Geochemistry of noble gas and CO_2 in fluid inclusions from lithospheric mantle beneath Eifel and Siebengebirge (Germany)

GMPV1.4 session, abstract EGU2020-14005

Fri, 08 May, 14:00–15:45

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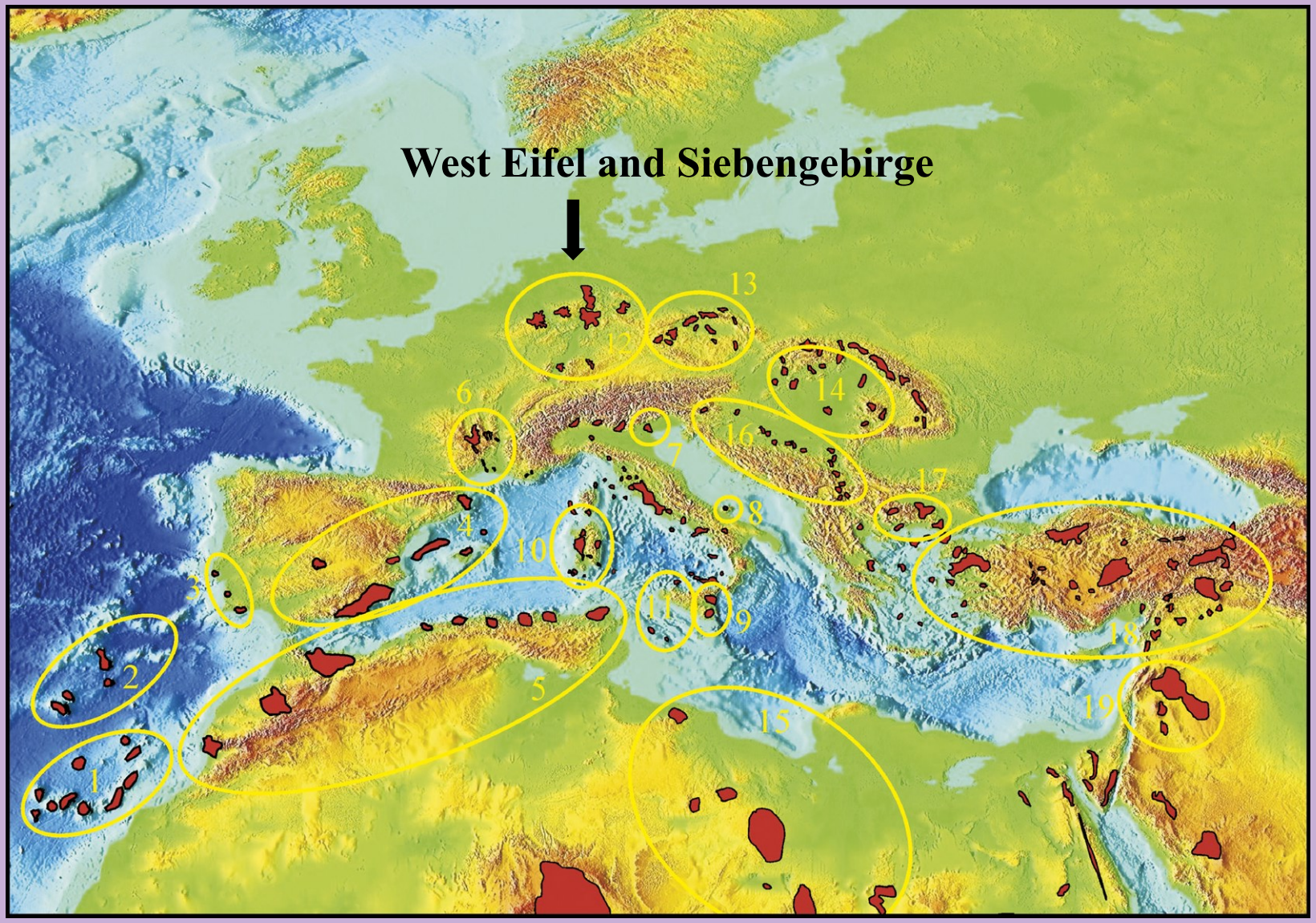
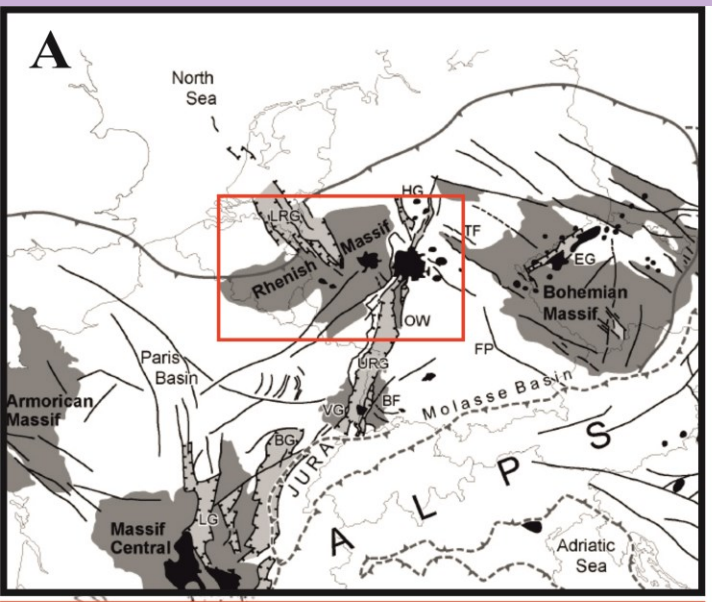
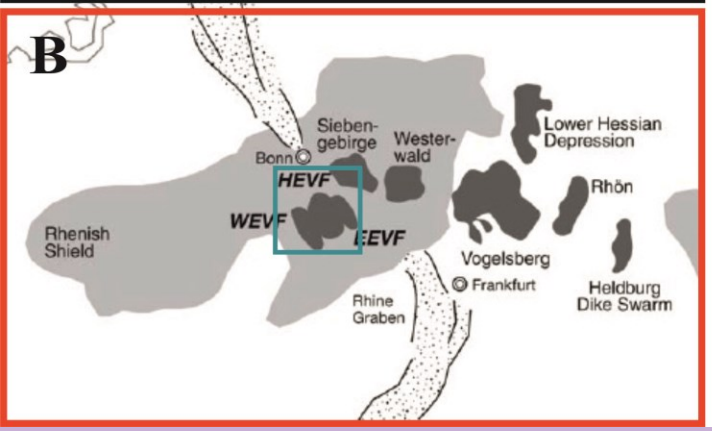
Studied Areas

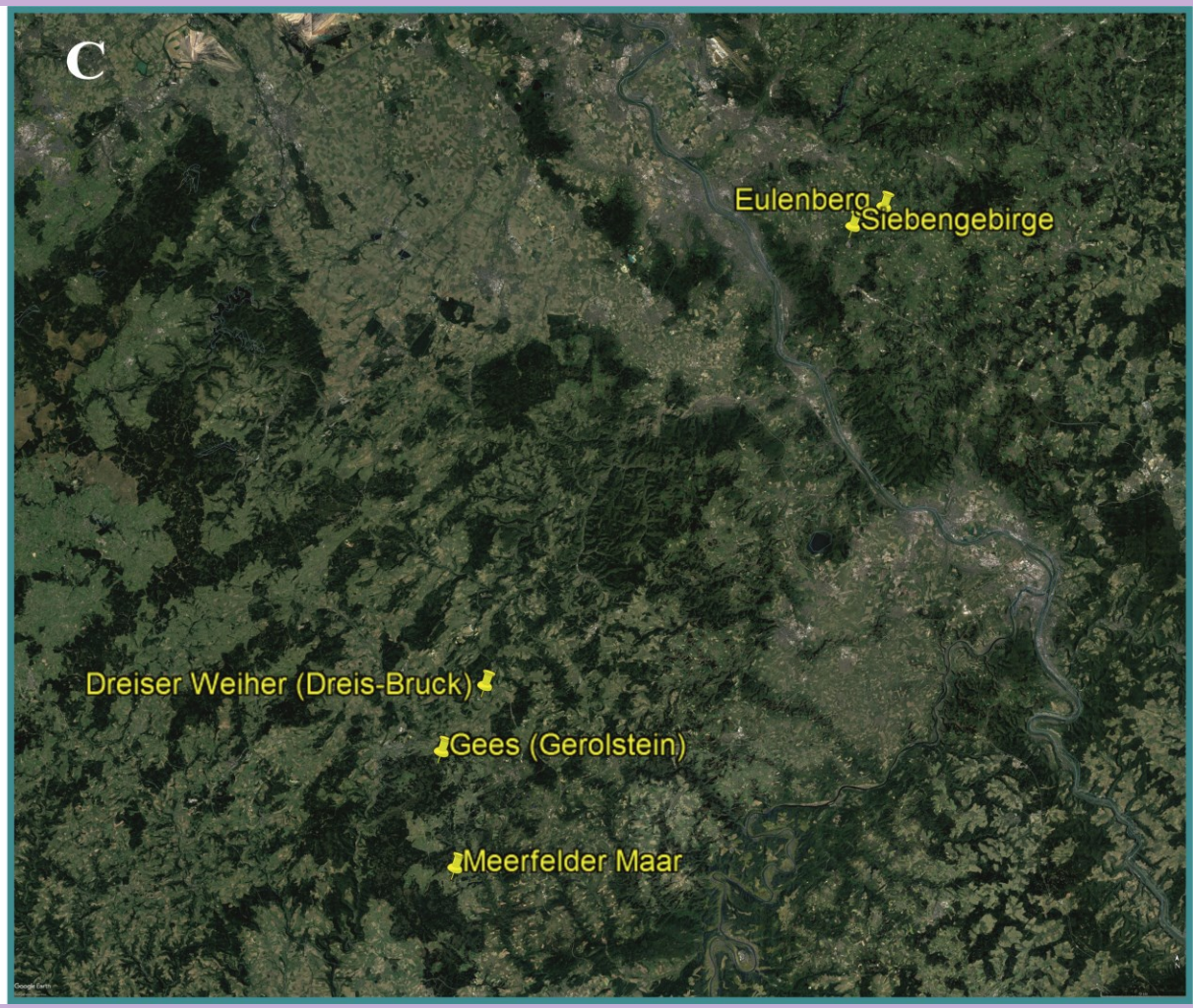


Modified from Lustrino and Wilson, 2007

West Eifel and Siebengebirge

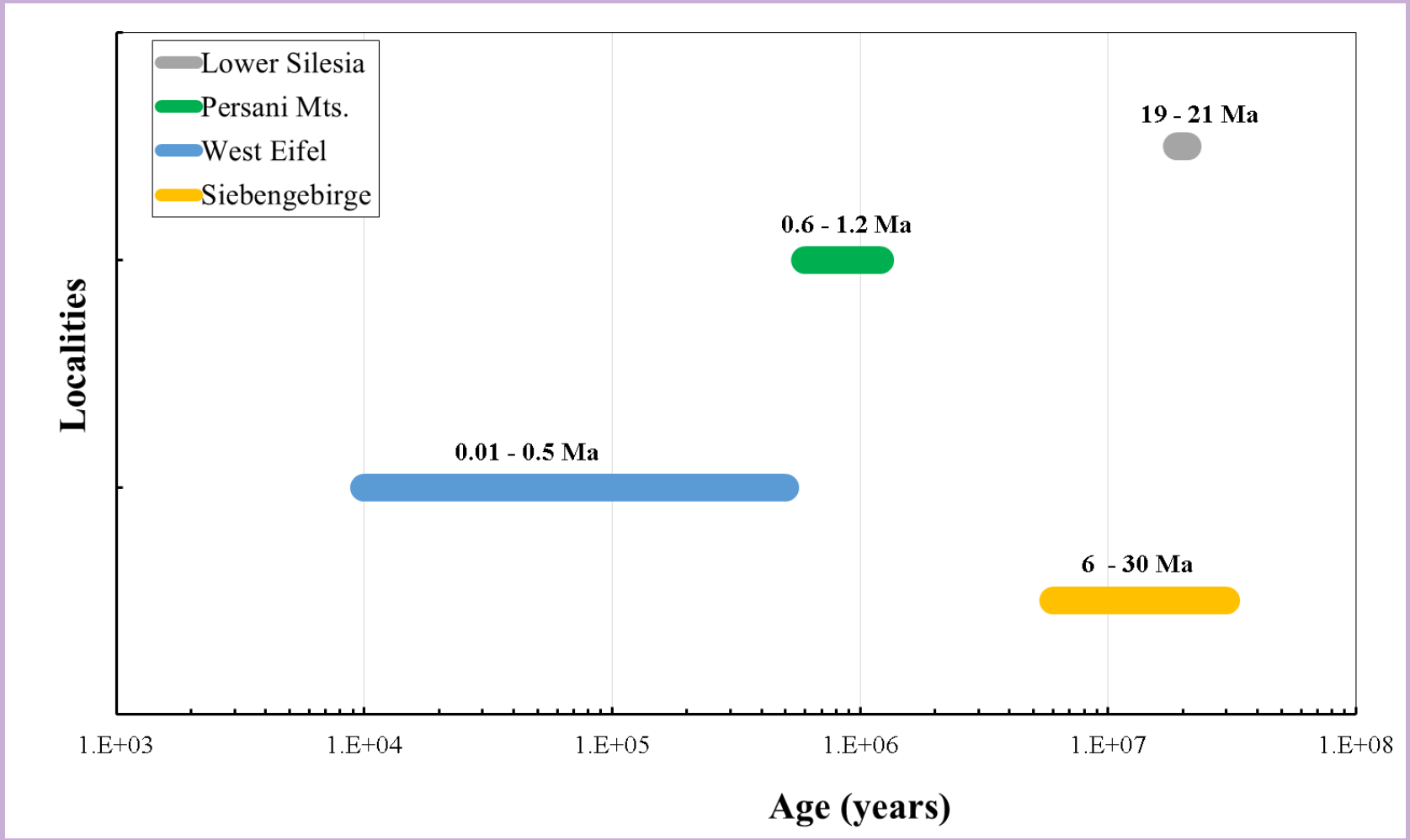




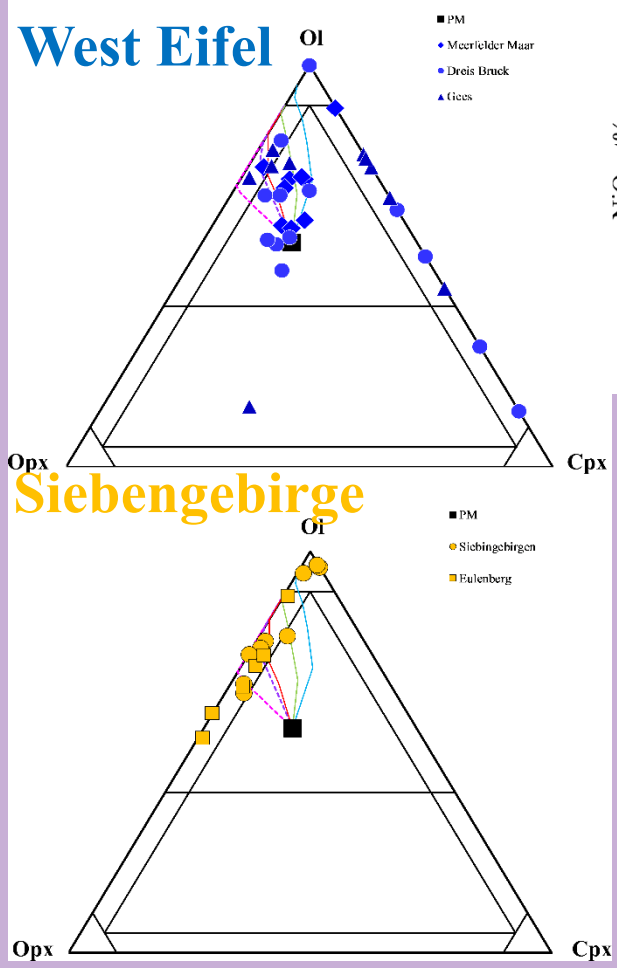


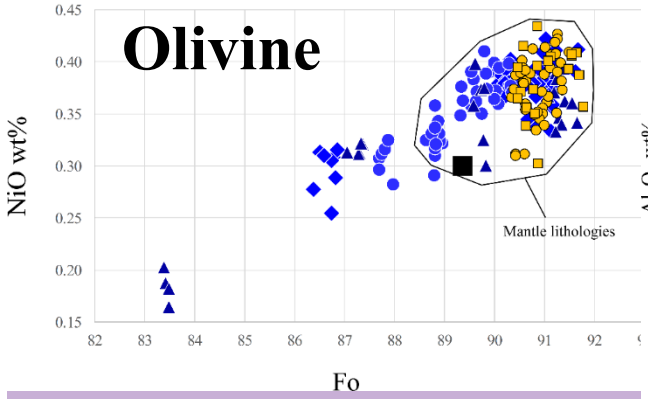
Map of the location of Eifel and Siebengebirge, illustrating the major volcanic fields that were sampled for mantle xenoliths.

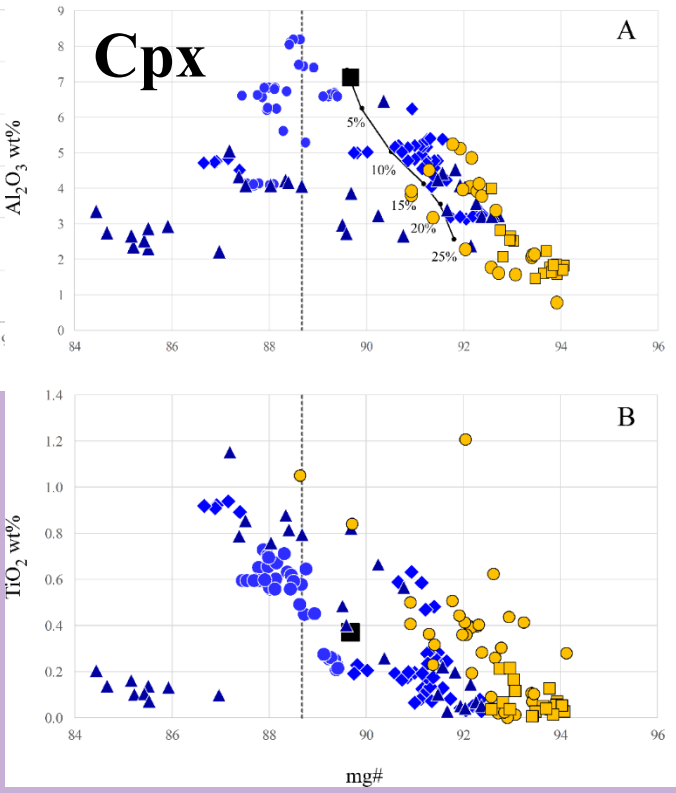
Age of alkaline magmatism of target areas



Petrography and mineral chemistry: West Eifel and Siebengebirge



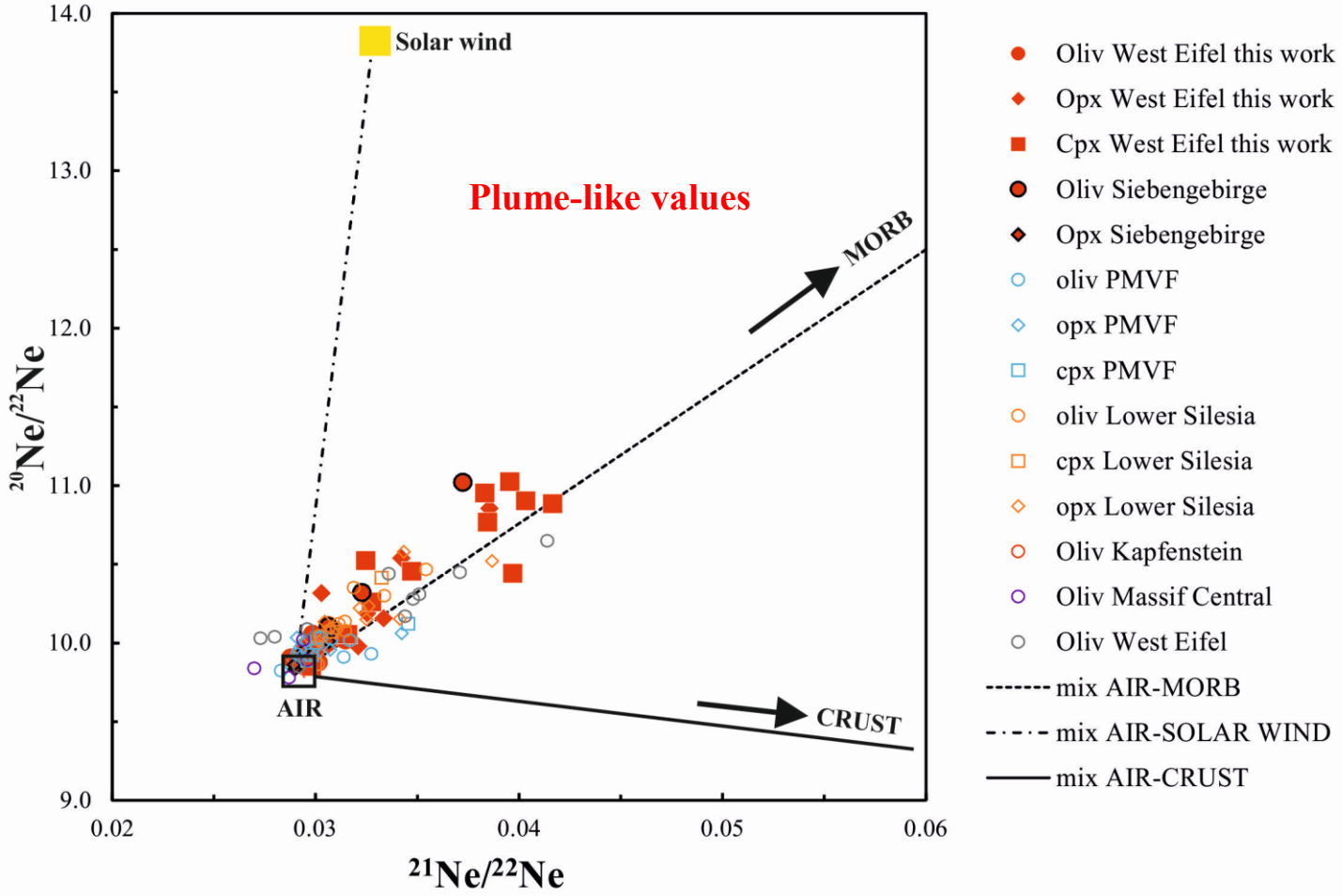




Samples consists of lherzolites, harzburgites and cumulates with the presence of hydrous phases (Phlog and Amph).

Olivines and pyroxenes composition suggest that Siebengebirge mantle experienced higher degree of melt extraction than West Eifel, which was more recently metasomatized/refertilized

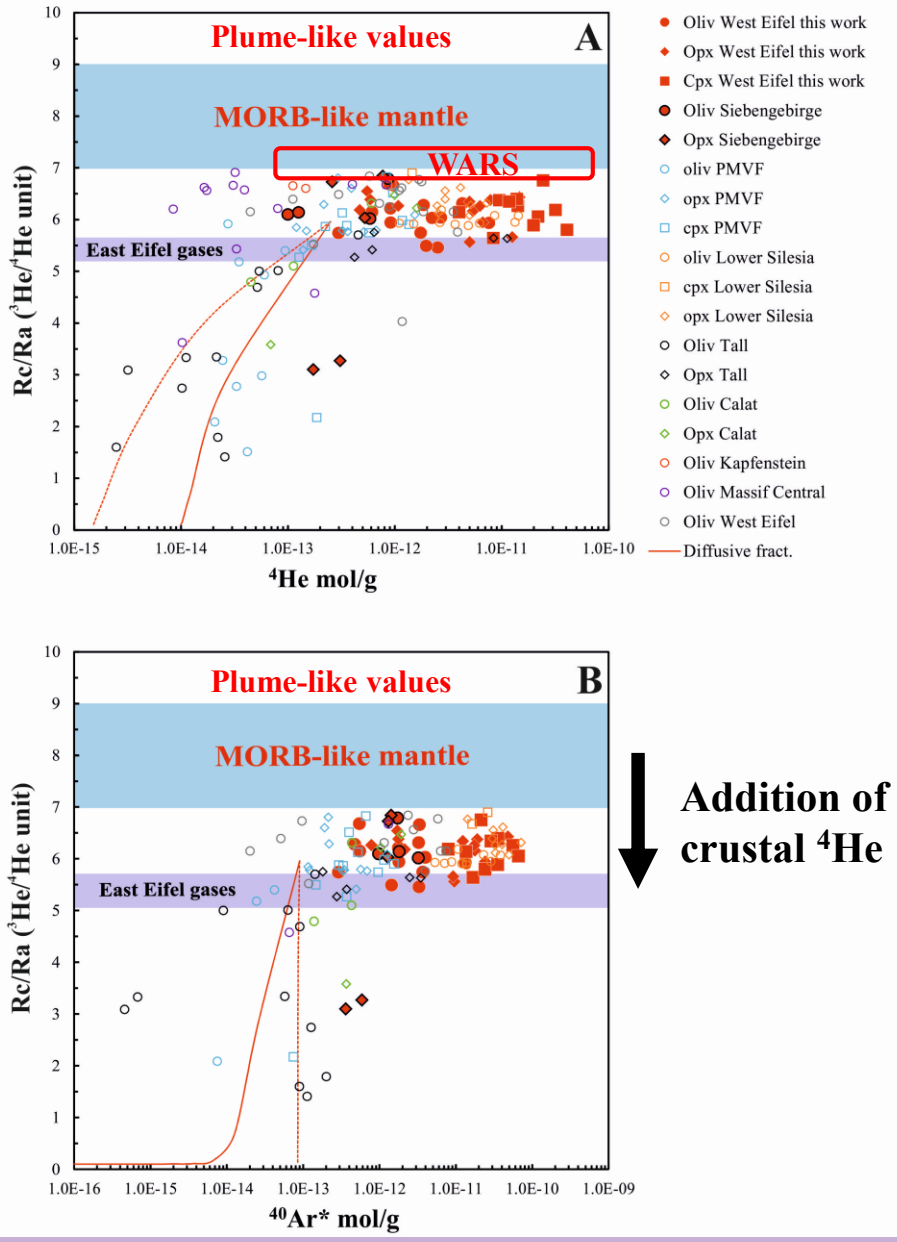
Fluid inclusions: isotopic ratios of neon



Neon isotopes confirm indication of argon in terms of air contamination, with Cpx of West Eifel and Lower Silesia showing the lowest air contamination among European nodules.

Neon isotopes reflect AIR-MORB mixing in all the studied localities, excluding clear plume evidences.

Fluid inclusions: isotopic ratios of helium



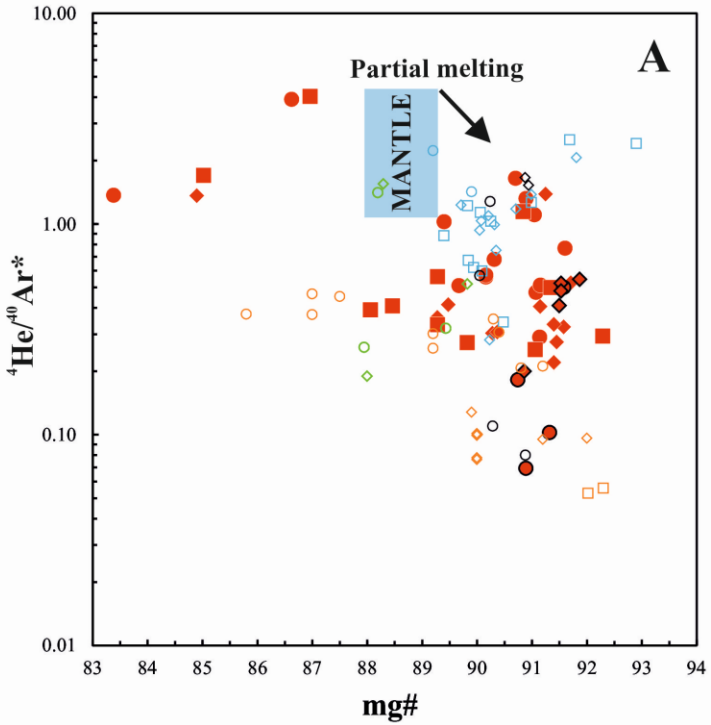
$^3He/^4He$ values cover most of the range from other European localities.

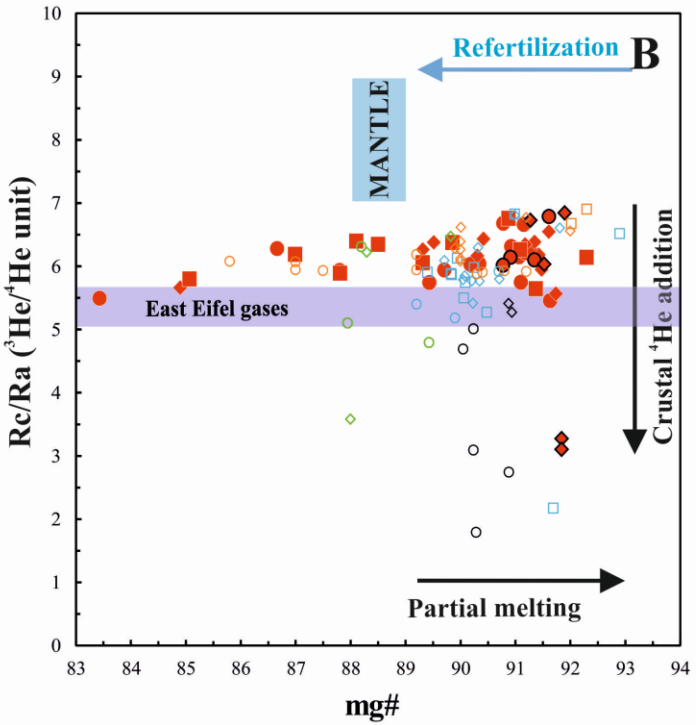
The highest $^3He/^4He$ values tend to the lower limit of MORB range, indicating mixing with astenospheric fluids.

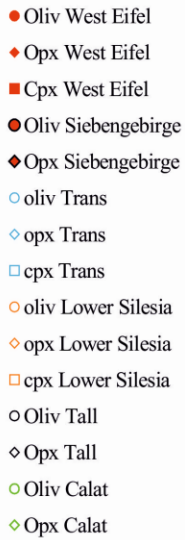
The $^3He/^4He$ of Persani Mts. are among the lowest of European SCLM indicating an enhanced recycling of crustal material in the local mantle.

$^3He/^4He$ <5.5 Ra are affected by diffusive fractionation

Fluid inclusions versus mineral chemistry (Mg#)







Mg# vs $^4He/^{40}Ar^*$ further support the evidences of variable extent of partial melting plus metasomatic/refertilization.

$^3He/^4He$ clearly shows a decreasing trend of the values at progressively lower of mg#, suggesting that below mg#=88 fluid inclusions are magmatic and tend to the signature of Laacher sea (West Eifel) gases, suggesting a more cumulitic origin and/or the entrapment of magmatic fluids.

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Grazie per l'attenzione!