Facoltà di Scienze MM. FF. NN.
Corso di laurea in Scienze Geologiche
Anno Accademico 2015-2016

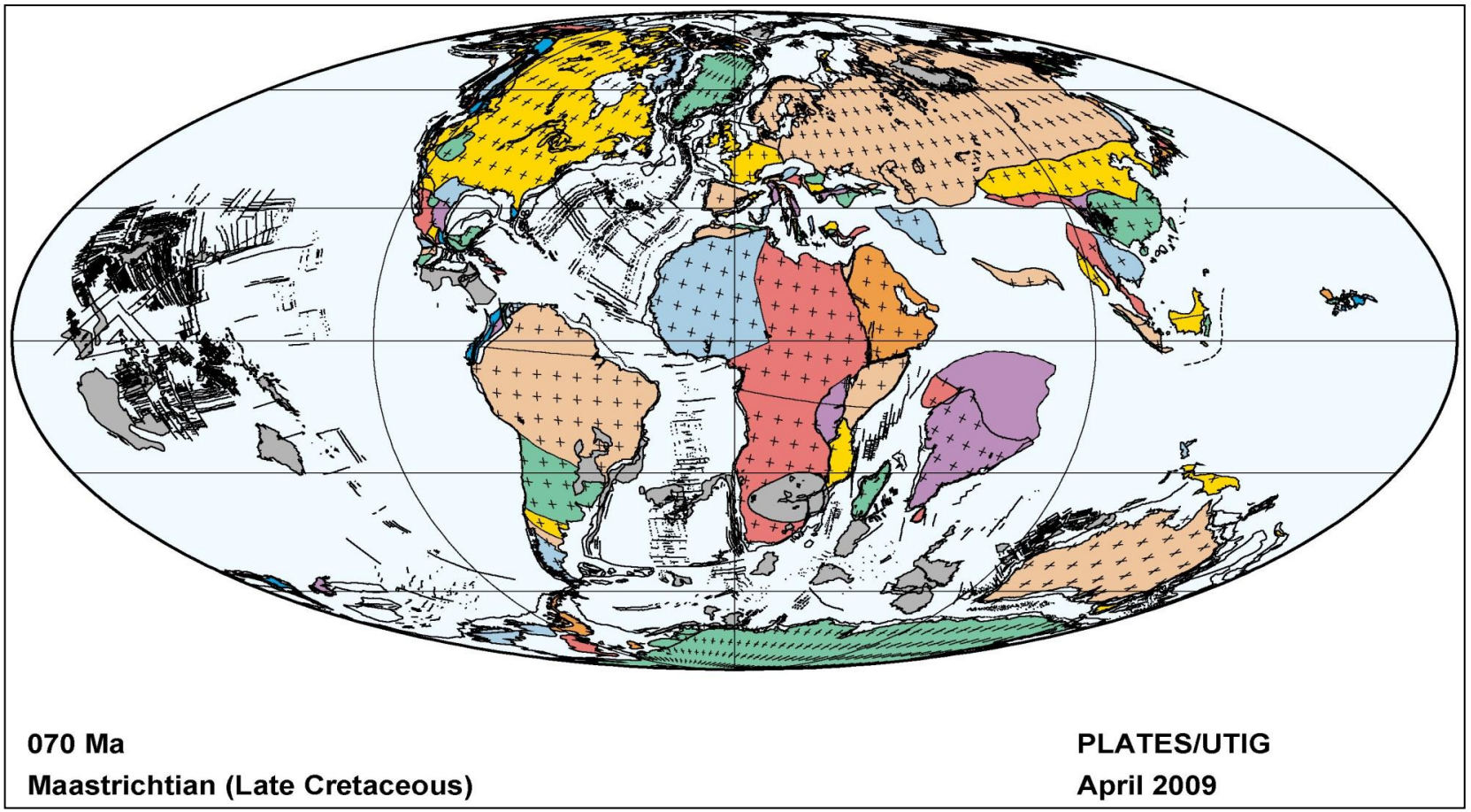
Il sistema di alimentazione magmatica dei basalti del Deccan (Western Ghats, India): evidenze mineralogiche e petrologiche

Relatore: Prof. Andrea Marzoli
Laureando: Andrea Boscaini

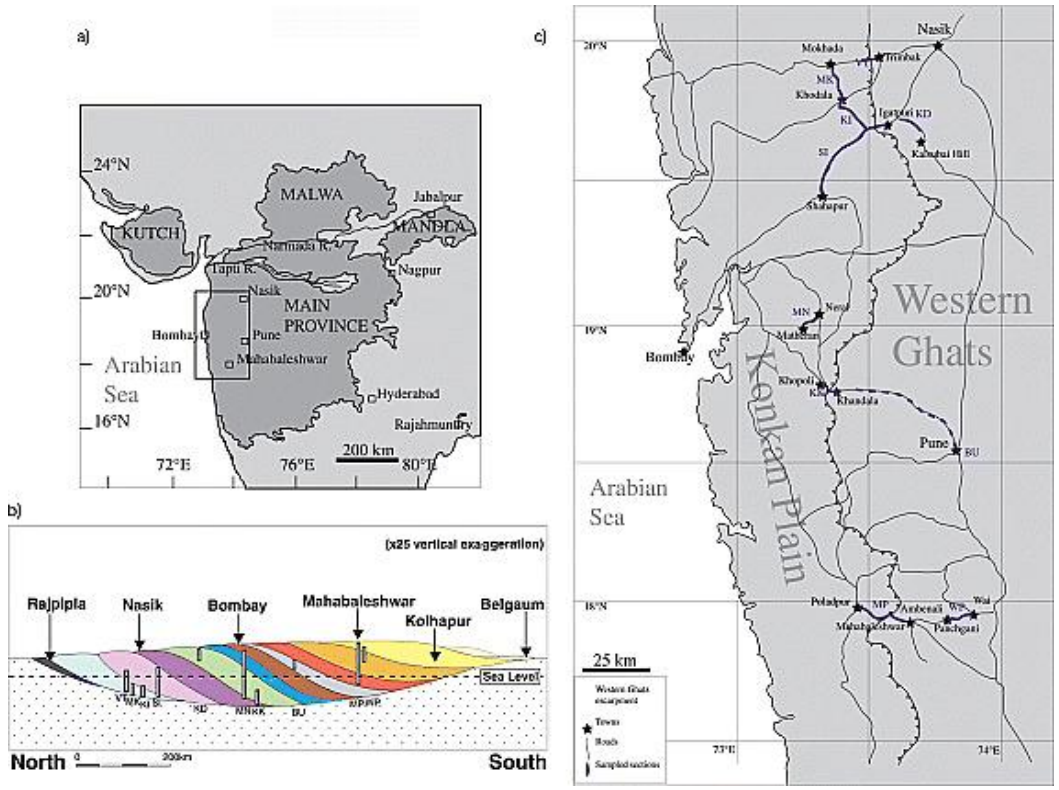
Collocazione geografica attuale

www.whoi.edu

Collocazione geografica passata



Western Ghats



Chenet et al. (2009)

Wai	Mahabaleshwar	280 m
	Ambenali	500 m
	Poladpur	375 m
Lonalava	Bushe	325 m
	Khandala	140 m
Kalsubai	Bimashankar	140 m
	Thakurvadi	650 m
	Neral	100 m
	Igatpuri	700 m
	Jawhar	200 m

Red Boles

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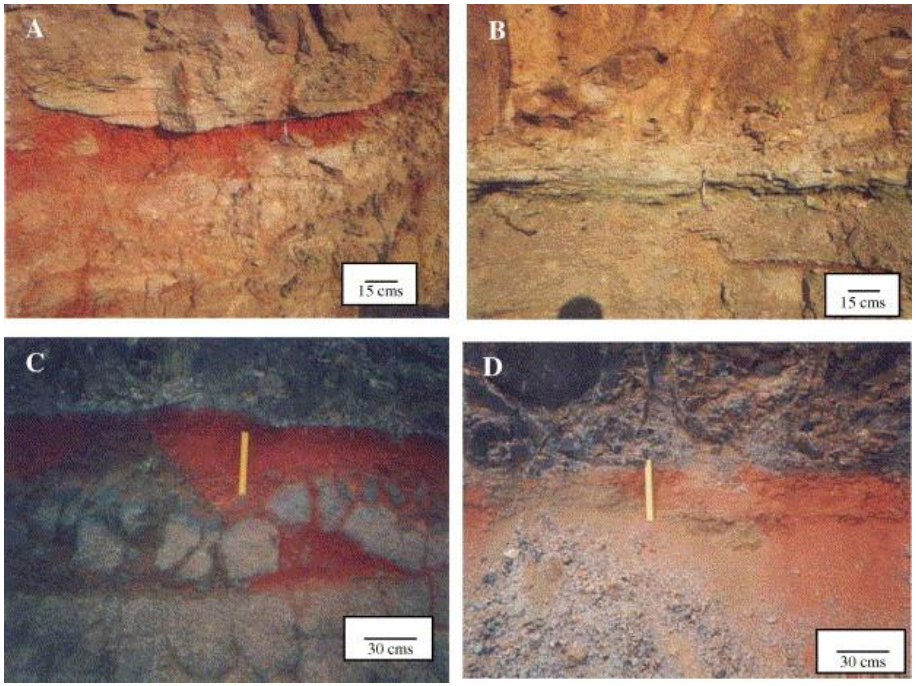
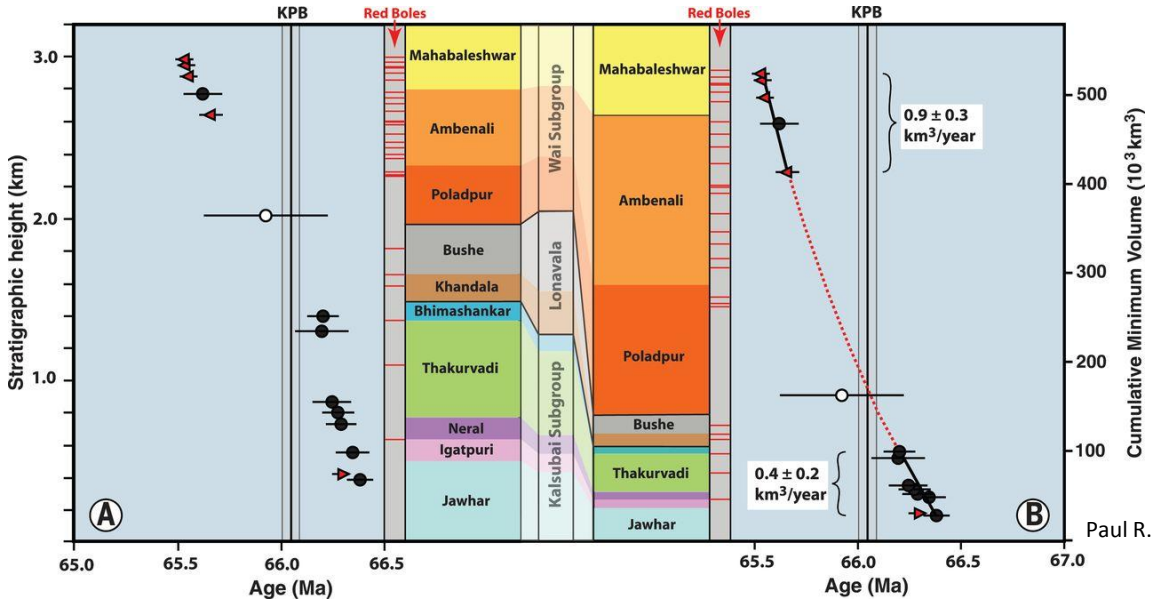


P. Ghosh et al. (2006)

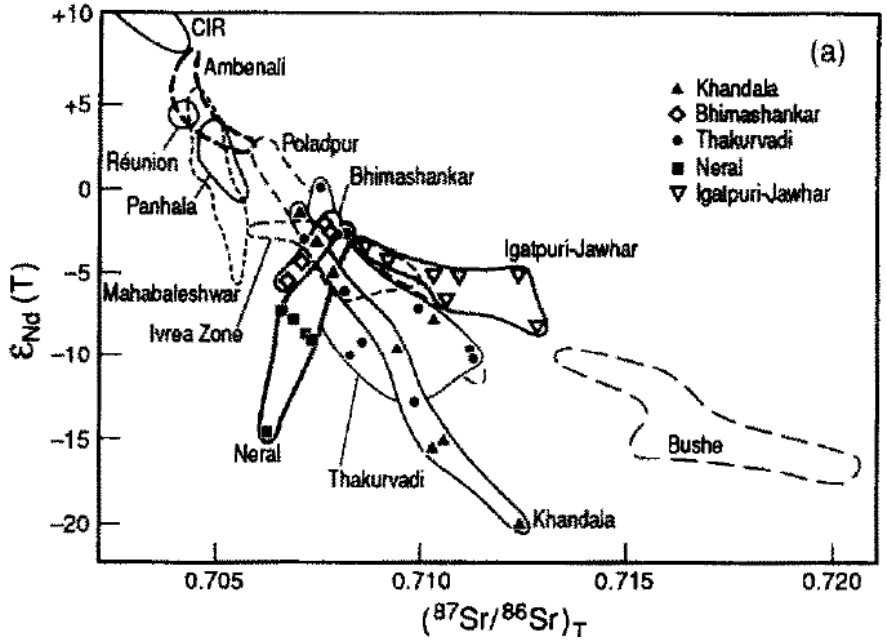
Degradazione dei basalti e formazione di paleosuoli, quindi periodi di stasi all'interno dell'attività eruttiva

Red Boles



Paul R. Renne (2015)

Tassi di eruzione:
- 0,9 Km^3/anno
- 0,4 Km^3/anno



Z.X. Peng, J. Mahoney, P. Hooper, C. Harris, J. Beane (1993)

- Variazione distribuzione Red boles
- Diversi tassi di eruzione
- Apparentemente maggiore contaminazione crostale per le formazioni inferiori
- Cristallinità formazioni superiori

IPOTESI: variazione della profondità delle camere magmatiche durante attività eruttiva?

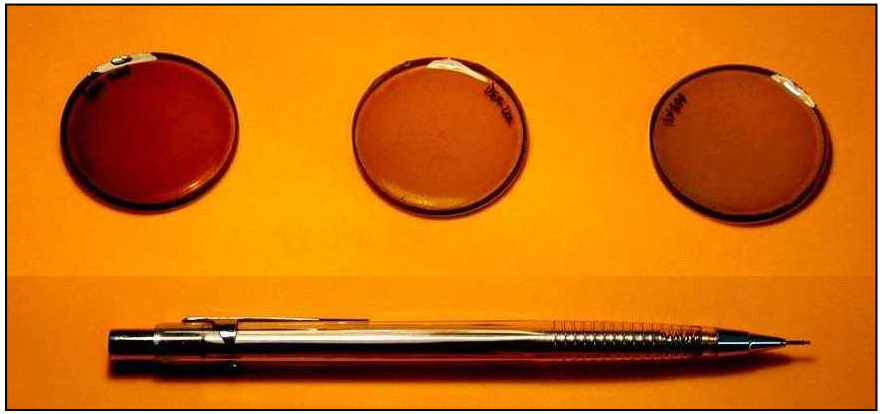
Metodologie

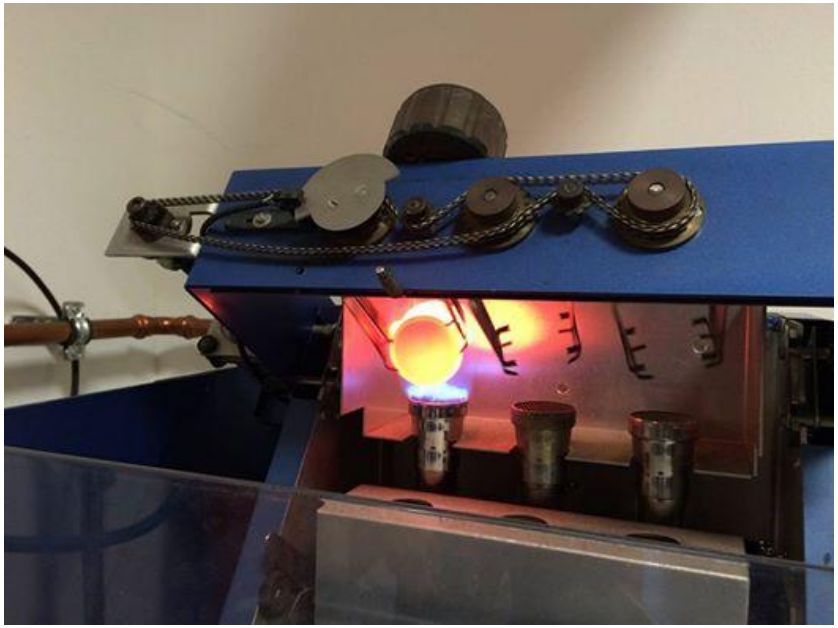
- Analisi chimica di roccia totale ottenuta con spettrometria a raggi X (XRF)
- Analisi mineralogica con microsonda (EMPA)
- Geotermobarometro Putirka (2008)

Spettrometria XRF

Preparazione del campione:

- Campione e standard di riferimento devono essere preparati nello stesso modo e con estrema accuratezza
- Coefficiente di assorbimento, densità e granulometria devono essere il più simili possibile
- Al termine si ottiene una PERLA, un campione vetrificato altamente omogeneo
- 0.65 g di campione calcinato
- diluizione con 6.5 g di $Li_2B_4O_7$ (tetraborato di litio, basso peso atomico medio)
- utilizzo di una perlatrice (strumento per la fusione, 1150°C).

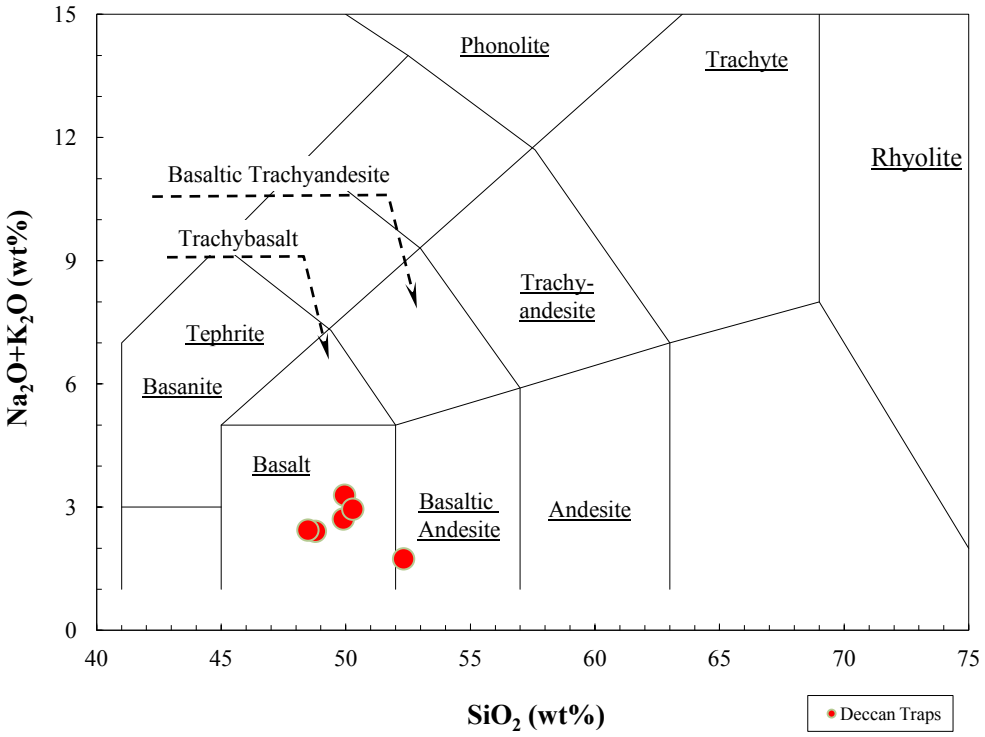




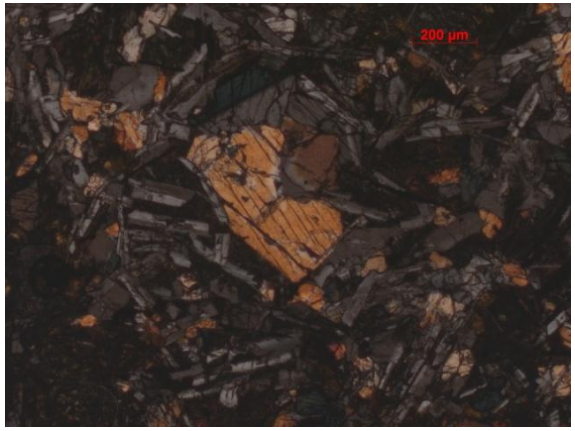
Campionamento

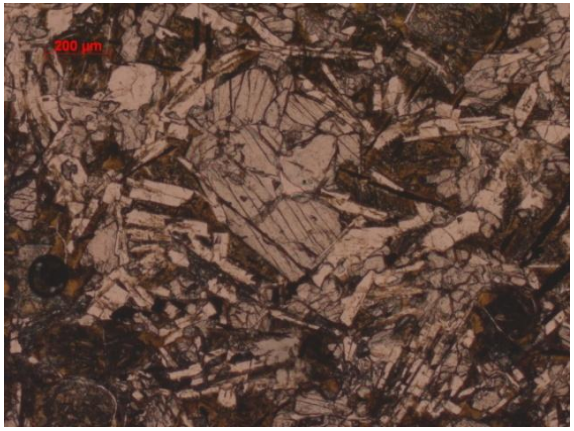
Tutti i campioni provengono dalla parte occidentale del Deccan Main Province (Western Ghats)

Sottogruppo	Formazione	Campione
Wai	Mahabaleshwar (280m)	AMB 14.10
	Ambenali (500m)	AMB 14.6
	Poladpur (375)	AMB 14.2
Lonalava	Bushe (325m)	
	Khandala (140m)	
Kalsubai	Bimashankar (140m)	
	Thakurvadi (650m)	BOR 14.2
	Neral (100m)	MAT 14.2
	Igatpuri (700m)	MSJ 14.2
	Jawhar (200m)	

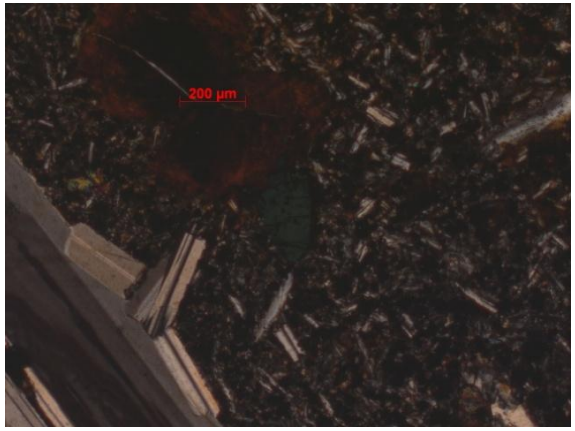


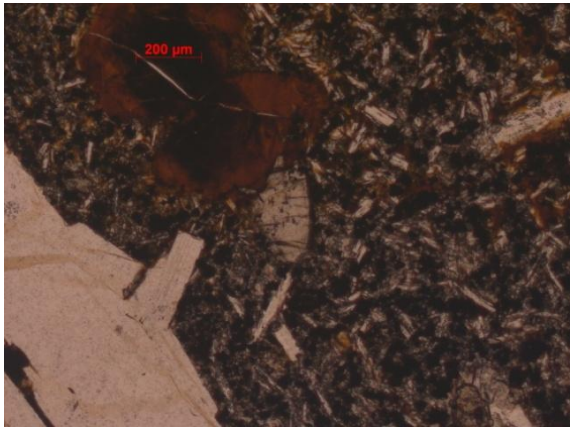
Composizione basaltica per cinque campioni analizzati. Composizione basaltico-andesitica per campione BOR 14-2, formazione di Thakurvadi.



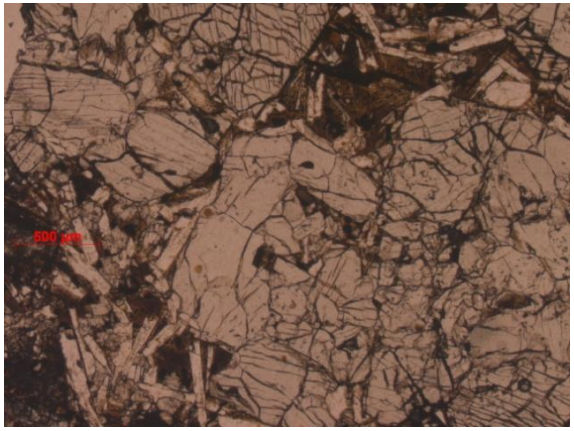


Igatpuri
MSJ 14-2

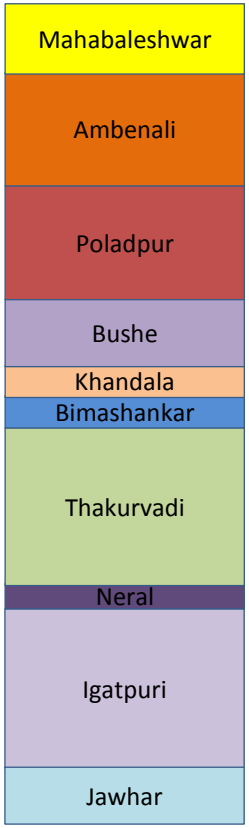


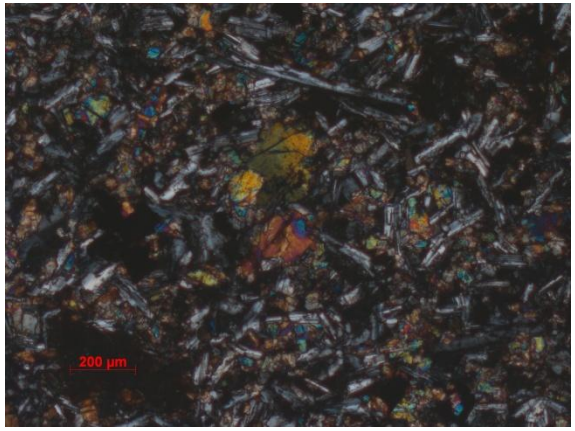


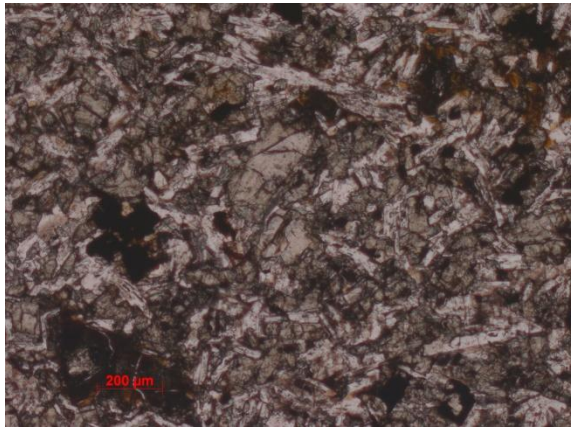
Neral
MAT 14-2



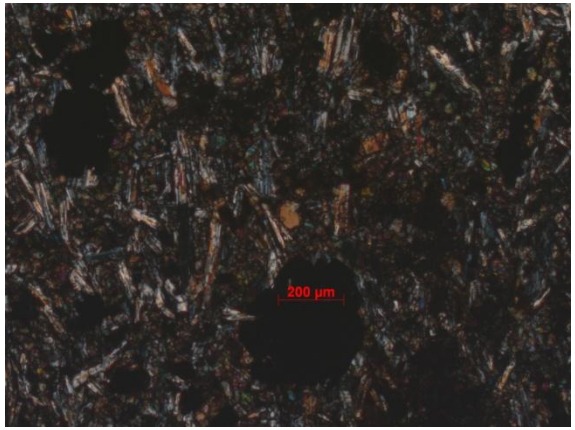
Thakurvadi
BOR 14-2

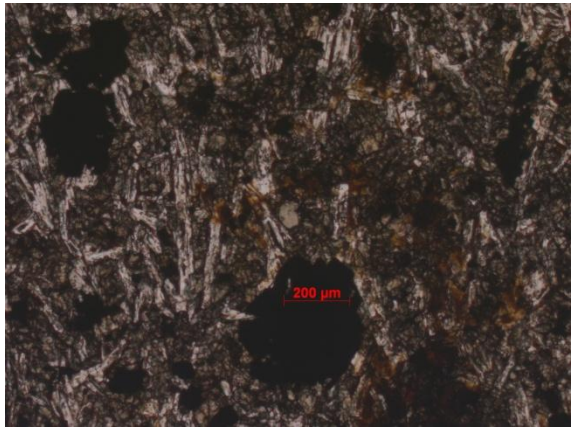




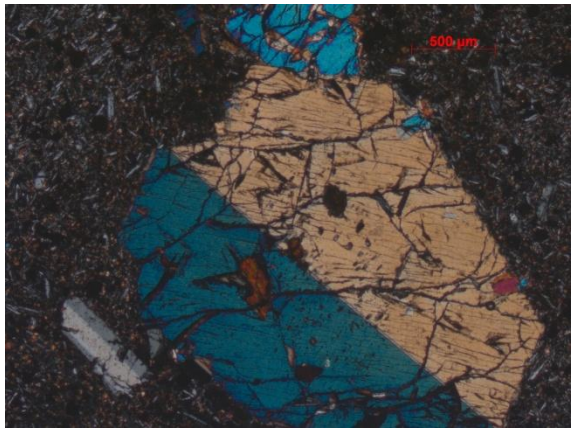


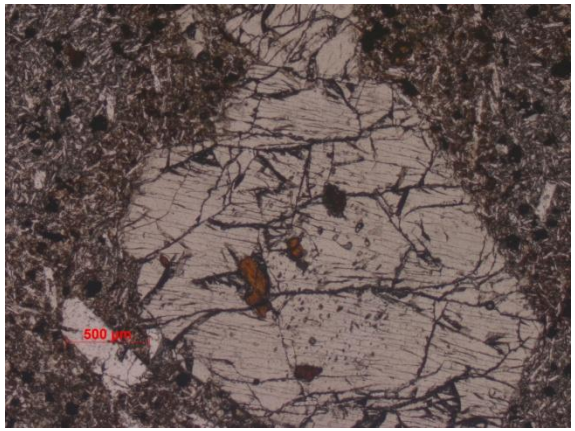
Poladpur
AMB 14-2



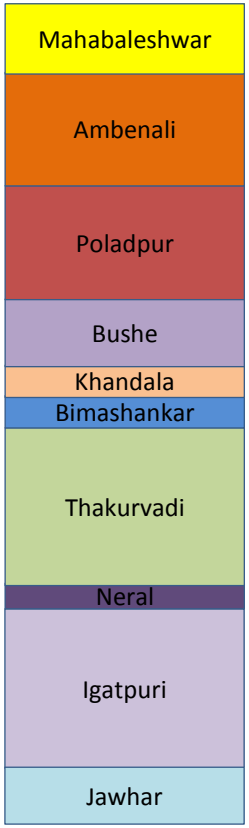


Ambenali
AMB 14-6

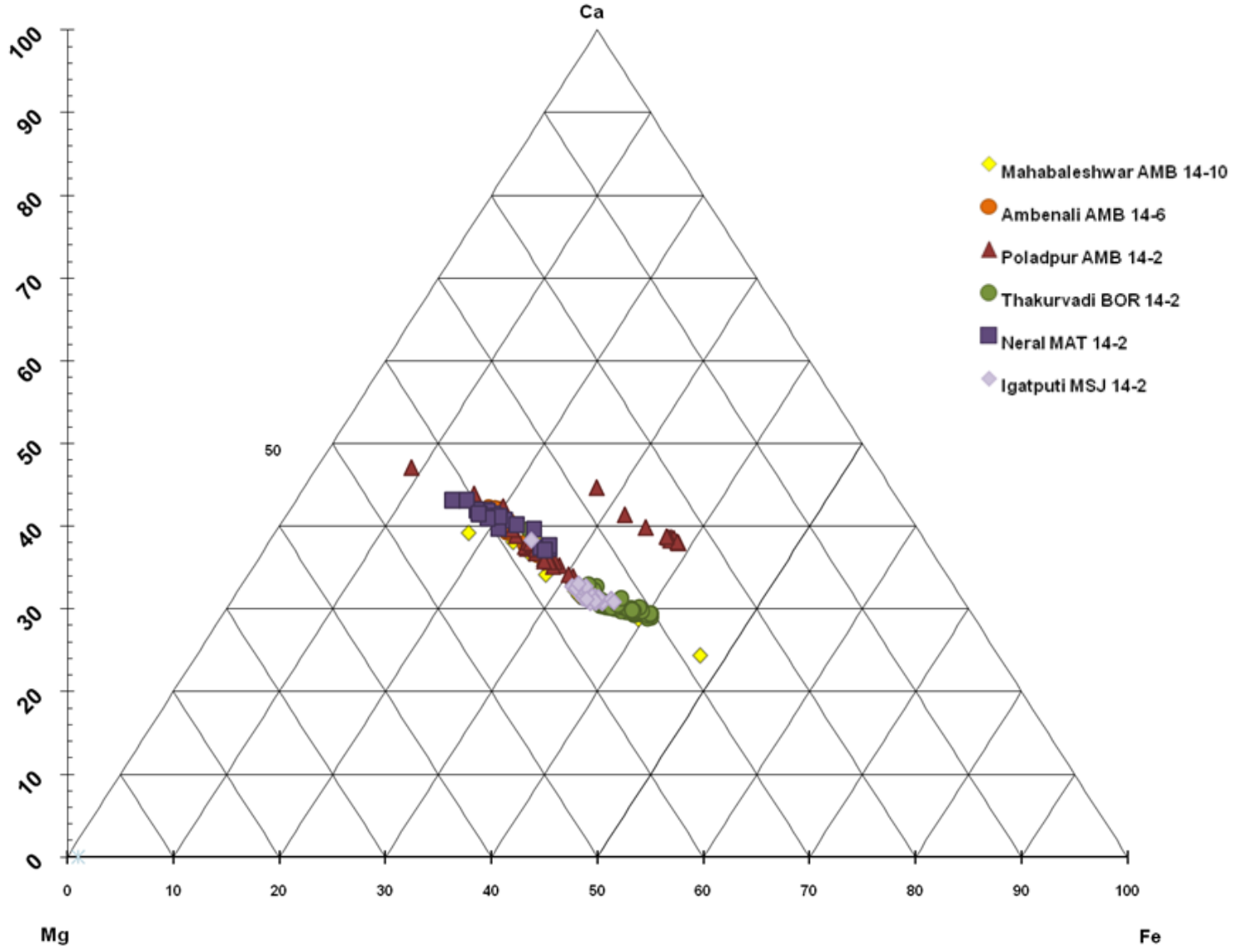




Mahabaleshwar
AMB 14-10

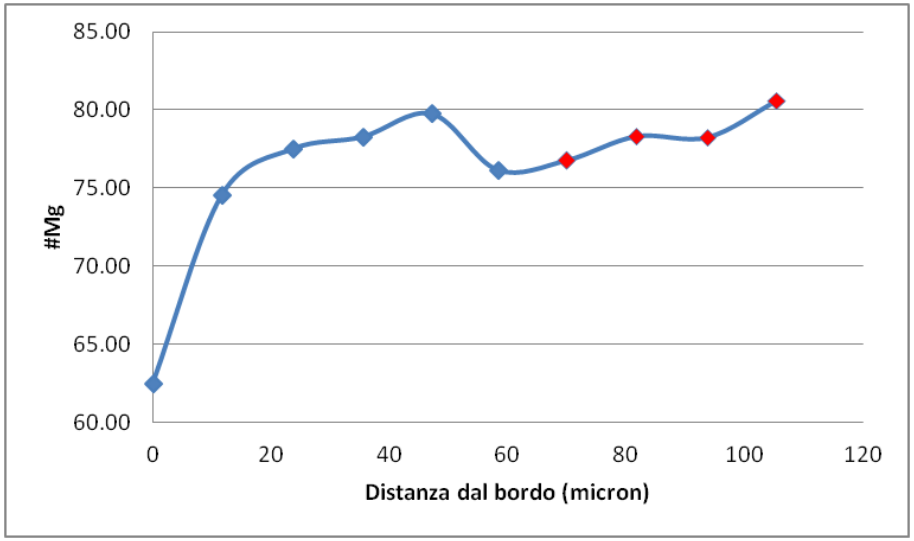


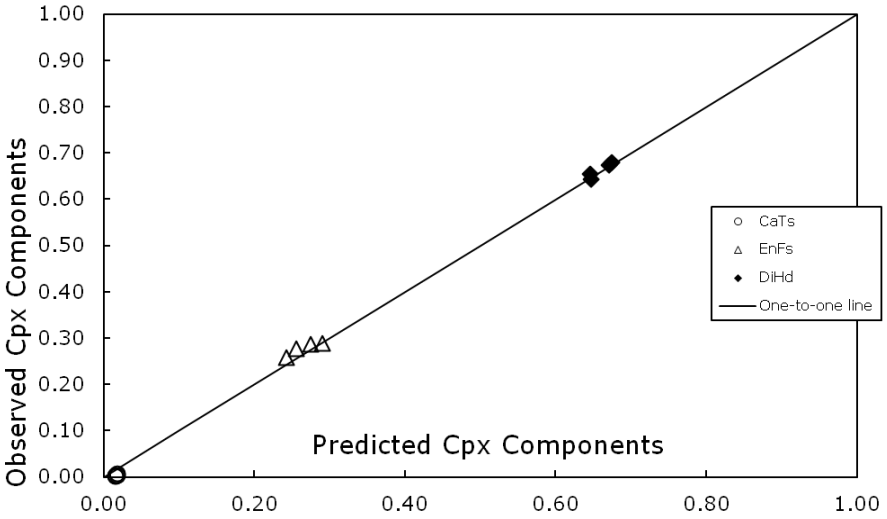
Triangolo dei pirosseni



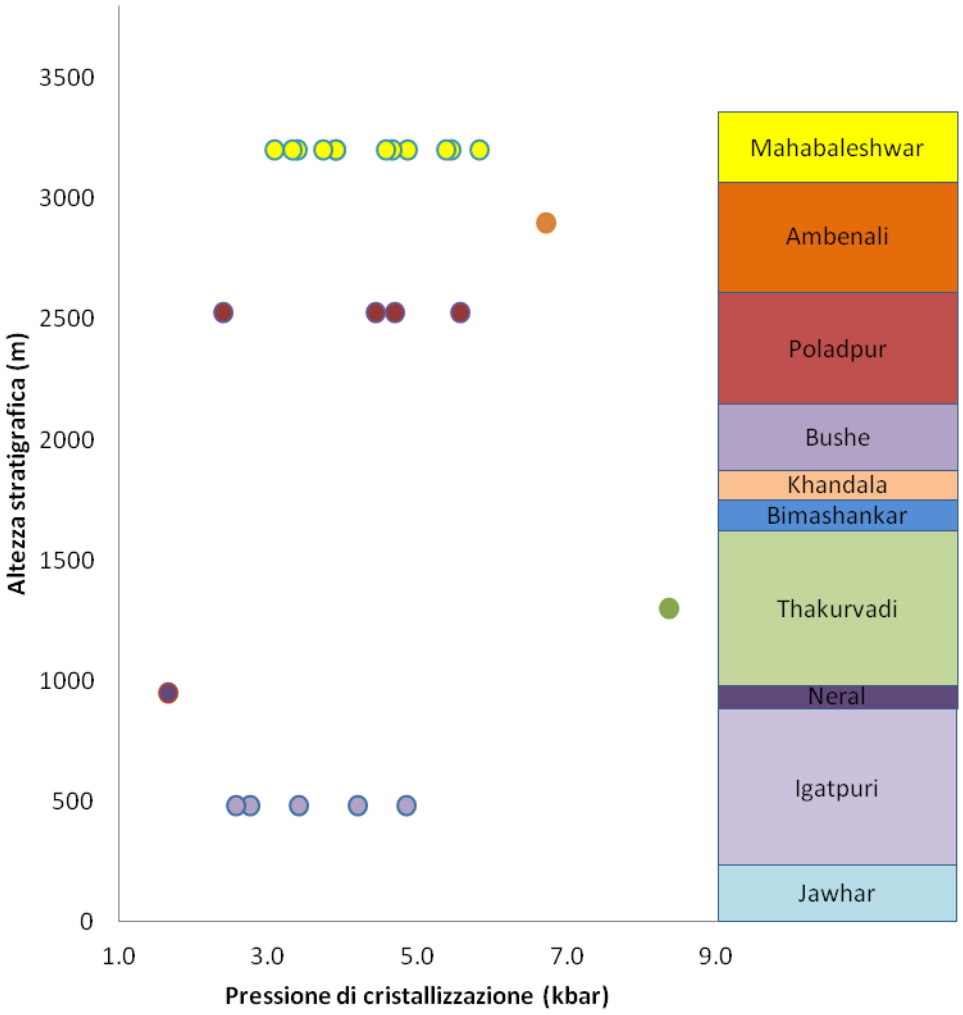
Geotermobarometro Putirka (2008)

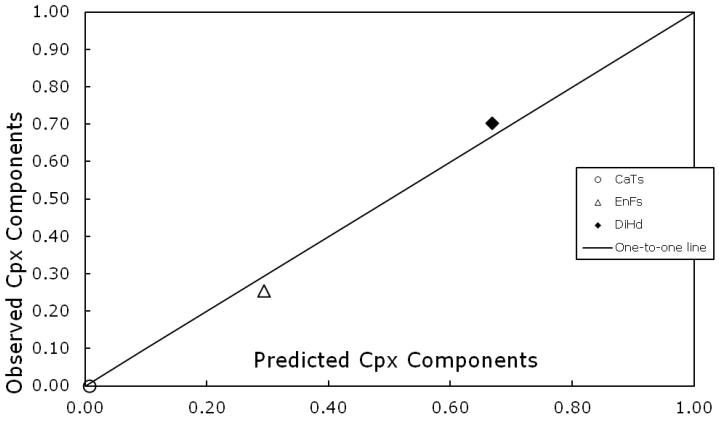
- Scambio tra fase minerale (clinopirosseno) e fuso, assumendo una cristallizzazione all'equilibrio
- Composizioni all'equilibrio raggiunte in ambiente di cristallizzazione non sono variate nel tempo
- Utilizzo delle composizioni ottenute da spot di analisi al centro del cristallo
- Verifica attraverso "test per l'equilibrio"

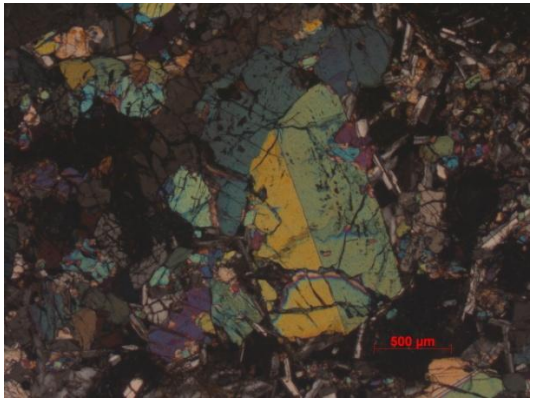




Risultati


Altezza stratigrafica (m)
3500
3000
2500
2000
1500
1000
500
0
1.0
3.0
5.0
7.0
9.0
Pressione di cristallizzazione (kbar)
Mahabaleshwar
Ambenali
Poladpur
Bushe
Khandala
Bimashankar
Thakurvadi
Neral
Igatpuri
Jawhar

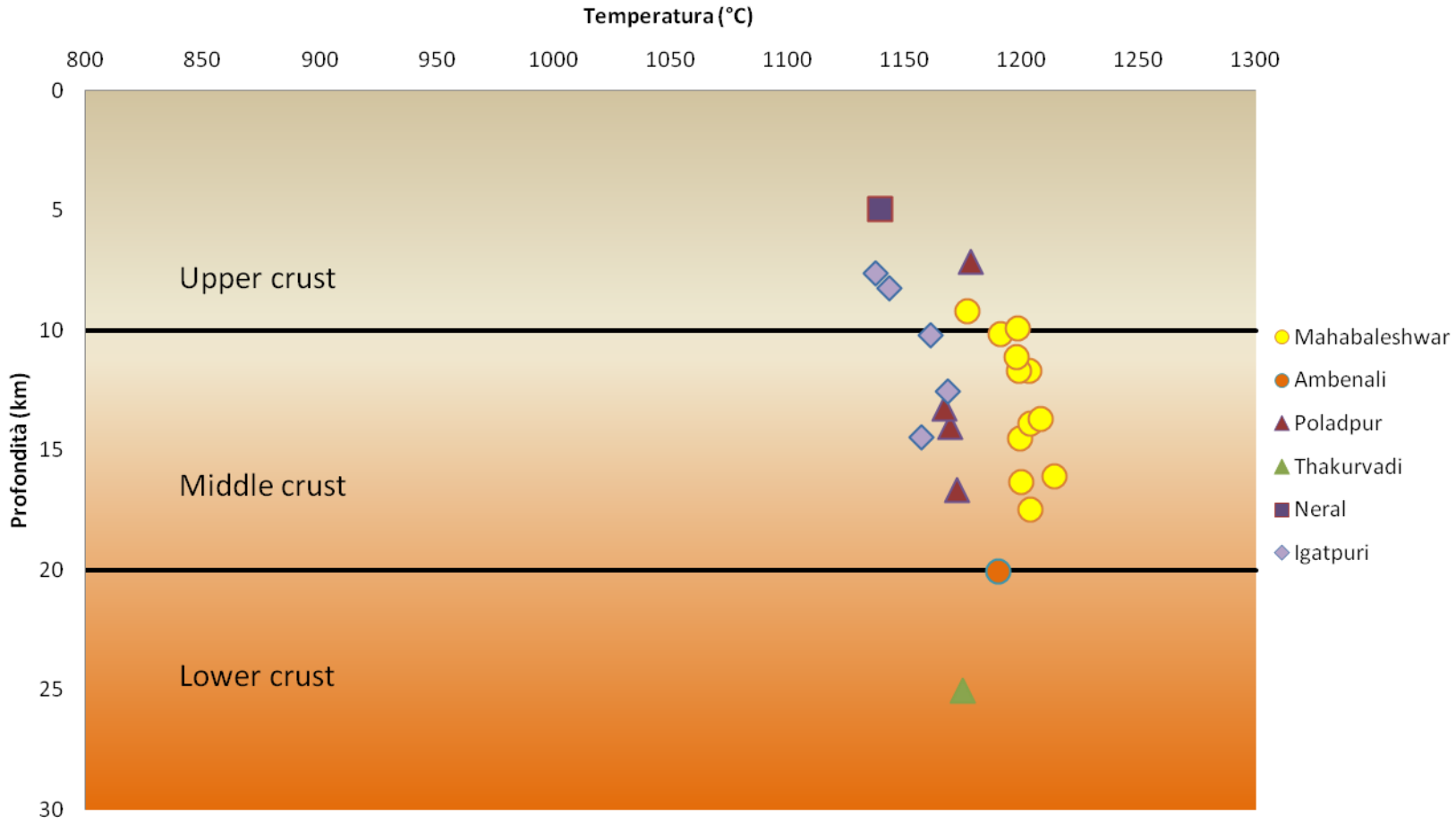

Observed Cpx Components
Predicted Cpx Components
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
0.00
0.20
0.40
0.60
0.80
1.00
CaTs
EnFs
DiHd
One-to-one line


500 µm


500 µm

Conclusioni

Profondità delle camere magmatiche



- Variazione di profondità delle camere magmatiche praticamente nulla
- Temperatura di cristallizzazione dei pirosseni per la formazione di Mahabaleshwar diversa dalle altre.

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Chenet, A., Courtillot, V., Fluteau, F., Gérard, M., Quidelleur, X., Khadri, S. F. R., Subbarao, K. V., Thordarson, T., (2009). Determination of rapid Deccan eruptions across the Cretaceous-Tertiary boundary using paleomagnetic secular variation: Constraints from analysis of eight new sections and synthesis for a 3500-m-thick composite section. *Journal of Geophysical Research,* 2009 (114)

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Grazie per l’attenzione