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# Detrital zircon source evolution during the Devonian-Carboniferous collision in the Northern Moroccan Variscides

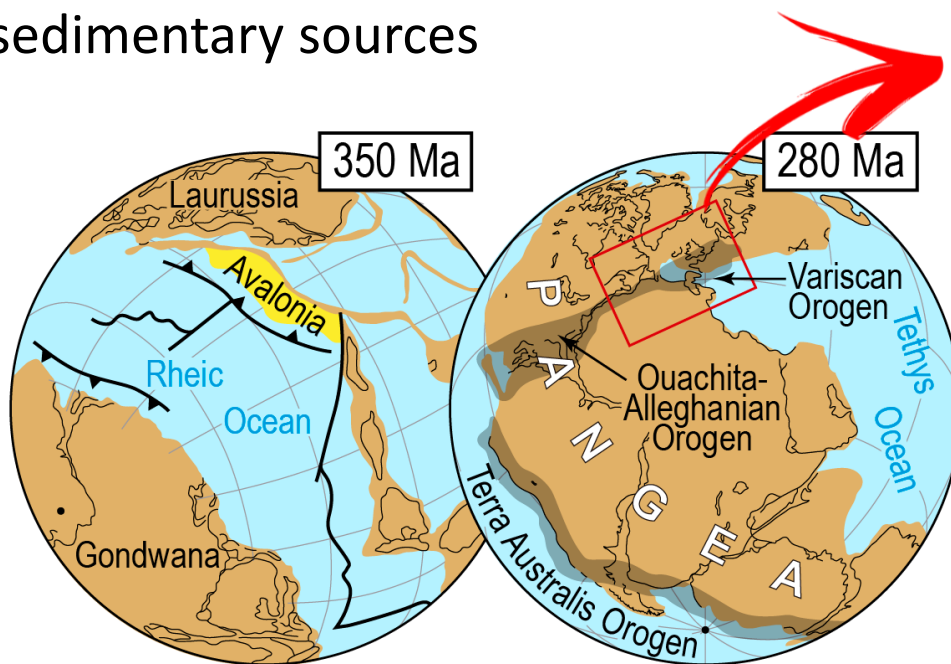
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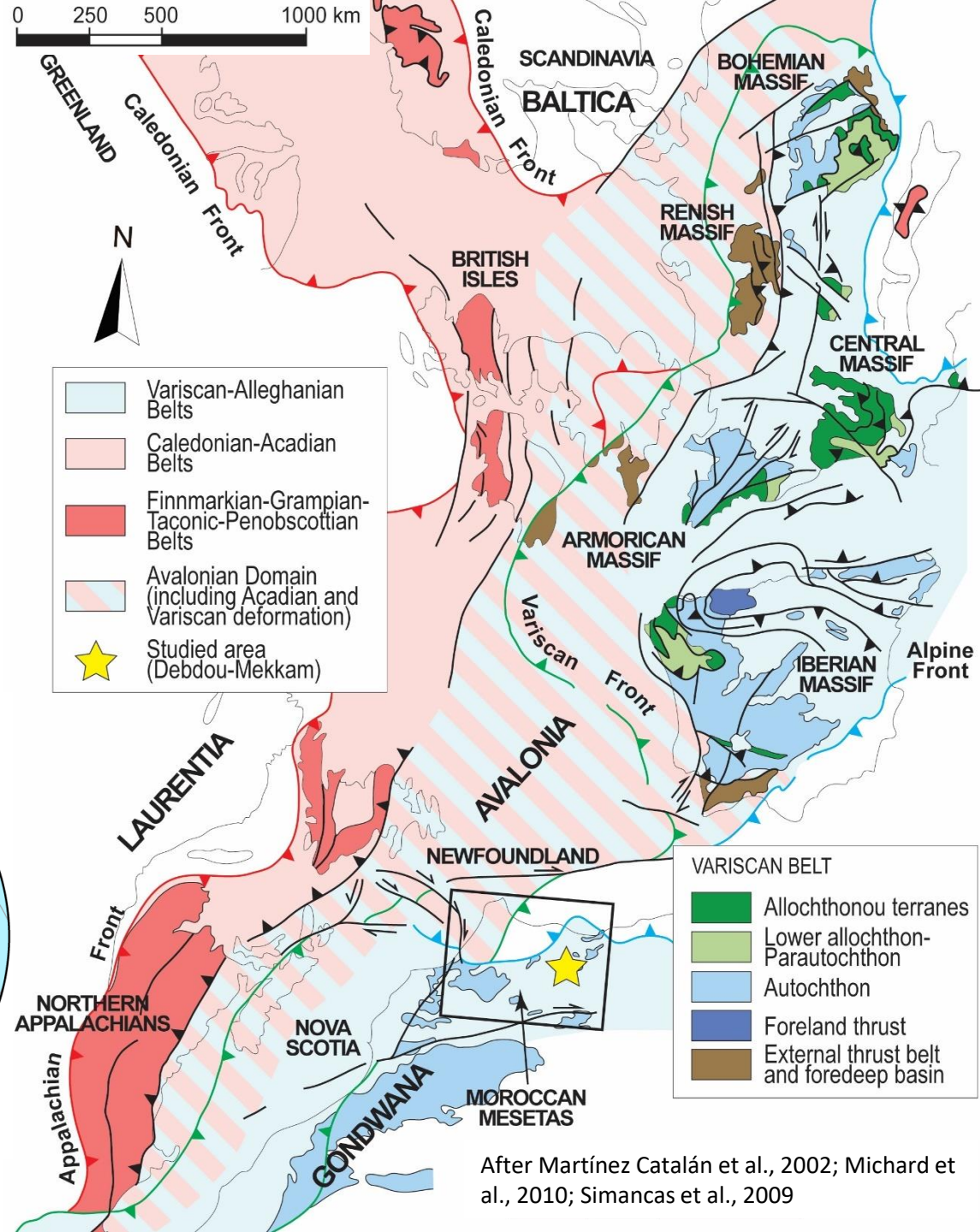


## OVERVIEW:

- Geological setting:
  - ✓ Moroccan Variscides
- Methodology and results:
  - ✓ Geochronology on detrital zircon grains
- Discussion: provenance of the different detrital zircon populations and evolution of the sedimentary sources



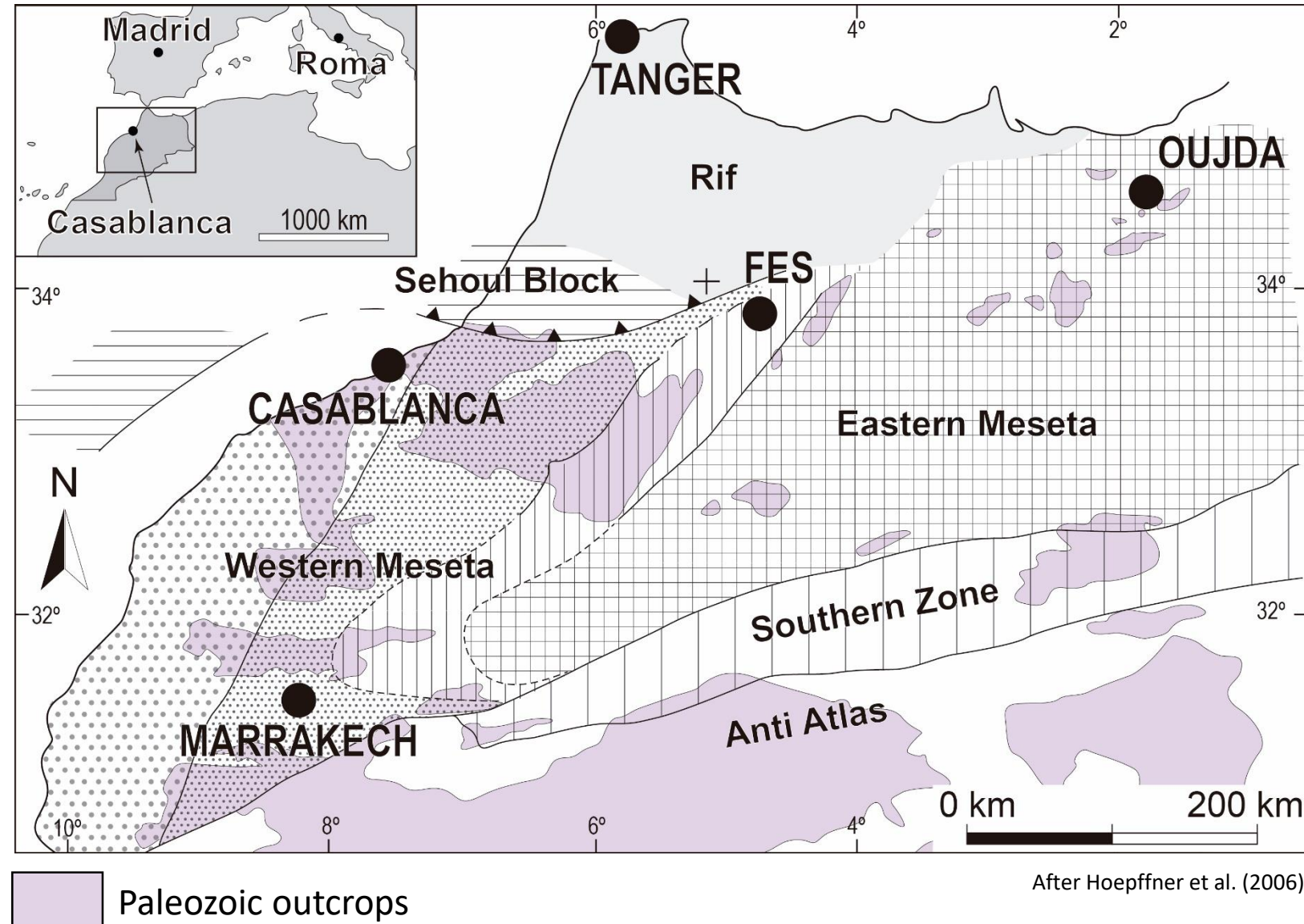
Modified from Nance et al., 2010 and references therein



After Martínez Catalán et al., 2002; Michard et al., 2010; Simancas et al., 2009

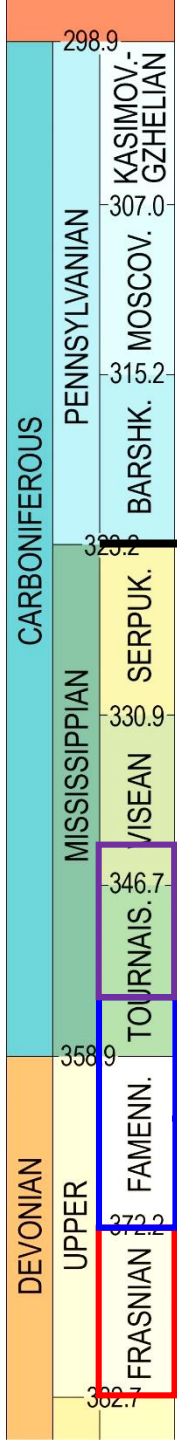
# GEOLOGICAL SETTING

- **Anti Atlas:** N-Gondwanan foreland of the Variscan Belt
- **Southern Zone:** autochthonous West African rocks
- **Western Moroccan Meseta (WMM):** several tectonic blocks, deformed mainly by upright folds
- **Eastern Moroccan Meseta (EMM):** poorly defined yet, deformed mainly by upright folds
- **Sehoul Block:** Caledonian-Avalonian, overthrust on the WMM
- **Rif:** alpine belt

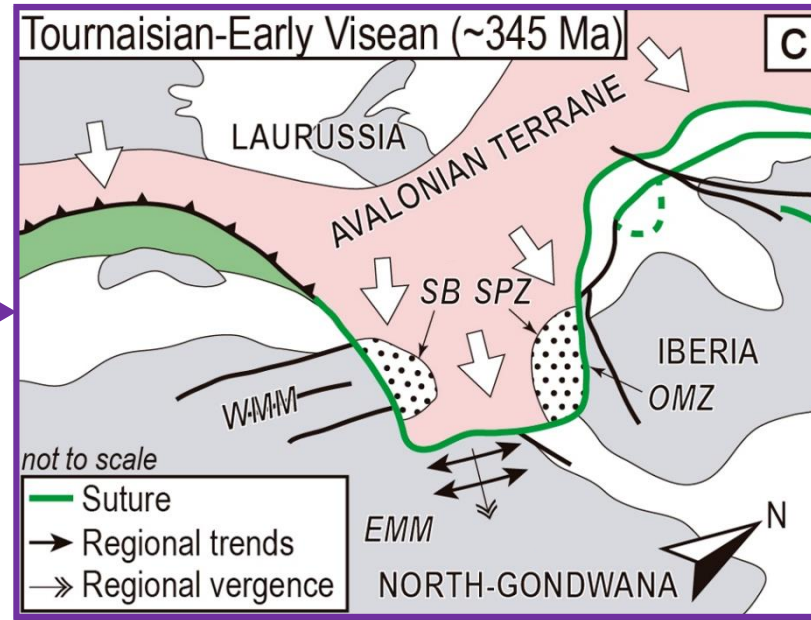


After Hoepffner et al. (2006)



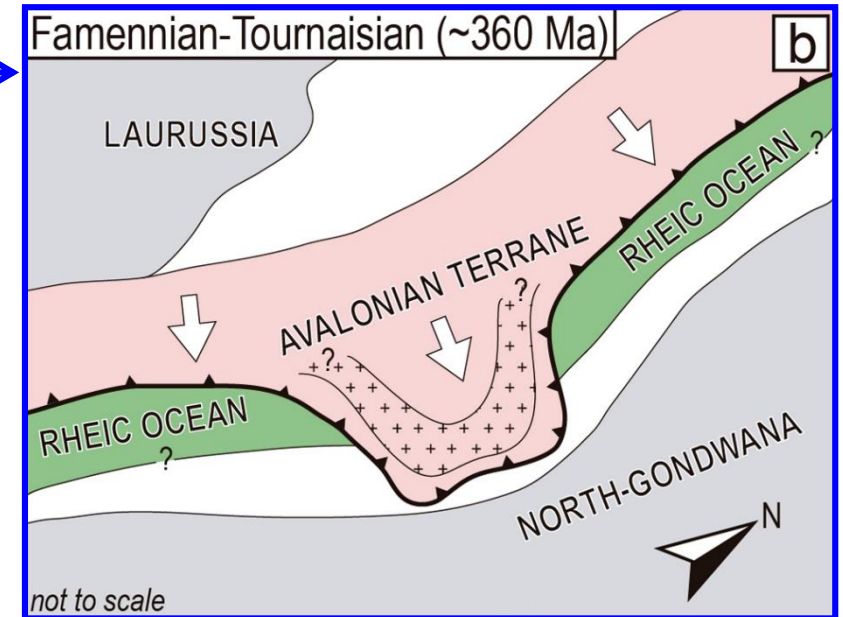
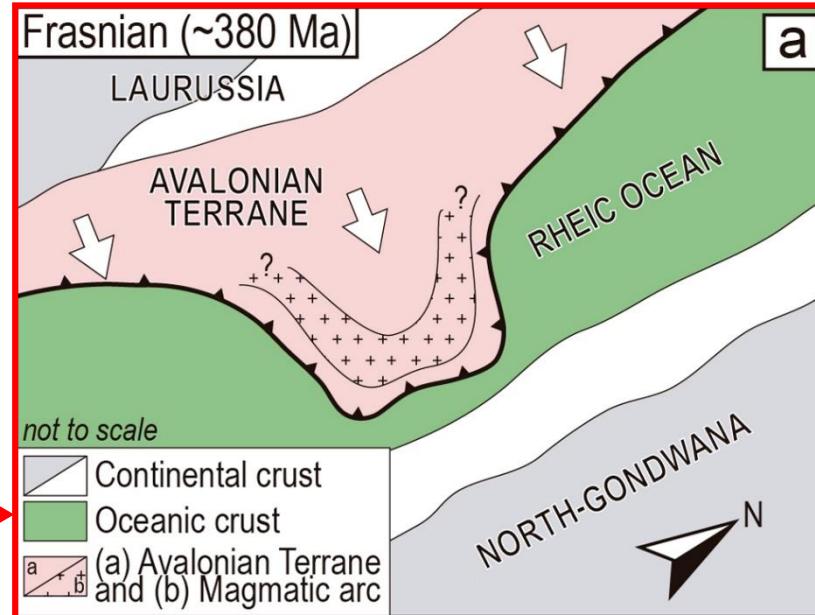


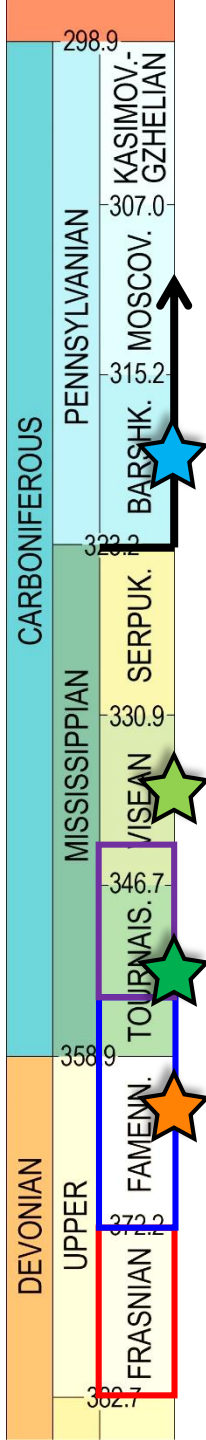
Main Variscan event



# GEOLOGICAL SETTING

EMM: Eastern Moroccan Meseta  
OMZ: Ossa-Morena Zone (SW Iberia)  
SB: Sehoul Block  
SPZ: South Portuguese Zone (SW Iberia)  
WMM: Western Moroccan Meseta

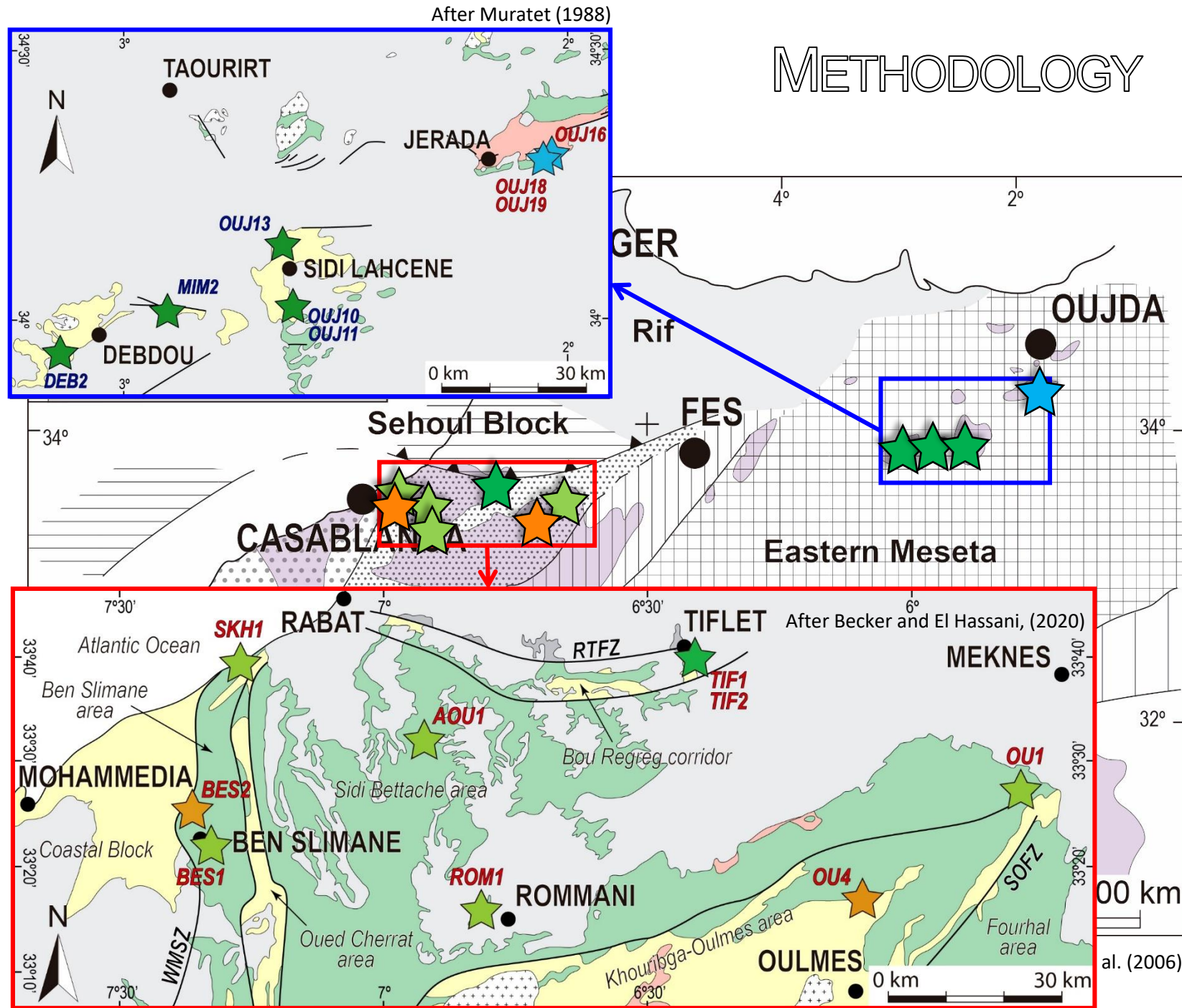




In this work:

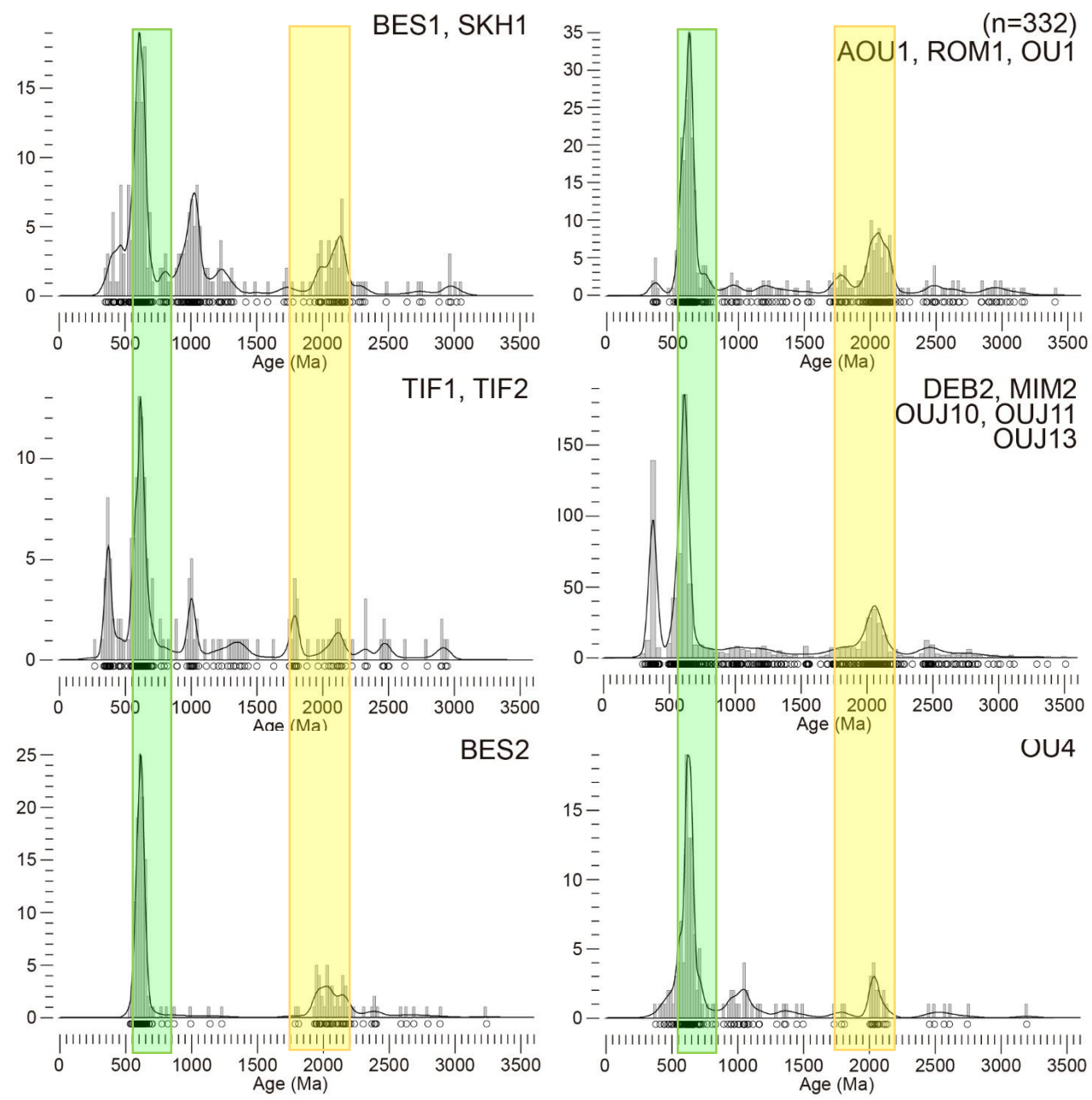
- **Eo-Variscan event**
- **SAMPLES:**
- 3 Serpukhovian-Moscovian samples** (Jerada area)
- 5 Viséan samples** (Ben Slimane, Sidi Bettache, Oulmes areas)
- 7 Tournaisian samples** (Tiflet and Debdou-Mekkam areas)
- 2 Famennian samples** (Ben Slimane and Oulmes areas)
- **U-Pb geochronology on detrital zircon grains** (LA-ICPMS, SHRIMP, and SIMS)

# METHODOLOGY



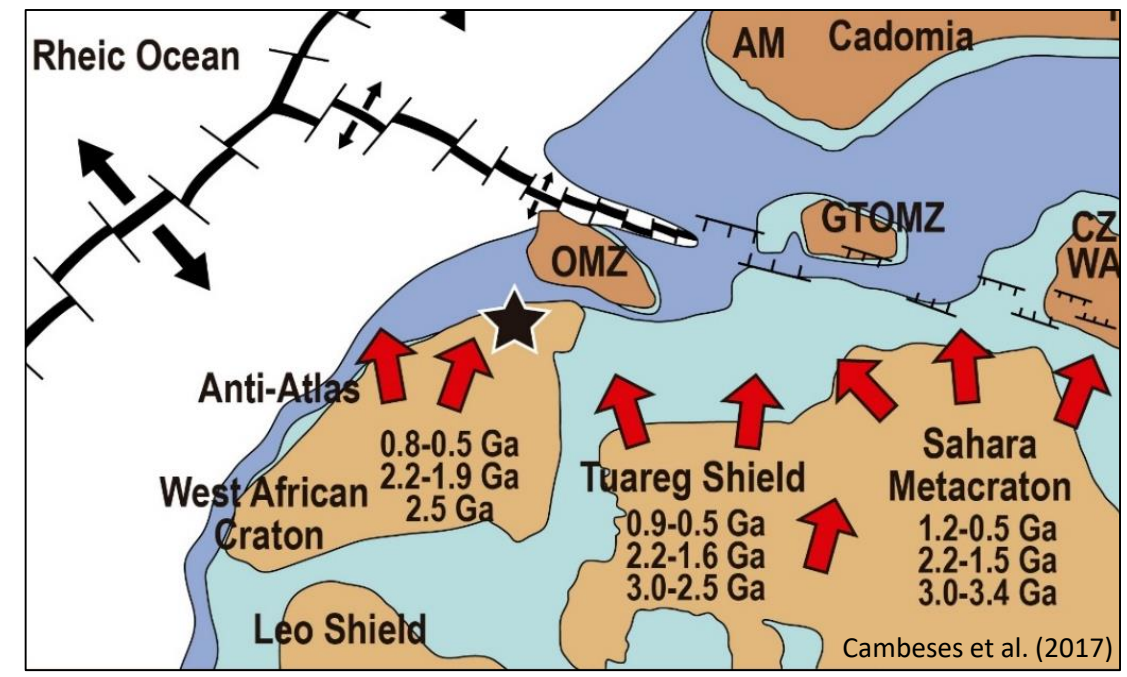


# U-Pb RESULTS

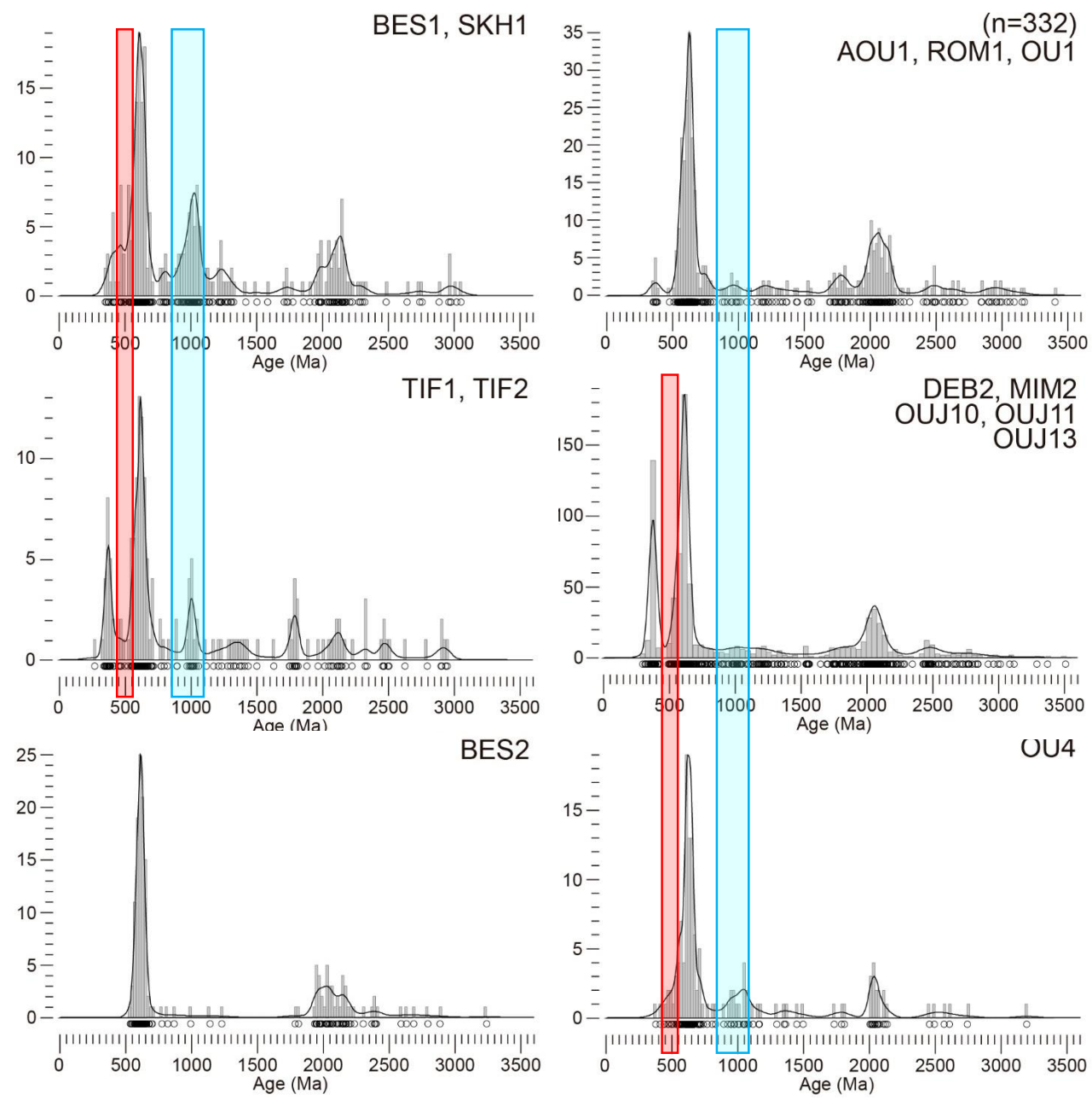


Neoproterozoic (800-540 Ma)

Paleoproterozoic (2200-1750 Ma)

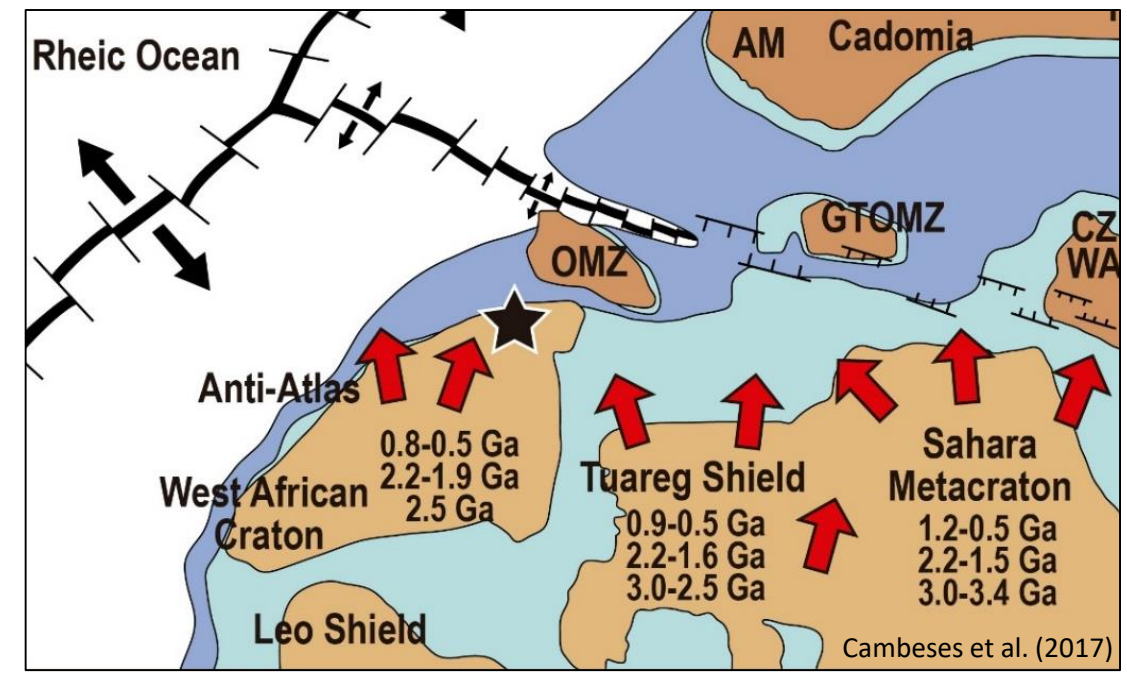


# U-Pb RESULTS

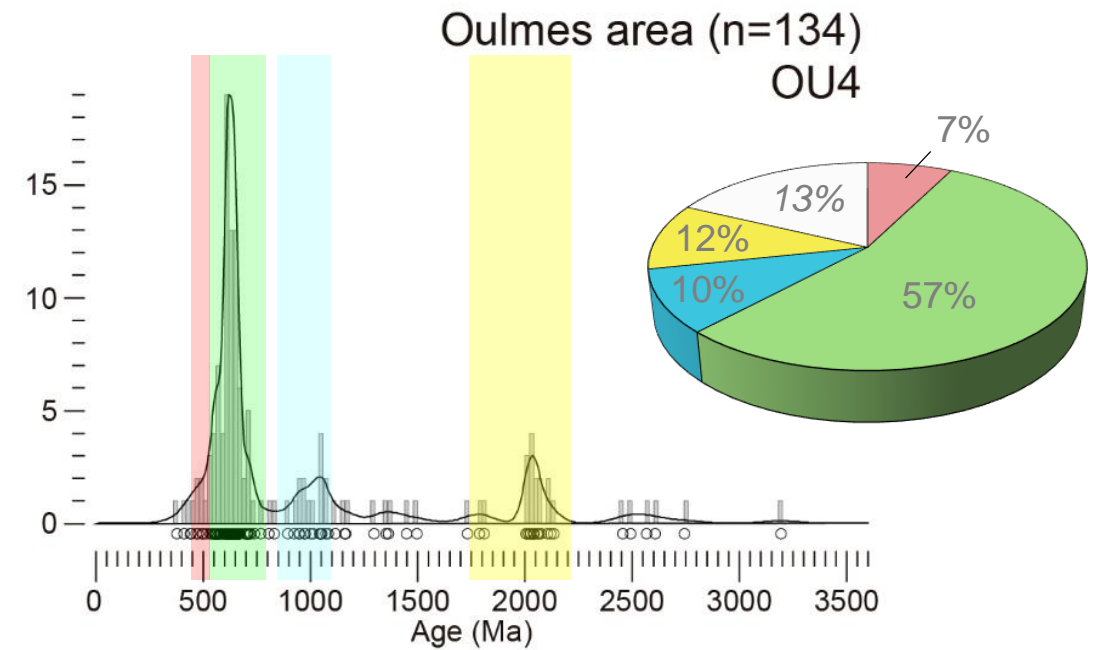
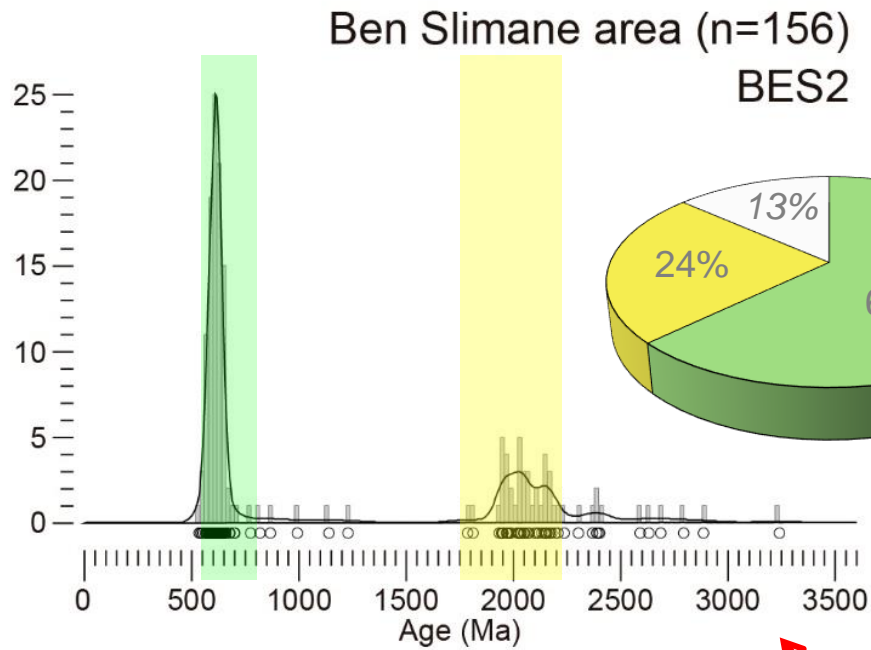
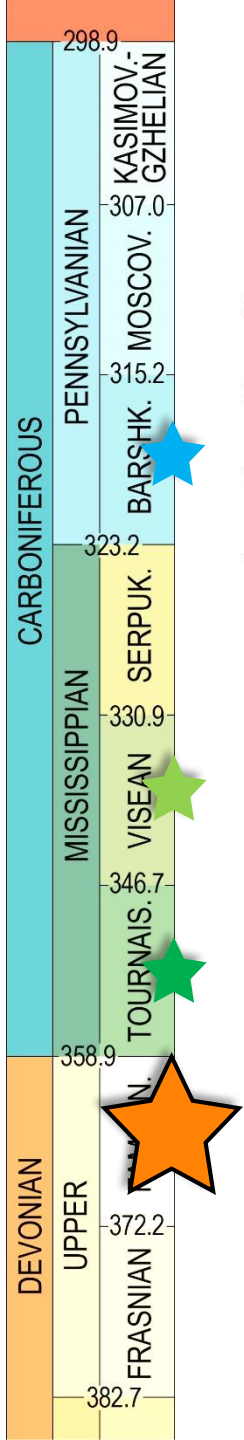


Cambrian-Ordovician (540-450 Ma)

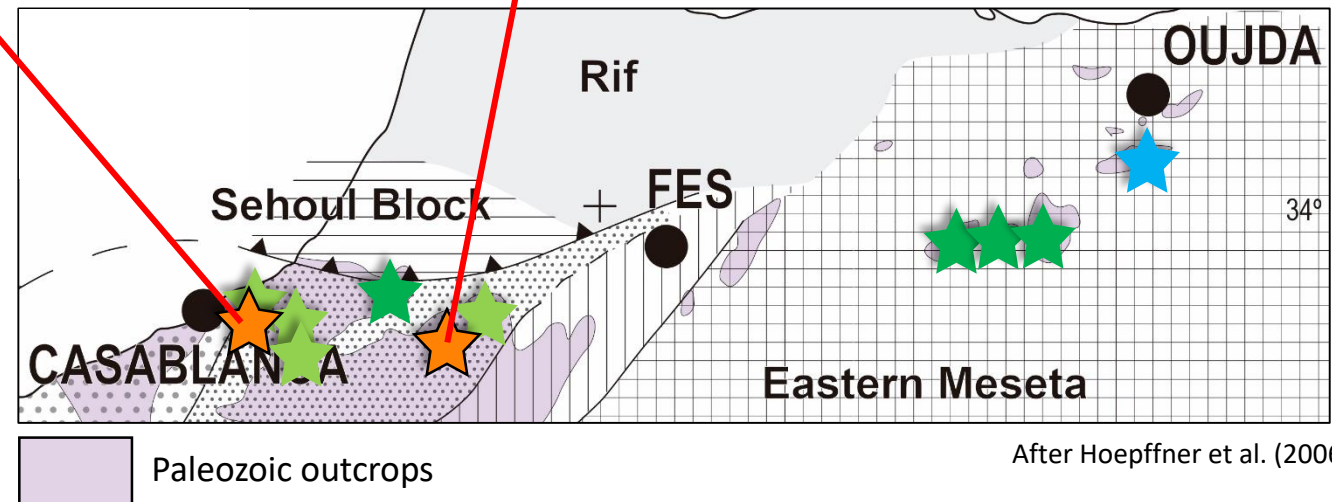
Stenian-Tonian (1100-850 Ma)



# U-Pb RESULTS: FAMENNIAN SAMPLES

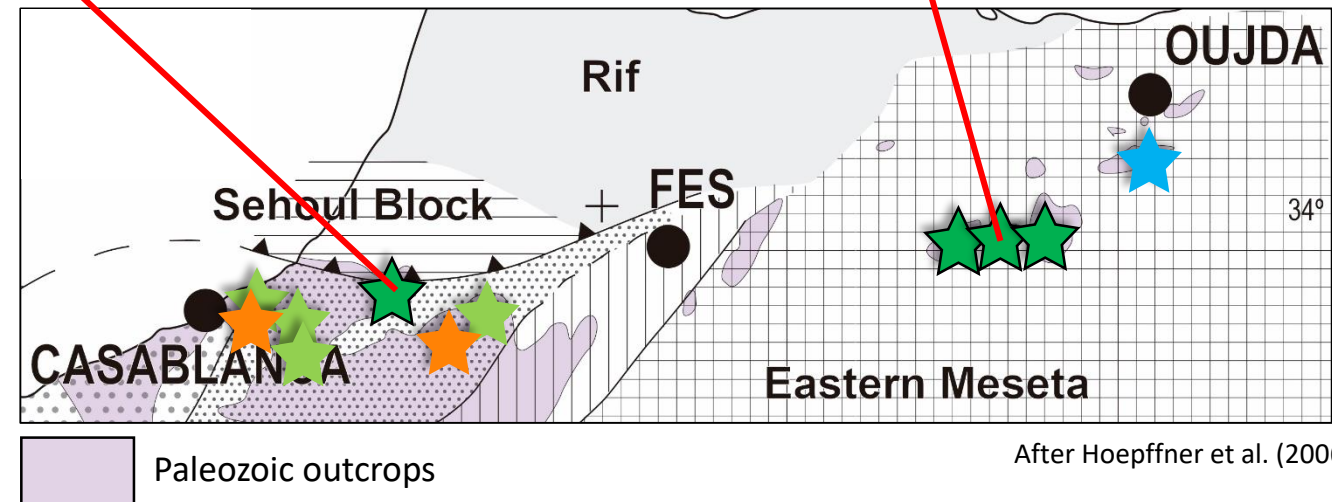
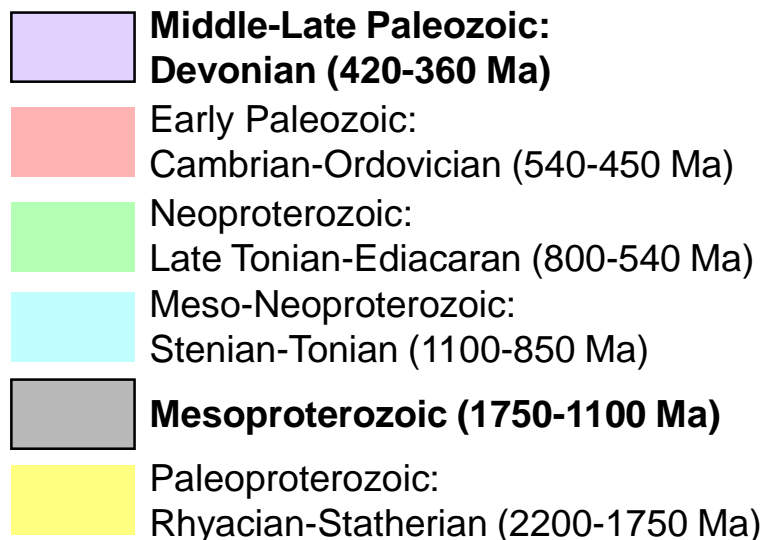
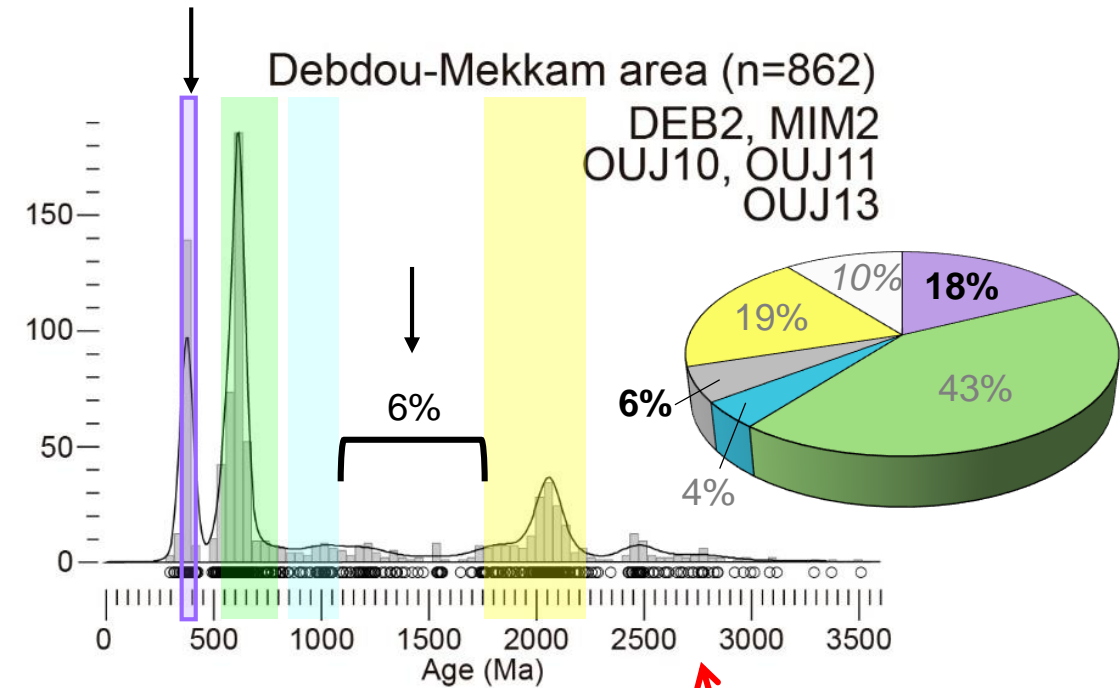
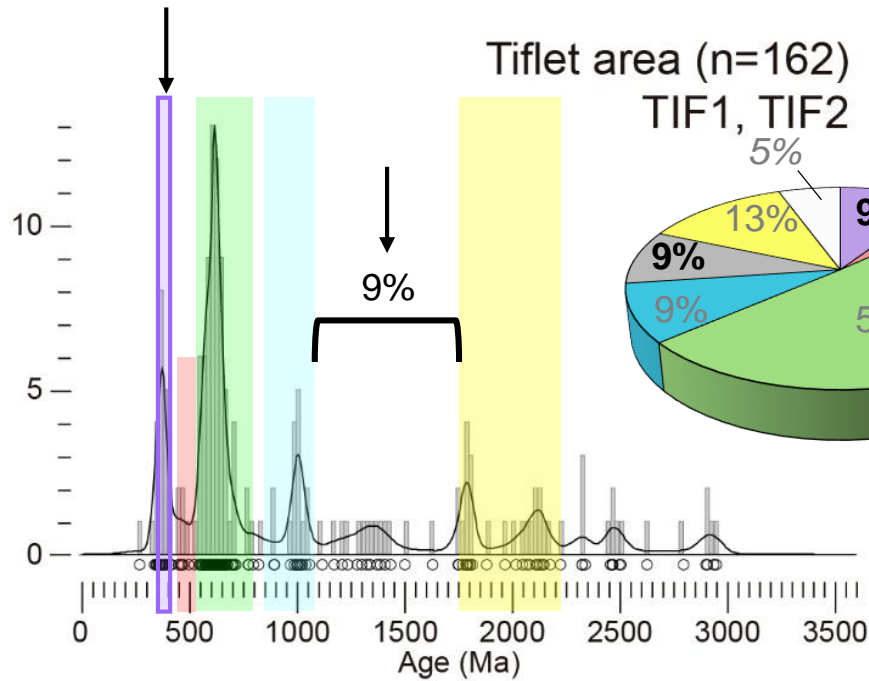


- Early Paleozoic: Cambrian-Ordovician (540-450 Ma)
- Neoproterozoic: Late Tonian-Ediacaran (800-540 Ma)
- Meso-Neoproterozoic: Stenian-Tonian (1100-850 Ma)
- Paleoproterozoic: Rhyacian-Statherian (2200-1750 Ma)



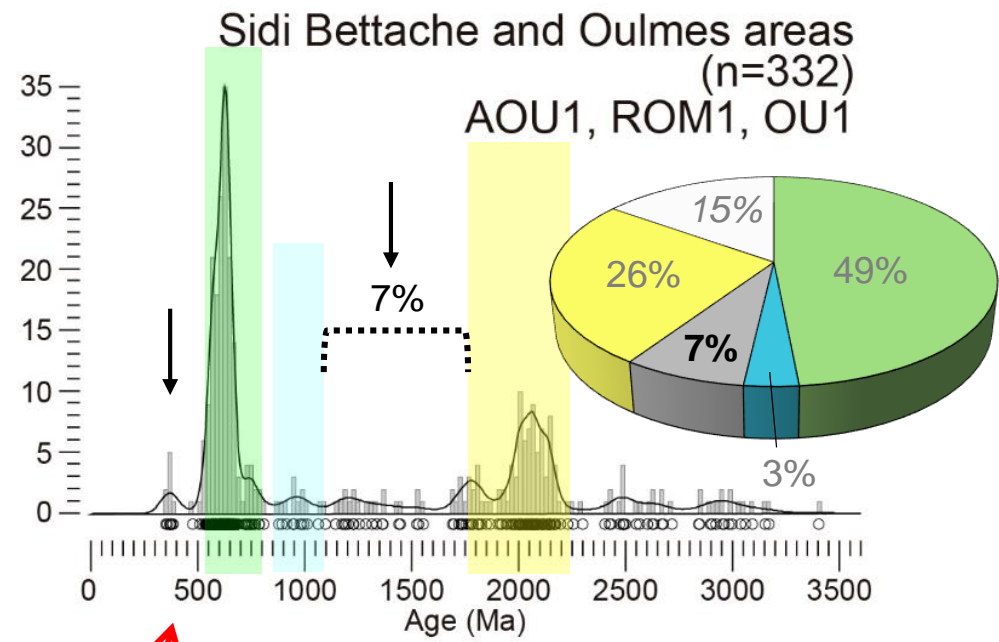
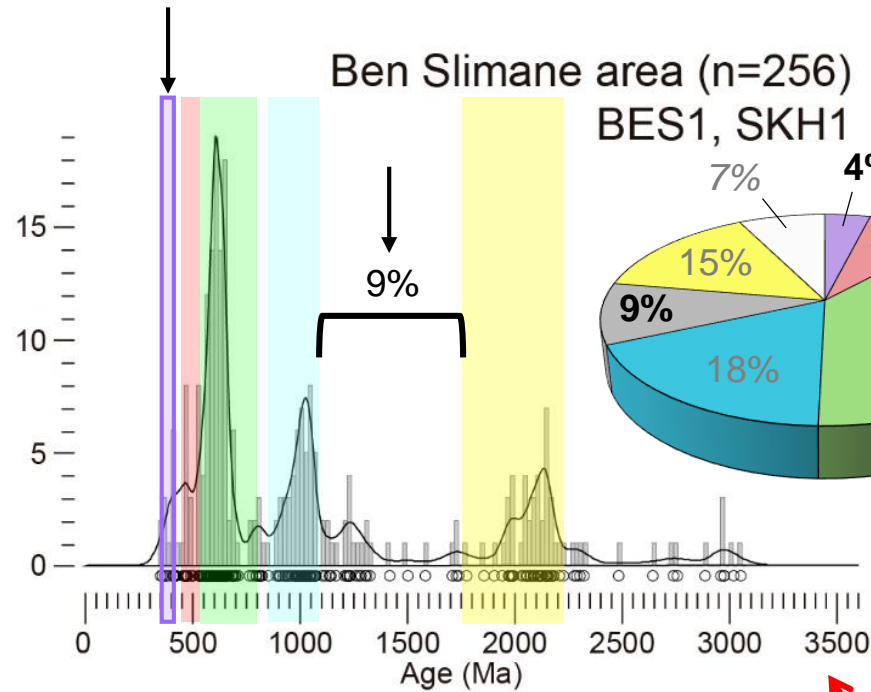
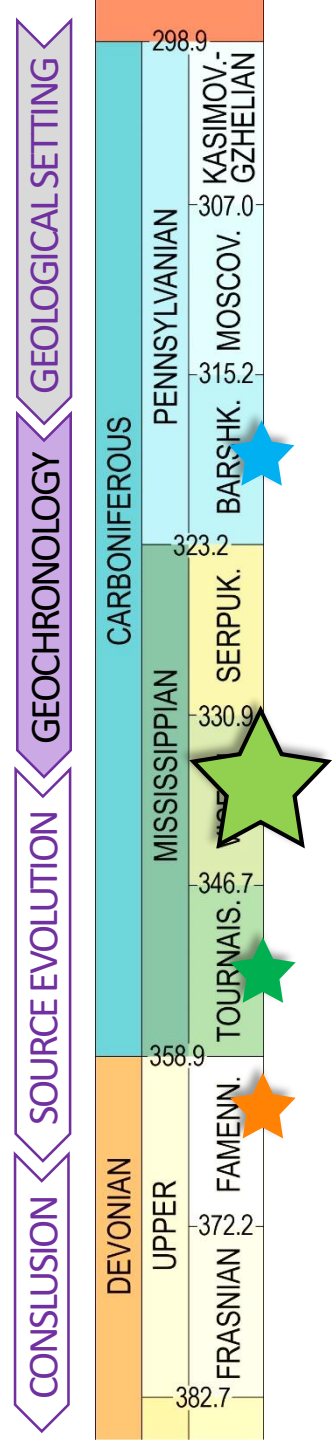


# U-Pb RESULTS: **TURNAISIAN** SAMPLES

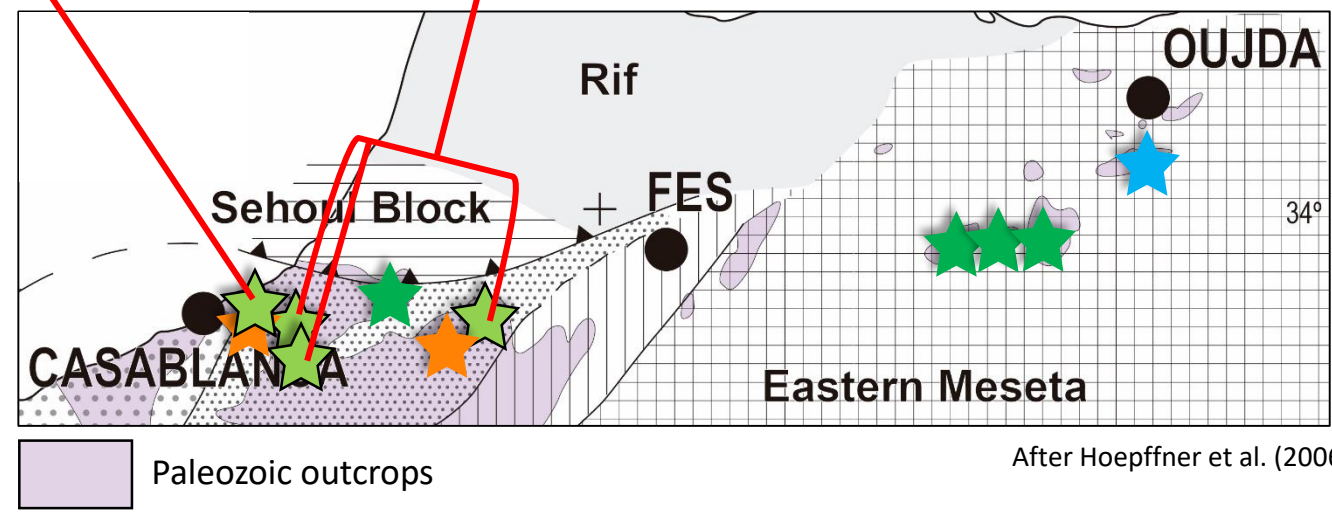


After Hoepffner et al. (2006)

# U-Pb RESULTS: VISEAN SAMPLES

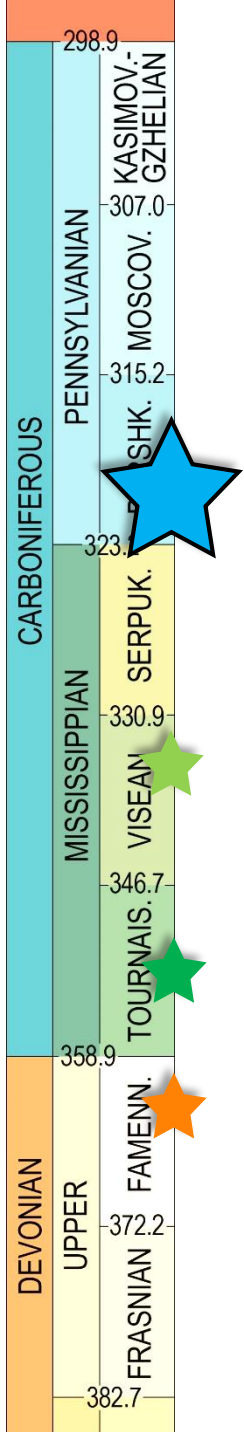


- Middle-Late Paleozoic:**  
Devonian (420-360 Ma)
- Early Paleozoic:**  
Cambrian-Ordovician (540-450 Ma)
- Neoproterozoic:**  
Late Tonian-Ediacaran (800-540 Ma)
- Meso-Neoproterozoic:**  
Stenian-Tonian (1100-850 Ma)
- Mesoproterozoic (1750-1100 Ma)**
- Paleoproterozoic:**  
Rhyacian-Statherian (2200-1750 Ma)

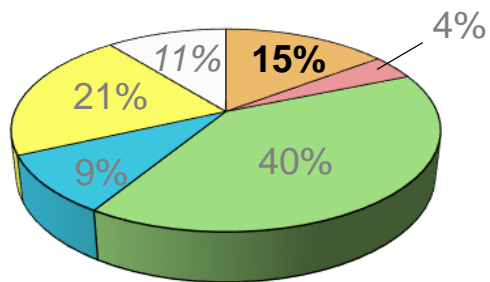


After Hoepffner et al. (2006)

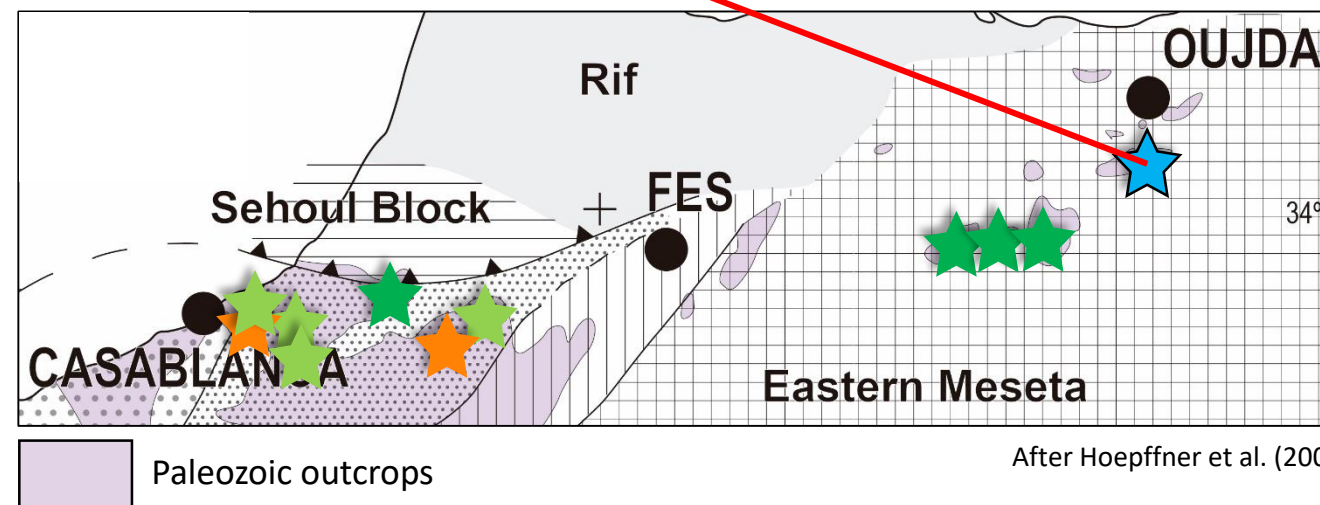
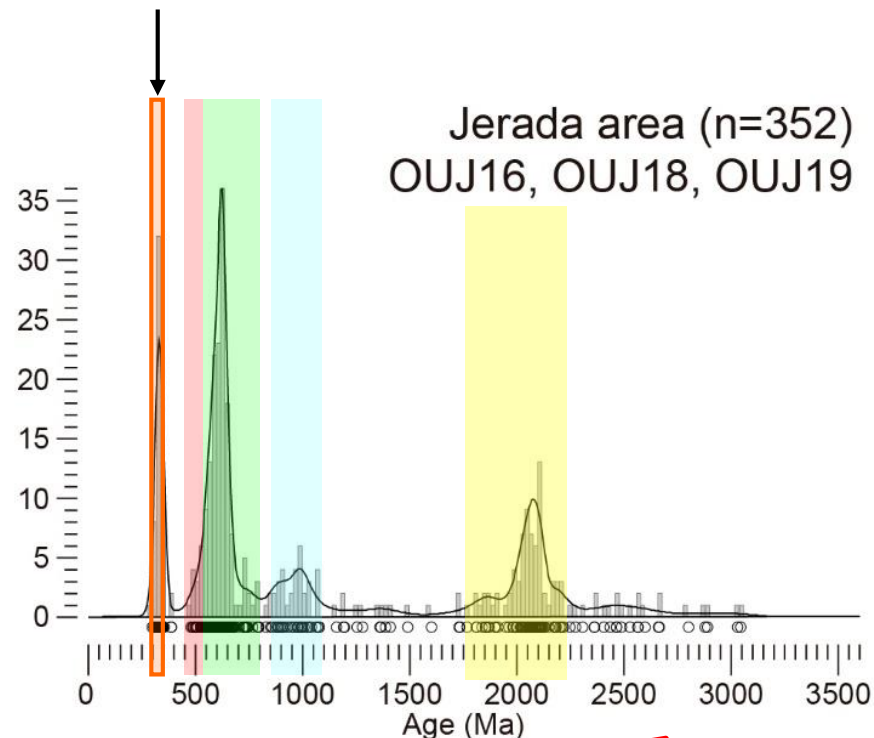




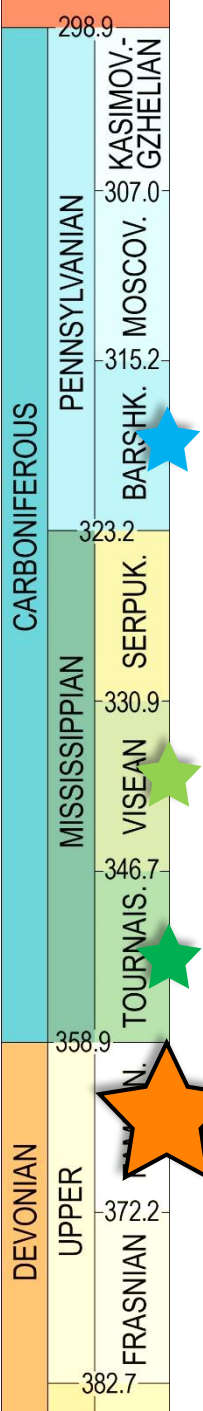
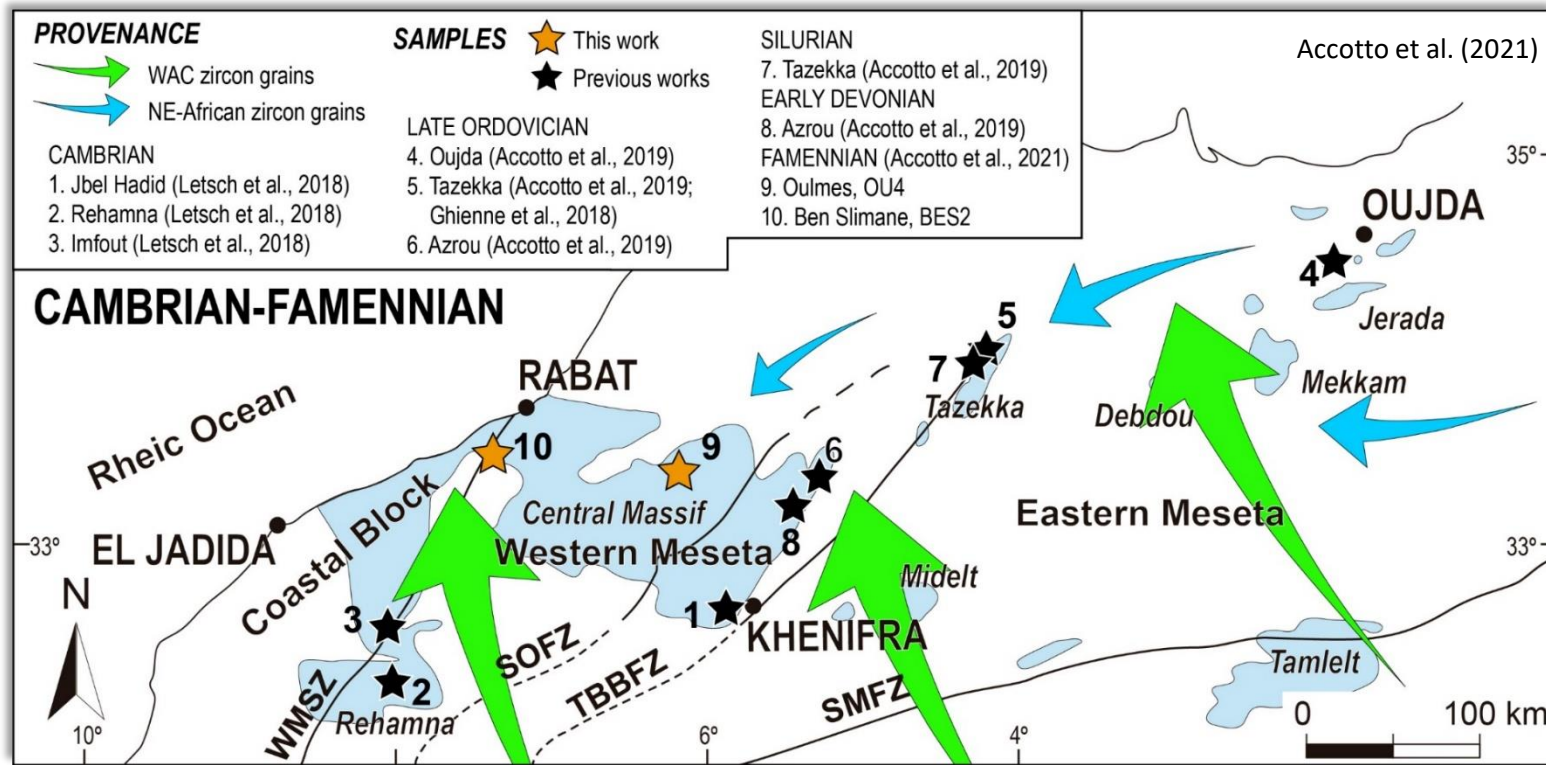
# U-Pb RESULTS: MID-UPPER CARBONIFEROUS SAMPLES



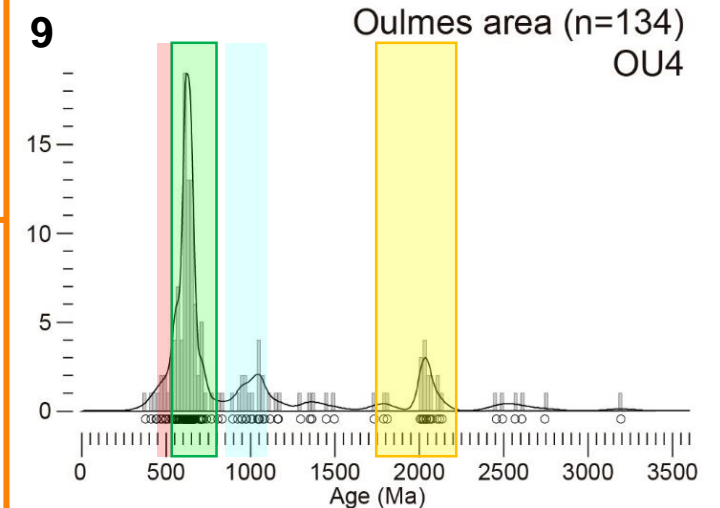
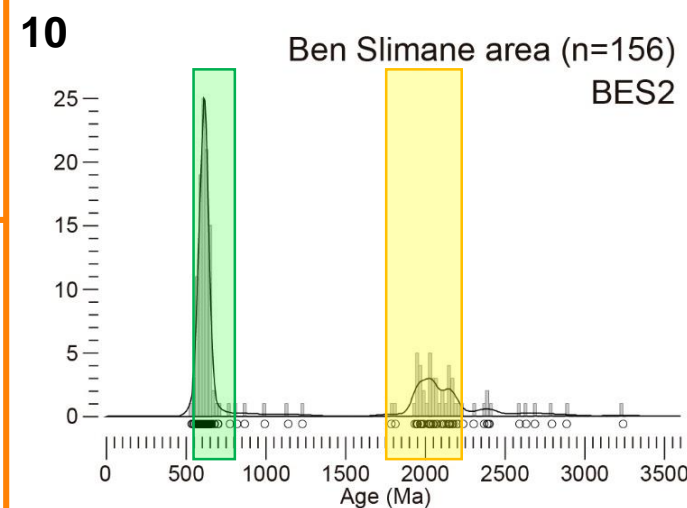
- Late Paleozoic:**  
**Carboniferous (350-300 Ma)**
- Middle-Late Paleozoic: Devonian (420-360 Ma)
- Early Paleozoic: Cambrian-Ordovician (540-450 Ma)
- Neoproterozoic: Late Tonian-Ediacaran (800-540 Ma)
- Meso-Neoproterozoic: Stenian-Tonian (1100-850 Ma)
- Mesoproterozoic (1750-1100 Ma)
- Paleoproterozoic: Rhyacian-Statherian (2200-1750 Ma)



# SOURCE EVOLUTION

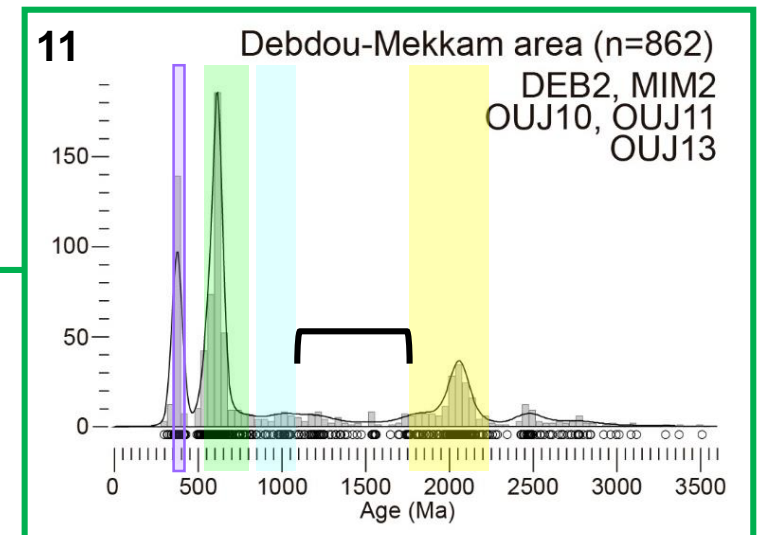
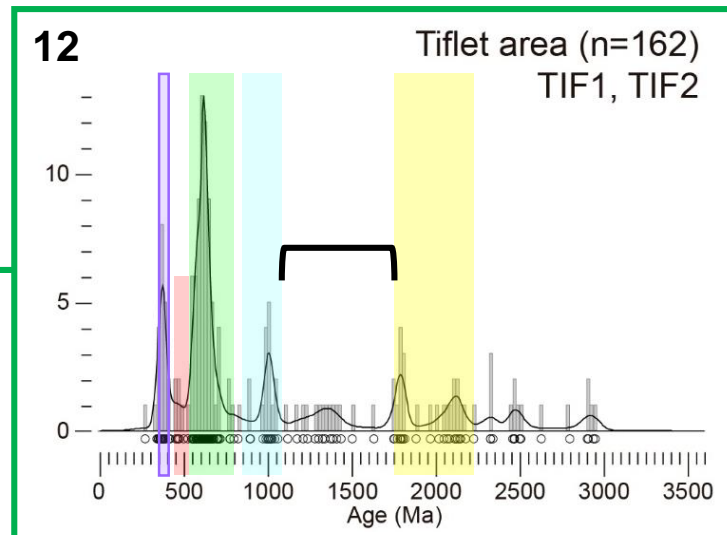
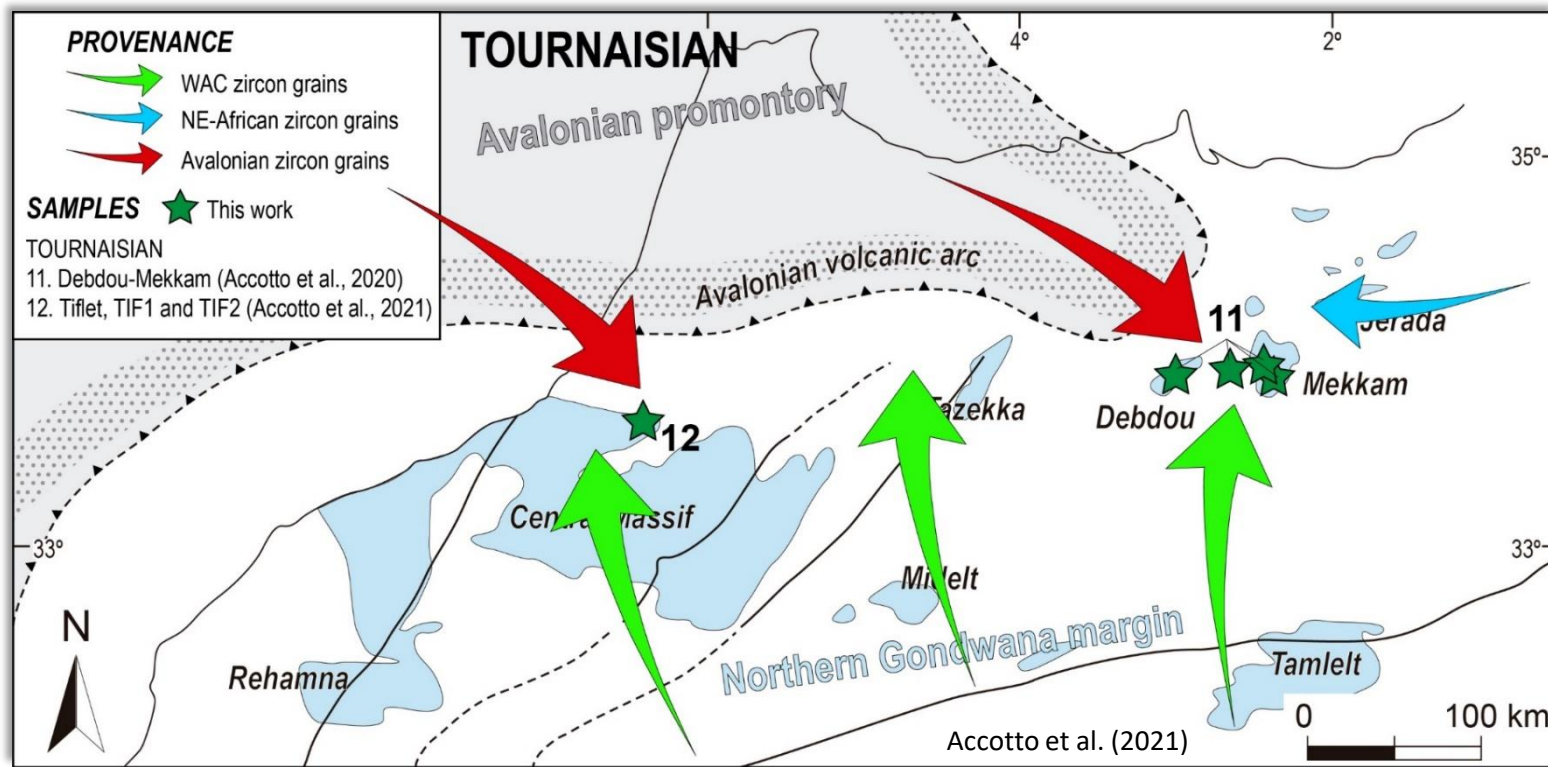


**LATE PRE-OROGENIC**

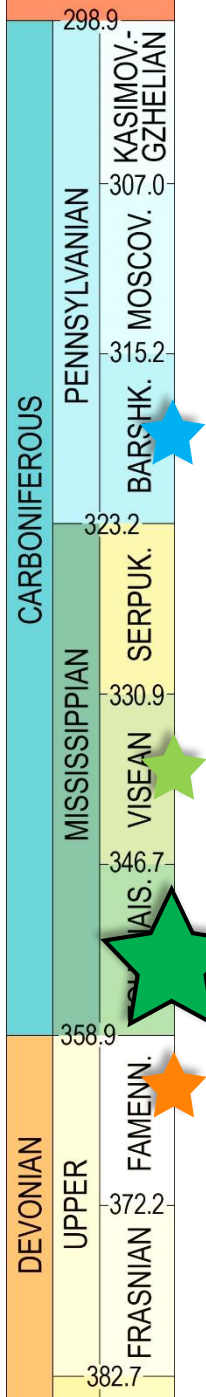




# SOURCE EVOLUTION



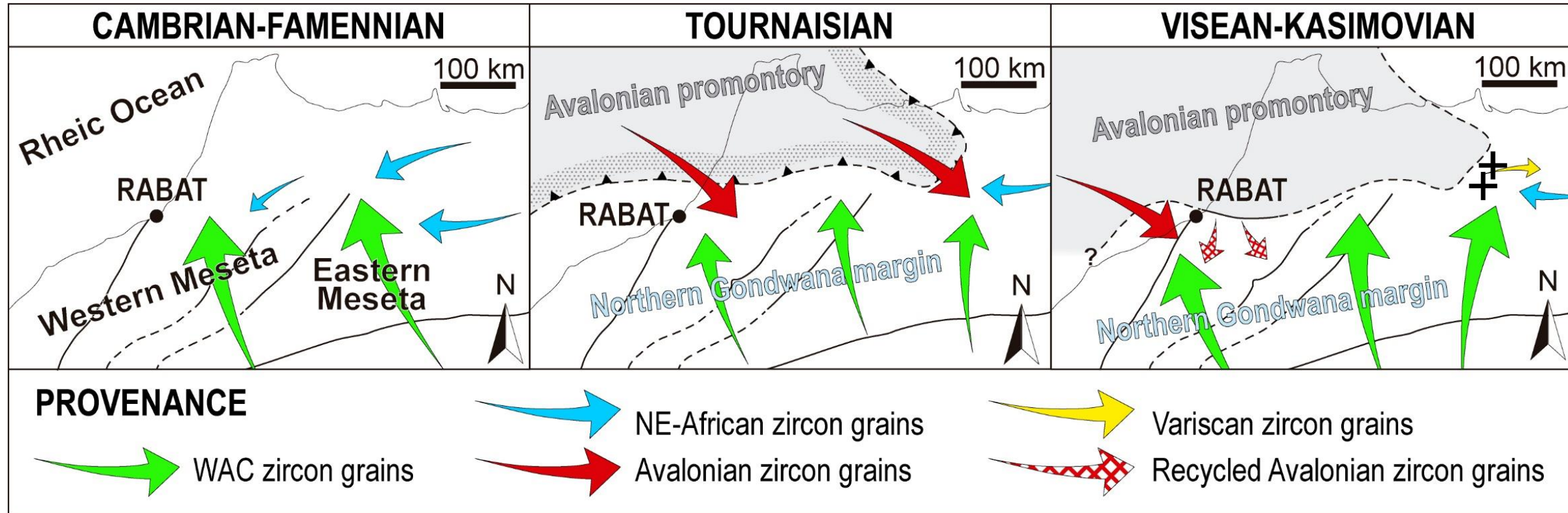
**SYN-OROGENIC**



CONCLUSION < SOURCE EVOLUTION < GEOCHRONOLOGY < GEOLOGICAL SETTING





**PRE-OROGENIC**

- West African Craton
- NE African sources

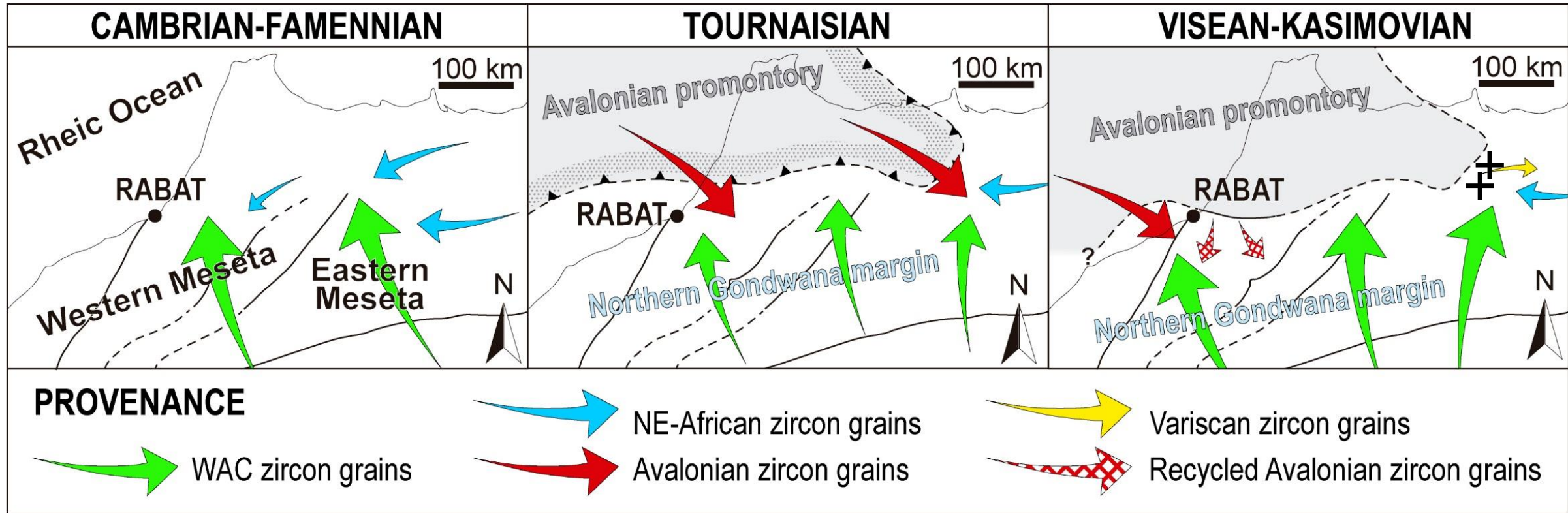
**SYN-OROGENIC**

- West African Craton
- NE African sources
- Avalonian sources

**POST-OROGENIC**

- West African Craton
- NE African sources
- Avalonian sources (primary and recycled)
- Variscan granitoids

# THANK YOU FOR YOUR ATTENTION



## ACKNOWLEDGEMENTS:

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