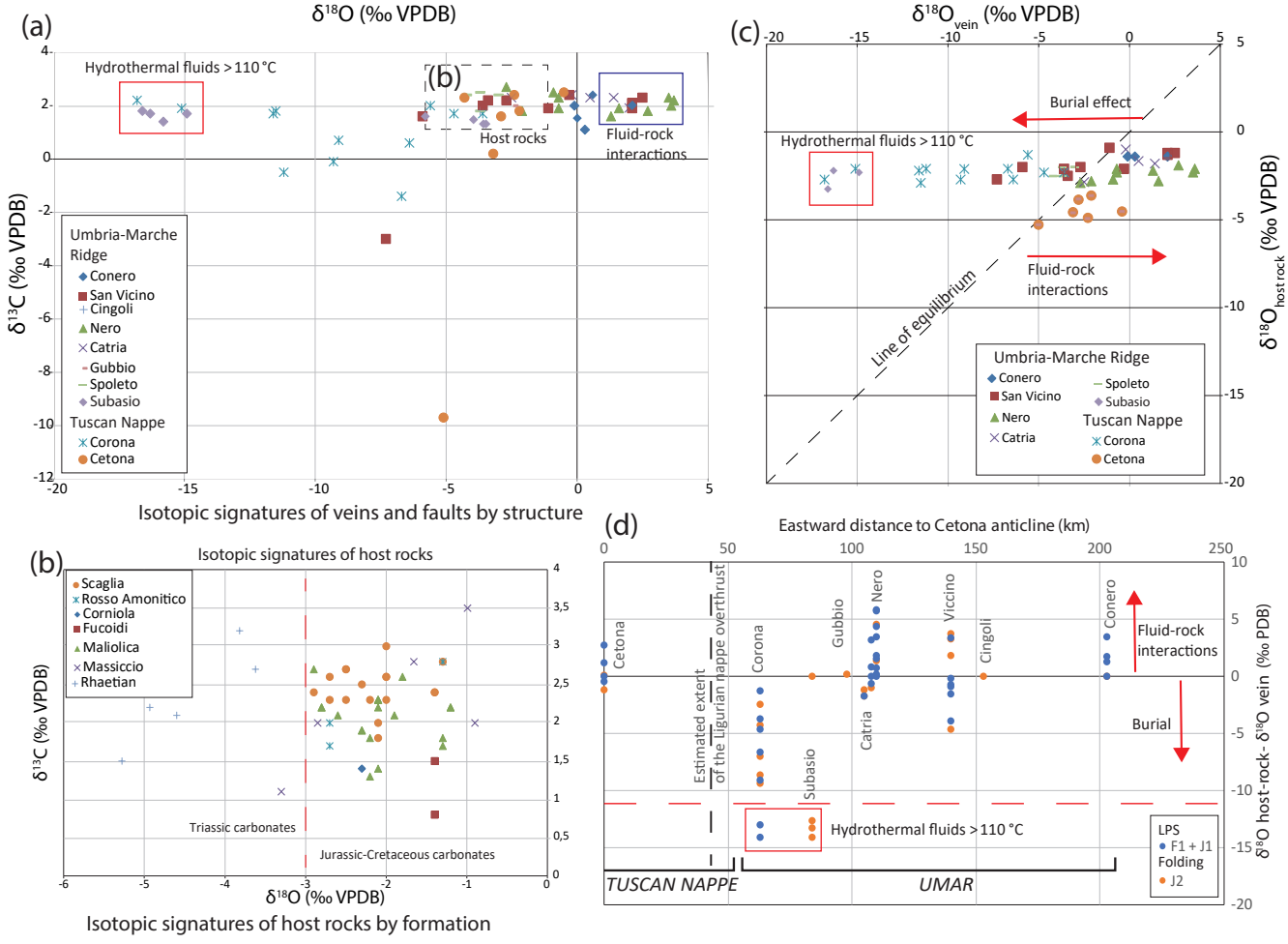
(a)
δ18O (‰ VPDB)
Hydrothermal fluids >110 °C
(b)
Host rocks
Fluid-rock interactions
δ13C (‰ VPDB)
Umbria-Marche Ridge
Conero
San Vicino
Cingoli
Nero
Catria
Gubbio
Spoleto
Subasio
Tuscan Nappe
Corona
Cetona
Isotopic signatures of veins and faults by structure
(c)
δ18Ovein (‰ VPDB)
Burial effect
Hydrothermal fluids >110 °C
Fluid-rock interactions
Line of equilibrium
δ18Ohost rock (‰ VPDB)
Umbria-Marche Ridge
Conero
San Vicino
Nero
Catria
Spoleto
Subasio
Tuscan Nappe
Corona
Cetona
(b)
Isotopic signatures of host rocks
Scaglia
Rosso Amonitico
Corniola
Fucoidi
Maliolica
Massiccio
Rhaetian
δ13C (‰ VPDB)
Triassic carbonates
Jurassic-Cretaceous carbonates
δ18O (‰ VPDB)
Isotopic signatures of host rocks by formation
(d)
Eastward distance to Cetona anticline (km)
Cetona
Estimated extent of the Ligurian nappe overthrust
Corona
Subasio
Gubbio
Nero
Catria
Viccino
Cingoli
Conero
Fluid-rock interactions
Burial
Hydrothermal fluids >110 °C
LPS
F1 + J1 Folding
J2
TUSCAN NAPPE
UMAR
δ18O host-rock - δ18O vein (‰ PDB)