

Supplementary Information for

1.36 million years of Mediterranean forest refugium dynamics in response to glacial-interglacial cycle strength

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Figures S1 to S6
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Other supplementary materials for this manuscript include the following:

Datasets S1

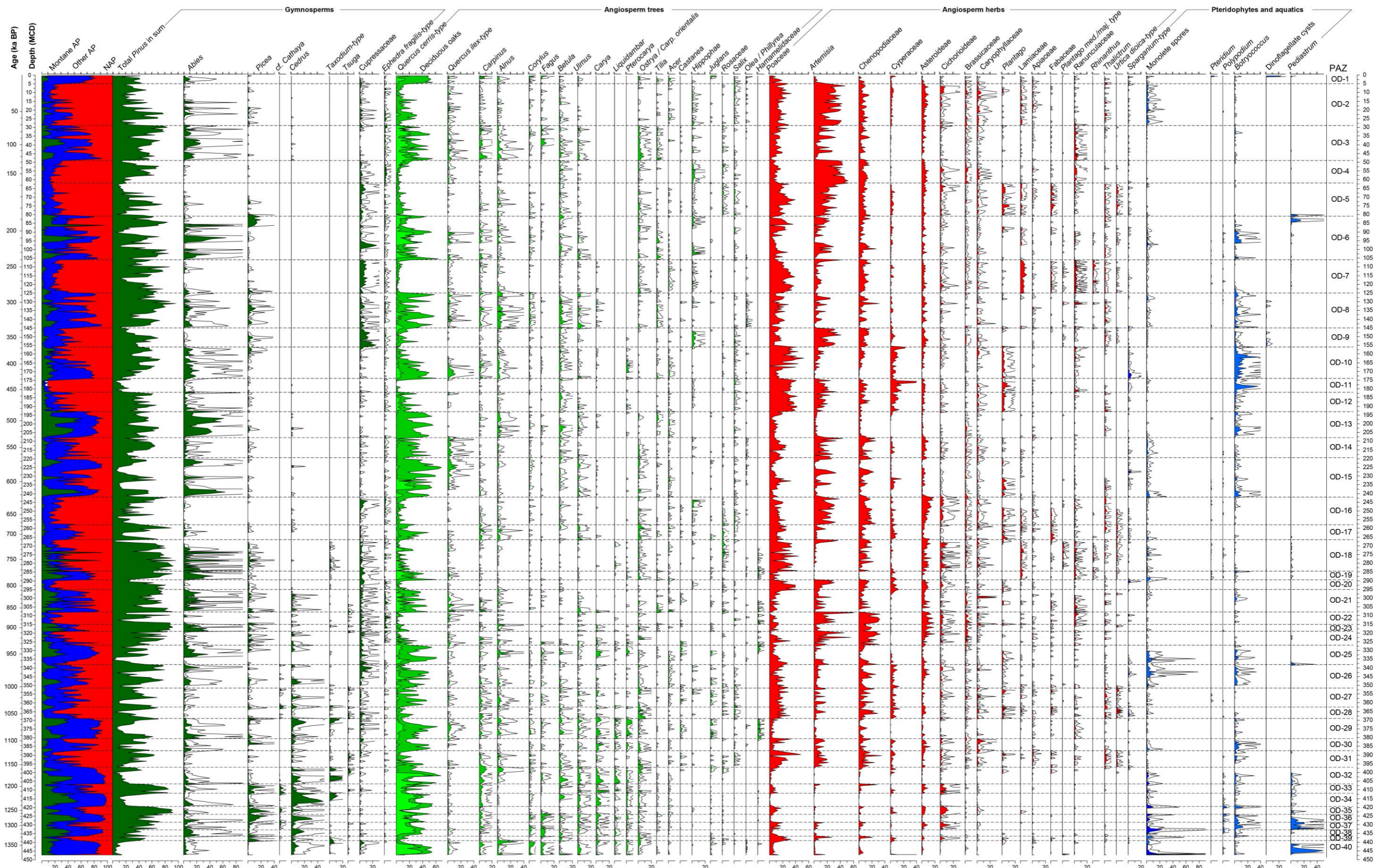


Fig S1: Detailed pollen diagram on depth scale from Lake Ohrid (N. Macedonia/Albania), DEEP Site. Pollen percentage diagram of selected (>2%) common taxa against depth scale. Age scale according to Wagner et al. (33). All taxa calculated on upland pollen sum excl. *Pinus*. *Pinus* % based on all upland taxa.

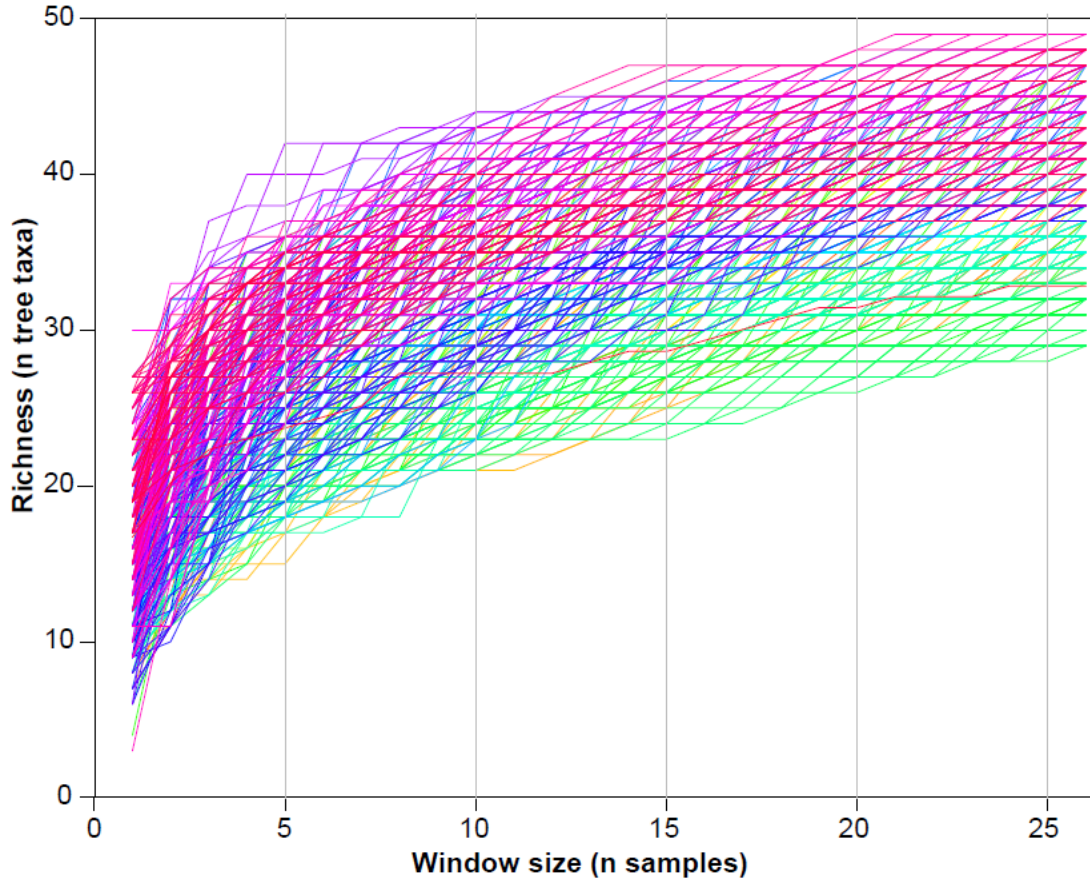


Fig. S2. Overlapping tree taxa accumulation curves based on successive windows (25 samples) of pollen count data from LO DEEP (see Methods).

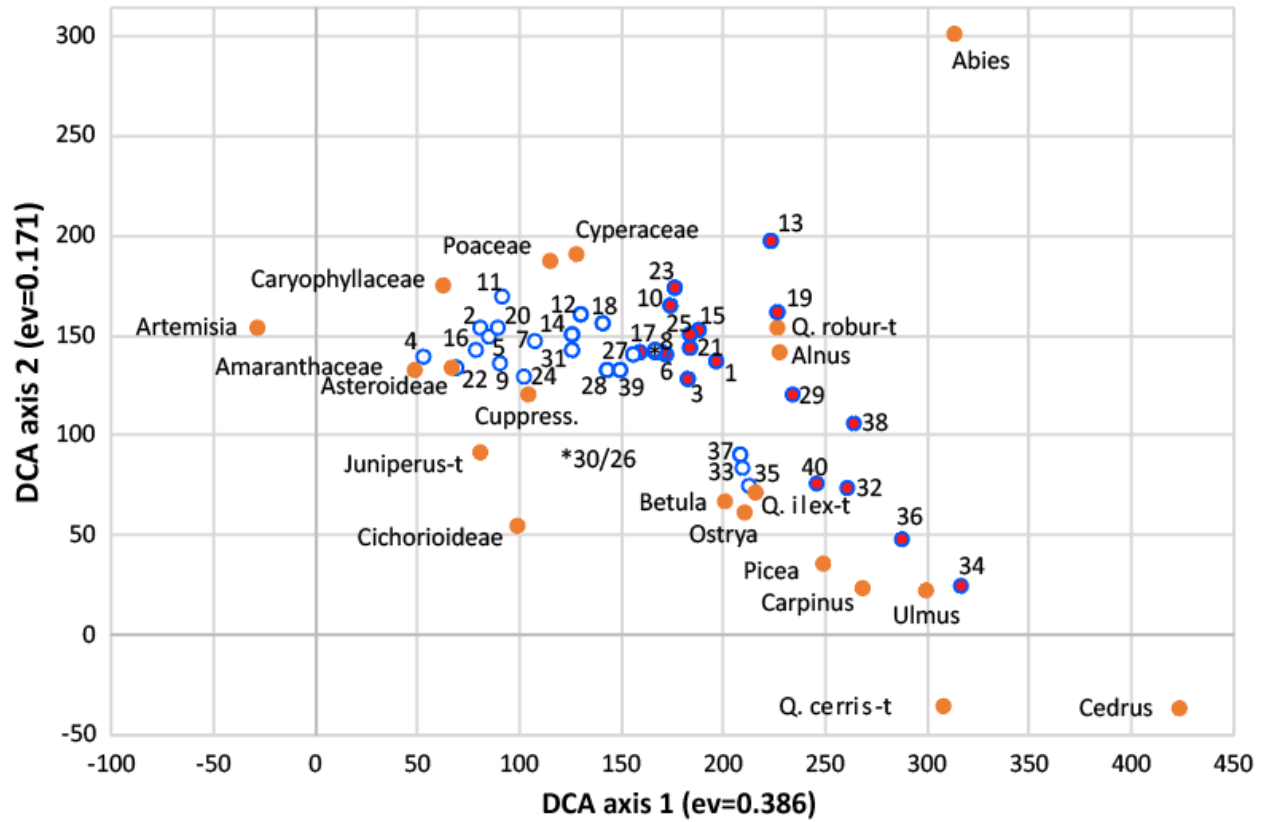


Fig. S3: Detrended Correspondence Analysis (DCA) biplot (sample means per zone, major taxa >1%) scores for the first 2 axes. Taxa means=orange dots, numbers indicate OD zones and represent mean values, blue open circles=glacial zones, red-filled circles=interglacial zones.

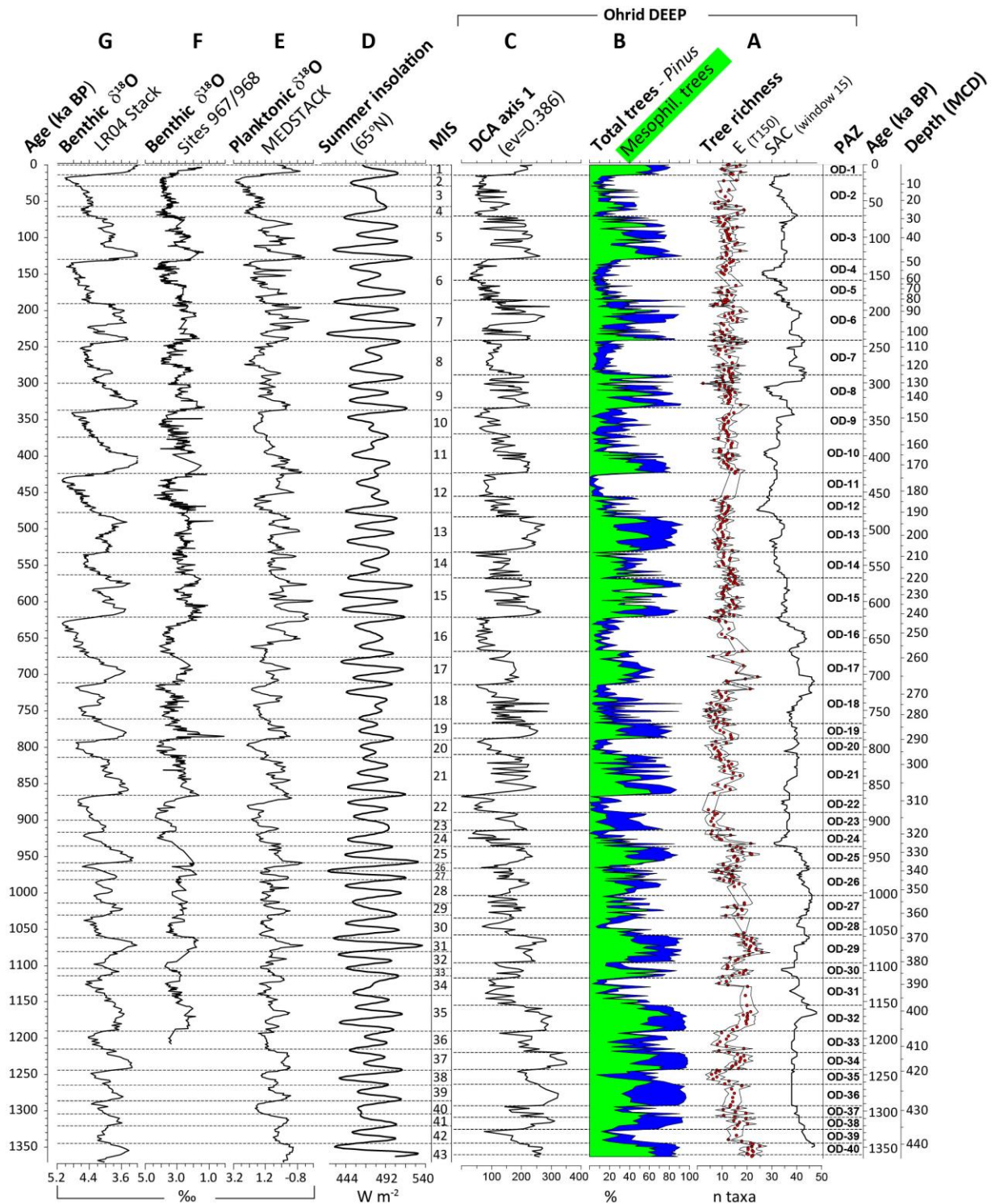


Fig. S4: (A) Tree taxa richness of Lake Ohrid DEEP based on tree species accumulation curves (SAC; sample window = 15; black line) on all samples and rarefaction from samples with >150 tree pollen E (T₁₅₀); red circles with 95% confidence interval) (61), see methods. (B) Total % AP excl. *Pinus* at Lake Ohrid DEEP. (C) Detrended Correspondence Analysis (DCA) axis 1 samples scores of pollen % data (taxa >1%). (D) Summer insolation at 65° North based on orbital solution of Laskar et al. (83). (E) MEDSTACK planktonic $\delta^{18}\text{O}$ data (81). (F) stacked benthic $\delta^{18}\text{O}$ data for ODP sites 967 and 968 from the eastern Mediterranean (82). (G) LR04 $\delta^{18}\text{O}$ global benthic stack (24).

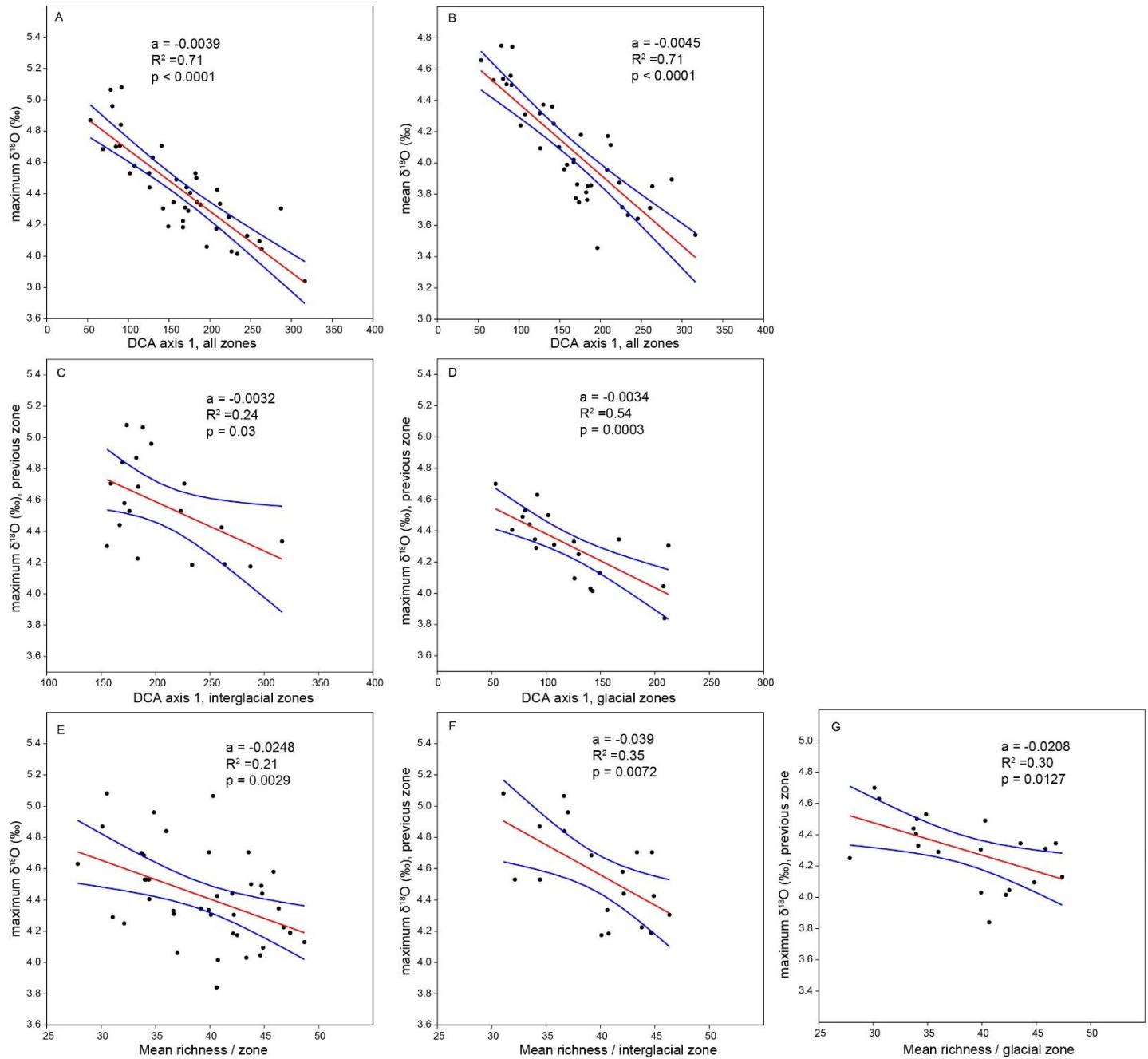


Fig. S5: (A) Regression analysis of DCA 1 (representing relative tree pollen abundance) against maximum and (B) mean glacial and interglacial means from the LR04 $\delta^{18}\text{O}$ global benthic stack (24), representing temperature and/or global ice volume during each correlative LO pollen zone. Similarly, (C) DCA 1 of only interglacial zones against previous maximum glacial $\delta^{18}\text{O}$, and (D) DCA 1 of glacial zones against previous maximum interglacial $\delta^{18}\text{O}$ values. (E) Tree pollen richness per zone (sample window = 15) against maximum glacial and interglacial $\delta^{18}\text{O}$ during every LO pollen zone. (F) Interglacial pollen richness against previous glacial $\delta^{18}\text{O}$, and (G) glacial richness against previous interglacial $\delta^{18}\text{O}$ values.

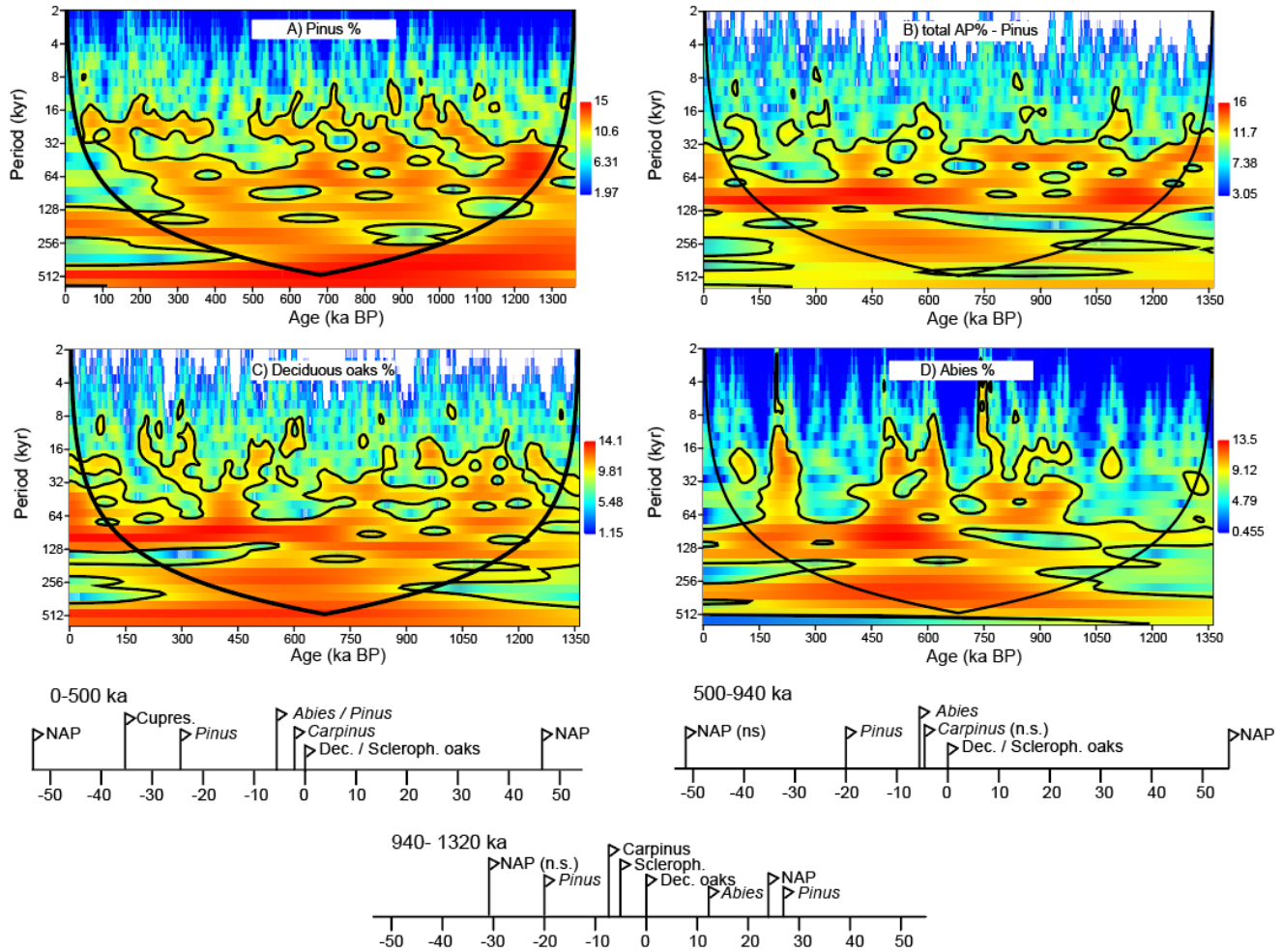


Fig. S6: A-D Continuous wavelet transform results of main vegetation elements from site DEEP showing significant variation at orbital periodicities. E-F Observed phase relations in the LO pollen percentage data based on major groups and taxa (NAP, *Abies*, *Pinus*, Cupressaceae, deciduous oaks (*Quercus robur* and *Q. cerris* types), sclerophyll taxa and *Carpinus*). Optimum lead/lags are calculated independently for three time intervals based on cross-correlation of even-sampled % data (79) relative to deciduous oak abundance. Negative numbers signify lead relative to dec. oaks. Unless otherwise indicated (ns), all relations are significant (*t*-test, $p < 0.01$).

Table S1. Description of the pollen assemblage zones (PAZ) from the DEEP site following the approach of Sadori et al. (37,41). Ages and exact zone boundaries have been updated for OD-1 to 12 following the chronology in Wagner et al. (33) and differences in OD-37/38 transition due to exclusion of *Pinus* from the pollen sum with respect to Panagiotopoulos et al. (38).

PAZ	Depth (MCD)		Age (ka)		Mean count			Zone description		
	top	base	top	base	+ <i>Pinus</i>	- <i>Pinus</i>	<i>n</i> sam.	General	Forest (% based on upland sum excl. <i>Pinus</i> , <i>Pinus</i> %: all upland taxa)	Herbs
OD-1	0	5	0	14.5	353	231	9	Mesophyllous forests prevail.	Characterized by <i>Quercus robur</i> type (22-53 %) and <i>Quercus cerris</i> type (2-21 %). Montane taxa are quite scarce and mainly represented by <i>Abies</i> and <i>Fagus</i> . Riparian and Mediterranean trees are also rare.	Poaceae are the dominant herbs, low herb diversity.
OD-2	5	29	14.5	71	283	168	37	Open vegetation (steppe) with isolated forest stands.	Low/medium values of <i>Pinus</i> (13-77 %) and sparse presence of many montane and mesophyllous taxa. Among them <i>Q. robur</i> type is the most abundant.	<i>Artemisia</i> dominates and is accompanied by other herbs like Poaceae, Amaranthaceae, Asteroideae, and Cyperaceae. Significant Caryophyllaceae
OD-3	29	49	71	130	817	342	31	Alternation of periods characterized by mesophyllous /montane trees and open vegetation.	Characterized by expansion of <i>Q. cerris</i> type (2-33 %) and <i>Q. robur</i> type (4-40 %) together with <i>Abies</i> and <i>Fagus</i> , the latter reaching the highest values of the diagram in this zone. Riparian and Mediterranean trees are present, <i>Ostrya</i> (1-9 %), <i>Carpinus</i> and <i>Fagus</i> (0-7 %) relatively high.	<i>Artemisia</i> , Poaceae and Amaranthaceae characterize the open vegetation, significant Ranunculaceae.
OD-4	49	62	130	159	448	262	21	Open vegetation (steppe) with montane trees and semi-arid shrubs.	Medium/high values of <i>Pinus</i> (14-75 %). Cupressaceae (0-5 %) and <i>Hippophaë</i> (0-6%) are important woody taxa. Mesophyllous taxa are present in low values.	Herbs are dominant: <i>Artemisia</i> shows a sudden increase, while Poaceae and Cyperaceae are reduced; Amaranthaceae and Asteroideae are abundant.
OD-5	62	81	159	187	332	203	29	Open vegetation with montane and semi-arid shrubs.	Medium values of <i>Pinus</i> (6-76 %), Cupressaceae (0-9 %) and <i>Hippophaë</i> . Many mesophyllous taxa are present in low values.	Herbs are dominant: Poaceae, <i>Artemisia</i> , Amaranthaceae and Cyperaceae are abundant, significant Plantago, Fabaceae.

PAZ	Depth (MCD)		Age (ka)		Mean count			Zone description		
	top	base	top	base	+ Pinus	- Pinus	n sam.	General	Forest (% based on upland sum excl. Pinus, Pinus %: all upland taxa)	Herbs
OD-6	81	106	187	241	646	287	39	Alternation of montane and mesophyllous forests with grassland (steppe) formations.	Abundant conifer taxa <i>Pinus</i> (5-85 %), <i>Abies</i> (0-77 %) and <i>Picea</i> (0-20 %); <i>Q. cerris</i> type (<1-32 %) and <i>Q. robur</i> type (0-63 %) are the dominant mesophyllous taxa.	Poaceae and <i>Artemisia</i> are accompanied by high values of <i>Amaranthaceae</i> , .
OD-7	106	125	241	289	614	242	28	Open vegetation with pine stands and high values of pioneer taxa.	<i>Pinus</i> is very abundant (10-87 %), Cupressaceae (<i>Juniperus</i> type) main pioneer.	Poaceae are very abundant, accompanied by <i>Amaranthaceae</i> , Asteroideae and <i>Artemisia</i> , Lamiaceae and Ranunculaceae.
OD-8	125	145	289	334	572	232	31	Mixed montane-temperate forests with dominant mesophyllous tree taxa.	Main conifer taxa are <i>Pinus</i> (11-96 %) and <i>Abies</i> (0-14 %). Forests are characterized by <i>Q. robur</i> type (5-57 %) and <i>Q. cerris</i> type (0-18 %) with the important contribution of Riparian and Mediterranean trees.	Poaceae are the dominant herbs, with significant <i>Artemisia</i> .
OD-9	145	156	334	370	378	211	18	Open steppe vegetation with relatively high values of semi-arid shrubs.	<i>Pinus</i> (20-69 %), Cupressaceae (1-25 %) and <i>Hippophaë</i> (0-7 %) are abundant. <i>Picea</i> (0-8 %) is mainly found in the middle of the zone. Peaks of mesophyllous taxa are also observed.	<i>Artemisia</i> dominant, Poaceae, <i>Amaranthaceae</i> , Asteroideae are abundant.
OD-10	156	174	370	423	612	318	28	Mixed montane-temperate forests.	Dominated by <i>Q. robur</i> type (2-57 %) and <i>Abies</i> (2-24 %). <i>Pinus</i> is abundant. Significant <i>Alnus</i> and <i>Pterocarya</i> .	Poaceae are the dominant herbs.
OD-11	174	182	423	456	374	320	12	Open steppe vegetation with isolated forest stands.	<i>Pinus</i> (5-61 %) and <i>Q. robur</i> type (0-19 %) are the most common trees. <i>Abies</i> (0-17 %) is mainly found in the lowermost samples of the zone.	Dominated by Poaceae, Cyperaceae, <i>Amaranthaceae</i> , Asteroideae, <i>Plantago</i> and <i>Artemisia</i> .
OD-12	182	193	456	484	427	224	17	Forests alternating with open vegetation.	Dominated by <i>Pinus</i> (26-67 %), <i>Q. robur</i> type (3-29 %) and <i>Abies</i> (<1-19 %)	Dominated by Poaceae, Cyperaceae, <i>Amaranthaceae</i> , Cichorioideae and <i>Artemisia</i> .

PAZ	Depth (MCD)		Age (ka)		Mean count			Zone description		
	top	base	top	base	+ Pinus	- Pinus	n sam.	General	Forest (% based on upland sum excl. Pinus, Pinus %: all upland taxa)	Herbs
OD-13	193	208	484	532	361	190	24	Mesophyllous and montane tree taxa prevail.	<i>Abies</i> (11-61 %) and <i>Q. robur</i> type (15-54 %) are the dominant tree taxa, middle phase with significant <i>Alnus</i> (0-7 %) and <i>Betula</i> (0-10 %).	Poaceae are the dominant herbs.
OD-14	208	219.5	532	568	356	200	18	Semi-open landscape with mixed forest.	<i>Pinus</i> (40-80%) and <i>Q. robur</i> type (15-50 %) dominate, significant <i>Q. ilex</i> type(1-10 %), high variability.	<i>Artemisia</i> dominates accompanied by primarily Poaceae, Amaranthaceae and Cyperaceae.
OD-15	219.5	242	568	622	382	267	35	Montane and mesophyllous forests alternating with open vegetation.	<i>Pinus</i> (9-81 %) and <i>Q. robur</i> type (10-60 %) are the most common trees, significant <i>Q. cerris</i> type (0-29 %) in lower half, followed by <i>Q. ilex</i> type(2-16 %). <i>Abies</i> (0-63 %) is common in forested intervals subsequent to <i>Q. robur maxima</i> .	Poaceae and <i>Artemisia</i> are the dominant herbs, accompanied by Amaranthaceae, Cyperaceae and <i>Plantago</i> .
OD-16	242	258	622	669	394	232	25	Open landscape (steppe) with semi-arid shrubs in second half, relatively little variability.	Low abundance <i>Q. robur</i> type(1-15%) together with scattered mesophyllous trees. Cupressaceae (0-12 %)	Dominant <i>Artemisia</i> with significant Poaceae, Amaranthaceae, Asteroideae and Chichorioideae
OD-17	258	266.5	669	714	284	133	13	Semi-open landscape with mesophyllous forest and variable pine stands.	Dominant <i>Q. robur</i> type (4-46 %) with significant <i>Carpinus</i> , <i>Alnus</i> and <i>Ostrya</i> , mostly low <i>Pinus</i> .	Mainly Poaceae with Cyperaceae, low <i>Artemisia</i> .
OD-18	266.5	284.5	714	768	1071	245	28	Montane open woodland, high variability.	Dominant <i>Pinus</i> (3-91 %), <i>Abies</i> (0-83 %), presence of <i>Picea</i> , low presence of <i>Q. robur</i> type and <i>Q. cerris</i> type	Dominant Poaceae with Amaranthaceae, Asteroideae and Chichorioideae, <i>Artemisia</i> nearly absent (except top)
OD-19	284.5	289.5	768	788	1241	339	8	Closed mixed forest.	High <i>Pinus</i> (25-90 %) and <i>Abies</i> (1-45 %) with main mesophyllous elements <i>Q. robur</i> type (10-59 %) and <i>Q. cerris</i> type (1-27 %).	Overall low; mainly Poaceae and Cyperaceae

PAZ	Depth (MCD)		Age (ka)		Mean count			Zone description		
	top	base	top	base	+ Pinus	- Pinus	n sam.	General	Forest (% based on upland sum excl. Pinus, Pinus %: all upland taxa)	Herbs
OD-20	289.5	295	788	810	711	252	9	Open vegetation with variable <i>Pinus</i> woodland.	<i>Pinus</i> (23-80 %), Cupressaceae (1-7 %), low <i>Q. robur</i> type and <i>Q. cerris</i> type.	Alternating high Poaceae and <i>Artemisia</i> with Amaranthaceae, Asteroideae and Cyperaceae
OD-21	295	308	810	866	474	155	20	Mixed forest with strongly variable herb abundance.	<i>Abies</i> (0-34) and <i>Pinus</i> (31-84 %) main conifers, presence of <i>Cedrus</i> . Main mesophyllous <i>Q. robur</i> type (4-36 %) and <i>Q. cerris</i> type (0-21 %), significant sclerophyll elements (<i>Q. ilex</i>) and <i>Ulmus</i> , <i>Tilia</i> in first half.	Mainly <i>Artemisia</i> , Poaceae, Amaranthaceae and Asteroideae
OD-22	308	315	866	890	304	113	11	Open vegetation (steppe) with very low tree abundance.	<i>Pinus</i> (8-88 %), with Cupressaceae and <i>Ephedra fragilis</i> ; sparse <i>Q. robur</i> type is the main mesophilous element.	Dominant Amaranthaceae, high <i>Artemisia</i> and Asteroideae, significant Chichorioideae and Brassicaceae
OD-23	315	319	890	914	942	120	6	Montane semi-open woodland with intermediate herb abundance.	Dominant <i>Pinus</i> (67-91 %) and <i>Abies</i> (5-37 %) with Cupressaceae, minor amounts of <i>Q. robur</i> type and <i>Alnus</i> .	Equal abundances of Amaranthaceae, Poaceae and Asteroideae
OD-24	319	327	914	937	321	108	13	Open vegetation (steppe) with low tree abundance.	<i>Pinus</i> (31-83 %), with Cupressaceae, <i>Abies</i> , <i>Picea</i> and <i>Ephedra fragilis</i> ; low <i>Q. robur</i> type is the main mesophyllous element.	Dominant Amaranthaceae, high <i>Artemisia</i> and Asteroideae, significant Chichorioideae and Brassicaceae
OD-25	327	338	937	966	350	243	17	Alternations of mixed forest and open woodland.	Intermediate and variable <i>Pinus</i> (0-55 %) and <i>Abies</i> (0-17 %) abundance, high <i>Q. robur</i> type (11-57 %) and significant occurrences of <i>Q. cerris</i> type (0-22 %), <i>Carya</i> (max 10%) and <i>Alnus</i> (max. 17 %)	Mostly Poaceae, <i>Artemisia</i> and Amaranthaceae. Abundant monolet fern spores.
OD-26	338	351.5	966	1004	519	228	21	Alternations of mixed forest and open woodland with shrubs.	Intermediate to high and variable <i>Pinus</i> (11-79 %), with phases of <i>Abies</i> (1-25 %), <i>Cedrus</i> (0-11 %), and Cupressaceae (0-19 %). Mesophyllous forest dominated by <i>Q. robur</i> type (7-42 %) and significant occurrence of <i>Q. cerris</i> type (0-15 %).	Mostly Poaceae, Cyperaceae and Amaranthaceae. Abundant monolet fern spores.

PAZ	Depth (MCD)		Age (ka)		Mean count			Zone description		
	top	base	top	base	+ Pinus	- Pinus	n sam.	General	Forest (% based on upland sum excl. Pinus, Pinus %: all upland taxa)	Herbs
DEEP										
OD-27	351.5	362.5	1004	1035	243	153	17	Highly variable, semi-open, mixed forest.	Intermediate and variable <i>Pinus</i> (10-67 %) with phases of <i>Cedrus</i> (0-15 %), other conifers are low. Mixed mesophyllous forest dominated by <i>Q. robur</i> type (0-38 %) with presence of <i>Q. cerris</i> type, <i>C. betulus</i> , and <i>Alnus</i> .	Mostly Poaceae, Cyperaceae, Amaranthaceae and <i>Thalictrum</i> .
OD-28	362.5	369	1035	1058	204	127	10	Semi-open vegetation with forest stands and pioneers.	Intermediate <i>Pinus</i> (3-67 %) with some Cupressaceae. Mesophyllous elements mainly <i>Q. robur</i> type (2-25 %) with <i>C.</i> (max. 7 %) and <i>Ostrya</i> (max. 11 %) and <i>Q. ilex</i> type.	Dominated by Poaceae, with significant <i>Artemisia</i> , Asteroidaeae, Amaranthaceae, Cyperaceae.
OD-29	369	380.5	1058	1096	302	210	18	Closed, mixed montane and mesophyllous forest with high diversity.	Intermediate <i>Pinus</i> (8-70 %) with high <i>Abies</i> (max. 34 %) in first half, and <i>Tsuga</i> (max. 15 %) and <i>Cedrus</i> (max. 23 %) abundances in the second half. <i>Q. robur</i> type (6-53 %), <i>Q. cerris</i> type (1-14 %) dominant mesophyllous elements. Significant <i>Betula</i> (max. 7 %), <i>Carya</i> (max. 9 %), Hamamelidaceae (max. 12 %), <i>Pterocarya</i> (max. 9 %), <i>Q. ilex</i> type (max. 6 %) and <i>Ulmus</i> (max. 8 %).	Low herb abundance, mostly Poaceae
OD-30	380.5	387.5	1096	1117	282	195	11	Variable, semi-open woodland.	Intermediate <i>Pinus</i> (7-52 %), with <i>Abies</i> (0-12 %) and common <i>Q. robur</i> type (13-49 %) with presence of <i>Carya</i> (max. 12 %) and <i>Ostrya</i> (max. 5 %) in first half of zone.	Poaceae, <i>Artemisia</i> dominant, with significant Amaranthaceae, Asteroideae, Cyperaceae and Caryophyllaceae.
OD-31	387.5	397	1117	1155	204	128	15	Open woodland with predominant pine forest stands. Steppe herb expansion.	<i>Pinus</i> (5-63% main forest element, with <i>Q. robur</i> type (2-39 %) and some <i>Betula</i> , <i>C. betulus</i> , <i>Ostrya</i> .	Poaceae, <i>Artemisia</i> , Amaranthaceae dominant, with Asteroideae, Cyperaceae and <i>Thalictrum</i> present.
OD-32	397	406.5	1155	1190	602	495	15	Closed evergreen and mixed forest with extensive riparians.	Common <i>Abies</i> (max. 21%), <i>Cedrus</i> (max. 20 %), <i>Pinus</i> (10-44 %) and <i>Tsuga</i> (max. 20 %). Dominant <i>Q. cerris</i> type (0-55 %) and <i>Q. robur</i> type (7-48 %) and common <i>Alnus</i> (max. 10 %), <i>Betula</i> (max. 13 %), <i>C. betulus</i> (max. 12 %), <i>Carya</i> (max. 11 %), <i>Liquidambar</i> (max. 8 %), <i>Ostrya</i> (max. 7 %) and <i>Ulmus</i> (max. 7 %).	Very low herbs, mostly Poaceae.

PAZ	Depth (MCD)		Age (ka)		Mean count			Zone description		
	top	base	top	base	+ Pinus	- Pinus	n sam.	General	Forest (% based on upland sum excl. Pinus, Pinus %: all upland taxa)	Herbs
OD-33	406.5	412	1190	1220	1498	377	8	Pine woodland with montane and mesophyllous stands. Notable steppic herbs.	Dominant <i>Pinus</i> (43-85 %), with <i>Abies</i> , <i>Picea</i> , <i>Cedrus</i> and <i>Cathaya</i> presence.	Mostly Chichorioideae, Amaranthaceae with Asteroideae, Cyperaceae and Poaceae.
OD-34	412	419.5	1220	1243	761	591	12	Closed montane and mesophyllous forests.	Dominant <i>Cedrus</i> (6-48 %), <i>Pinus</i> (19-56 %) and <i>Q. cerris</i> type (0-55 %) with common <i>Abies</i> (max. 15%), <i>Q. robur</i> type (3-23 %), presence of <i>Alnus</i> , <i>Betula</i> , <i>Carya</i> and <i>Ulmus</i> .	Very low herbs, mostly Poaceae.
OD-35	419.5	424	1243	1262	2133	338	7	Pine woodland with montane and isolated mesophyllous stands. Notable steppic herbs.	Dominant <i>Pinus</i> (62-92 %), with <i>Picea</i> (max. 18 %), <i>Cedrus</i> (max. 17 %) and some <i>Abies</i> (max 8 %). Mesophyllous mostly <i>Q. cerris</i> type (5-38 %) and <i>Q. robur</i> type (2-18 %).	Mostly Chichorioideae, Poaceae, with Amaranthaceae, Cyperaceae and Asteroideae.
OD-36	424	428.5	1262	1293	900	372	7	Closed montane and mixed forests.	<i>Pinus</i> (35-76 %) with <i>Abies</i> (1-24 %), <i>Cedrus</i> (1-31 %) and <i>Picea</i> . Mesophilous elements mostly high <i>Q. cerris</i> type (9-31 %), <i>Q. robur</i> type (5-13 %) with common <i>Fagus</i> (max. 16 %) and <i>Carya</i> (max. 7 %).	Very low herbs, mostly Poaceae.
OD-37	428.5	433	1293	1309	1002	469	7	Pine woodland with montane and mesophyllous stands. Notable steppic herbs.	Common <i>Pinus</i> (25-67 %) with relatively common <i>Abies</i> (max. 11 %), <i>Cedrus</i> (max. 12 %). Mesophyllous elements mostly <i>Q. cerris</i> type (13-30 %), <i>Q. robur</i> type (6-15 %).	Mostly Chichorioideae, Poaceae, with <i>Artemisia</i> , Amaranthaceae and Asteroideae. Abundant monoete fern spores.
OD-38	433	436.5	1309	1325	733	471	6	Closed montane and mixed forests.	High <i>Pinus</i> (16-43 %), <i>Abies</i> (8-24 %), <i>Cedrus</i> 7-20 %). Mesophyllous elements mostly <i>Q. cerris</i> type (1-30 %), <i>Q. robur</i> type (6-32 %) with common <i>Fagus</i> (max. 8 %) and <i>Betula</i> (max. 6 %).	Very low herbs, mostly Poaceae.

PAZ	Depth (MCD)		Age (ka)		Mean count			Zone description		
	top	base	top	base	+ Pinus	- Pinus	n sam.	General	Forest (% based on upland sum excl. Pinus, Pinus %: all upland taxa)	Herbs
OD-39	436.5	439	1325	1344	325	207	4	Pine woodland with montane and mesophyllous stands. Notable steppic herbs.	<i>Pinus</i> (10-49 %), <i>Picea</i> (max. 16 %), with <i>Q. robur</i> type (3-16 %) and <i>Betula</i> (max. 3 %), and <i>Ostrya</i> (max. 7 %) as main m mesophyllous elements.	Mostly <i>Artemisia</i> , Poaceae with Chichorioideae, Amaranthaceae, Cyperaceae and monolete fern spores.
OD-40	439	447	1344	1360	639	594	12	Closed mesophyllous forests with montane stands.	Relatively low <i>Pinus</i> (3-19 %), <i>Abies</i> (1-8 %) and <i>Cedrus</i> (4-11 %). mesophyllous taxa dominate with <i>Q. cerris</i> type (1-40 %), <i>Q. robur</i> type (8-35 %) with common <i>Alnus</i> (max. 30 %), <i>C. betulus</i> (max. 8 %), <i>Corylus</i> (max. 9 %), <i>Fagus</i> (8 %) and <i>Ulmus</i> (max. 6 %).	Very low herbs, mostly Poaceae and monolete fern spores.

Qualification of abundances for mean values per zone: present: <5%, significant/common: 5-10 %, high: 10-20 %, dominant > 20 %. *Pinus*: dominant: >60 % common: 20-60 %, low: 0-20 %.

Dataset S1 (separate file). Sample information, percentage pollen abundance, ecogroup data and richness estimates from Ohrid DEEP as displayed in Figs. 2, 3 and S1.

SI Additional references

83 J. Laskar, P. Robutel, F. Joutel, M. Gastineau, A.C.M. Correia, B. Levrard, A long term numerical solution for the insolation quantities of Earth. *Astron. Astrophys.* **428**, 261-285 (2004).