CHARACTERISTIC OF CR-SPINEL IN MANTLE PERIDOTITE-CHROMITITE FROM MANIPUR OPHIOLITE COMPLEX, INDIA: IMPLICATION FOR MAGMATIC PROCESS IN MANTLE AND DISCRIMINATION OF TECTONIC SETTINGS.

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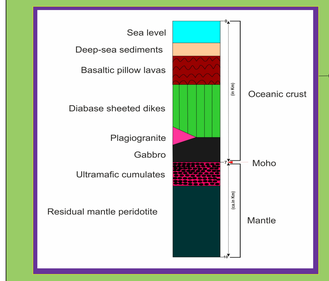
INTRODUCTION

- Ophiolite is a fragments of ancient oceanic lithosphere. This fragments of oceanic crust were emplaced along the Indo-Myanmar Orogenis Belt during closure of Tethys Ocean.
- The most acceptable evidences tectonic regime for the formation of ophiolite are mid-oceanic ridges (MOR), subduction zone, arc settings (back & fore) etc. as suggested from different studies.



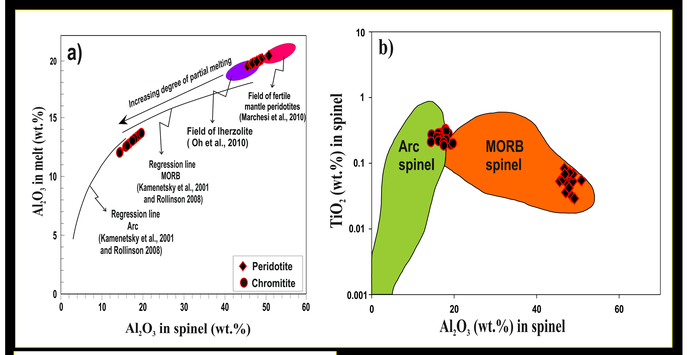
- Mineralization of chromite, PGE and minor sulphide have occurred in ophiolite associated with ultramafic rocks.
- Mantle melting, melt-rock interaction, magmatic process and recently paleoclimate studies can be experienced from ophiolite study.

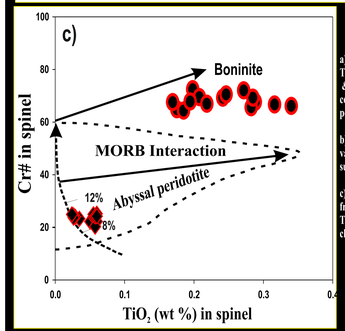
AIM AND OBJECTIVE OF THE STUDY

The present study attempt to understand the tectonic regime and mantle melting processes (peridotites and associated chromitites) from the southern Manipur Ophiolite Complex (MOC).

GEOLOGY OF THE STUDY AREA

The southern MOC is extension of NMOB and integral part of NNW-SSE trending Indo-Myanmar Orogenic belt, chiefly composed of peridotites (cpx-bearing harzburgite and lherzolite) with small pods of podiform chromitites, mafic intrusive-extrusive rocks and oceanic pelagic sediments.



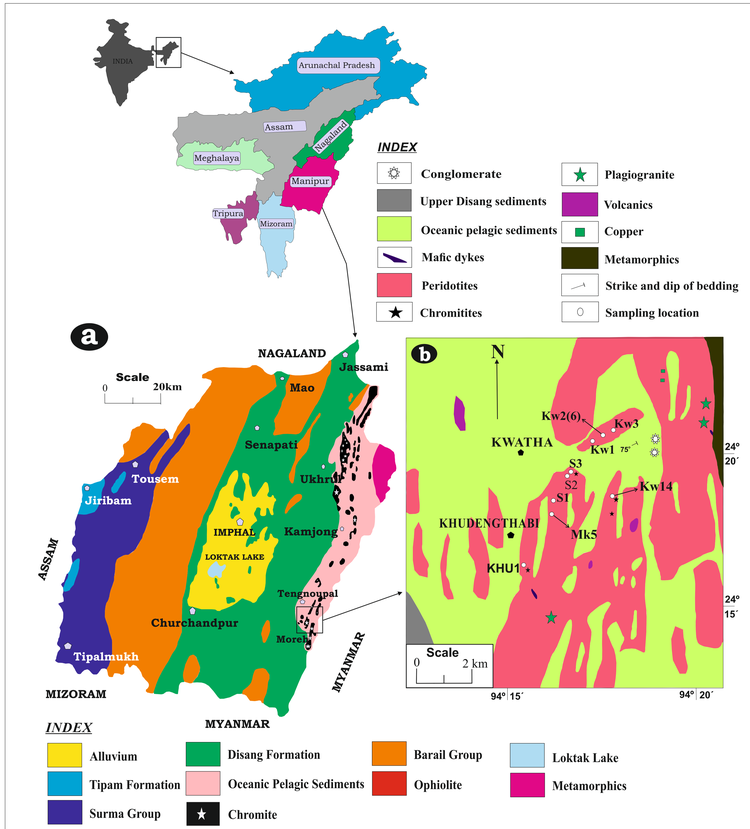


Figures:

a) The compositional relationship of spinel-melt expressed in terms of Al_2O_3 content. The arc ad MORB evolution trend are adapted from Kamenetsky et al., 2001 & Rollinson, 2008. Field of lherzolite from Bibong ultramafic bodies of the Hongseong collision belt, South Korea (Oh et al., 2010; Singh et al., 2013) and fertile mantle peridotite from the Monte del Estado massif , Soth western Puerto Rico (Marchesi et al., 2013).

b) Al_2O_3 versus TiO_2 (wt.%) plot (after F. Xiong et al., 2017) showing the compositional variation of Al_2O_3 exhibit peridotite in MORB affinity whereas chromitite in arc related subduction zone setting.

c) Compositional relationship of Cr# in spinel versus TiO_2 in spinel content in peridotite from MOC (after Xiong et al., 2017) plot showing the degree of melting of mantle rocks. The abyssal peridotite experienced < 12% partial melting and MORB source whereas chromitite >20% partial melting of boninitic affinity.



a) Generalized Geological map of Manipur, India showing the distribution of ophiolite slices (after Singh et al., 2017) b) Geological map of the southern Manipur Ophiolite Complex (after Singh et al., 2013)

CONCLUSION

1. The peridotite from MOC (Manipur Ophiolite Complex) consists of Al-rich chrome spinel (45.59-50.85) and low Cr# (19.66-23.56) whereas chromitite has low Al2O3 (14.35-19.68) and high Cr# (65.5-71.83).

2. It has been concluded from ths evidences that two diverse tectonic environment take place for the formation Manipur Ophiolite Complex (MOC)-

In the initial stage, magma from deeper source generated at the mid-oceanic ridges by low degree of partial melting and produced high alumina Cr-spinel in the host rocks (peridotite), secondly as degree of partial melting increases low alumina and high Cr chromitite cryatallised from boninitic magma series at the subduction zone tectonic setting.

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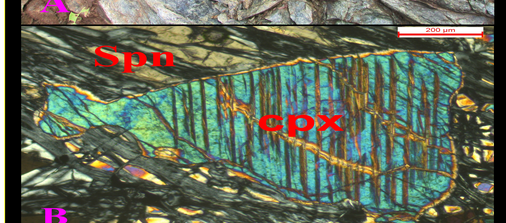
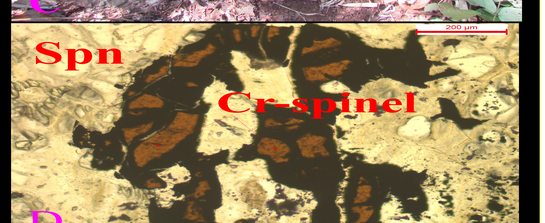
FIELD PHOTOS AND PETROGRAPHY





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