Major and trace element characteristics of wehrlitization within the upper mantle beneath the Nógrád-Gömör Volcanic Field (Northern Pannonian Basin)

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Meeting of Young Geoscientists
Balatonföldvár, 28-29 March 2014

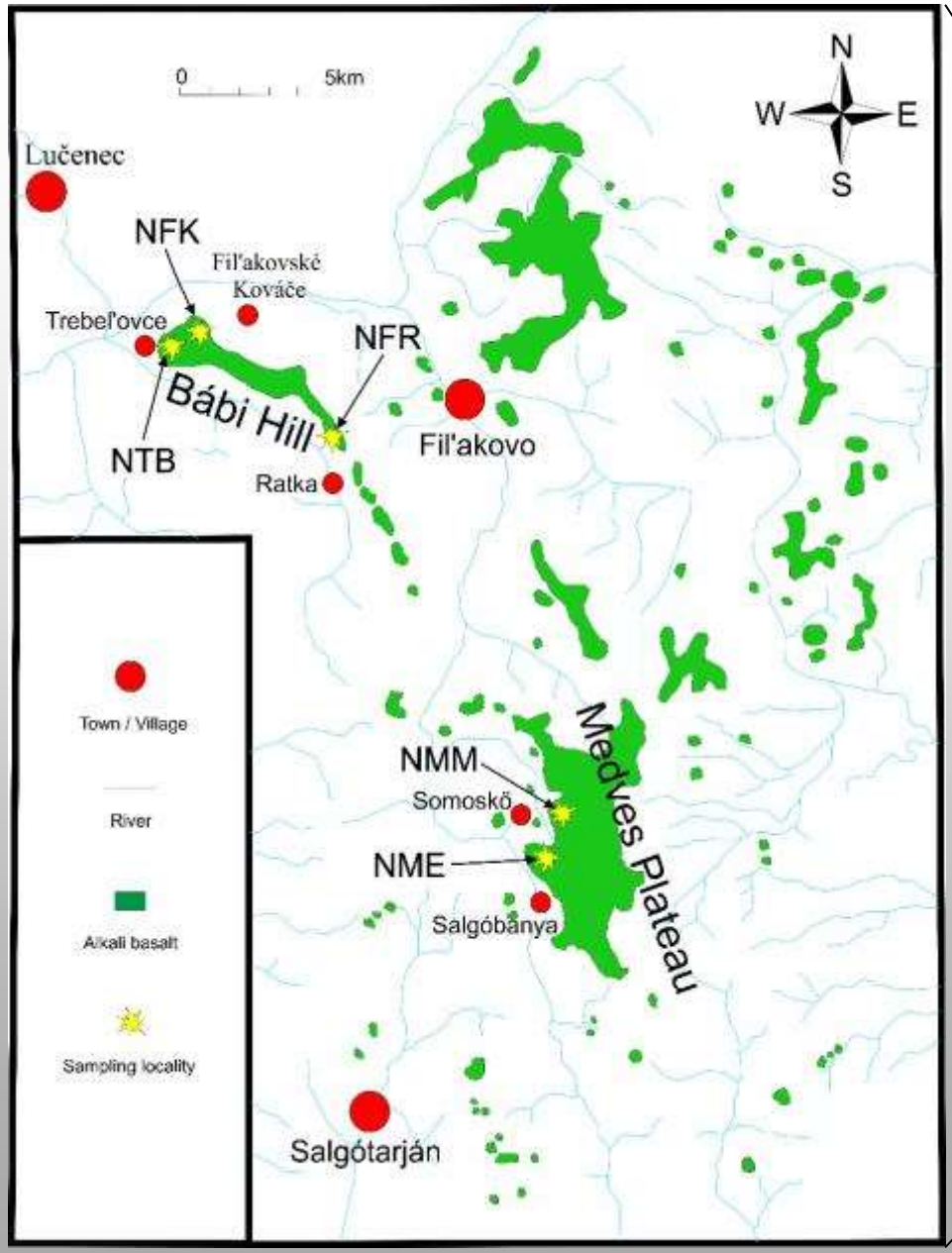
Outline of presentation

- Geological setting
- Xenolith petrography
- Major element geochemistry
- Trace element geochemistry
- Mechanism of metasomatism
- Conclusion

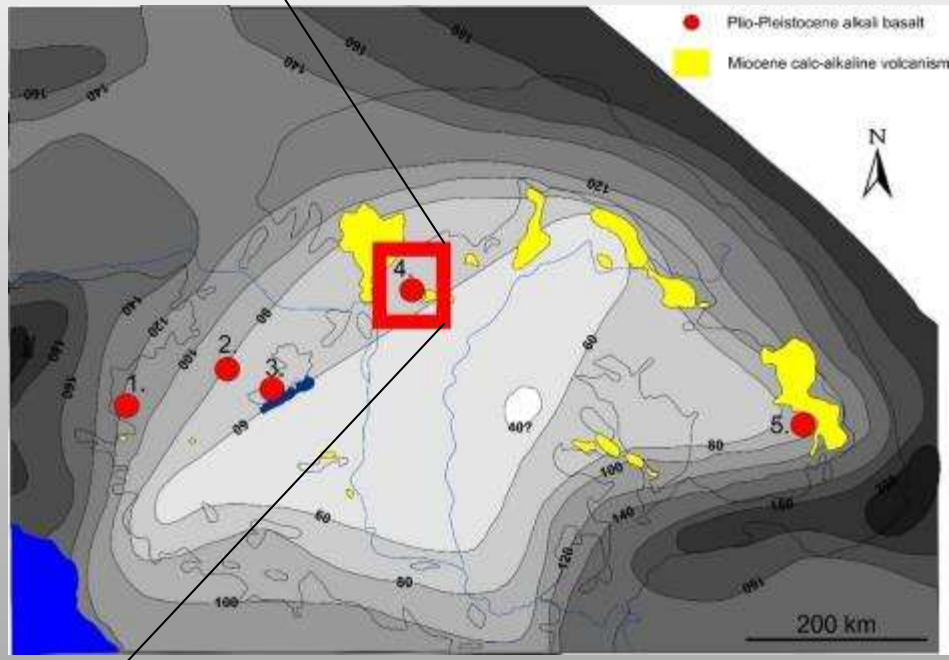
The aim of this study is to determine the composition of the melt that transformed a large portion of lherzolite to wehrlite via mantle metasomatism

Geological setting

1. Styrian Basin VF
2. Little Hungarian Plain VF
3. Bakony-Balaton Highland VF
4. **Nógrád-Gömör VF**
5. Persani Mountains VF

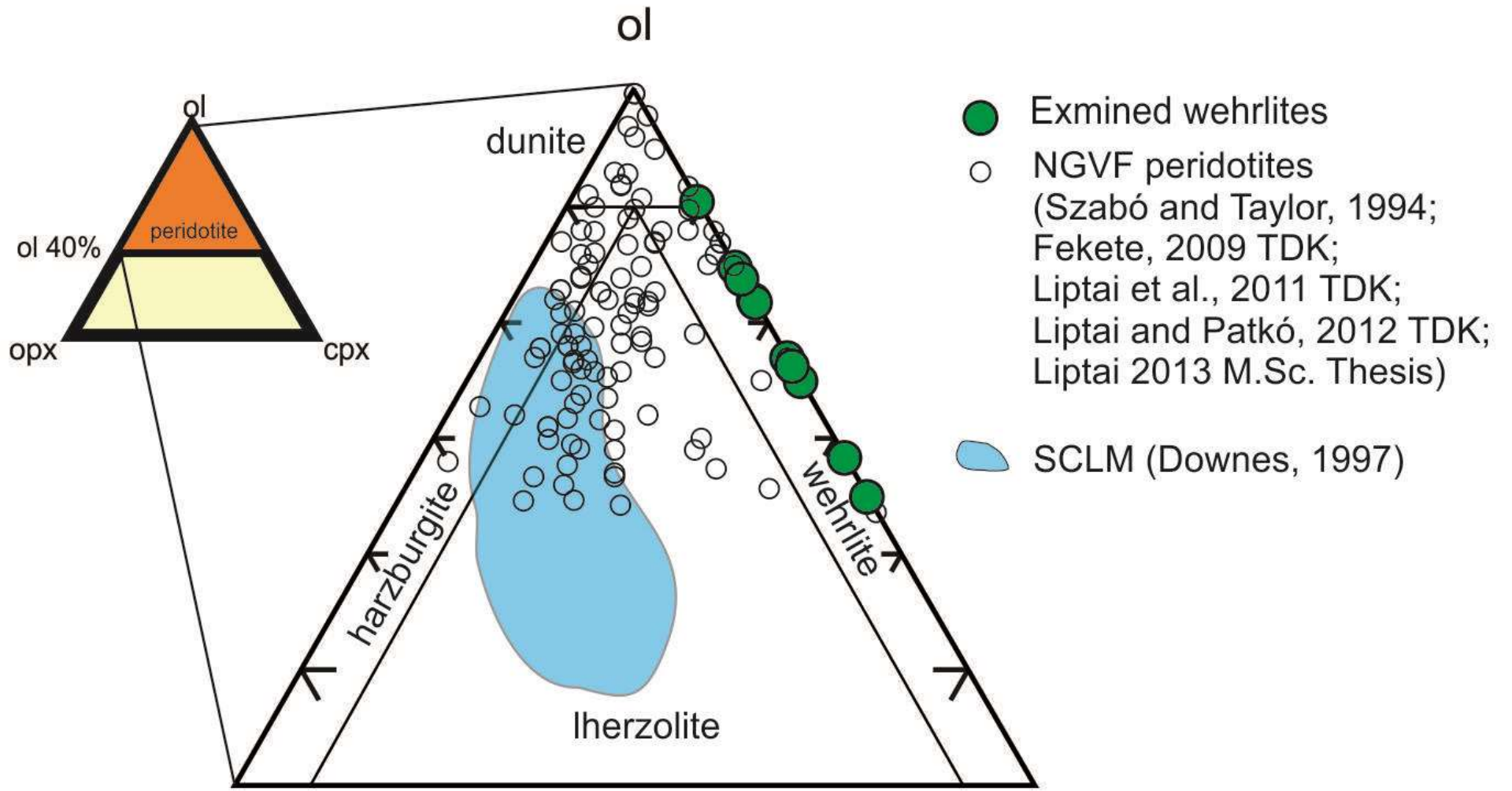


Modified after Jugovics, 1971



Lithosphere thickness data from Horváth, 1993
Distribution of volcanic rocks after Harangi, 2001

Modal composition of xenoliths from NGVF



Different ways to create wehrlites within HP-HT conditions

- Mg-wehrlites: represent a metasomatic product as a result of carbonatitic melt interaction with peridotite wallrock

- Fe-wehrlites: represent a metasomatic product as a result of mafic melt interaction with peridotite wallrock

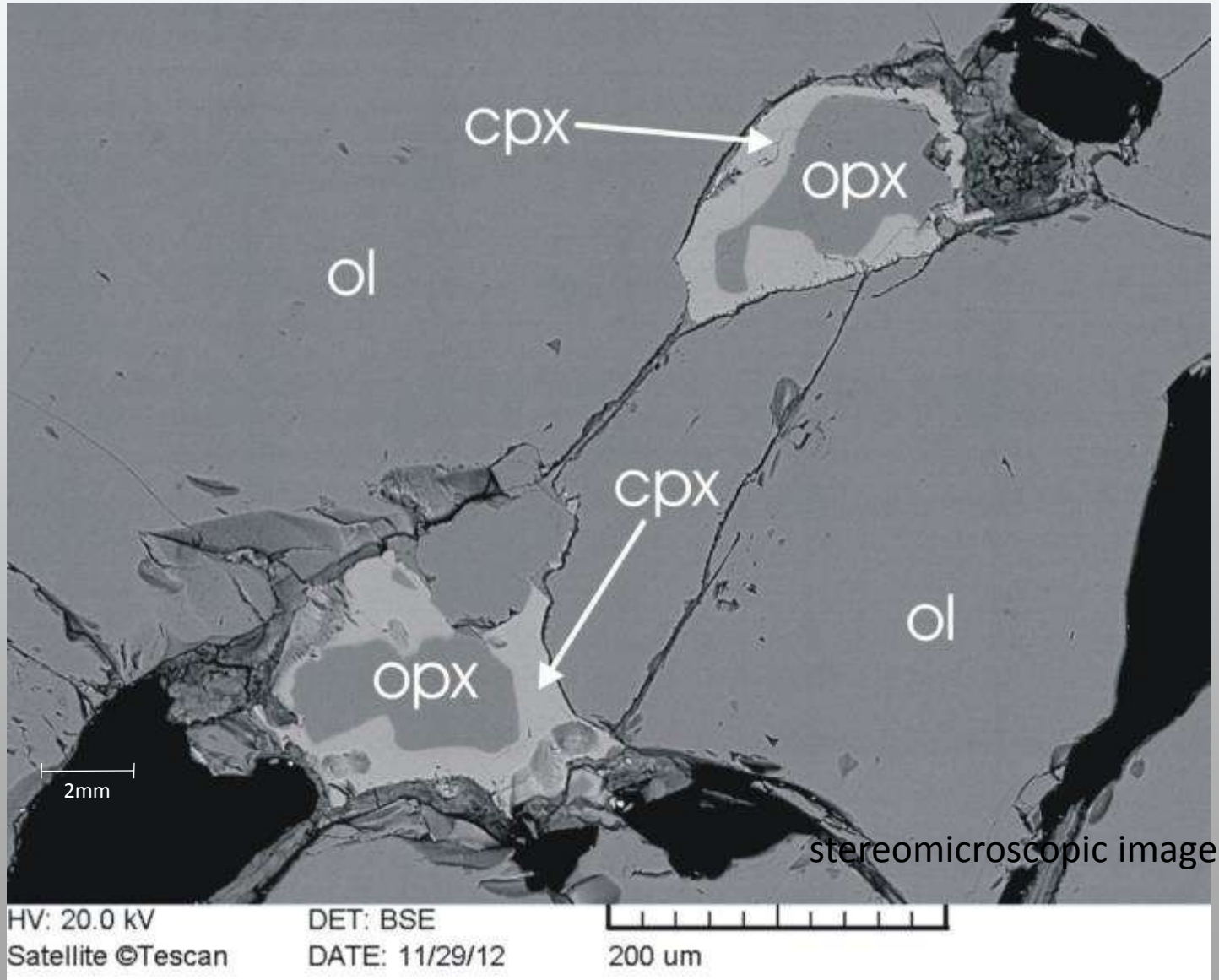
- Cumulate wehrlites: represent crystallization products near MOHO dephts

Wehrlite xenolith petrography

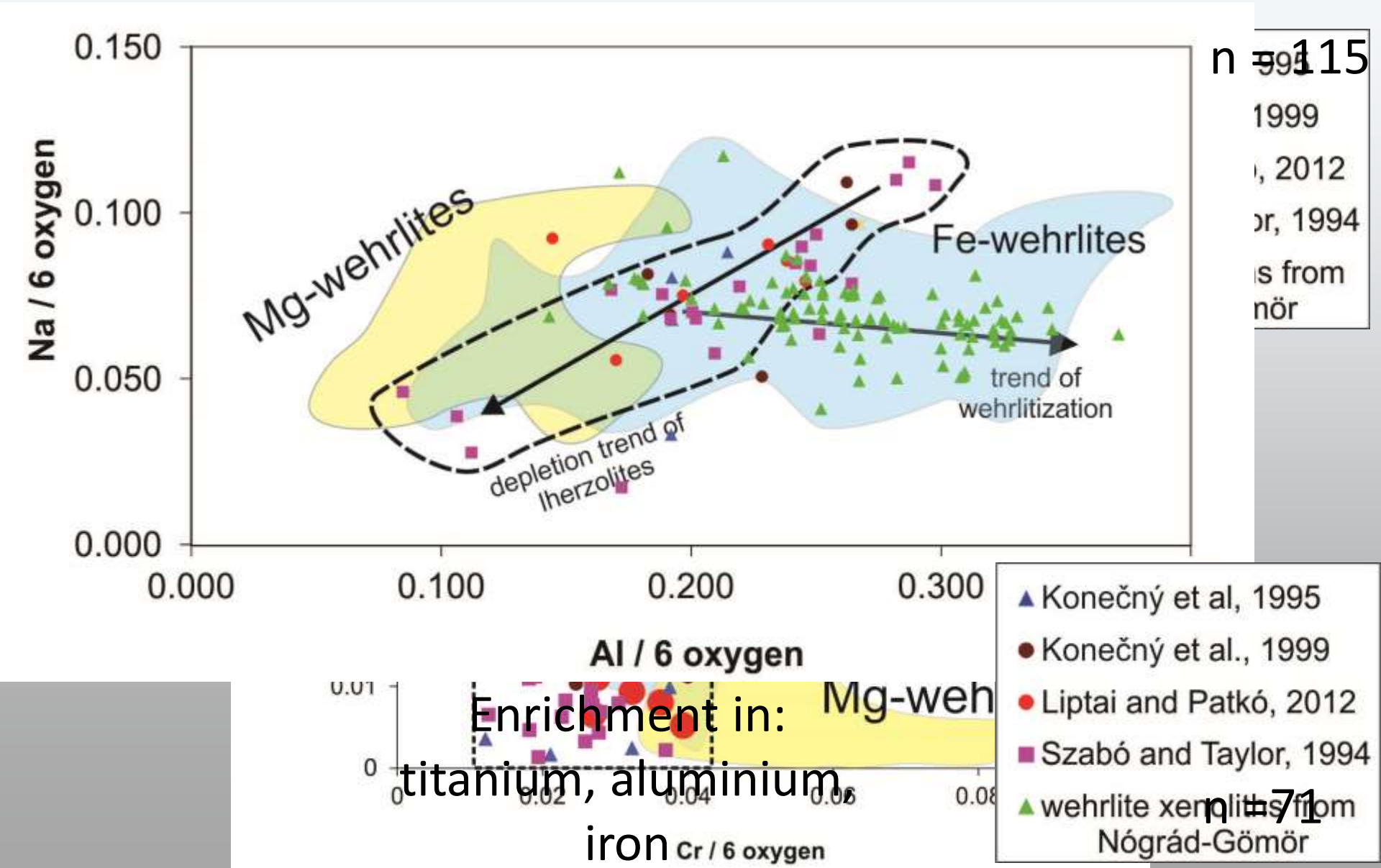
ol – olivine

opx – orthopyroxene

cpx - clinopyroxene



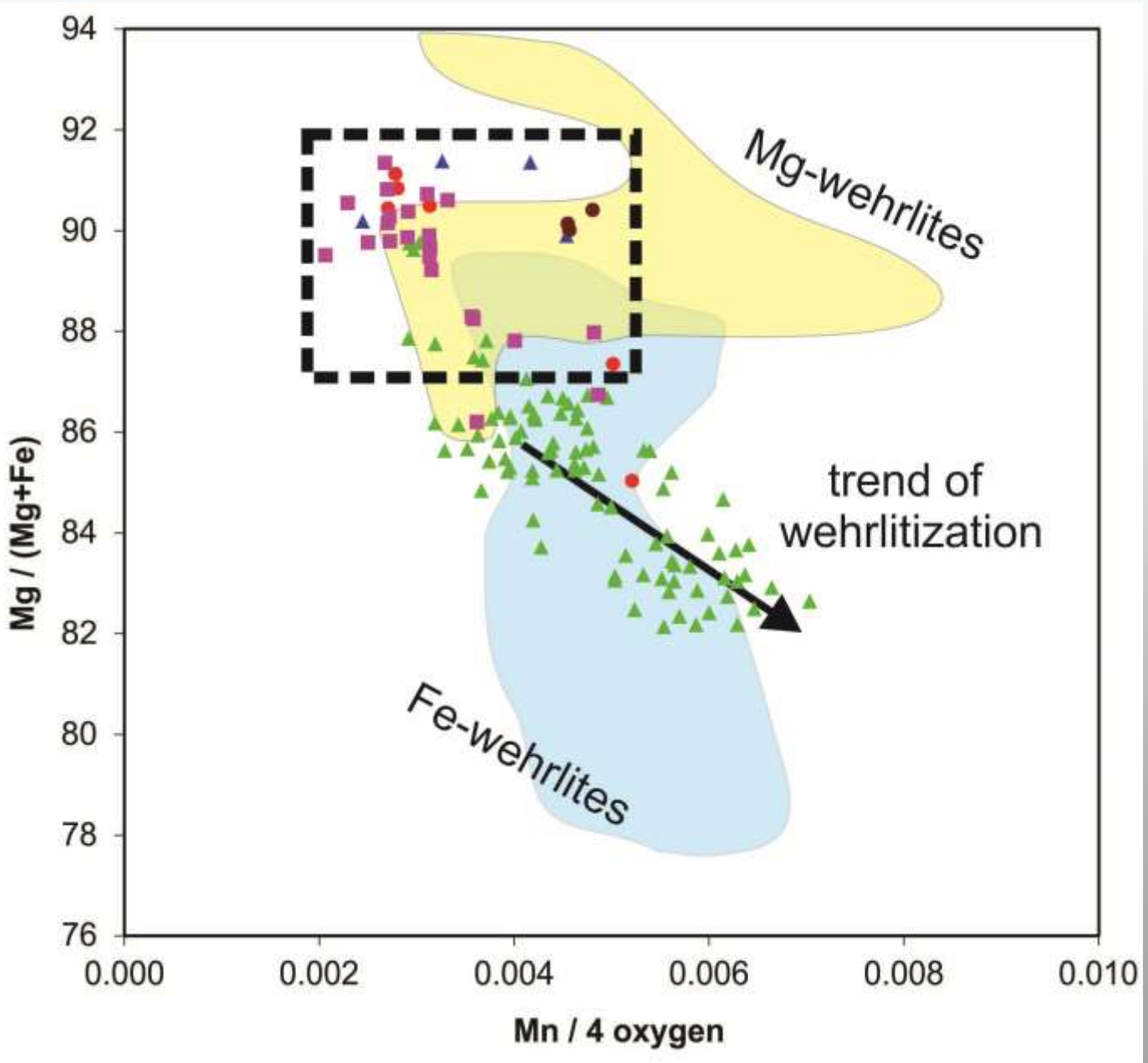
Clinopyroxene geochemistry



Enrichment in:

titanium, aluminium, iron

Olivine geochemistry

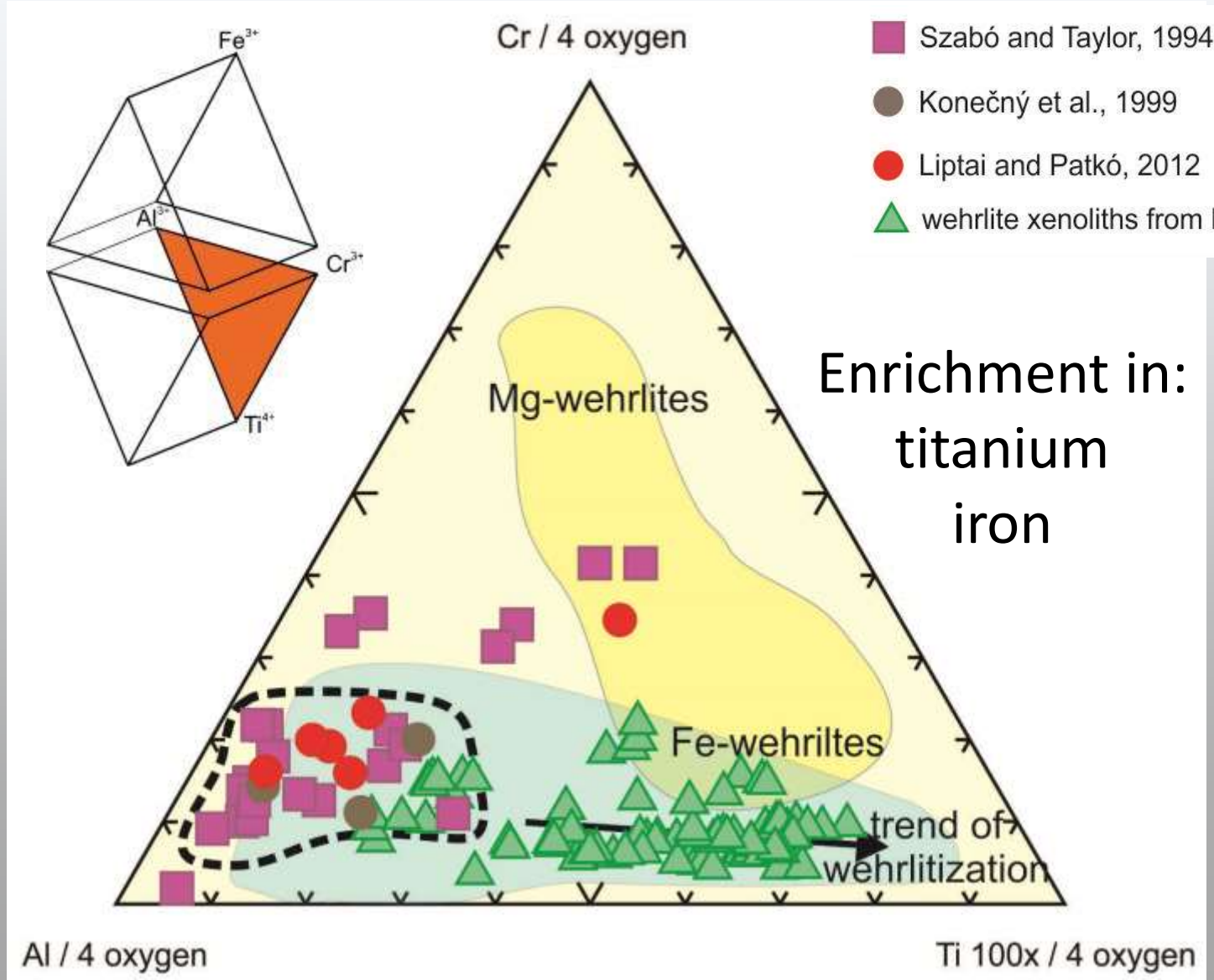


Konečný et al, 1995
Konečný et al., 1999
Liptai and Patkó, 2012
Szabó and Taylor, 1994
wehrlite xenoliths from Nógrád-Gömör

n = 94

Enrichment in:
manganese
iron

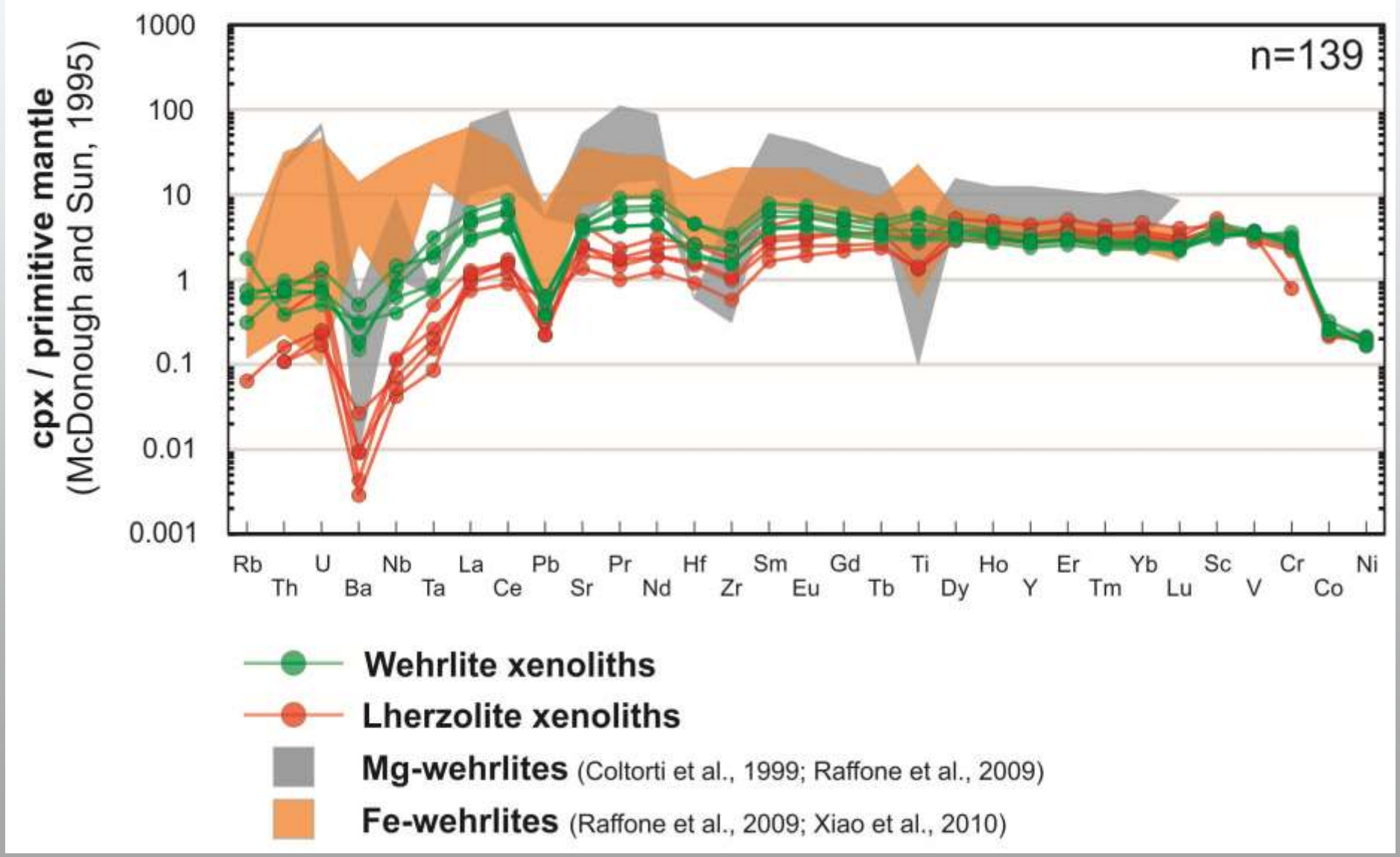
Spinel geochemistry



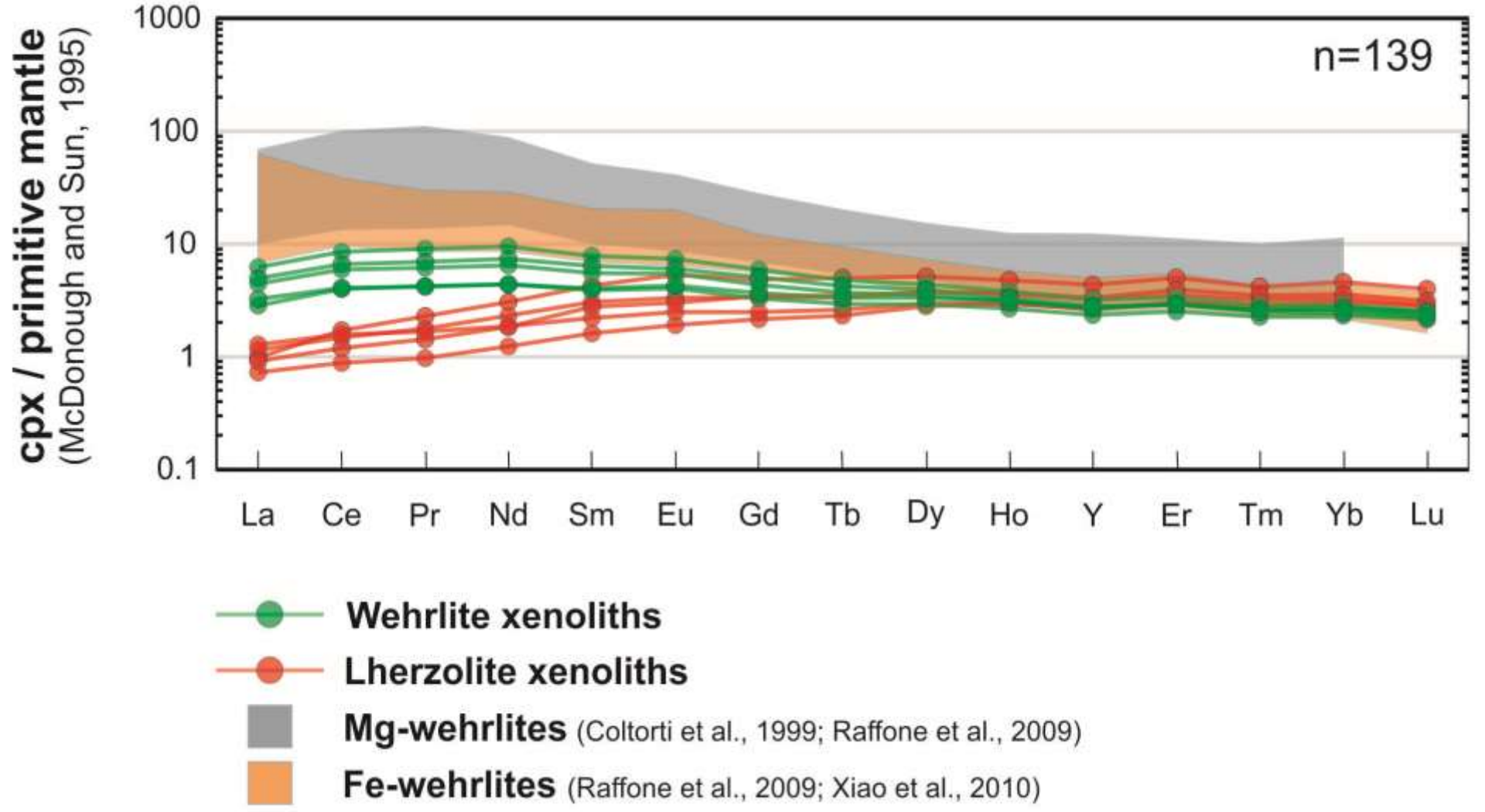
Enrichment in:
titanium
iron

n = 89

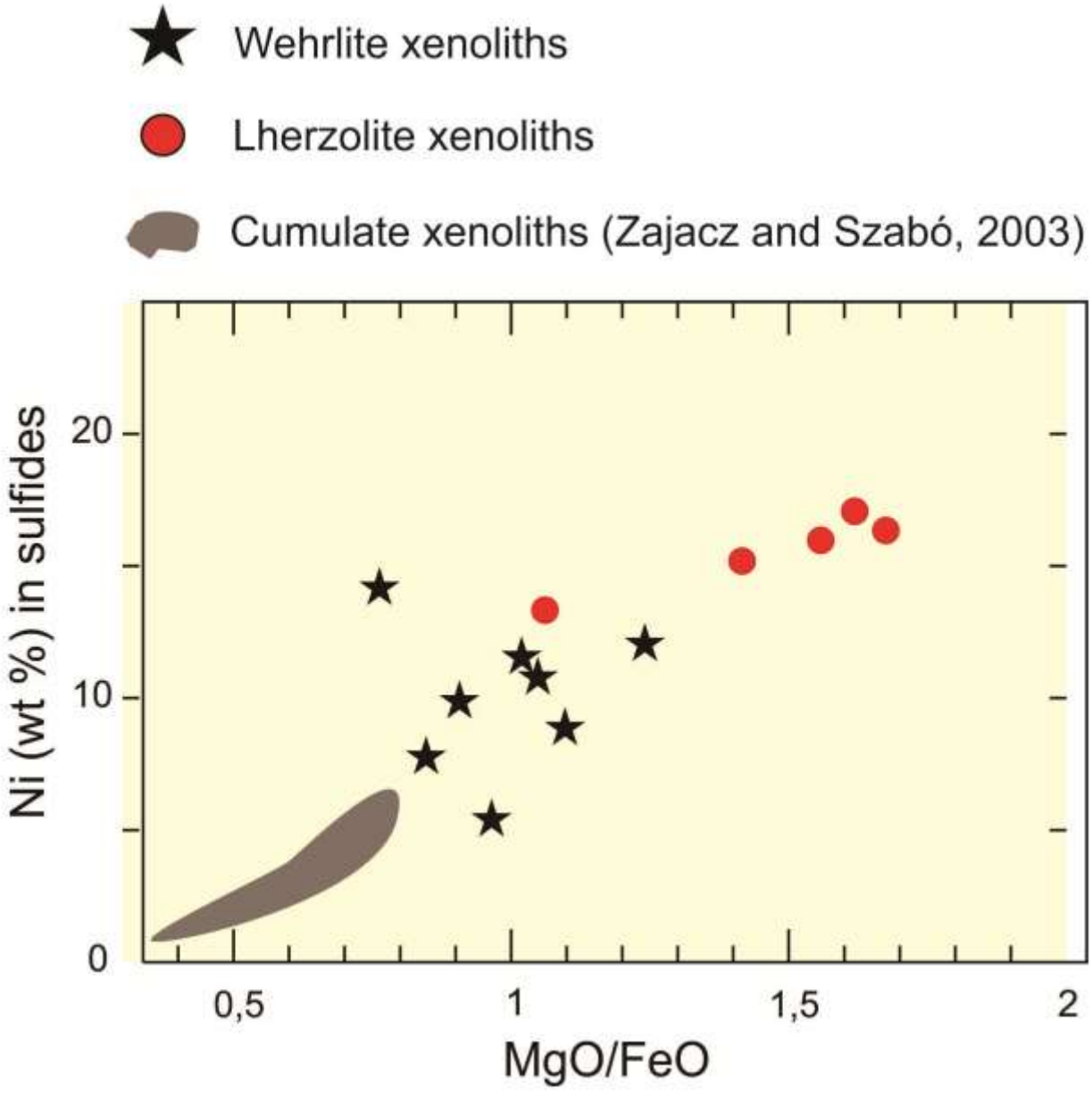
Multielement diagram of clinopyroxenes



REY diagram of clinopyroxenes



Genetic relationship of different xenoliths

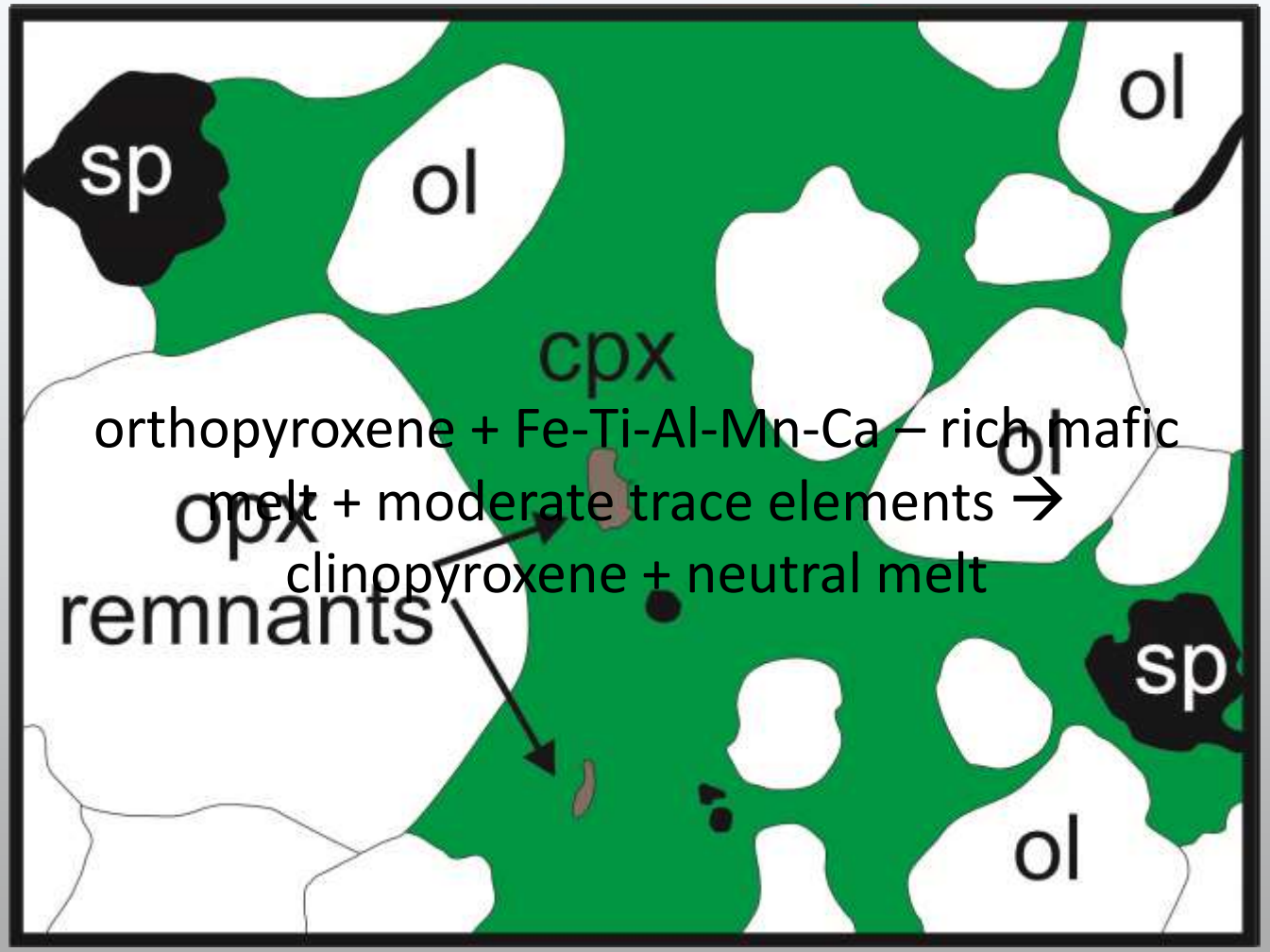


$$\frac{MgO}{FeO_{\ melt}} = \frac{D(cpx\ or\ ol)}{\frac{FeO}{MgO}\ (cpx\ or\ ol)}$$

after Shaw & Eyzaguirre, 2000

Evolution history of wehrlitization

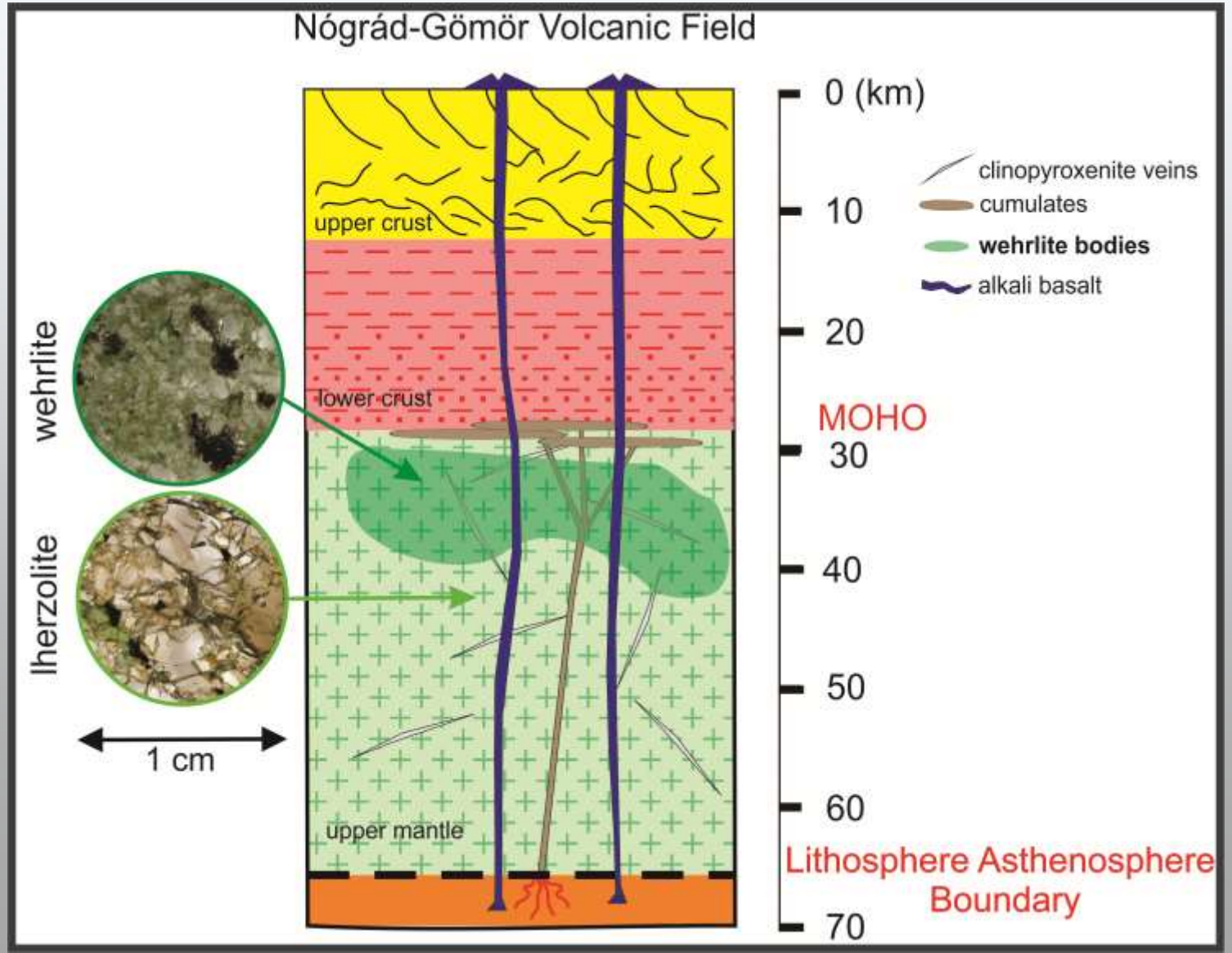
precursor
lherzolite



ol – olivine opx – orthopyroxene
cpx – clinopyroxene sp – spinel

0.5 mm

Evolution history of wehrlitization in an idealized section



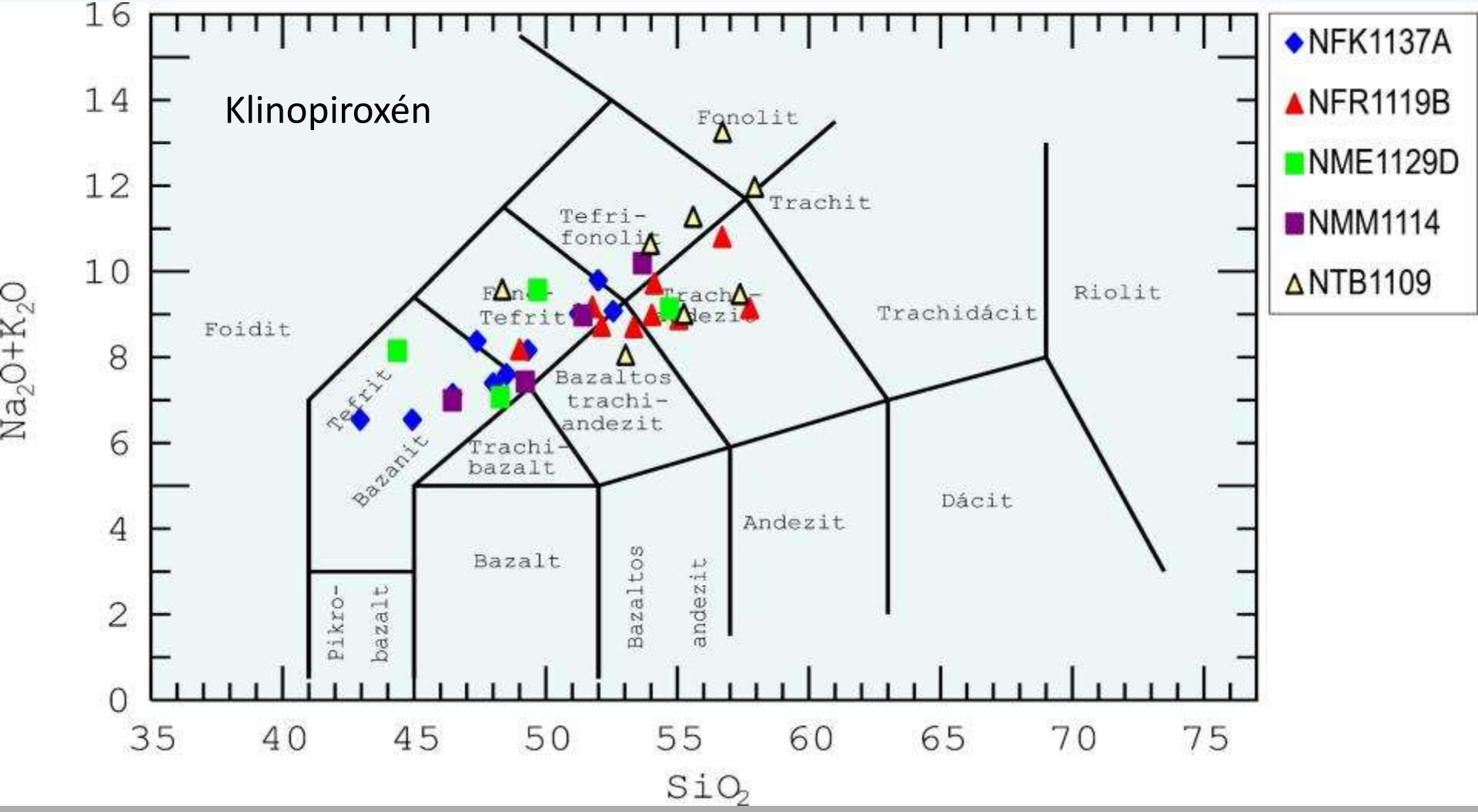
Conclusions

- Detailed petrography, major- and trace element geochemistry of widespread wehrlites from NGVF were carried out
- According to the results, the metasomatic process led to clinopyroxene enrichment at the expense of orthopyroxenes
- The wehrlitic rock forming minerals are enriched in Fe-Ti-Al-Mn-Ca compared to lherzolites
- The melt agent is assumed to be mafic in geochemical character and derives from the asthenosphere

Thank you for your attention!

I owe thanks to my supervisor, **Csaba Szabó,** who guided me during my research. I would like to highlight Nóra Liptai and László Előd Aradi who helped me a lot and were always willing to consult. Furthermore, I am grateful to Anna Maria Fioretti, Raúl Carampin and Teresa Jeffries for their invaluable help during EMPA and LA-ICP-MS measurements. Last but not least I am grateful to all other members of the LRG for their support.

TAS diagram



- SiO_2-gazdag olvadék jelenléte ortopiroxének inkongruens olvadása eredményeként
- Mafikus metaszomatizáló olvadék
- Olvadékok keveredés