



DIPARTIMENTO DI  
GEOSCIENZE

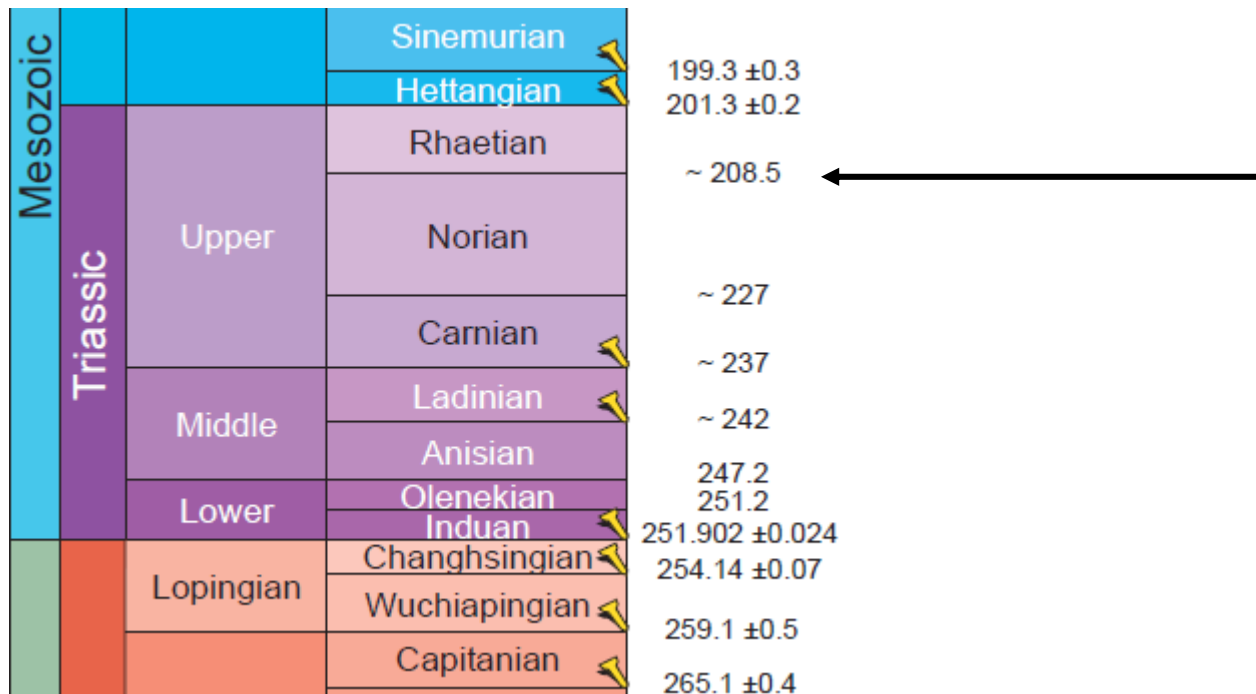
# Utilizzo dello shift negativo del $\delta^{13}\text{C}$ organico come possibile evento per la definizione del limite Norico/Retico

Laurea Triennale in Scienze Geologiche  
a.a. 2019-2020

Laureando: Samuele Rampin  
Matricola: 1164366  
Relatore: dott. Manuel Rigo

# Scopo della tesi

- Correlare sezioni provenienti da zone rappresentative di Tetide e Pantalassa per verificare la presenza di un evento globale in prossimità del limite Norico-Retico (NRB) (208.5 Ma)

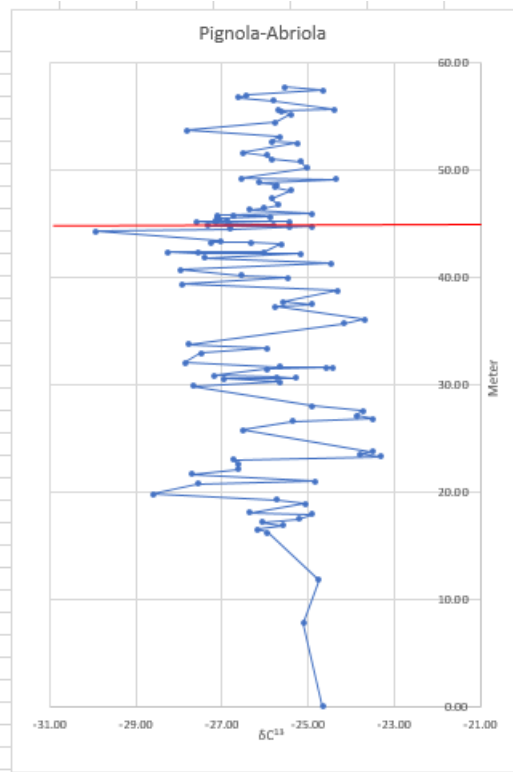


# Metodo

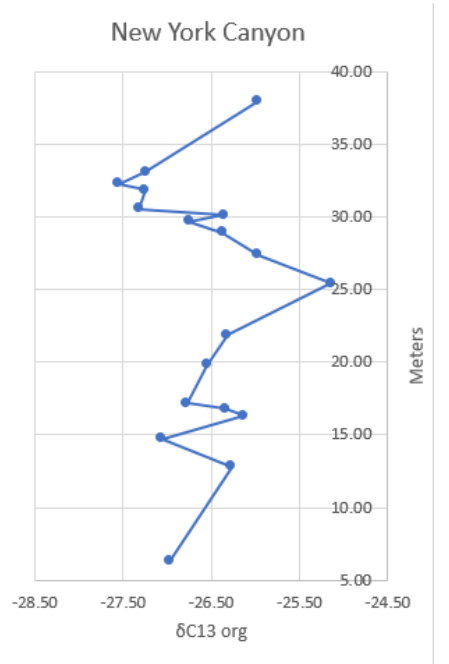
Elaborazione dati geochimici in funzione dell'altezza stratigrafica

Confronto grafici ottenuti con proxy stratigrafici presenti in letteratura

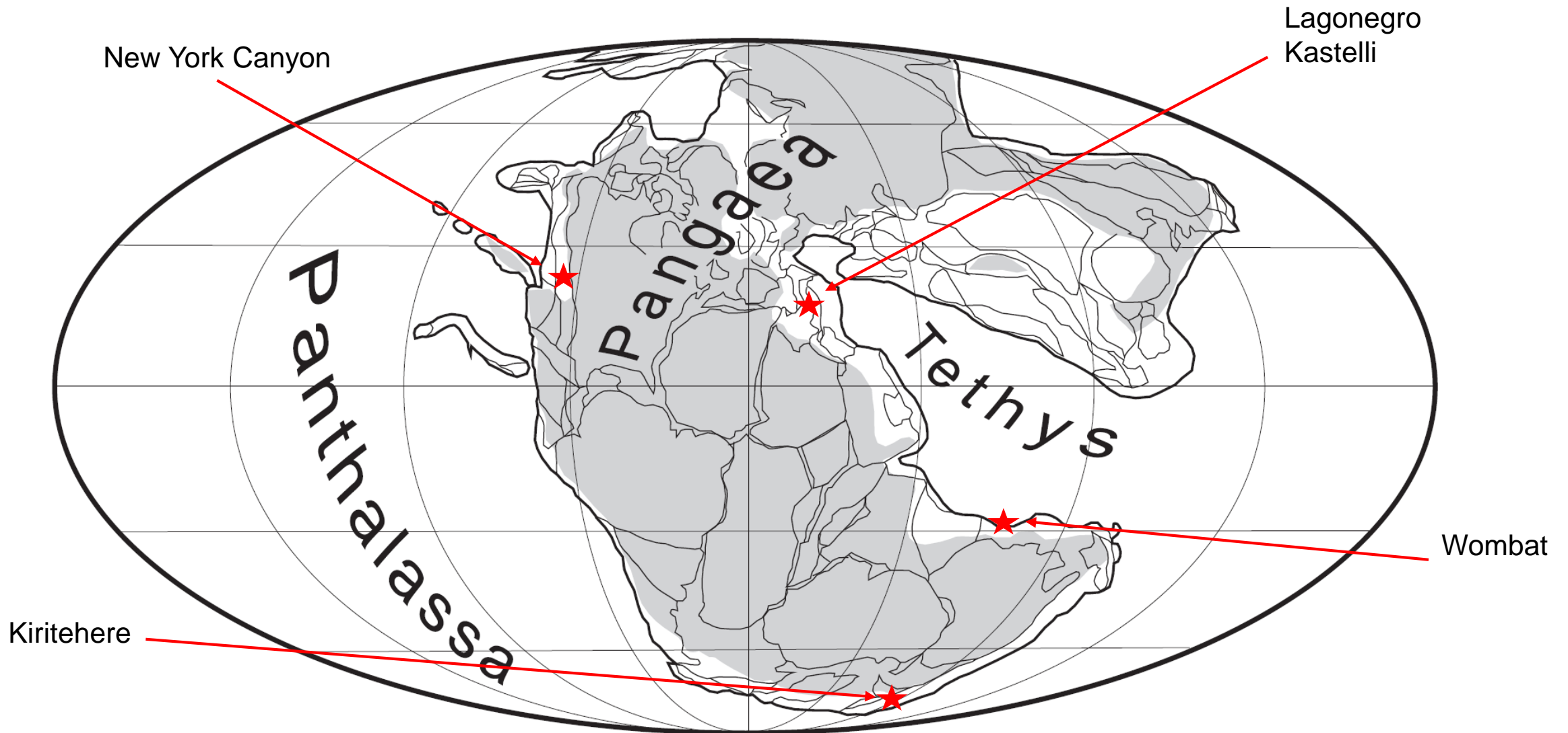
Sample	Meter	$\delta^{13}C_{org}$ (‰)
Pai 189	57.80	-25.56
Pai 187	57.50	-24.66
Pai 185	57.05	-26.43
GNI 117	56.76	-26.61
Pai 184	56.50	-25.80
GNI-29	55.70	-24.41
Pai 180	55.63	-25.71
GNI28	55.55	-25.63
GNI 27	55.25	-25.40
Pai 173	54.45	-25.77
GNI 102	53.75	-27.83
Pai 168	53.15	-25.67
GNI26	52.65	-25.85
PAI166	52.50	-25.26
Pai 162	51.65	-26.52
GNI 25	51.40	-25.97
GNI 85	51.05	-25.86
PAI160	50.80	-25.17
Pai 157	50.20	-25.03
GNI 24	49.25	-26.56
GNI 23	49.15	-24.36
GNI22	48.90	-26.15
PAI155	48.65	-25.72
GNI 21	48.40	-25.77
GNI 20	48.10	-25.40
GNI 19B	47.40	-25.86
GNI19	46.80	-25.68
GNI 18	46.45	-26.05
GNI 17	46.30	-26.37
Pai 143	45.95	-24.90
GNI16	45.80	-27.10
PA 140 P	45.80	-26.72
Pai 142	45.65	-25.89
PA 120 P	45.60	-27.12
PA 105 P	45.45	-27.06
PA 91 P	45.31	-26.87
GNI 15	45.30	-27.13
GNI14	45.23	-25.42
Pai 139	45.18	-27.58
PA 72 P	45.12	-27.13
PAI136	44.95	-25.80
PA 55 P	44.95	-26.80
PA 46 P	44.86	-27.35



Sample	Meter	$\delta^{13}C_{org}$ (‰)
NYC 18	37.95	-25.98
NYC 17	33.10	-27.24
NYC 16	32.30	-27.55
NYC 15	31.85	-27.25
NYC 14	30.55	-27.32
NYC 13	30.15	-26.36
NYC 12	29.70	-26.75
NYC 11	28.95	-26.37
NYC 10	27.40	-25.97
NYC 9	25.45	-25.15
NYC 8	21.90	-26.32
NYC 7	19.80	-26.55
NYC 6	17.20	-26.78
NYC 5	16.80	-26.34
NYC 4	16.30	-26.13
NYC 3	14.75	-27.06
NYC 2	12.80	-26.27
NYC 1	6.30	-26.98



# Posizione nel tardo Triassico dei punti di campionamento



# Bacino di Lagonegro: sezione Pignola-Abriola

Calcari con Selce  
(carbonati pelagici)

Proposta GSSP  
per NRB:  
FAD *Misikella  
posthernsteini*  
(Conodonti)

Altro proxy  
proposto:  
base della biozona  
a *Propavicingula  
moniliformis*

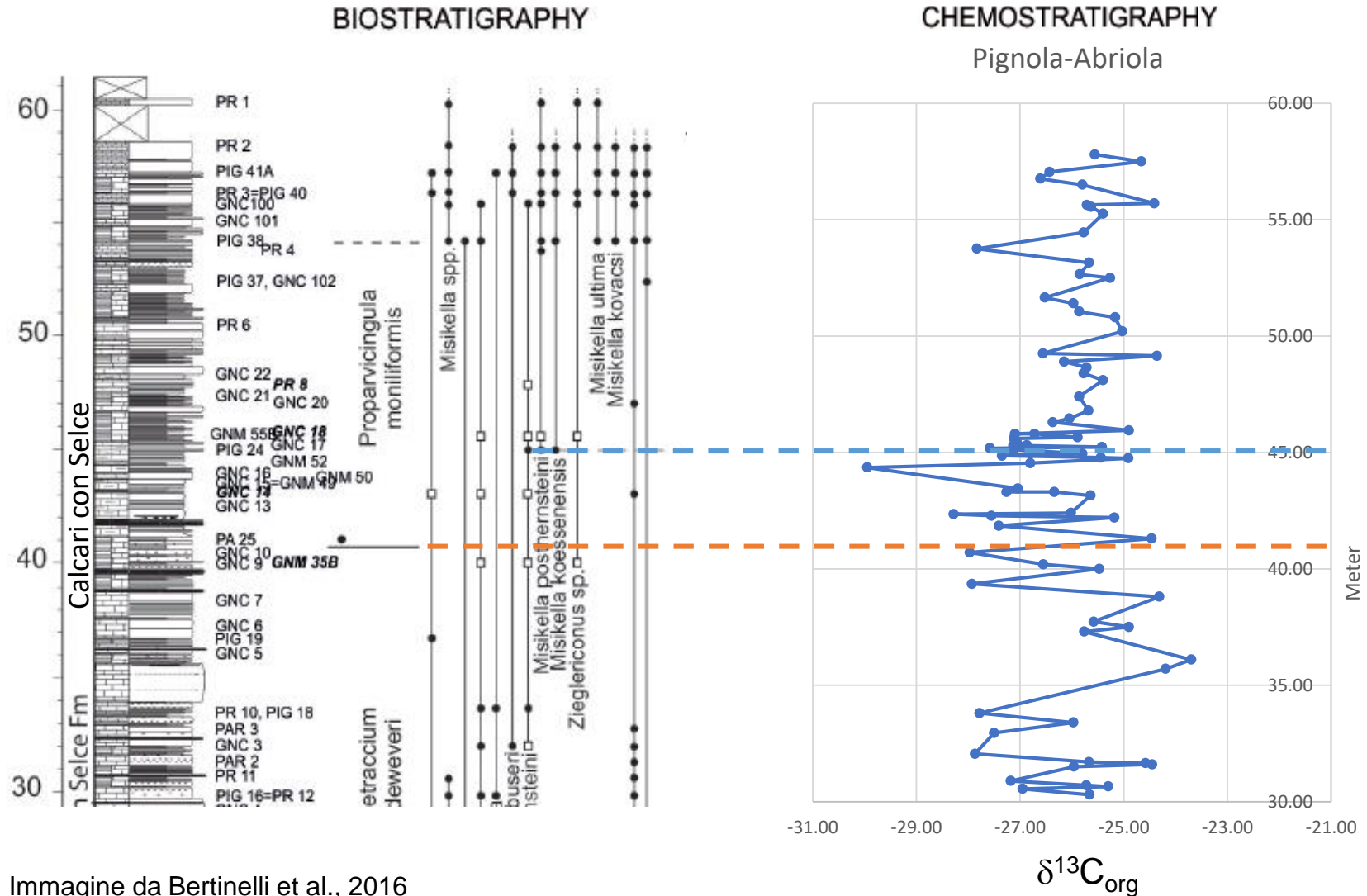


Immagine da Bertinelli et al., 2016

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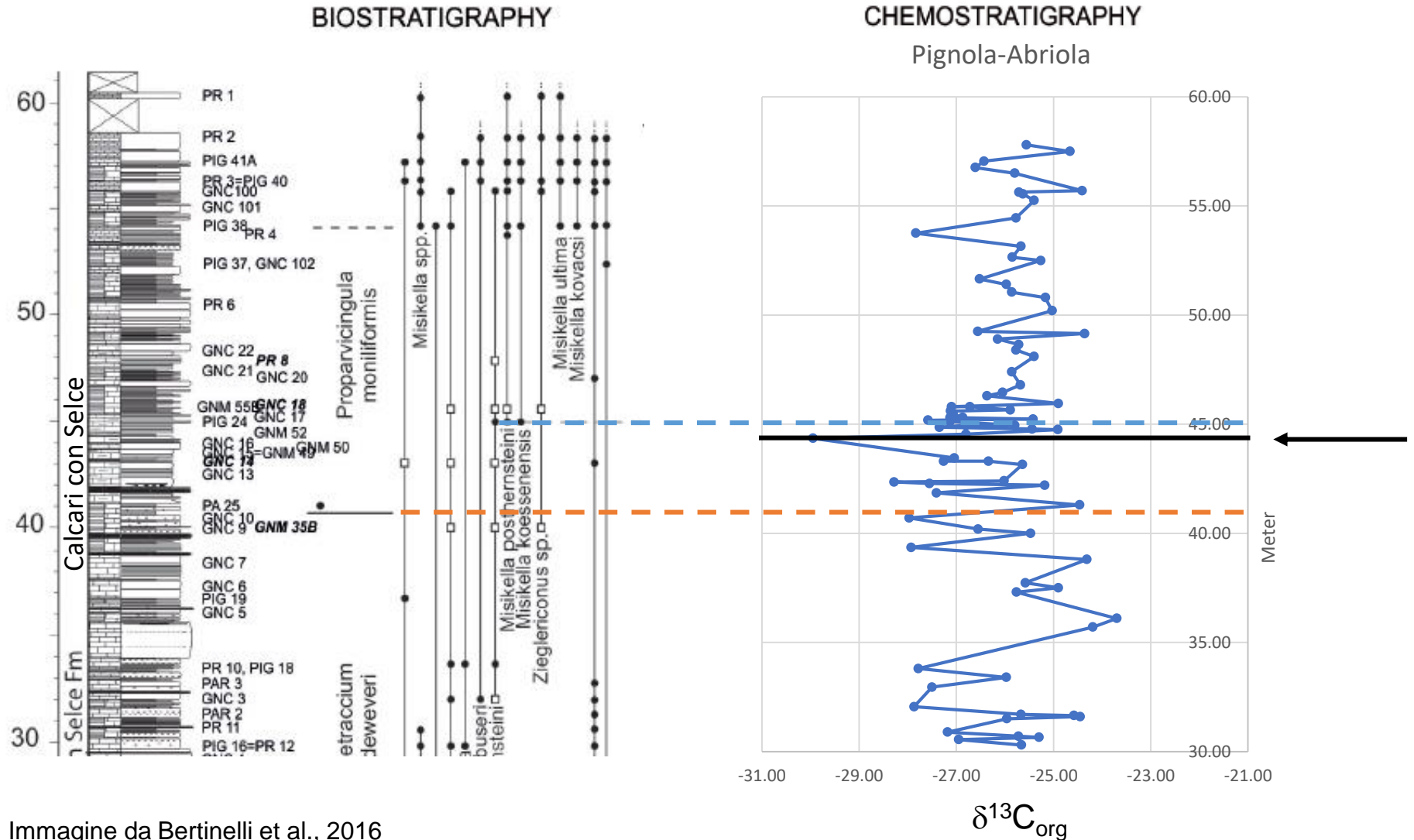


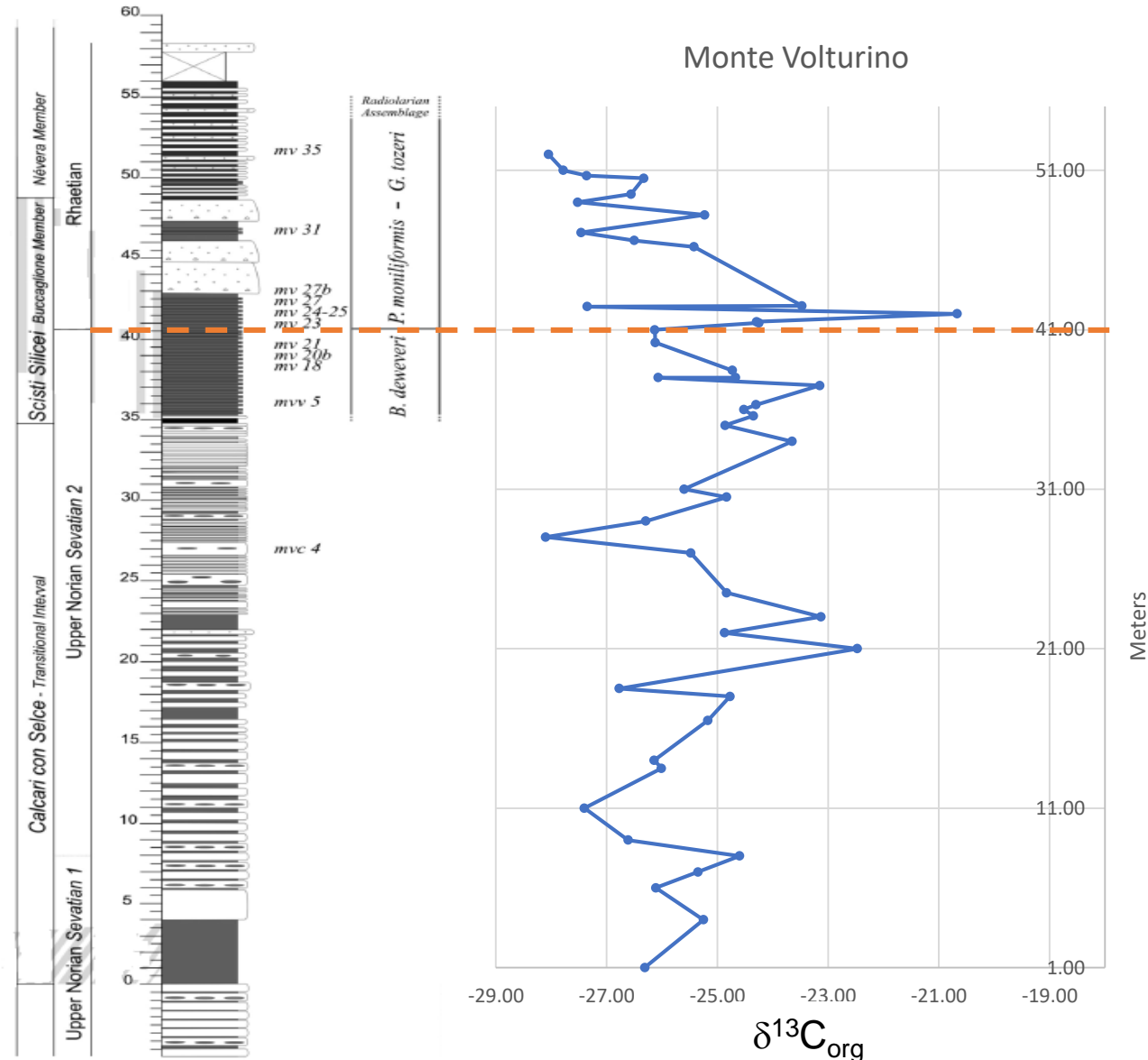
Immagine da Bertinelli et al., 2016

# Bacino di Lagonegro: sezione Monte Volturino

Scisti Silicei (depositi silicei)

Ambiente deposizionale marino più profondo, diverso marker biostratigrafico:

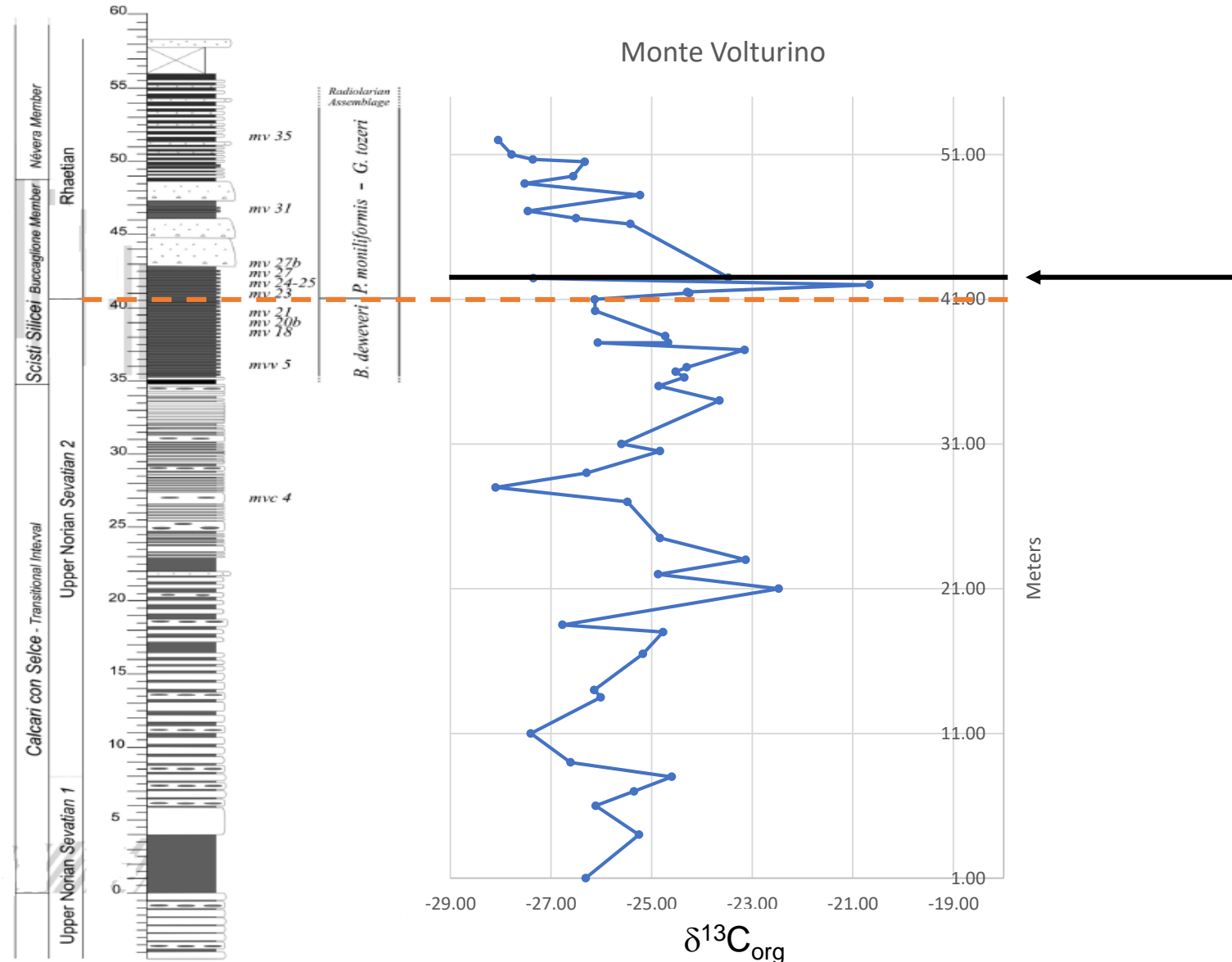
Biozona a *Propavicingula moniliformis* (Radiolari)



# Bacino di Lagonegro: sezione Monte Volturino

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Ambiente deposizionale marino più profondo, diverso marker biostratigrafico:  
Biozona a *Propavicingula moniliformis* (Radiolari)





# Sezione Kastelli, Grecia occidentale

Calcari di Drimos  
(calcari micritici,  
radiolariti, selce)

Studio eseguito sui  
conodonti: NRB con  
comparsa

*M. posthernsteini*

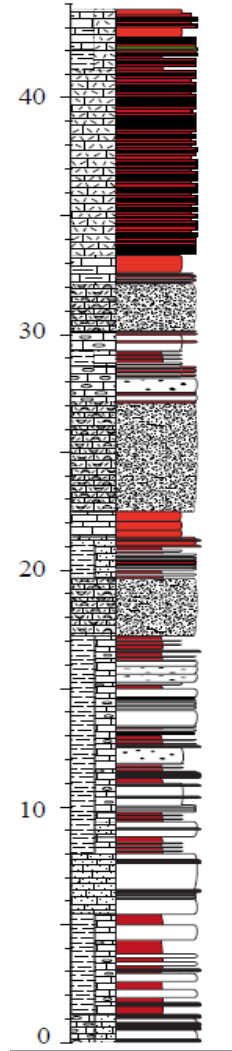
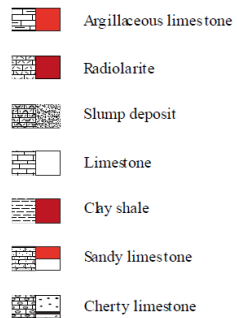
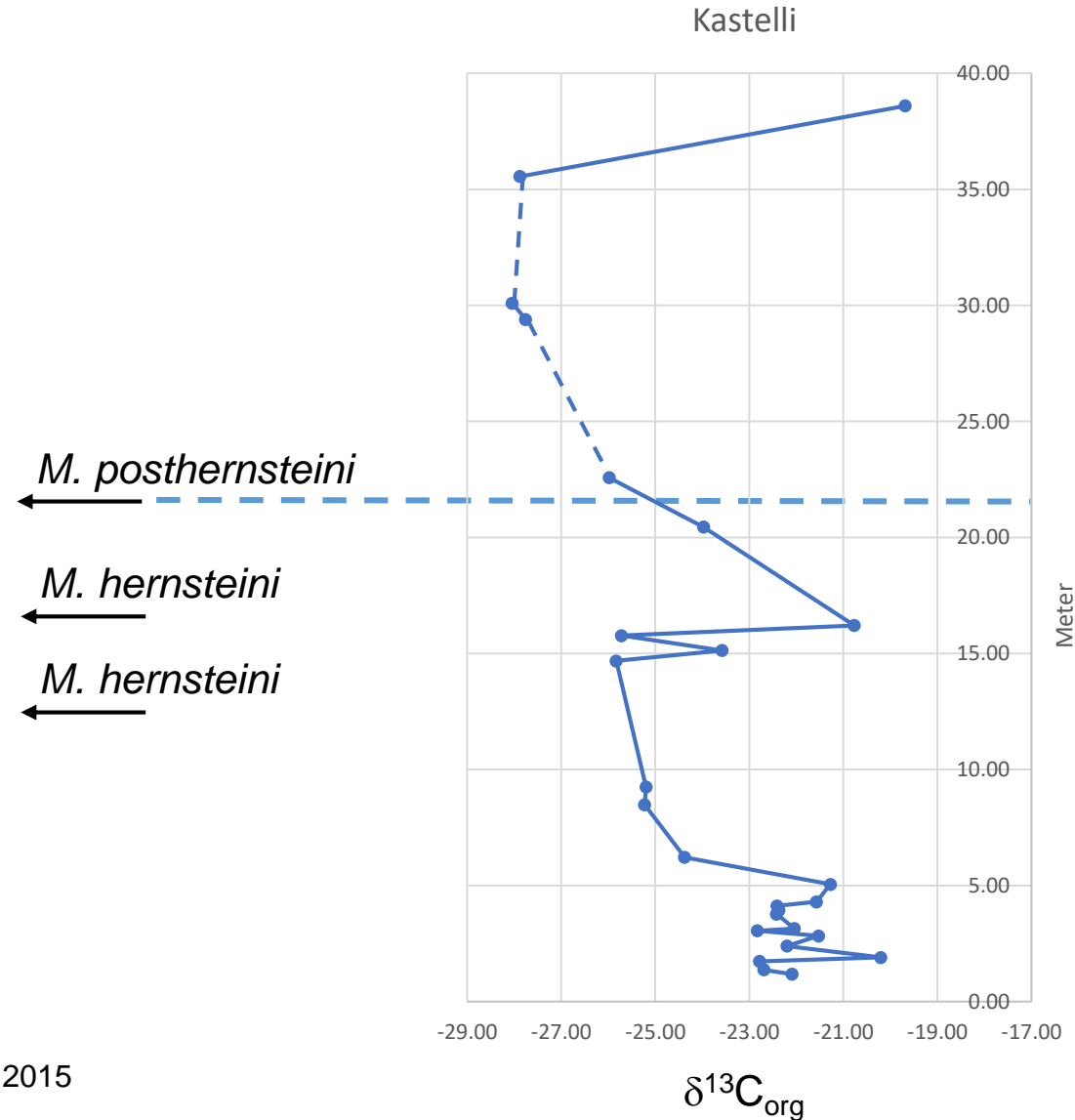


Immagine da Demo, 2015



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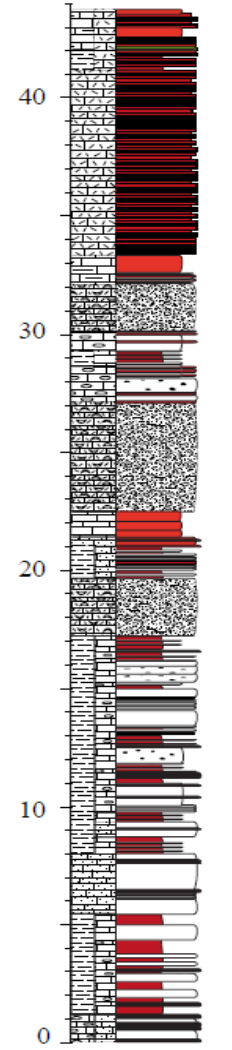
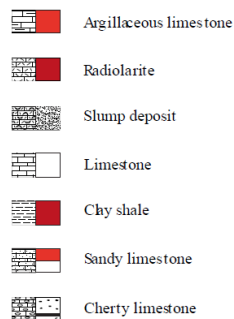
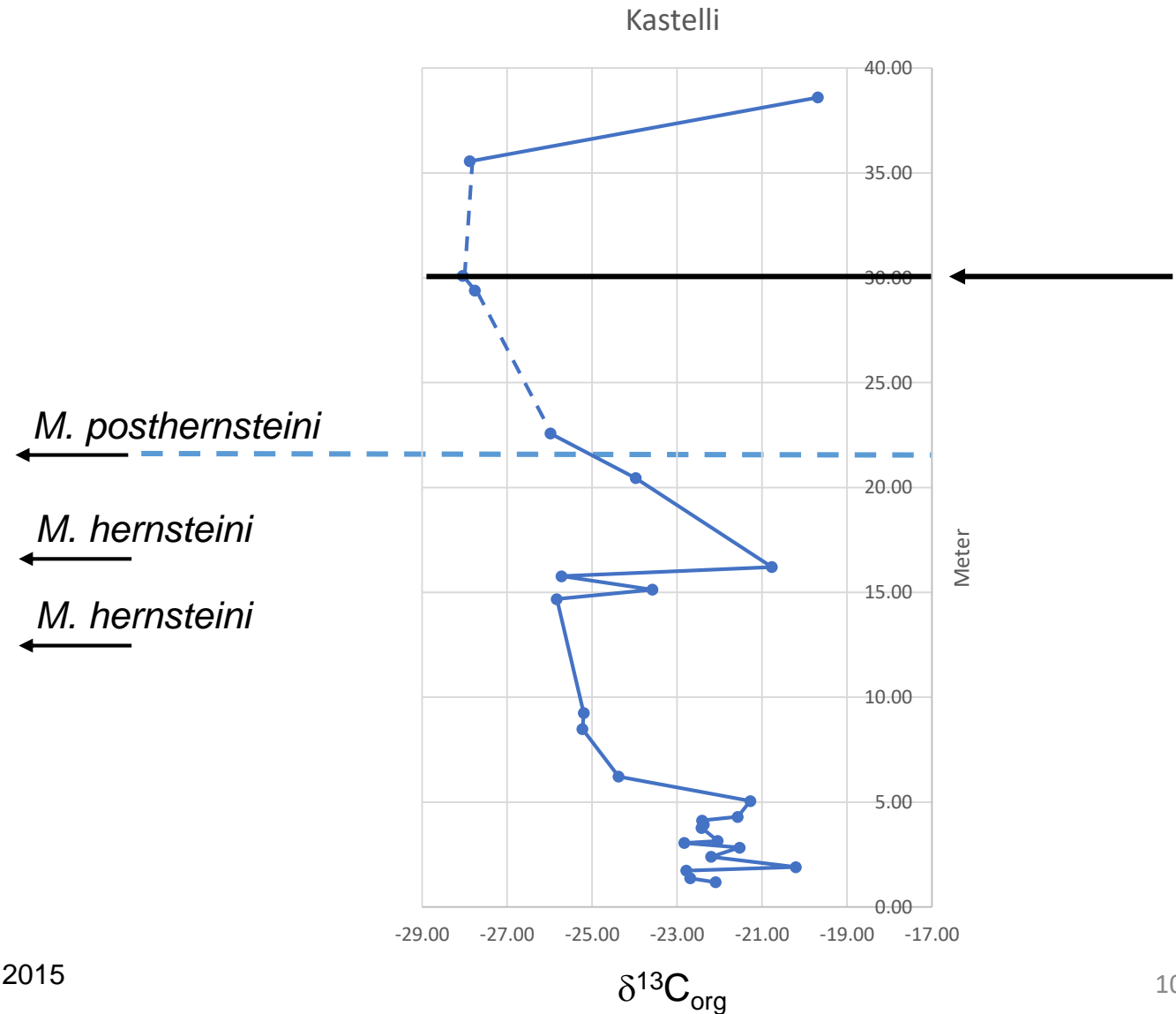


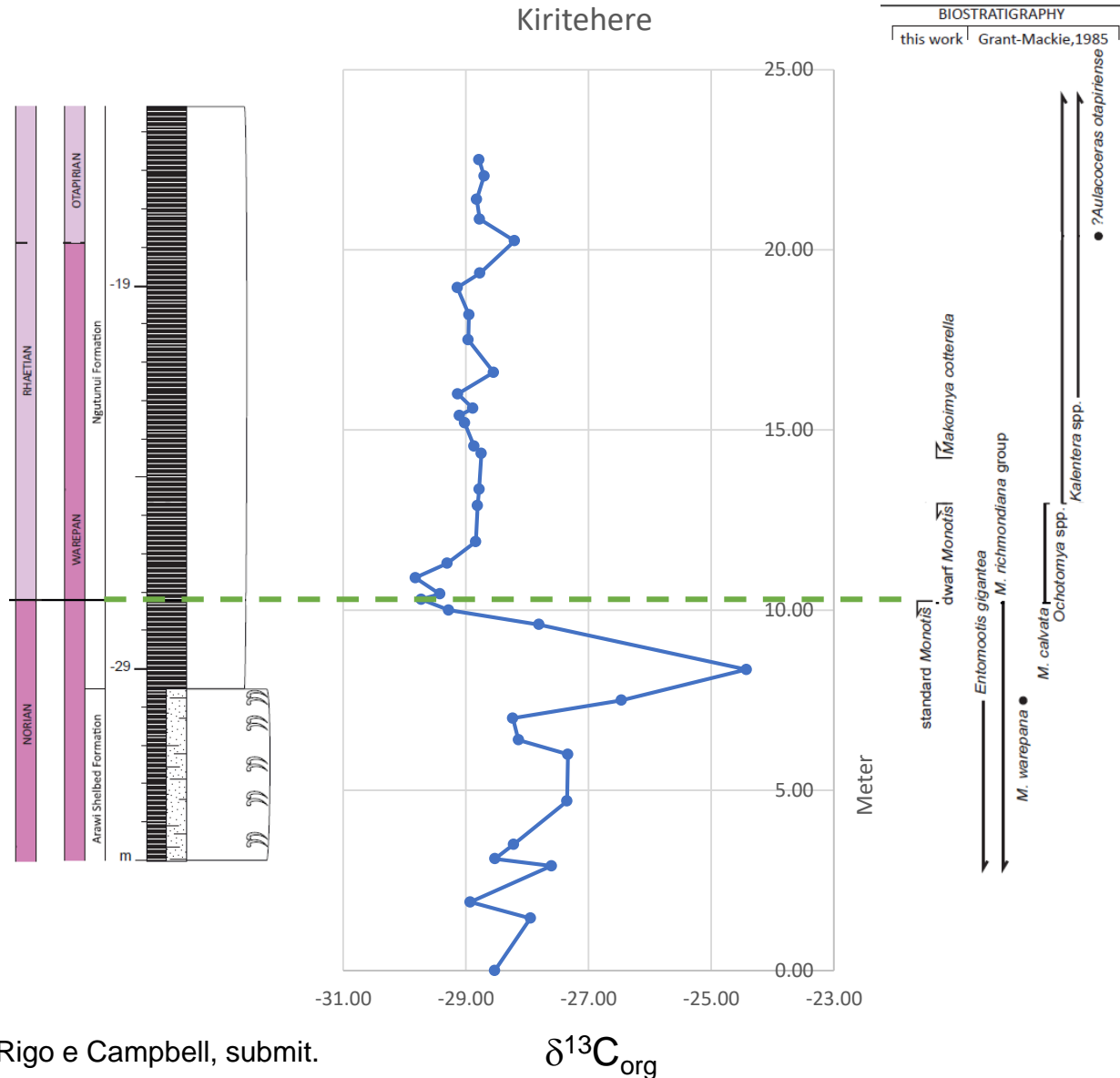
Immagine da Demo, 2015



# Sezione Kiritehere, Nuova Zelanda

Arenarie e Siltiti

NRB approssimato da scomparsa *Monotis* standard –  
comparsa *dwarf Monotis*

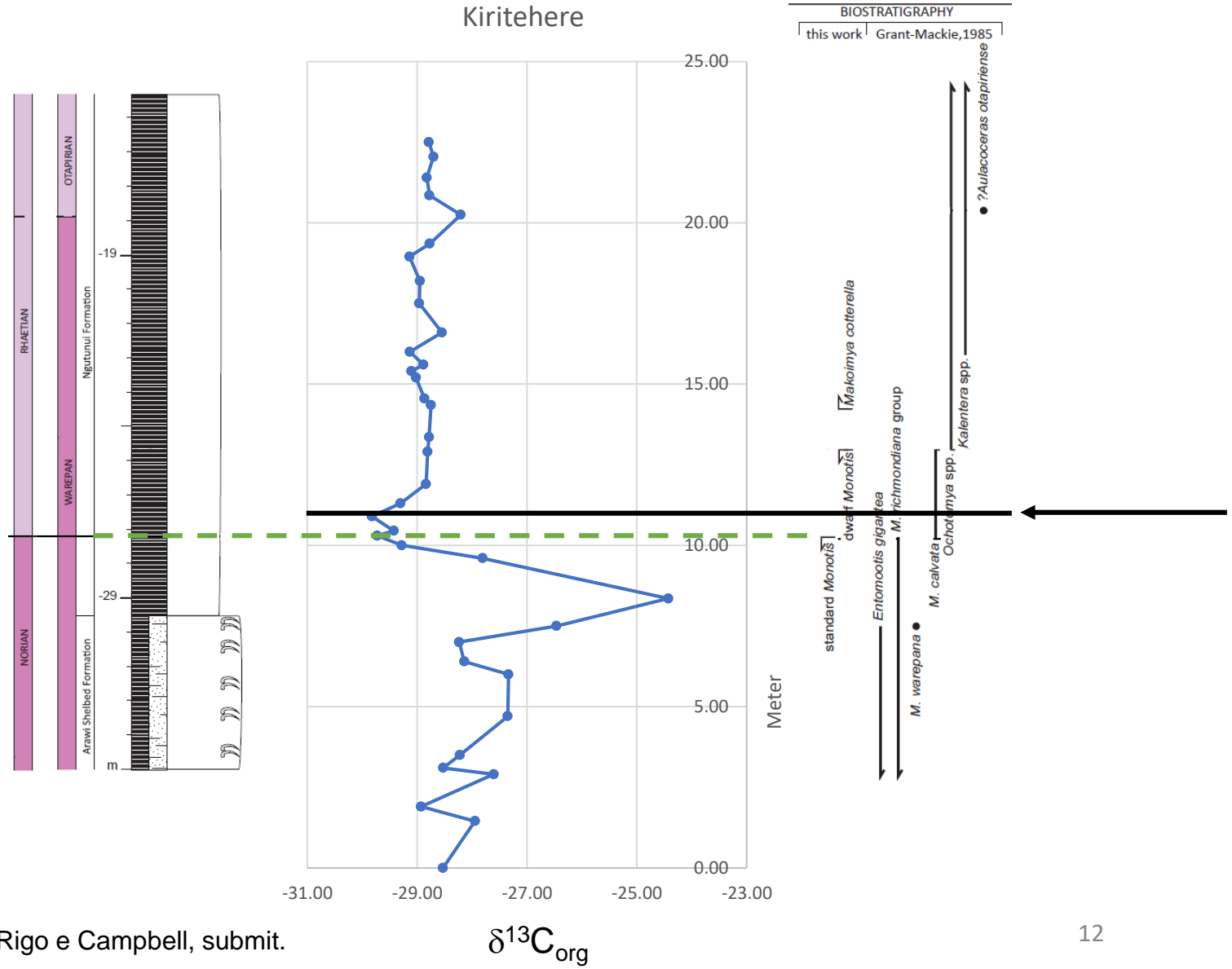


Immagini da Rigo e Campbell, submit.

# Sezione Kiritehere, Nuova Zelanda

Arenarie e Siltiti

NRB approssimato da scomparsa *Monotis* standard – comparsa *dwarf Monotis*



Immagini da Rigo e Campbell, submit.

# Sezione Wombat Basin, Australia orientale

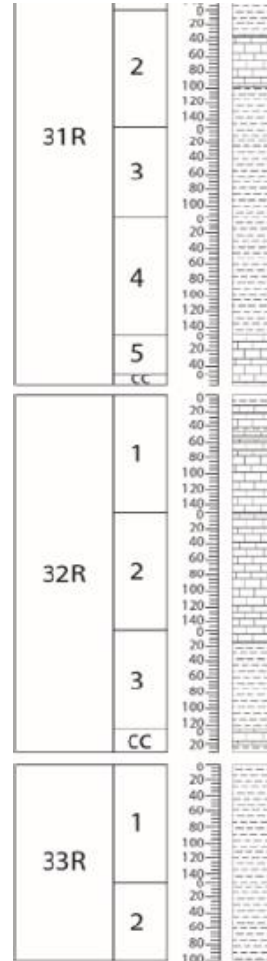
Marne e rocce calcaree

FO *Ecunusphaera*

*zamlachensis* e

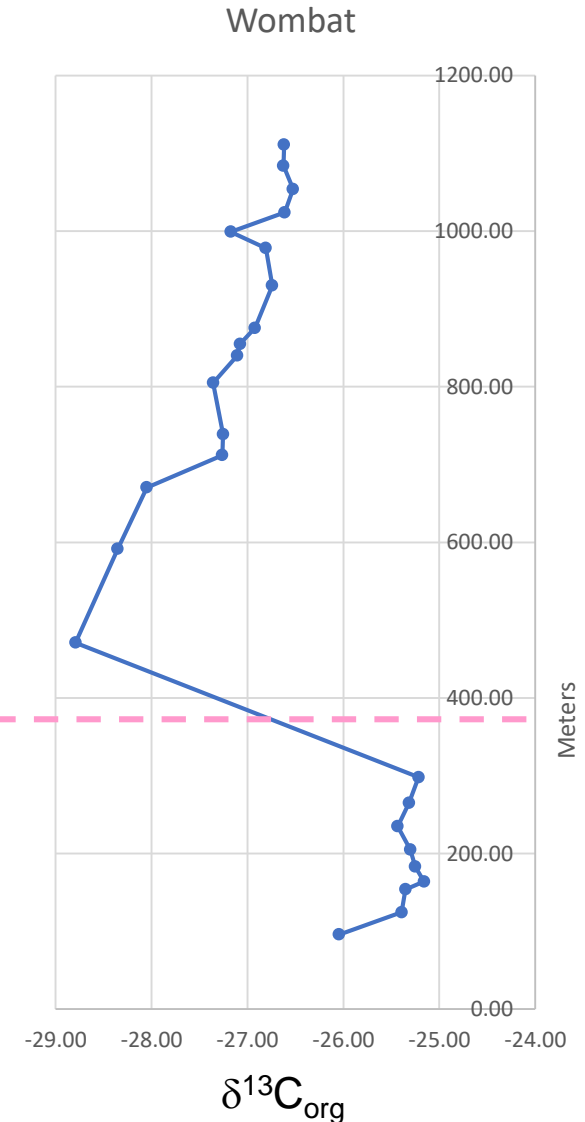
*Crucirhabdus minutus*

In aggregazioni simili a  
sezione Steinbergkogel  
(Austria)



*E. zamlachensis*  
*C. minutus*

Immagini da Rigo e Campbell, submit.

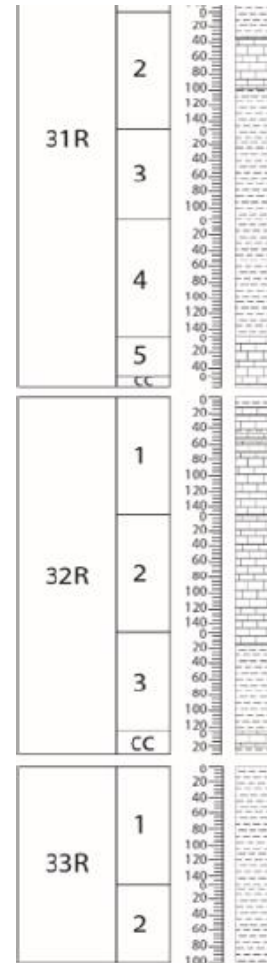


# Sezione Wombat Basin, Australia orientale

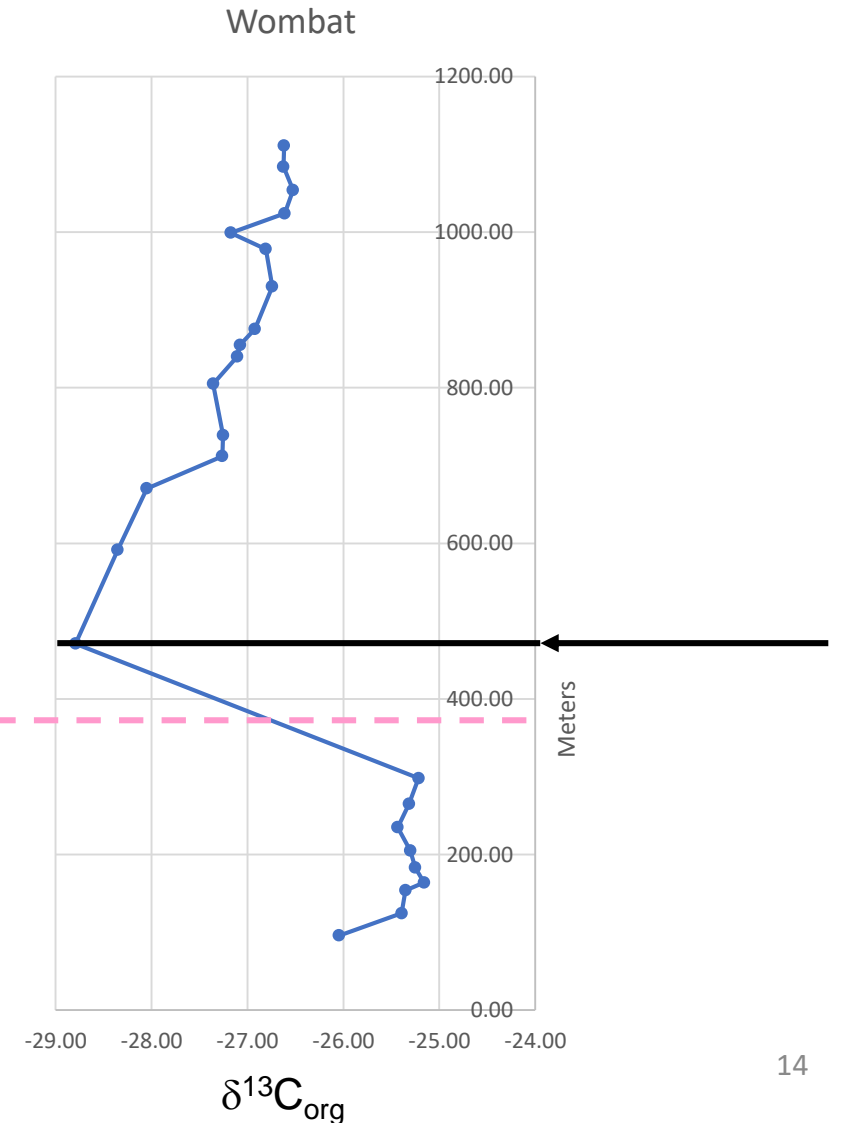
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FO *Ecunusphaera zambachensis* e *Crucirhabdus minutus*

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Immagini da Rigo e Campbell, submit.

# Sezione New York Canyon, Nord America

Gabbs Formation  
(calcari e siltiti)

Proxy chemostratigrafici:  
NRB determinato con  
variazioni  $^{87}\text{Sr}/^{86}\text{Sr}$

Elevato tempo di  
residenza nelle acque  
(~1Ma)

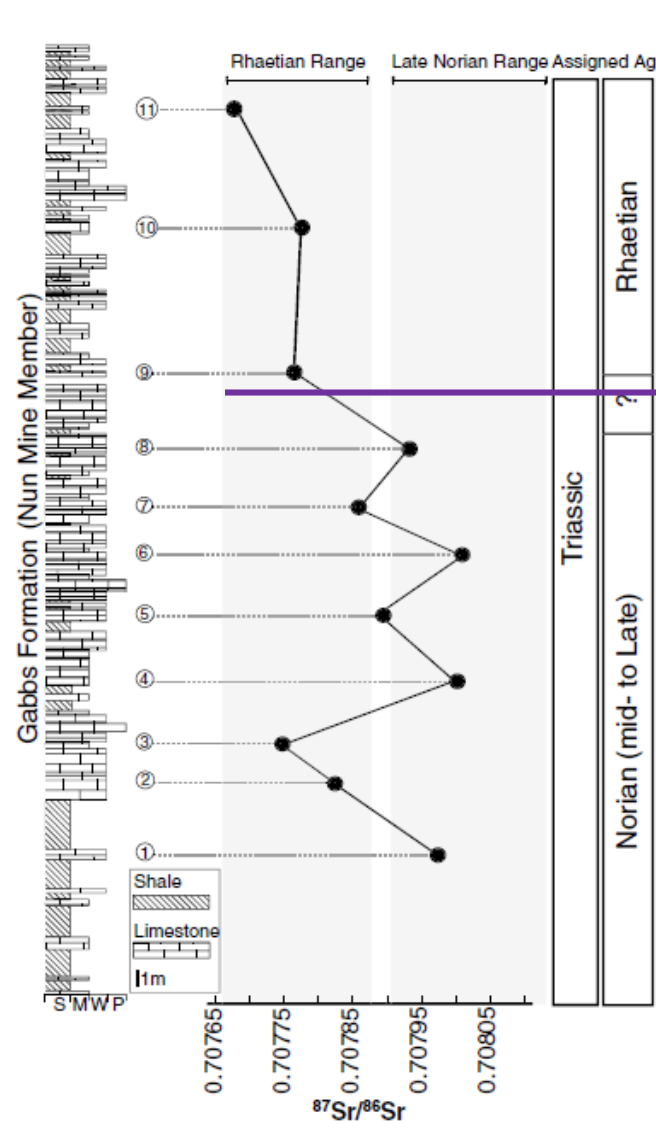
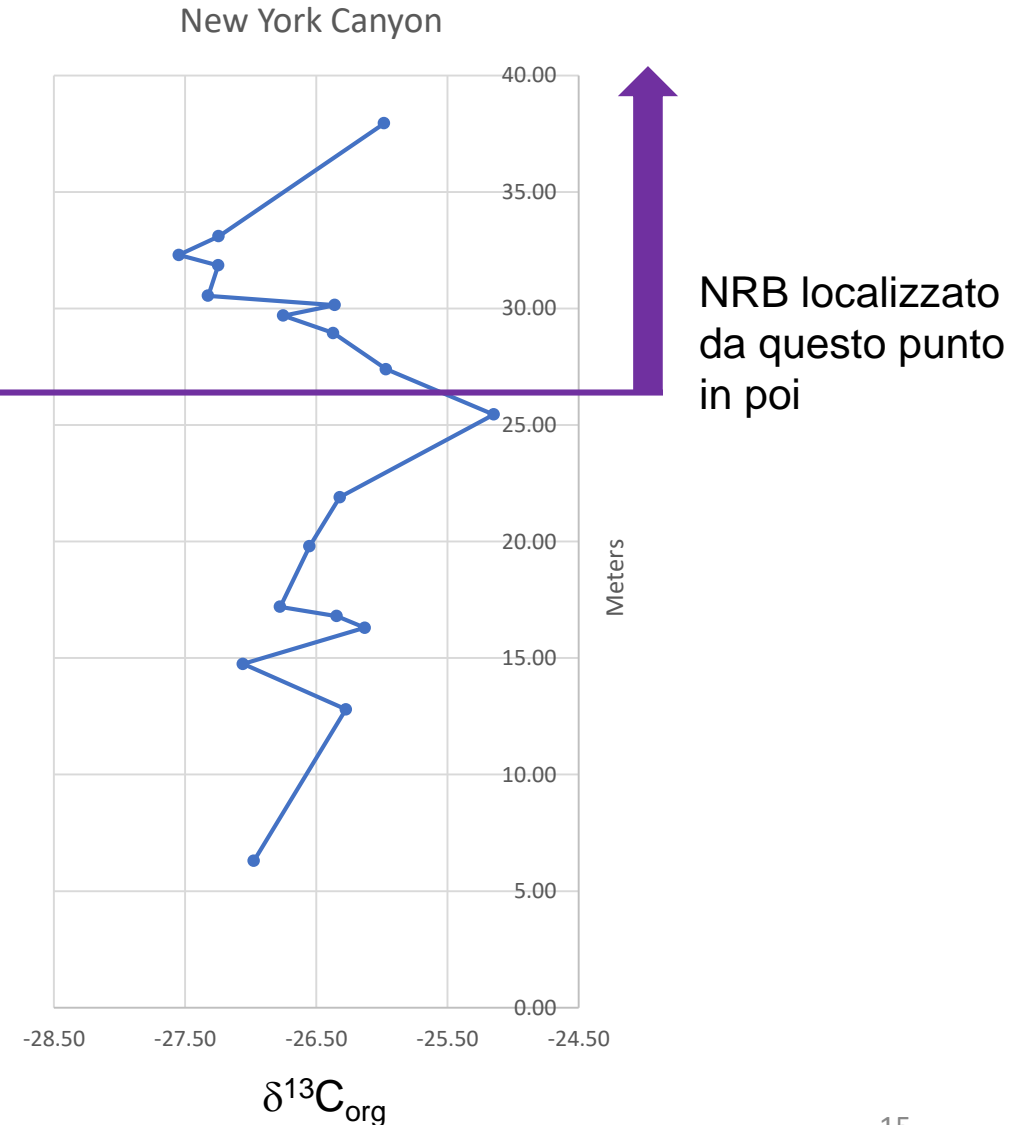


Immagine da Tackett et al., 2014



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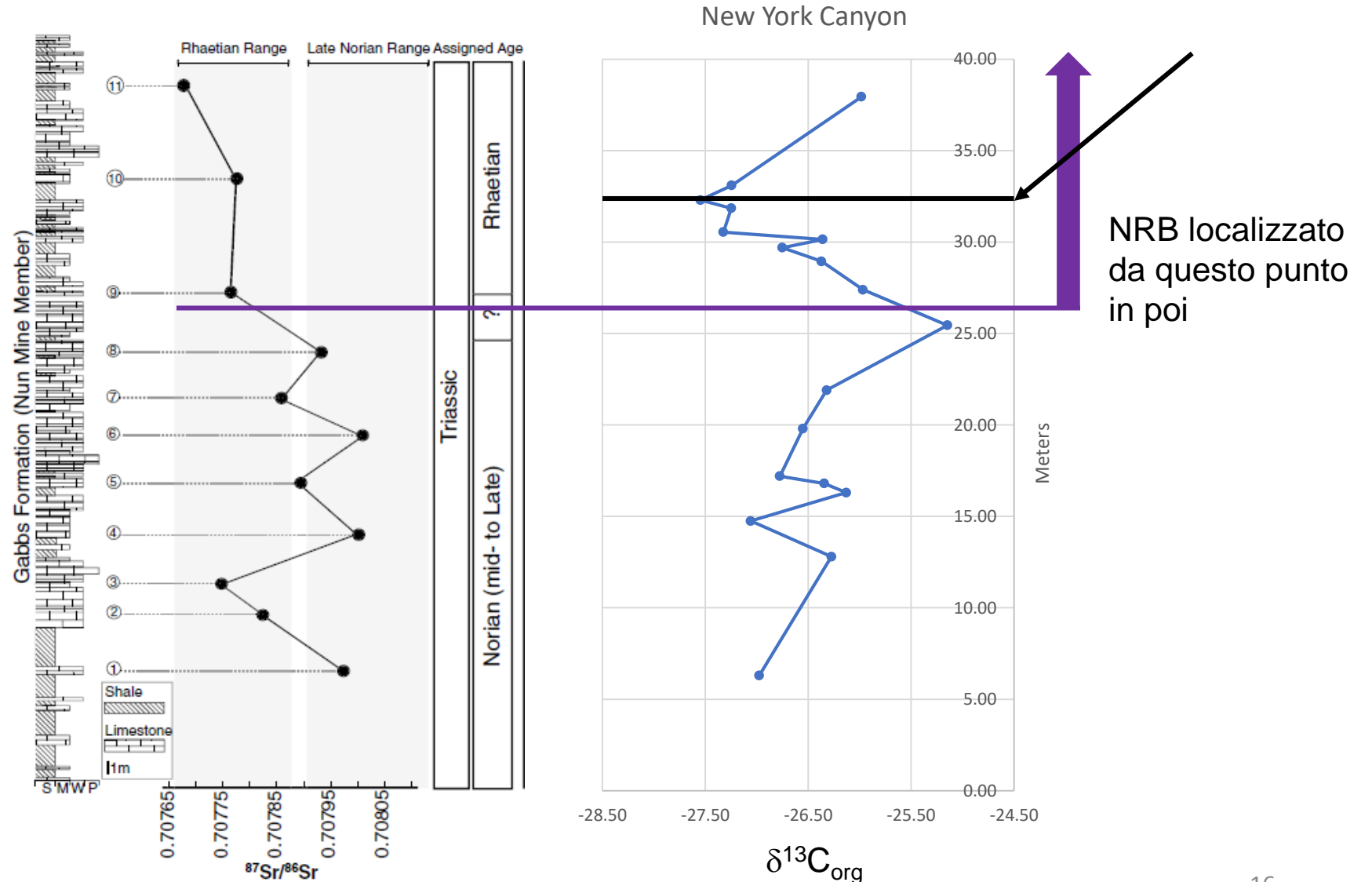
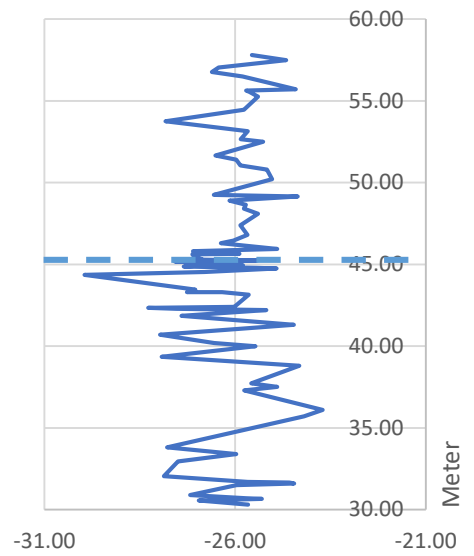


Immagine da Tackett et al., 2014



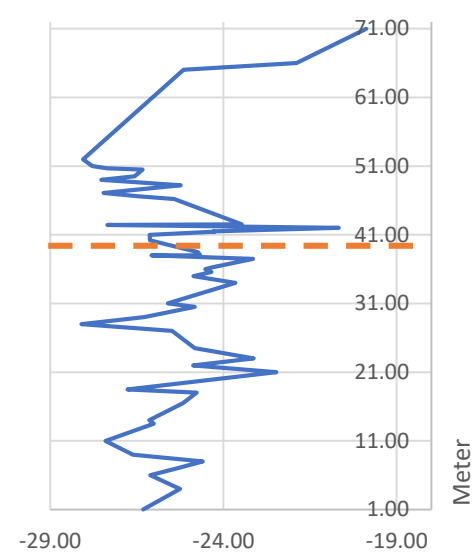
Individuato il  
NRB...

Pignola-Abriola



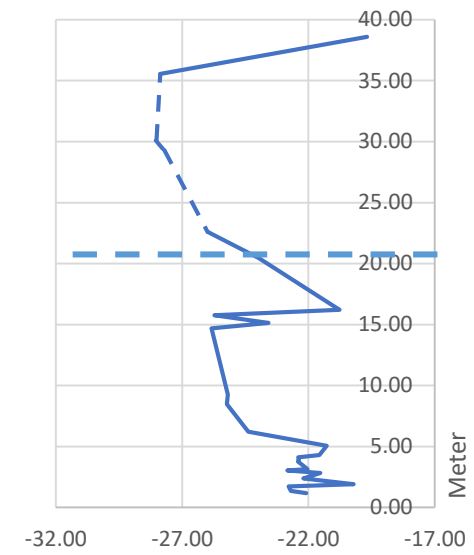
$\delta^{13}\text{C}_{\text{org}}$

Monte Volturino



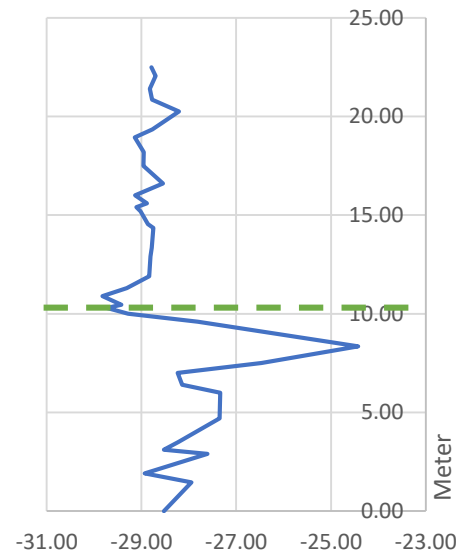
$\delta^{13}\text{C}_{\text{org}}$

Kastelli



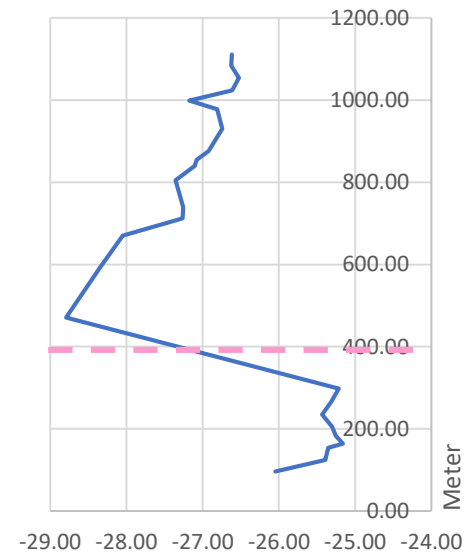
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Kiritehere



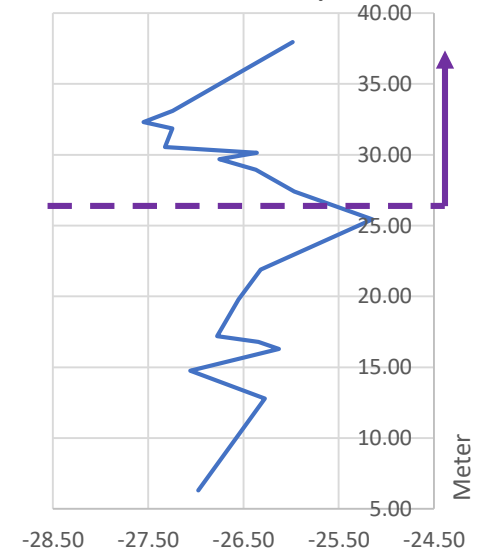
$\delta^{13}\text{C}_{\text{org}}$

Wombat



$\delta^{13}\text{C}_{\text{org}}$

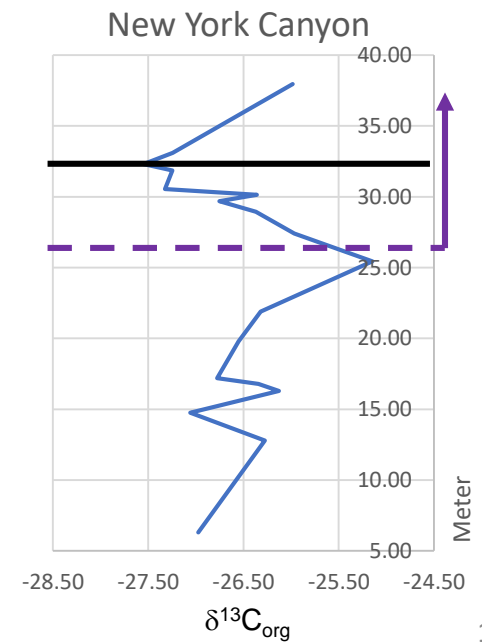
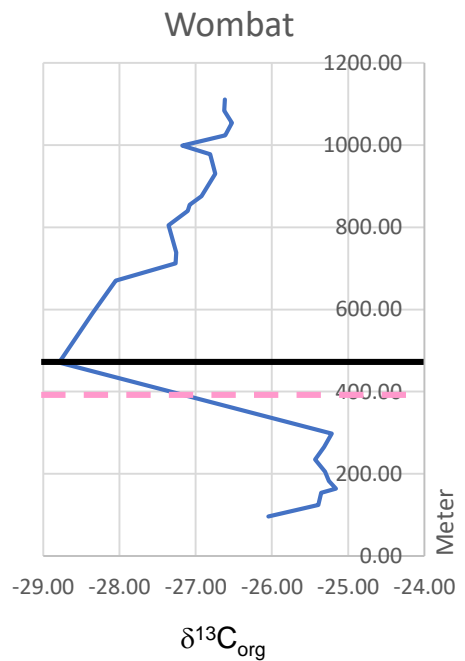
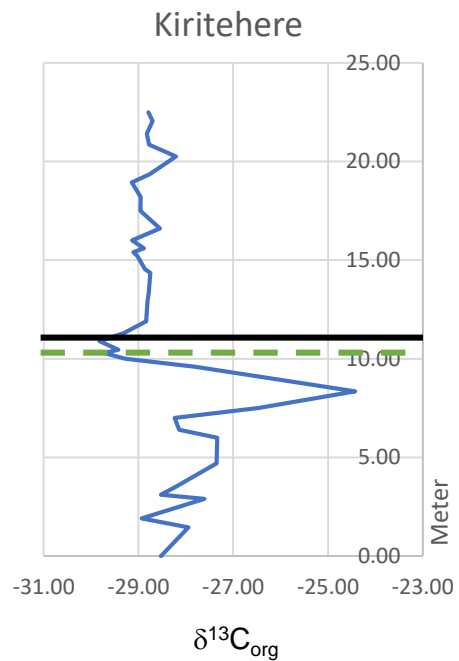
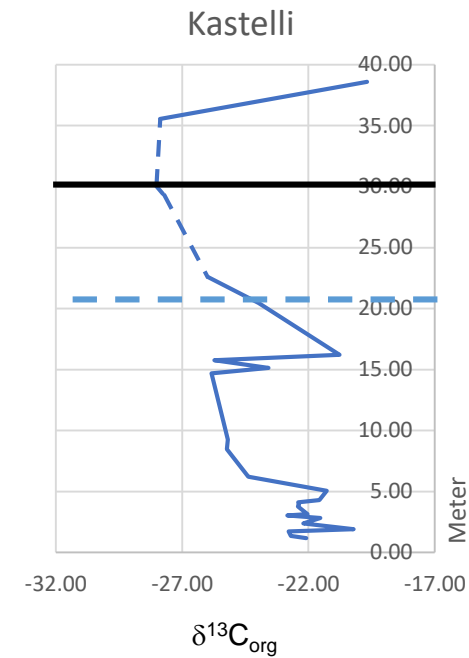
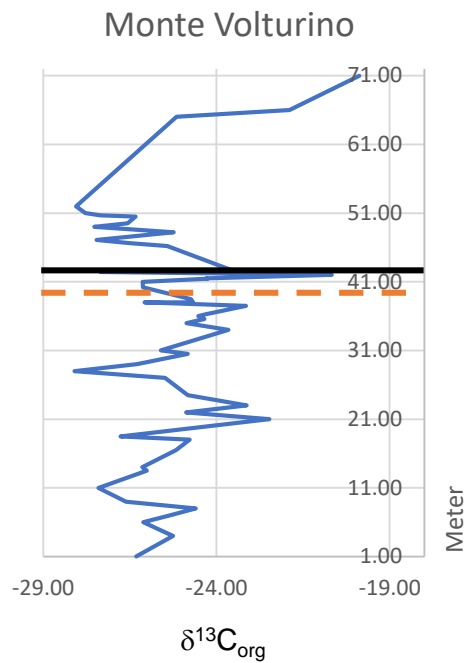
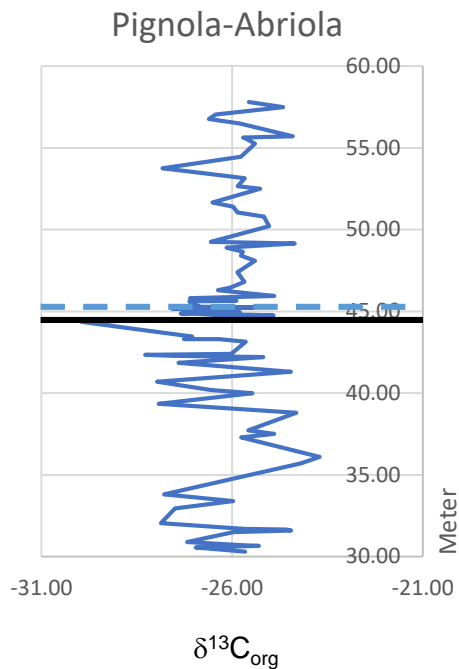
New York Canyon



$\delta^{13}\text{C}_{\text{org}}$

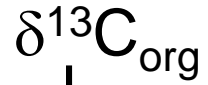
- Conodonti
- Radiolari
- Bivalvi
- Nannofossili
- $^{87}\text{Sr}/^{86}\text{Sr}$

...e individuati  
i picchi negativi  
del  $\delta^{13}\text{C}_{\text{org}}$

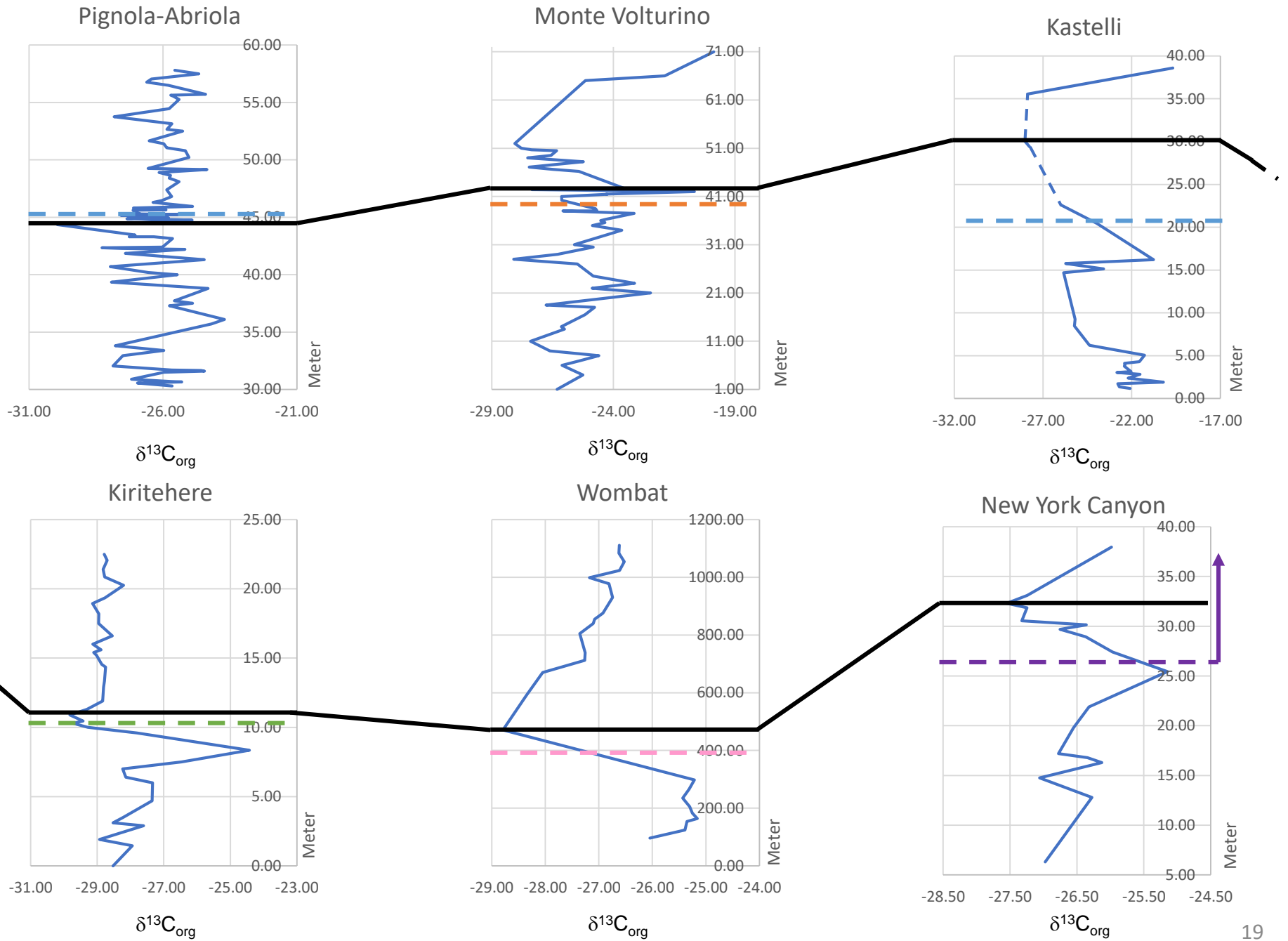


- Conodonti
- Radiolari
- Bivalvi
- Nannofossili
- $^{87}\text{Sr}/^{86}\text{Sr}$
- $\delta^{13}\text{C}_{\text{org}}$

Shift negativo



Evento globale  
al NRB



- Studiate sezioni provenienti da Tetide e Panthalassa
- Individuato shift negativo attorno a NRB con valenza globale

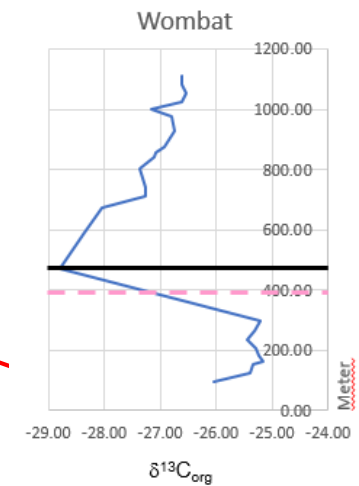
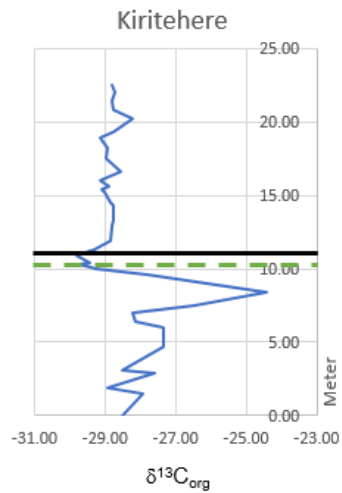
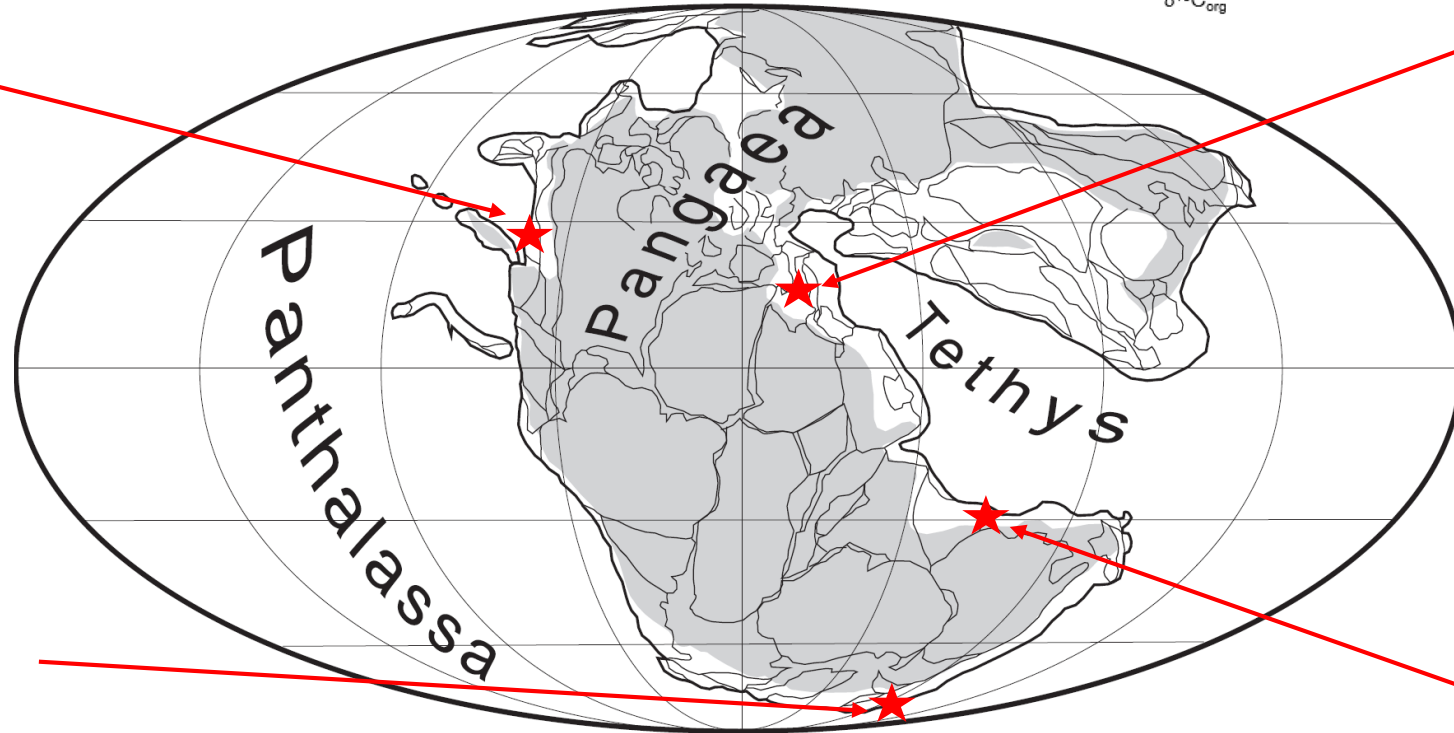
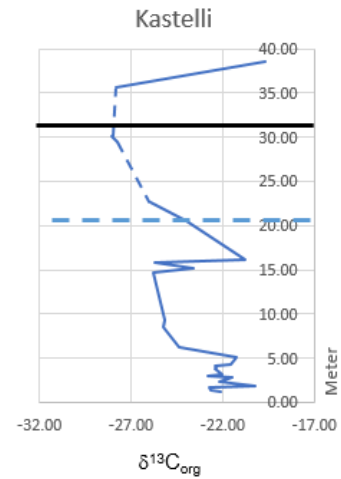
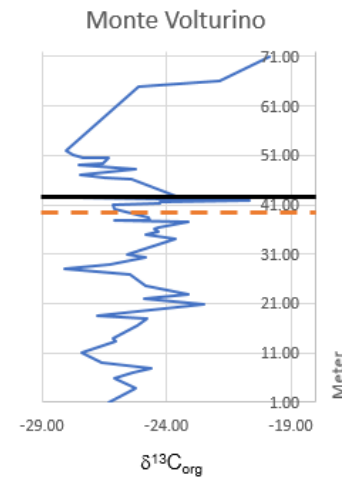
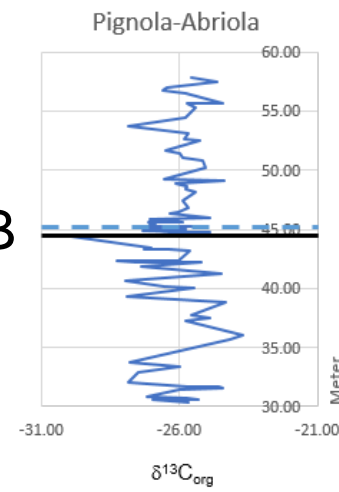
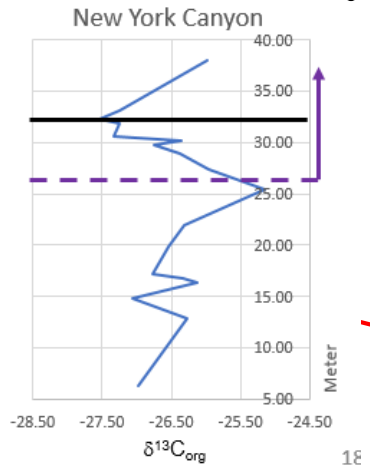


Immagine da Rigo et al., 2016 (modificata)

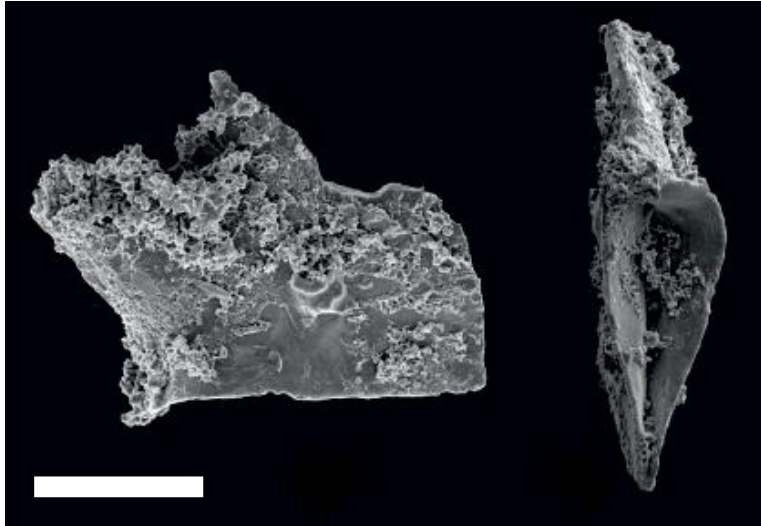
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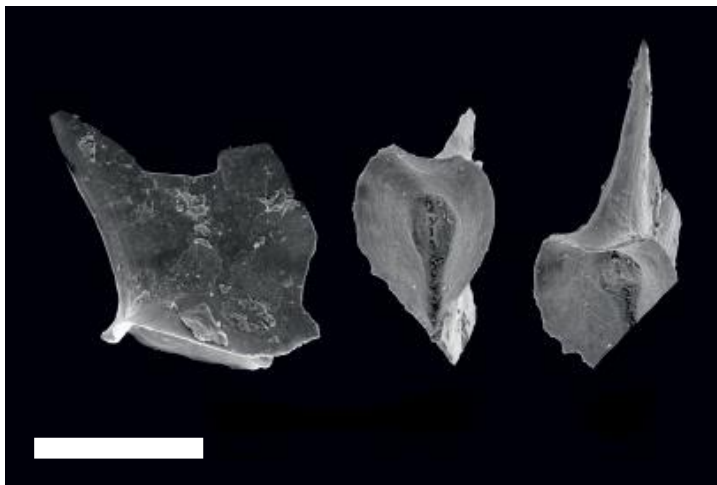
**Grazie per l'attenzione**



# Fossili: Conodonti



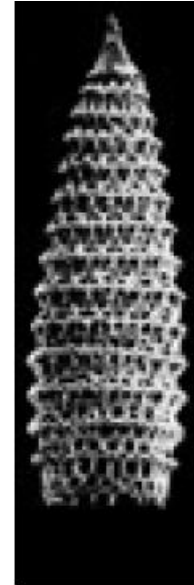
*Misikella hernsteini*



*Misikella posthernsteini*

Immagini SEM  
Scale bar = 100µm

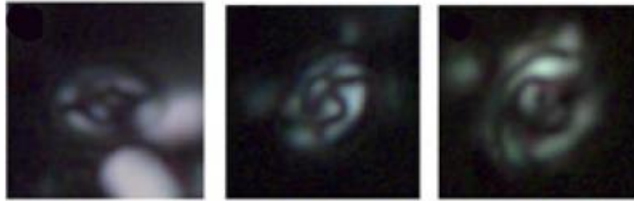
# Radiolari



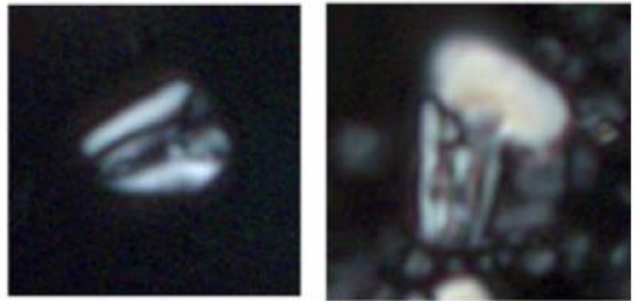
*Propavicingula moniliformis*



# Fossili: Coccoliti



*Crucirhabdus minutus*

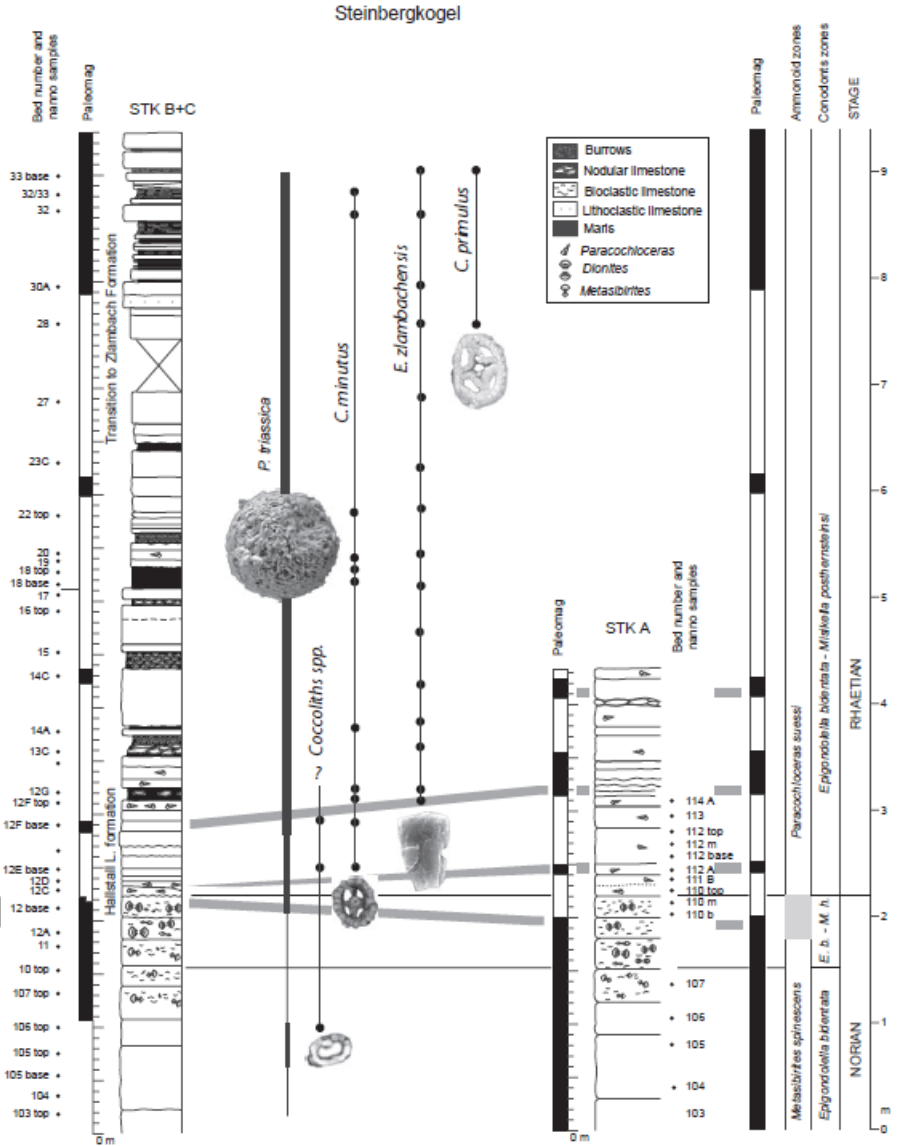


*Ecunusphaera  
zlambachensis*

2µm

Immagini da Gardin et al., 2012

# Sezione Steinbergkogel, Alpi austriache



	Magstrat	Conodonts	Ammonoids	Bivalves	Palynology	Calcareous nannofossils
Rhaetian			<i>Dionites</i> <i>Sagenites s.str.</i>	<i>Otapiria</i> ?	Dinoflagellate cyst acme	<i>C. primulus</i>
		<i>M. koessensis</i> + <i>M. posthernstehni</i>	<i>Paracochloceras</i> / <i>Cochloceras</i>	dwarf <i>Monotis</i>	LO of "Norian" sporomorphs	<i>E. zimbachensis</i> <i>C. minutus</i>
Norian	N	<i>M. hernstehni</i>	<i>Metasibirites</i>	? <i>Sagenites s. str.</i> <i>Sagenites with nodes</i>	<i>Rhaetogonyaulax rhaetica</i>	<i>coccoliths spp.</i>

Immagini da Gardin et al., 2012