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Palynological study around the Paleocene/Eocene (P/E) boundary in the Untersberg section (Salzburg, Austria)

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Abstract

The 190 cm thick Untersberg section (Salzburg, Austria) of the Northern Calcareous Alps comprises the Palaeocene–Eocene transition and equivalent to planktonic foraminifera zone P5 and calcareous nannoplankton zone NP9. The succession is comprise of red and green claystone and marly claystone, represents the global negative carbon isotope excursion (CIE) which is used to recognize the Palaeocene/Eocene (P/E) boundary. The succession was deposited in a lower bathyal slope environment at a palaeodepth of about 2000 m and the CIE was associated with a shallowing of the calcite compensation depth by at least 1 km. A 49% increase in detrital quartz and feldspar within the CIE-interval suggests enhanced continental run-off due to high rainfall, associated with abundant radiolarian casts indicating high primary productivity (e.g. Egger et al., 2005). The palynological investigation indicates bad dinoflagellate cysts preservation in all samples except two at 100 and 120 cm above the P/E boundary which are characterized by an acme of *Apectodinium homomorphum*. The kerogene slides are characterized by a high abundance of amorphus organic materials (AOM) and phytoclasts groups, palynomorphus group are very rare.

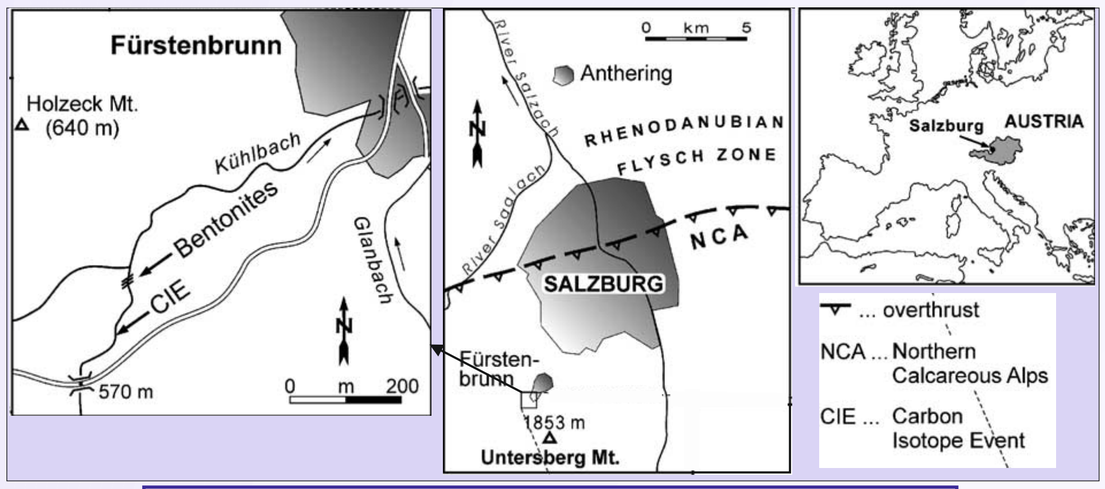

Figure 1. Location of the Untersberg section and position of the carbon isotope excursion (CIE) at the Palaeocene–Eocene boundary.

Age	Paleocene					Eocene									
Sample Numbers	P/E-50	P/E-40	P/E-30	P/E-20	P/E-10	P/E+10	P/E+20	P/E+30	P/E+40	P/E+50	P/E+60	P/E+70	P/E+80	P/E+100	P/E+120	P/E+140
Achomosphaera alcicornu			1			1	3							1		
Adnatosphaeridium multispinium							1									
Adnatosphaeridium tutulosum			4	1			2	1								
Apectodinium homomorphum			1				1							**240**	**160**	**16**
Apectodinium quinquelatum														**7**	**4**	
Apectodinium spp.														**10**	**8**	
Areoligera spp.							1									
Cordosphaeridium spp.							1									
Deflandrea scabrata												1				
G sp1																2
G sp2							1									
Glaphyrocysta ordinata			1				1									
Glaphyrocysta spp.			1													
Hystrichosphaeridium salpingophorum		2													1	
Hystrichosphaeridium tubiferum subsp. *brevispinum*							1									
Lejeunecysta hyalina								1								
Operculodinium centrocarpum			3				3	1	2			1		2	2	1
Pterodinium cingulatum subsp. *cingulatum*						1		1			1					
Pterodinium spp.															1	
Rottnestia spp.															1	
Senoniasphaera inornata		1														
Spiniferites cf. *bulloideus*															1	1
Spiniferites pseudofurcatus	1				1											1
Spiniferites ramosus		2	7				3	1	1			3		1	7	1
Spiniferites ramosus subsp. *granosus*												1				
Spiniferites scabrosus		1						1								
Spiniferites spp.							1								1	
Thalassiphora pelagica								1								
Total Dinocysts	**1**	**6**	**18**	**1**	**1**	**2**	**18**	**6**	**3**	**0**	**1**	**6**	**0**	**261**	**185**	**22**

Table 1. Distribution of dinoflagellate cysts taxa in the Untersberg section. *Apectodinium* acmes are shaded.

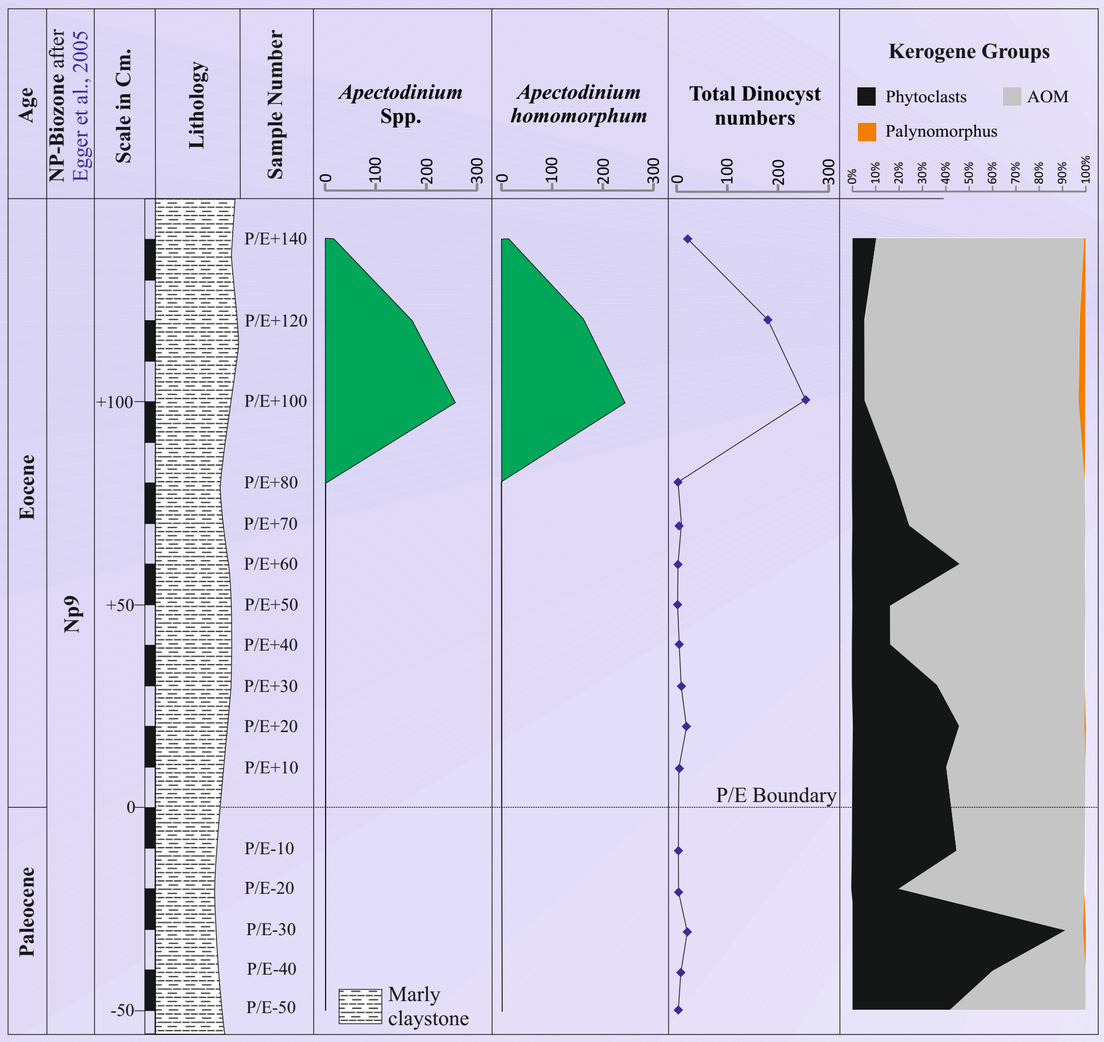

Figure 2. Distribution of the *Apectodinium* spp. , *A. homomophum,* total dinocyst numbers and different kerogene groups in the Untersberg section.
The significant increase in the dinocyst numbers are recorded at 1 m above the P/E boundary. This increase is coincident with the acme of genus *Apectodinium*.
The phytoclasts group show a relatively high abundance in the uppermost Paleocene than the Lower Eocene.

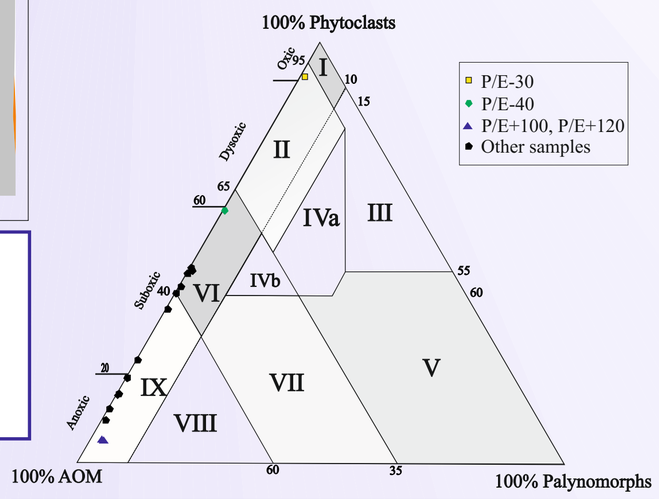

Figure 3. Distribution of Untersberg section samples in the phytoclasts-Palynomorphus-AOM ternary diagram of Tyson (1995).

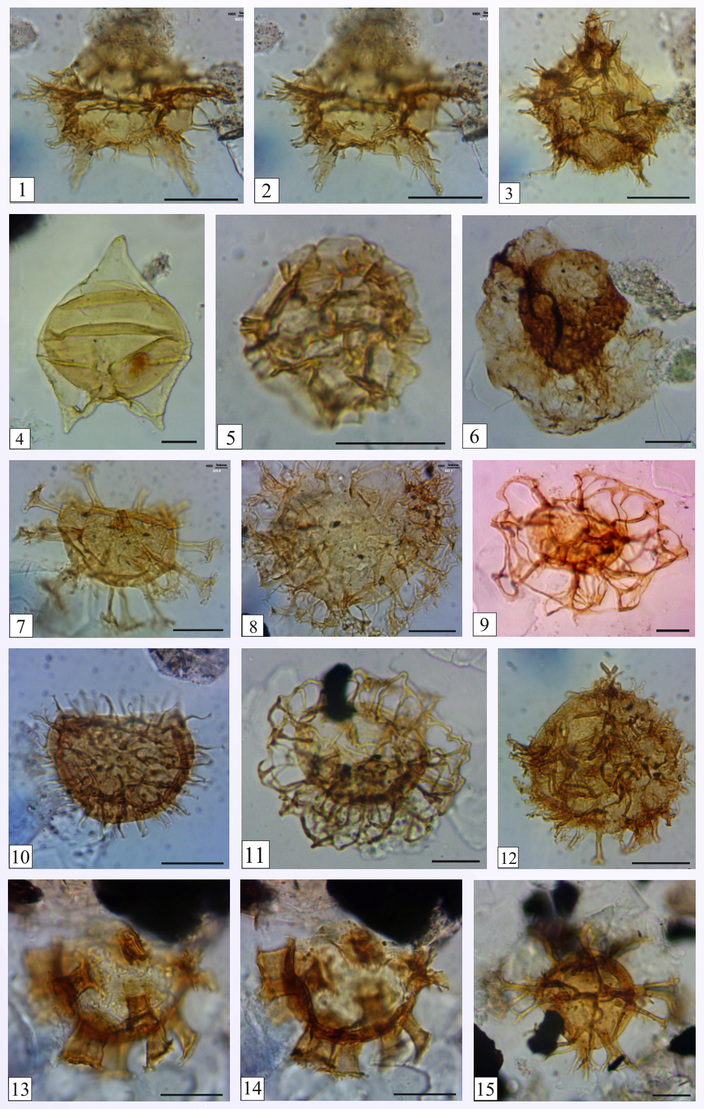

Plate 1

1-3. *Apectodinium quinquelatum*
4. *Deflandrea scabrata*
5. *Pterodinium cingulatum* subsp. *cingulatum*
6. *Thalassiphora pelagica*
7. *Hystrichosphaeridium salpingophorum*
8. *Glaphyrocysta ordinata*
9. *Adnatosphaeridium tutulosum*
10. *Operculodinium centrocarpum*
11. *Adnatosphaeridium tutulosum*
12. *Apectodinium homomorphum*
13, 14. *Hystrichosphaeridium tubiferum* subsp. *brevispinum*
15. *Spiniferites* sp.

Conclusion:

In the almost samples from the Untersberg section, the kerogene slides show a very rare dinocysts with a bad preservation. Most dinocysts were decomposed by the oxidization during the preservation. Moreover two samples (P/E+50 and P/E+80) are barren from dinocysts. Only two samples (P/E+100 and P/E+120) show a high dinocysts abundance. This abundance is related to the acme of genus *Apectodinium*.
In the majority of the samples AOM dominates over phytoclasts (black and translucent debris) and palynomorphs (dinosysts and sporomorphs). Most samples are located in the palynofacies fields VI and IX of Tyson (1995) (see Fig. 3). The field VI indicates proximal suboxic-anoxuic shelf and the field IX indicates distal suboxic-anoxic basin according Tyson (1995). The black phytoclasts show a relatively high abundance over AOM in only two samples (P/E-30 and P/E-40) which are located in the palynofacies fields II and IV of Tyson (1995) respectively. The field II indicates marginal dysoxic-anoxic basin according Tyson (1995).

References:

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