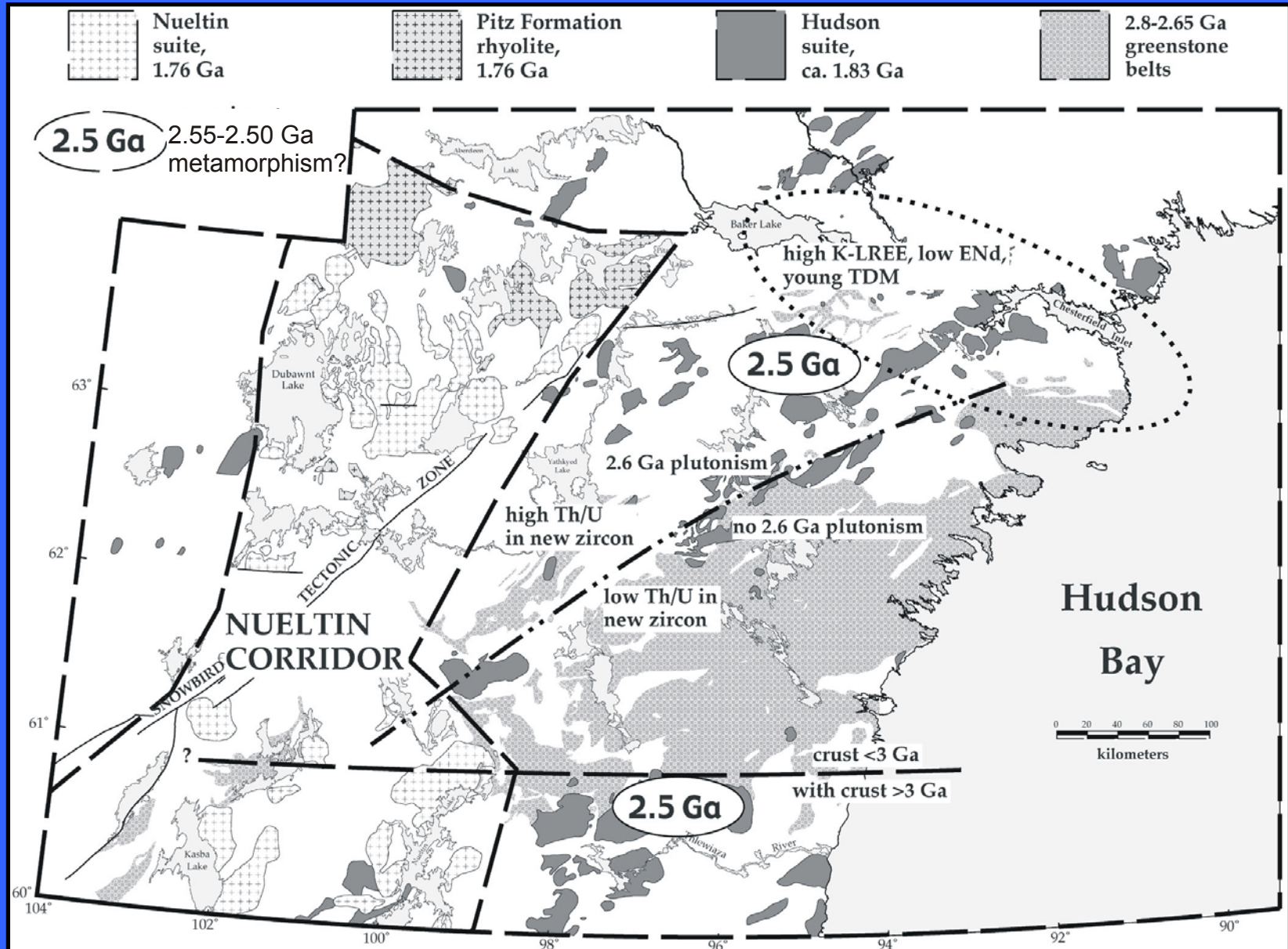
Binned frequency histograms (20 Ma bin width) and probability density distributions (PDD) for Neoproterozoic inherited zircon $^{207}\text{Pb}/^{206}\text{Pb}$ model ages from 13 Hudson granites: a) PDD for the whole study area; b) histogram and PDD for samples H1, H2, H3, H4 and H6; c) histogram and PDD for samples H8, H9 and H10; d) histogram and PDD for samples H11, H12 and H13; and e) histogram for samples H17, H18 and H20.

U and Th concentrations



U and Th concentrations and Th/U ratios for all Proterozoic granites. Hudson granites are shown in filled diamonds and Nueltin granites are shown in crosses.

Crustal domains



Crustal domains in the western Churchill province, inferred from U-Pb (zircon) and Sm-Nd (whole rock) isotopic data. The Snowbird tectonic zone separates the Rae domain (north) from the Hearne domain (south), but these domains are not apparent in any geochronological or lithochemical data set.