Detrital zircon U-Pb analysis of Timanian passive-margin successions and Caledonian nappes in Northern Norway and significance for Arctic reconstructions

Wen Zhang [1], David Roberts [2], Victoria Pease[1]
1. Department of Geological Sciences, Stockholm University, 106 91 Stockholm, Sweden
2. Geological Survey of Norway, 7491 Trondheim, Norway

Geological Background

- The Neoproterozoic passive-margin succession of the **Timanian** margin, northern Norway, includes the 9 km-thick, deep-marine to deltaic Barents Sea Group (BSR). To the south, a fluvial to shallow-marine platformal domain (TVR)[1] defines the succession. To the west, different rocks of the **nappe complexes** (Lower, Middle and Upper Allochthons) of the Norwegian Caledonides[2-5] occur.
- The **Timanian 'fingerprint'** is defined by zircon ages from regionally restricted subduction-related granitoids generated during Timanian orogenesis at c. 610-560 Ma across the Timan-Pechora basin. How can a Timanides source be recognized if distal to the arc/ lacking magmatic intrusions of this age?
  The detrital zircon U-Pb spectrum of the sediments has not been fully assessed...
- **Aim:** To determine the detrital signature of Timanian passive-margin successions at *their type locality*.
- **Significance:** Evaluate to what extent (if any) these passive-margin sediments have been recycled, to recognize them in younger sediment deposits, and to possibly correlate them in the now widely distributed allochthonous Timanian fragments of the circum-Arctic.

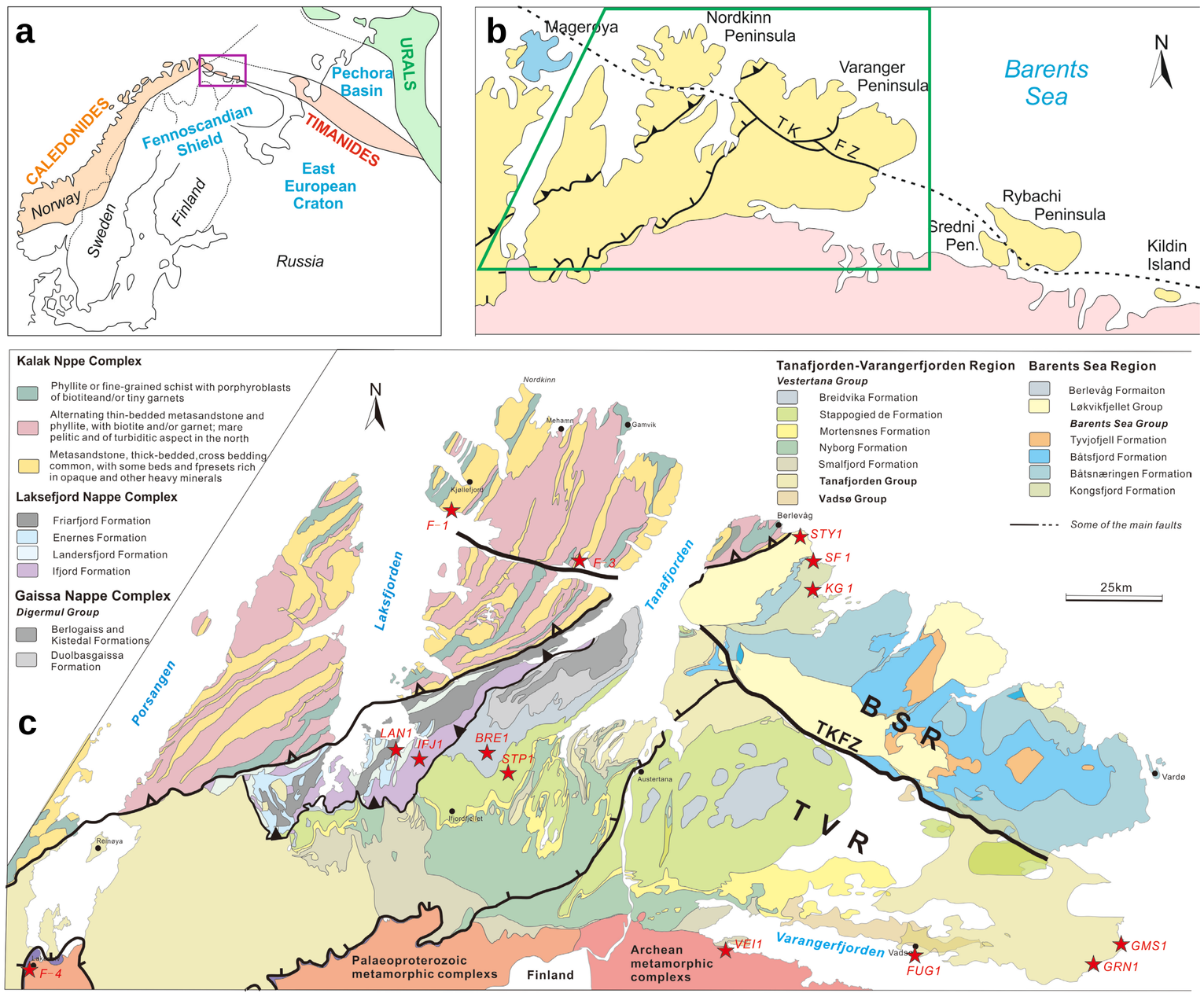

Figure **1a**. Location of the Timanides[6]; **1b**. Locaiton of the Rybachi, Sredni, Varanger and Nordkinn peninsulas and Kildin Island[1]. TKFZ- Trollfjorden-Komagelva Fault Zone; **1c.** Study area in North Norway, with sample locations (modified after 1:500 000 Finmark Bedrock Geology, NGU).

Preliminary results of U-Pb detrital zircon investigation (LA-ICP-MS)

Sample STY1
Styret Formation
Løkviksfjellet Group
Varanger Peninsula

Sample IFJ1
Ifjord Formation
Laksefjord Nappe Complex

Sample F4
Feldspathic sandstone
Nordkinn Peninsula

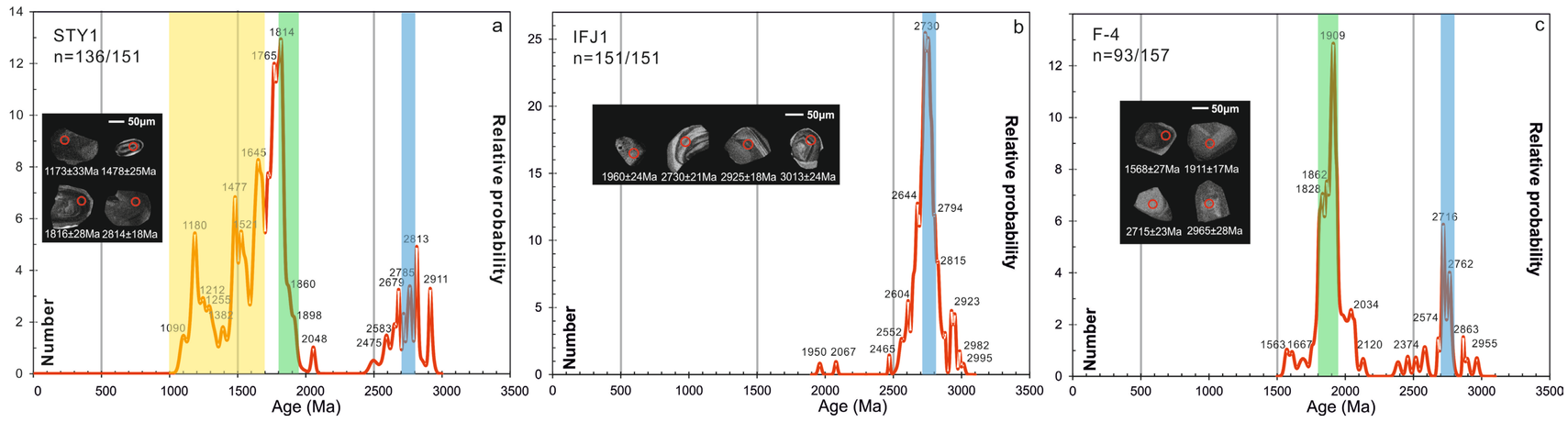

Figure 2. Probability density versus age (common-Pb corrected, $^{207}Pb/^{206}Pb$ ages) . a) STY1; b) IFJ1; c) F1. The number of grains indicated = those <10% discordant / the total number of analyses. The probability density plots exclude ages >10% discordant.

Sources

2.8-2.7 Ga = *Neoarchean complexes of the northern Fennoscandian Shield*

1.95-1.8 Ga = *Paleoproterozoic terranes of the northern Fennoscandian Shield, deformed during Svecofennian orogeny*

Mesoproterozoic ages =

- *a source(s) concealed beneath the Caledonian nappes/adjacent shelf?*
- *a northward extension of the Sveco-norwegian/ Grenvillian orogeny?*
- *a Tonian-emplaced, sandstone-dominated thrust sheet derived from the margin of Rodinia?*

Conclusion:

The Neoproterozoic Barents Sea and Løkviksfjellet group successions was an established passive-margin depositional system with little to no coeval magmatism.

References
[1] Roberts and Siedlecka, 2012; [2]Burke et al., 2007; [3] Gee and Pease, 2004; [4] Kirkland et al., 2006; [5] Kirkland et al., 2008; [6]Robert and Siedlecka, 2002.