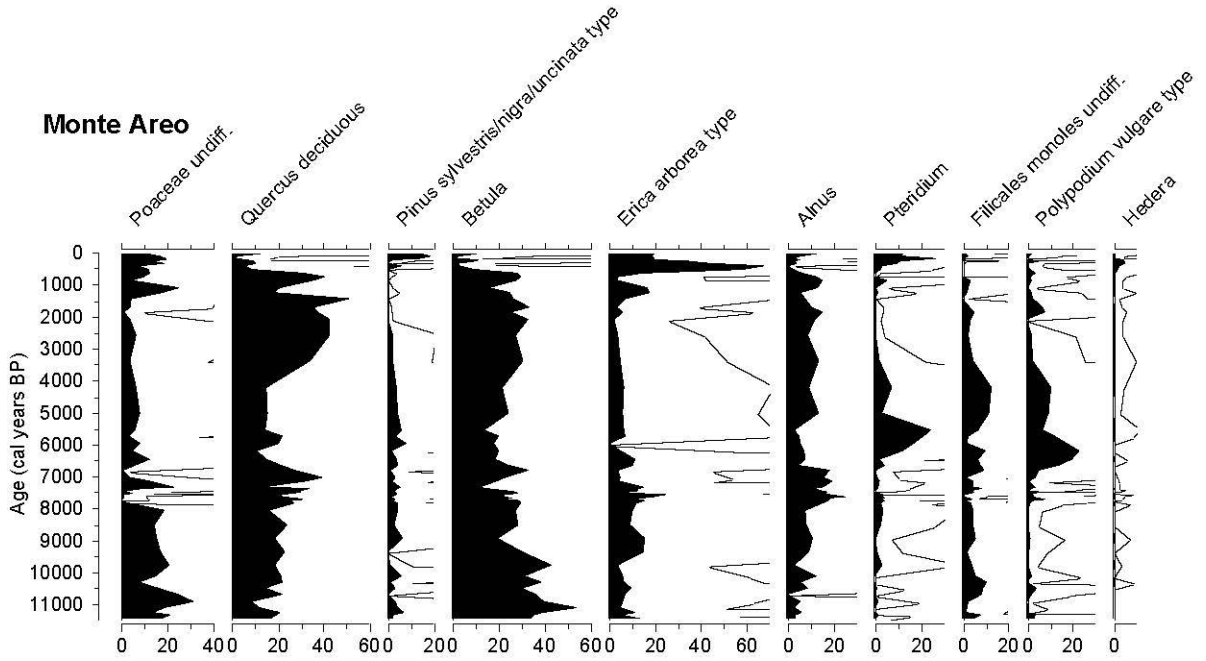
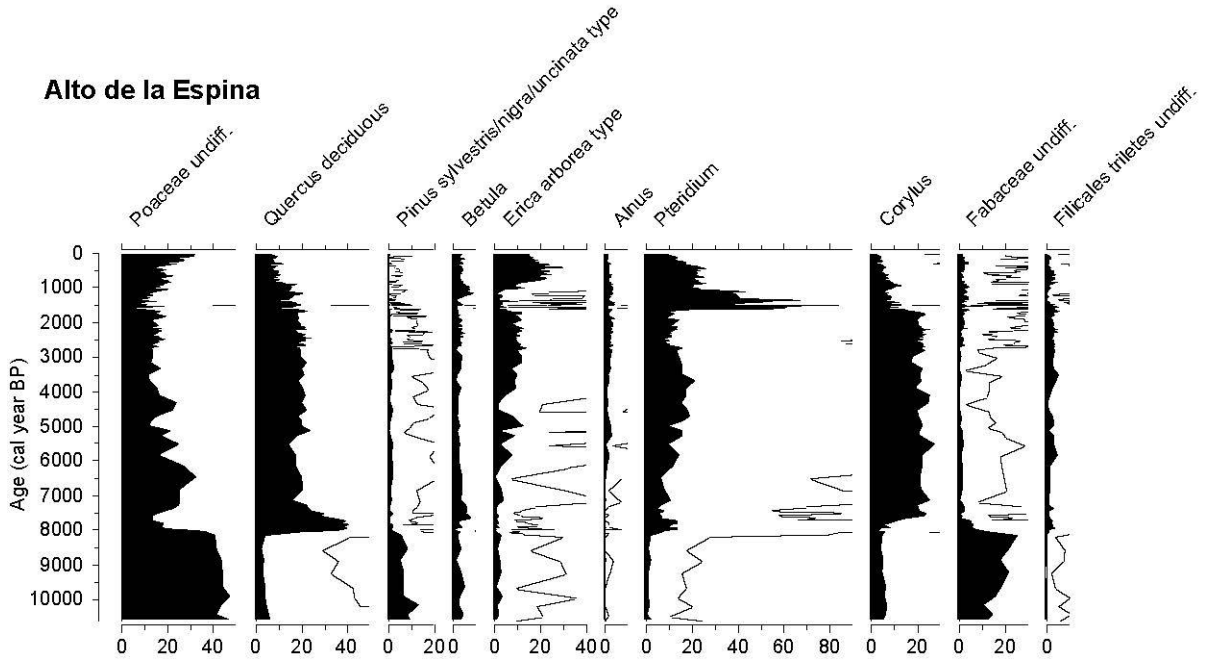
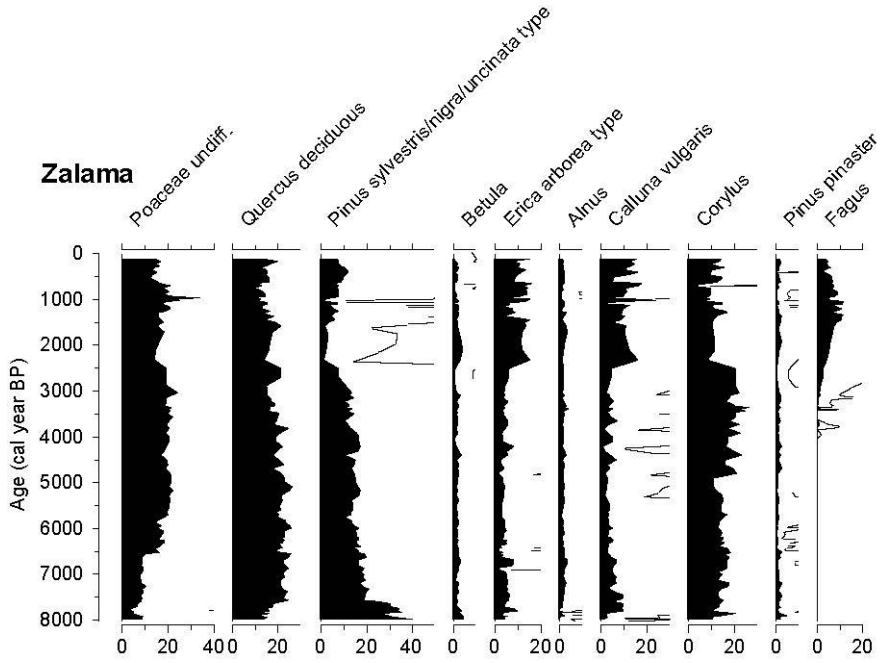
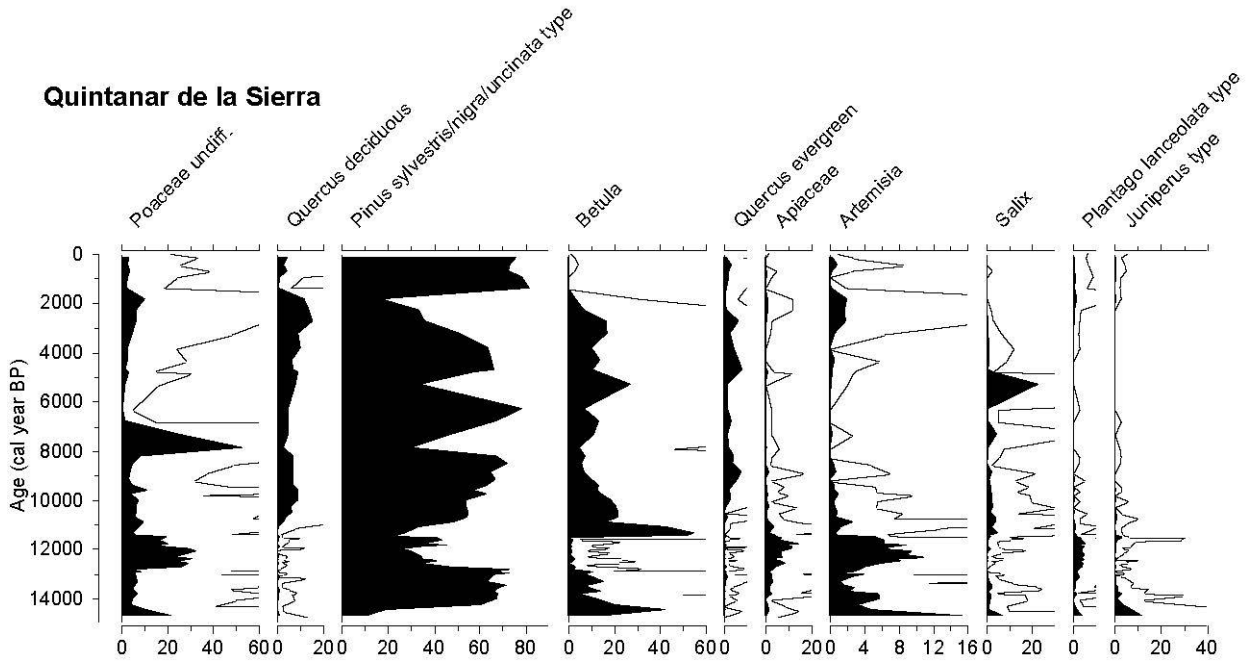
Figure S1. Simplified pollen percentage diagrams for seven pollen records used in precipitation reconstructions. Only the ten most common and important pollen taxa are shown. Black silhouettes indicate the percentage values and the unshaded silhouettes 10 x exaggerations.

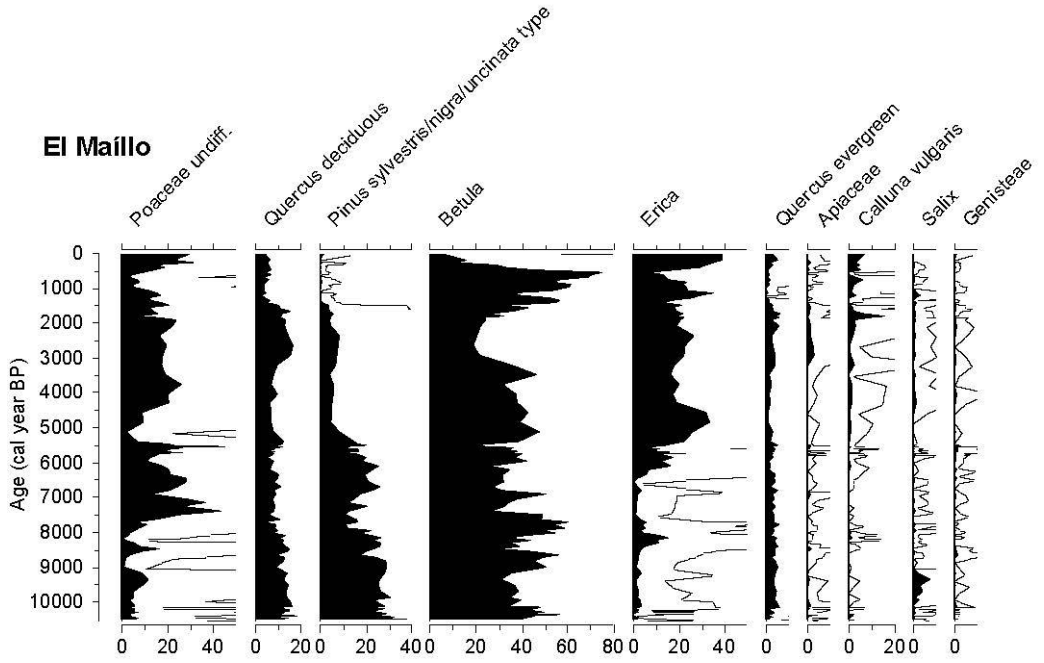


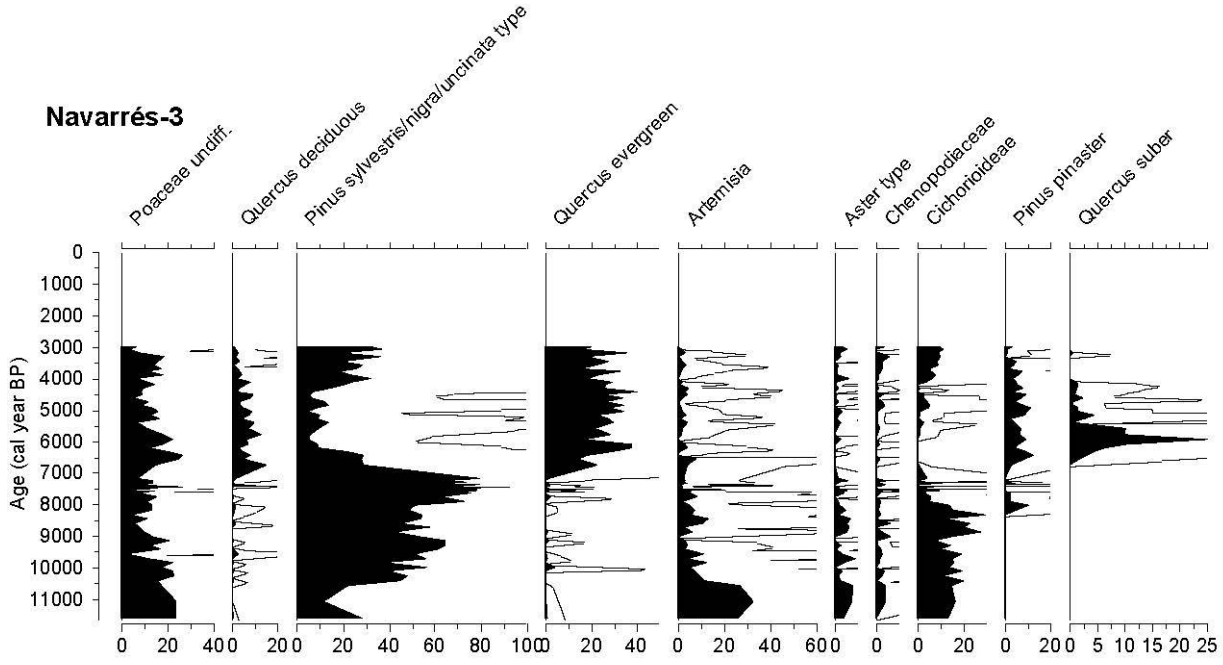
5




Zalama
Poaceae undiff.
Quercus deciduous
Pinus sylvestris/nigra/uncinata type
Betula
Erica arborea type
Alnus
Calluna vulgaris
Corylus
Pinus pinaster
Fagus
Age (cal year BP)
0
1000
2000
3000
4000
5000
6000
7000
8000
0 20 40
0 20
0 20 40
0 20
0 20
0 20
0 20
0 20
0 20
0 20


Quintanar de la Sierra
Poaceae undiff.
Quercus deciduous
Pinus sylvestris/nigra/uncinata type
Betula
Quercus evergreen
Apiaceae
Artemisia
Salix
Plantago lanceolata type
Juniperus type
Age (cal year BP)
0
2000
4000
6000
8000
10000
12000
14000
0 20 40 60
0 20
0 20 40 60 80
0 20 40 60
0 20
0 4 8 12 16
0 20
0
0 20 40


El Maíllo
Poaceae undiff.
Quercus deciduous
Pinus sylvestris/nigra/uncinata type
Betula
Erica
Quercus evergreen
Apiaceae
Calluna vulgaris
Salix
Genisteae
Age (cal year BP)


Navarrés-3
Poaceae undiff.
Quercus deciduous
Pinus sylvestris/nigra/uncinata type
Quercus evergreen
Artemisia
Aster type
Chenopodiaceae
Cichorioideae
Pinus pinaster
Quercus suber
Age (cal year BP)

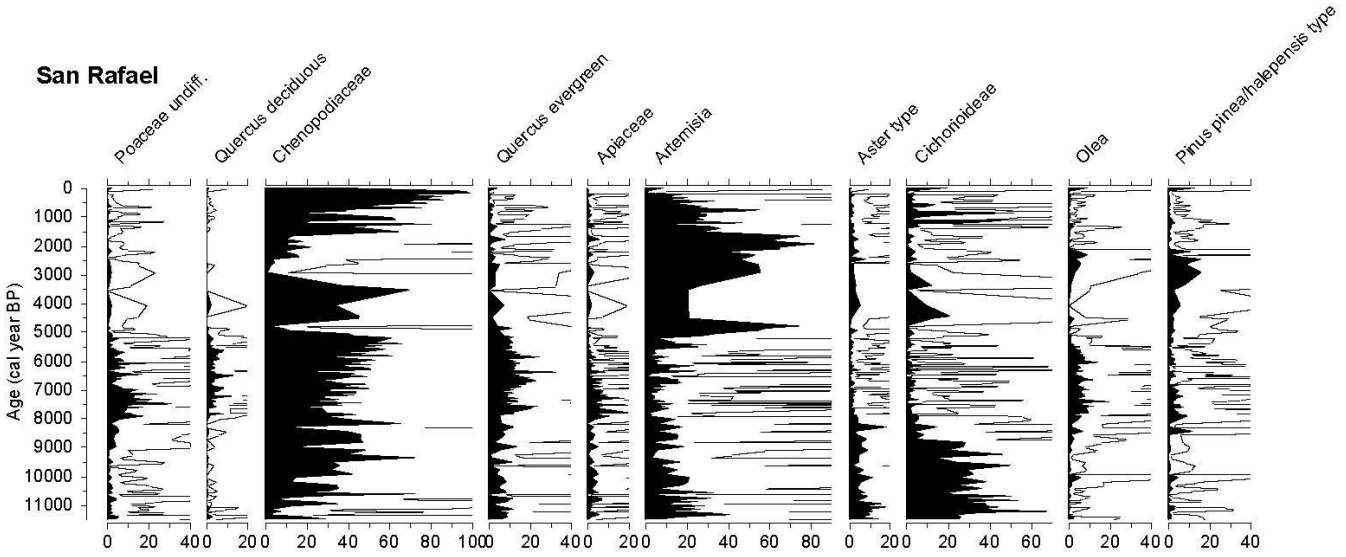

San Rafael
Poaceae undiff.
Quercus deciduous
Chenopodiaceae
Quercus evergreen
Apiaceae
Artemisia
Aster type
Cichorioideae
Olea
Pinus pinea/halepensis type
Age (cal year BP)
0
1000
2000
3000
4000
5000
6000
7000
8000
9000
10000
11000
0 20 40
0 20
0 20 40 60 80 100
0 20 40
0 20
0 20 40 60 80
0 20
0 20 40 60
0 20 40
0 20 40

Figure S2: Gaussian response curve for a taxon *j* determined by α_j (scaling factor), β_j (optimum precipitation), and γ_j (tolerance to precipitation).

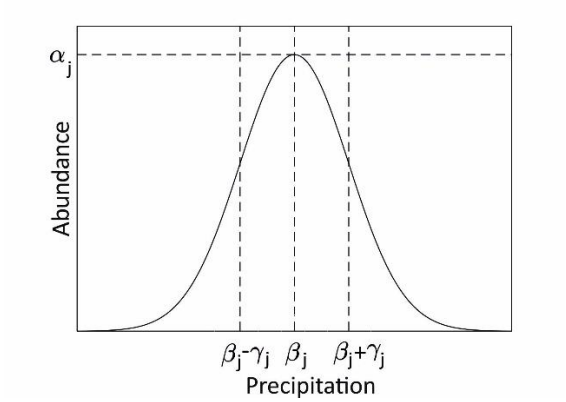


Table S1: The prior distributions of the Bayesian model parameters. We denote by *n* and *k* the number of sites and the number of taxa in our modern calibration set. The number of slices in studied pollen record c, c=1,…,7, is denoted as n_c. Pann(*i*) is the observed modern Pann at site *i* and Pann(*c*) is the observed modern Pann at the location of pollen record *c*.

Parameter	Prior distribution
α_j scaling factor for taxon *j*, *j*=1,…,*k*	$Uniform(0,90)$
β_j optimum precipitation for taxon *j*, *j*=1,…,*k*	$Normal(\widehat{\beta_j}, 250^2)$, see Salonen et al. (2012) for $\widehat{\beta_j}$
γ_j tolerance to precipitation for taxon *j*, *j*=1,…,*k*	$Gamma(9, 33)$
x_i^m modern Pann for site *i*, *i*=1,…,*n*	$Normal(Pann(i), [1/4 \cdot Pann(i)]^2)$ for leave-one-out cross-validation
x_{ci}^f past Pann for slice *i*, *i*=1,…,n_c in pollen record c, *c*=1,…,7	$Normal(Pann(c), [1/4 \cdot Pann(c)]^2)$ for pollen record reconstructions