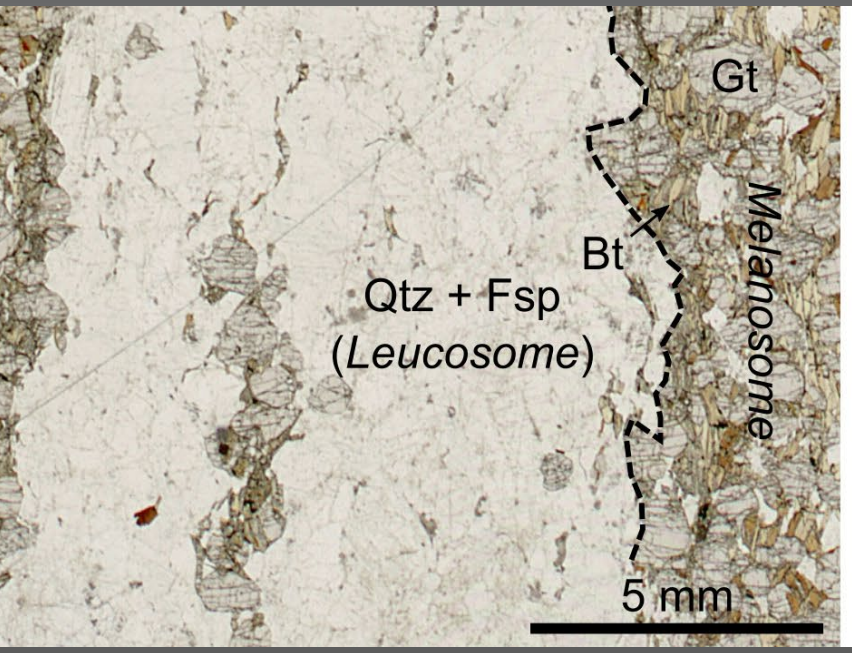
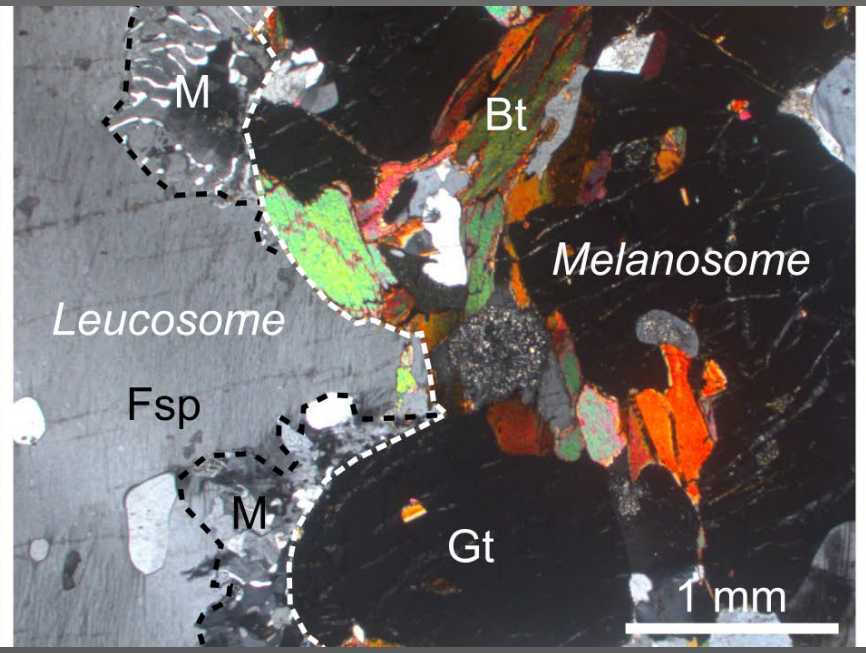
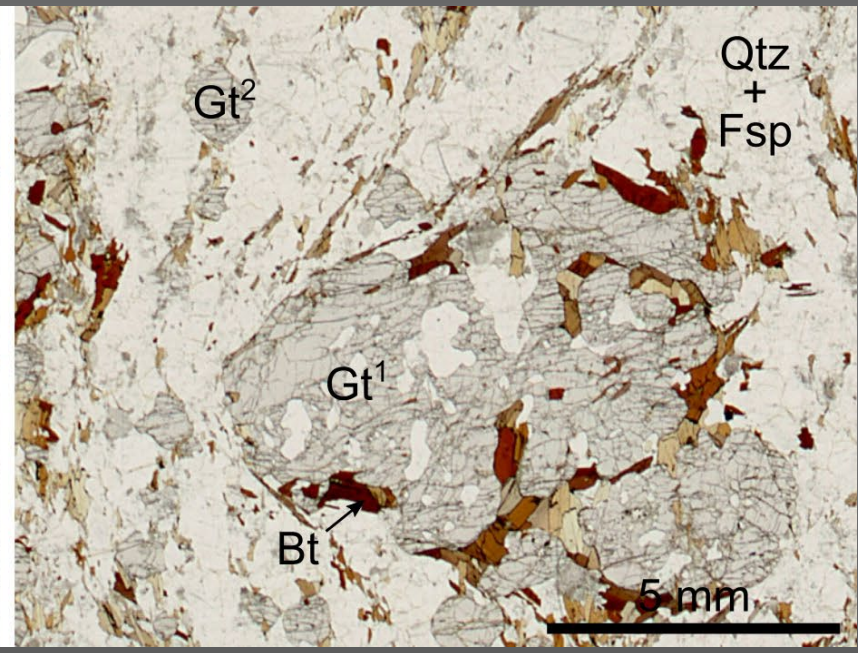
Mesoarchean nanogranitoids and fluid inclusions in migmatites of the Kangerlussuaq basement, Southeast Greenland







Silvio Ferrero[1], Gautier Nicoli [2], Kerstin Gresky [2]

[1] *Università degli Studi di Cagliari, 09042 Monserrato, Italy*
[2] *Universität Potsdam, 14476 Potsdam, Germany*

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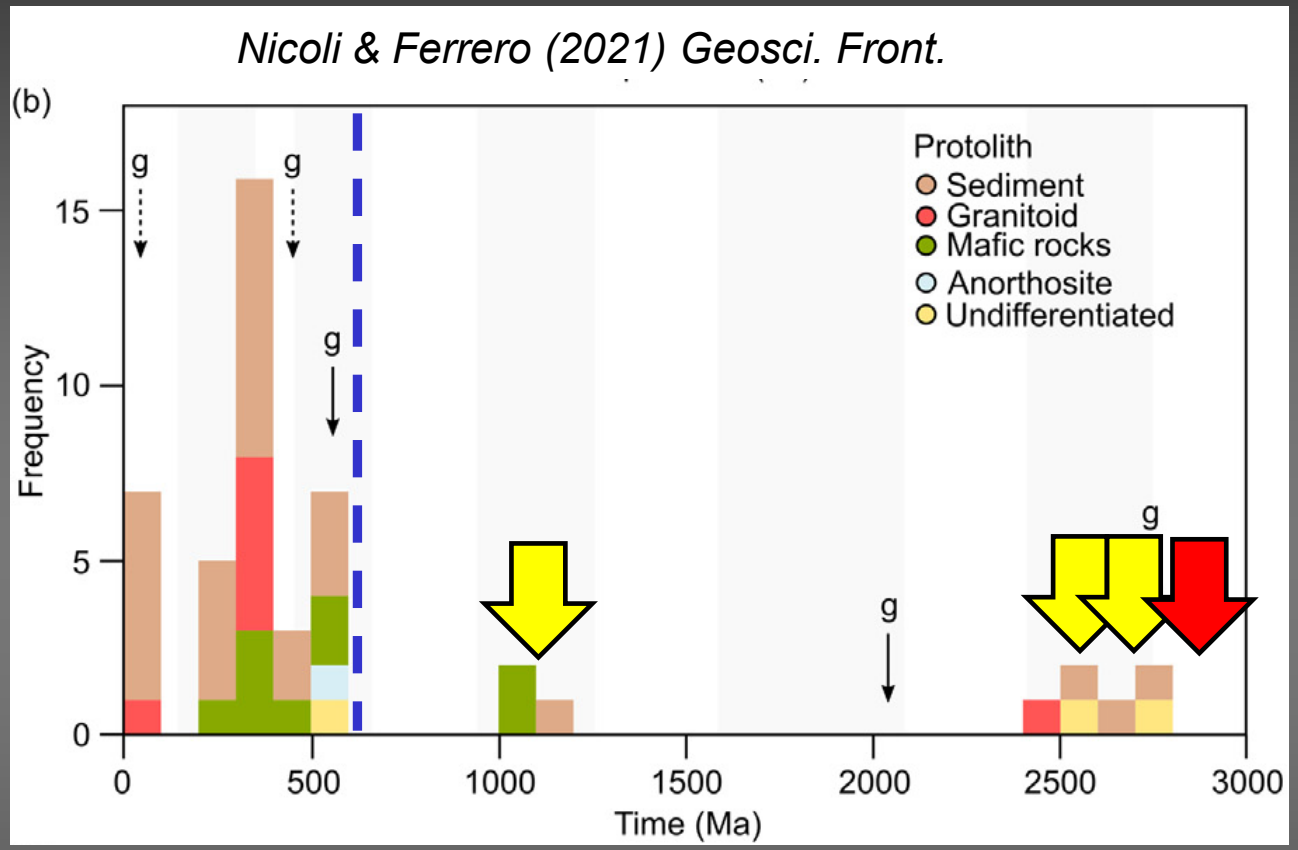
Nanogranitoids through time



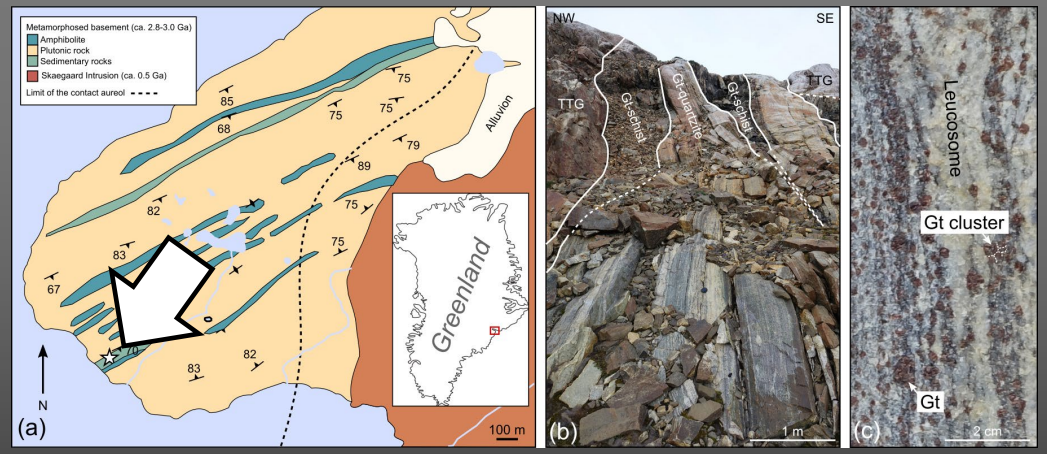
(1)1050 Ma, Adirondacks *(Darling, 2013; Ferrero et al., 2021; Nicoli et al., this session)*

(2) 2580 Ma, Athabasca granulites terrane *(Tacchetto et al., 2019)*

(3) 2700 Ma, Limpopo Belt *(Safonov et al., 2021)*

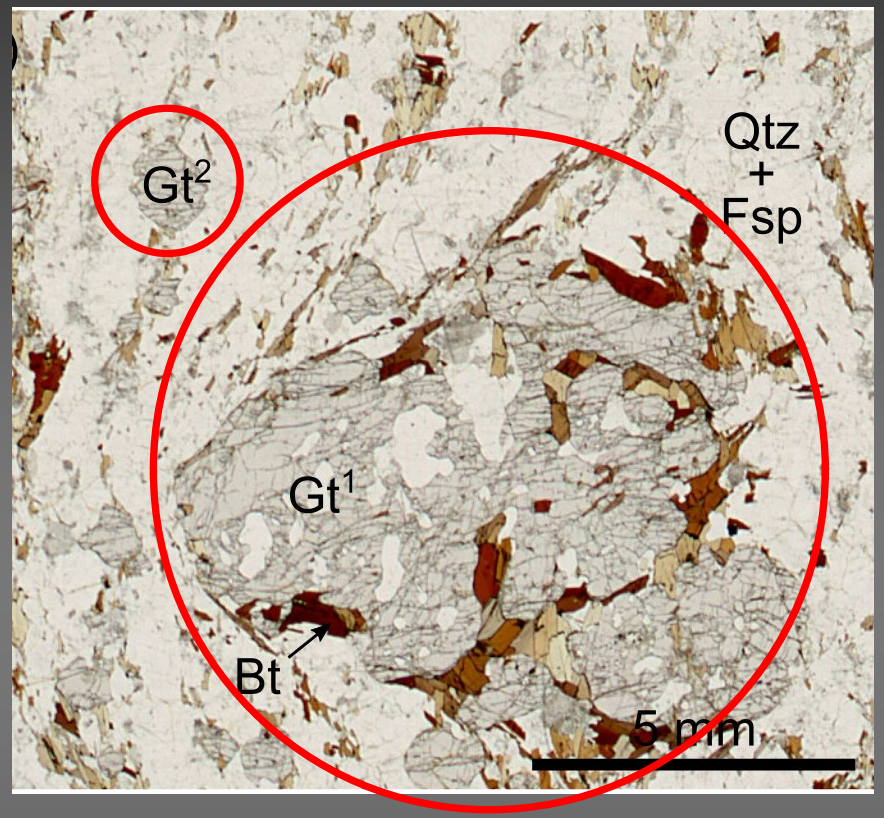
- Nanogranitoids (NG): (crystallized) inclusions of deep melts from anatexis

- Few cases in the Precambrian



2860 Ma, Kangerlussuaq basement *(Nicoli et al., 2022)*

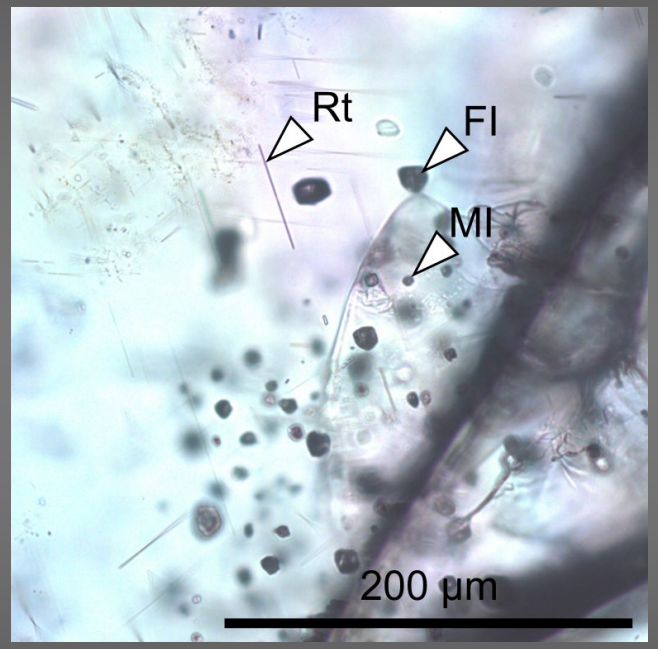
Mesoarchean nanogranitoids and fluid inclusions



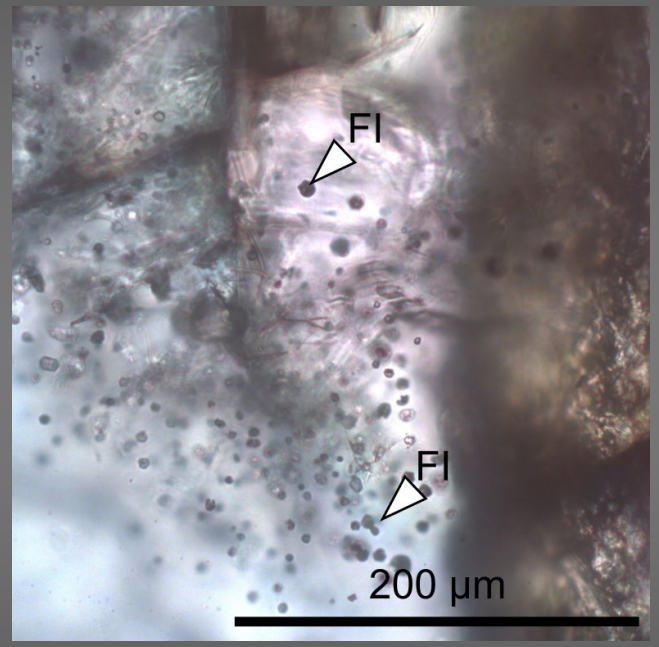
- Stromatic migmatites
  Grt+Bt+Kfs+Qtz, no graphite

- Primary nanogranitoids (NG) and fluid inclusions (FI) in peritectic garnet

- Two generations of garnet

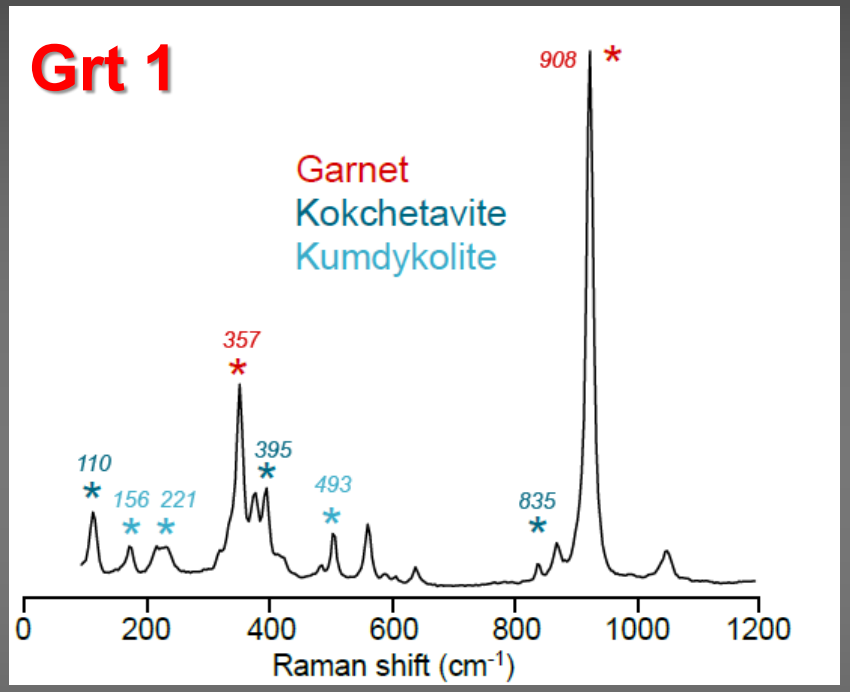


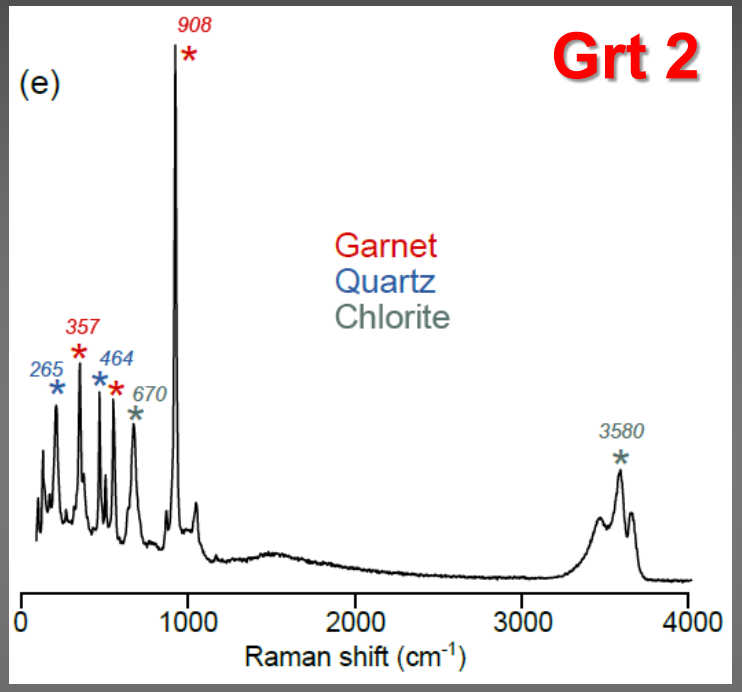
- **Grt^1**
  Larger, xenoblastic
  NG >> FI
  Rutile needles+Qtz+Bt
  > Pyrope

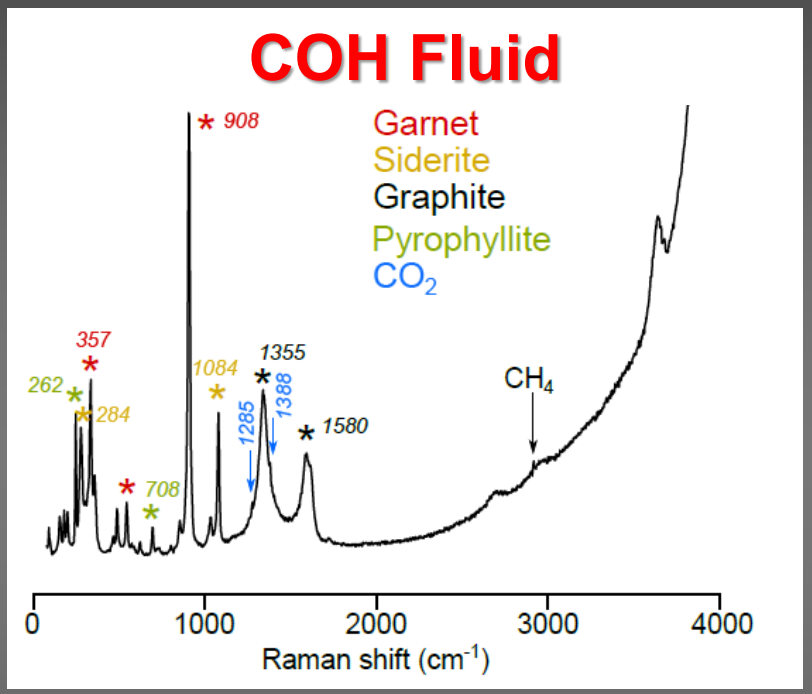


- **Grt^2**
  Smaller, idioblastic
  FI >>>> NG
  < Pyrope

Two garnets, two melts, always with coexistent fluid





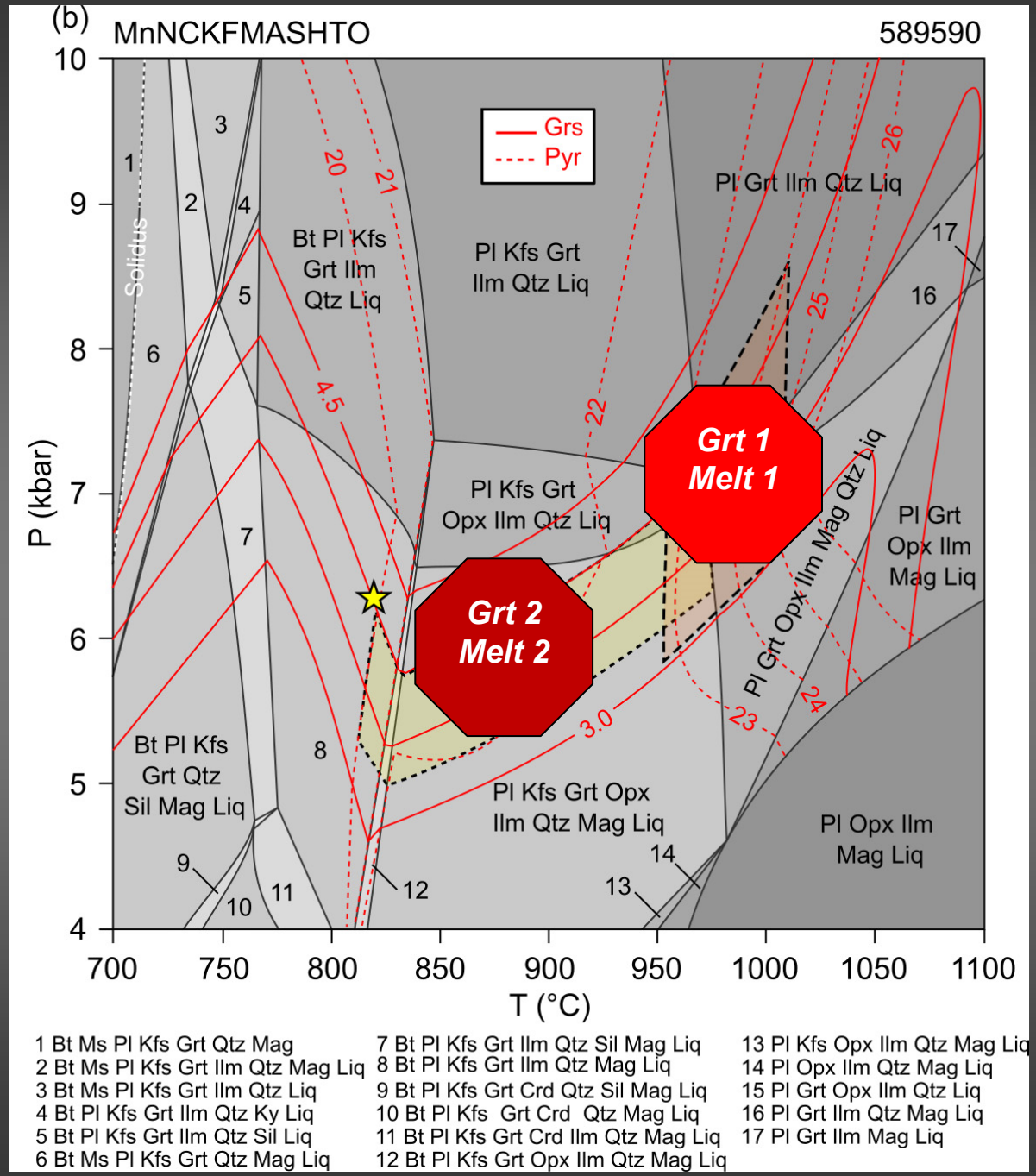


- **Melt 1:**
Quartz/Cristobalite
+Kokchetavite
+Kumdykolite
+Phlogopite

- **Melt 2:**
Quartz +K-feldspar
+Chlorite $\pm H_2O$

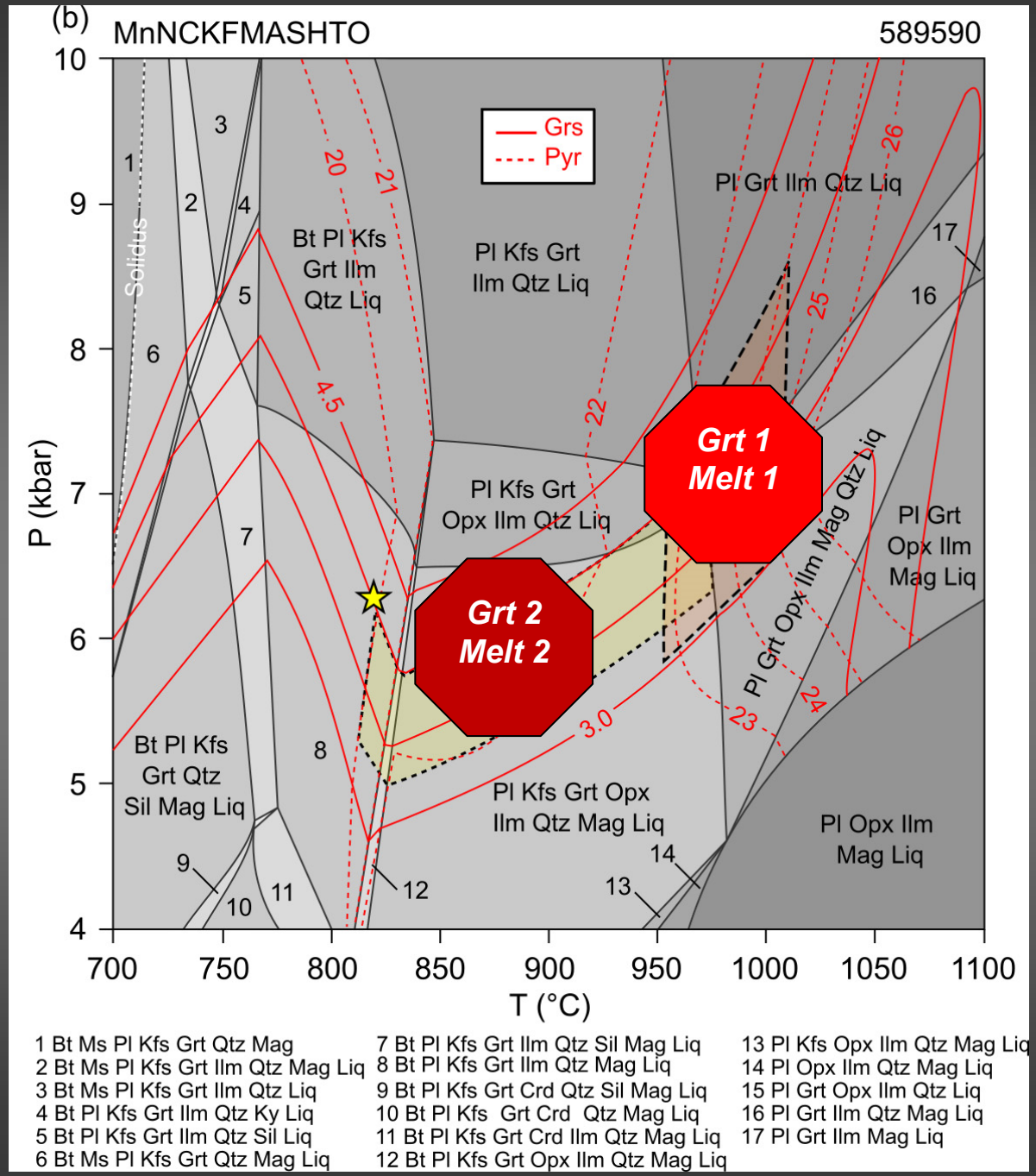
- **Primary fluid-melt immiscibility** during garnet growth

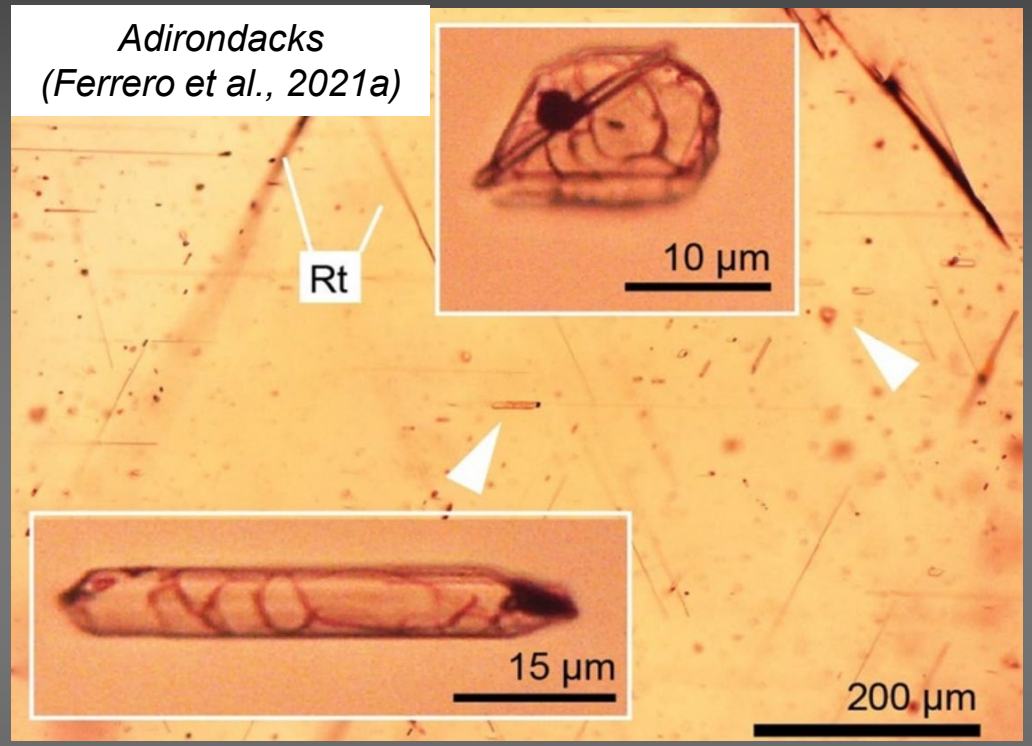
Partial melting at low-medium P and T ≤1000°C



- Modelling show a supra-solidus evolution between 0.5 and 0.8 GPa
- Garnet/melt pairs are likely snapshots of **two different melting events** at ≠T
- **Rt needles+NG** in Grt 1 seems typical of garnets formed at T 950-1050°C (Ferrero et al., 2021a,b)

Partial melting at low-medium P and T ≤1000°C

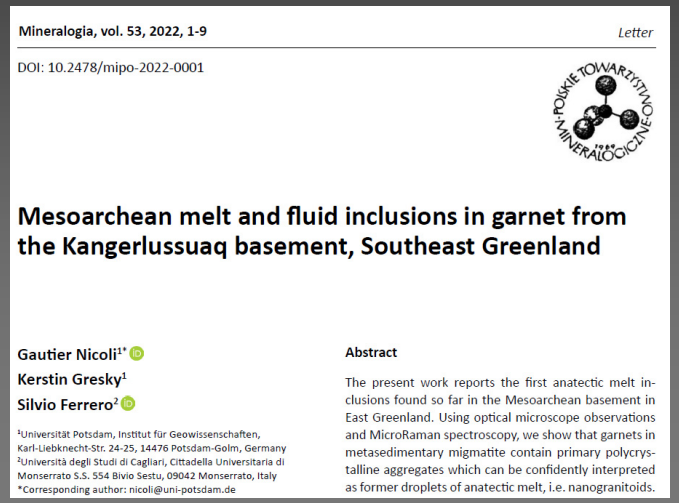




- **Rt needles+NG** in Grt 1 seems typical of garnets formed at T 950-1050°C (Ferrero et al., 2021a,b)

Conclusions

- Oldest occurrence of preserved nanogranitoids
- Fluid-melt immiscibility→ COH fluid present partial melting
- First evidence of suprasolidus metamorphism in the area (previously 600-700°C / 0.3-0.4 Gpa)



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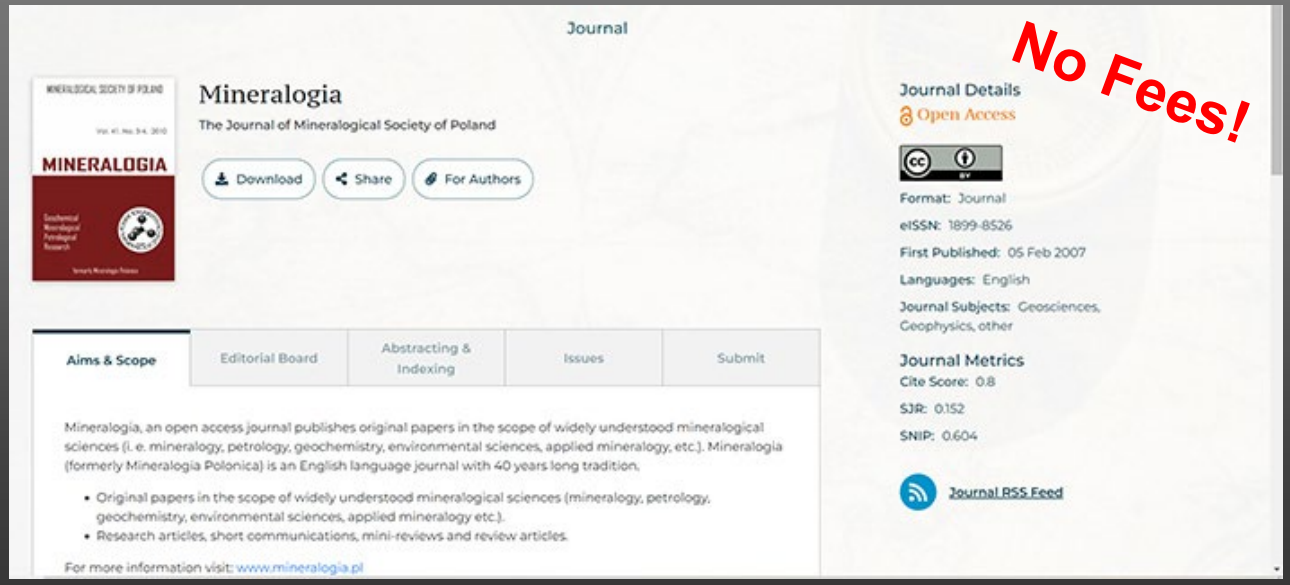
Mesoarchean melt and fluid inclusions in garnet from the Kangerlussuaq basement, Southeast Greenland

Gautier Nicoli[1]*
Kerstin Gresky[1]
Silvio Ferrero[2]

[1]Universität Potsdam, Institut für Geowissenschaften, Karl-Liebknecht-Str. 24-25, 14476 Potsdam-Golm, Germany
[2]Università degli Studi di Cagliari, Cittadella Universitaria di Monserrato S.S. 554 Bivio Sestu, 09042 Monserrato, Italy
*Corresponding author: nicoli@uni-potsdam.de

Abstract

The present work reports the first anatectic melt inclusions found so far in the Mesoarchean basement in East Greenland. Using optical microscope observations and MicroRaman spectroscopy, we show that garnets in metasedimentary migmatite contain primary polycrystalline aggregates which can be confidently interpreted as former droplets of anatectic melt, i.e. nanogranitoids.



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