Late Cretaceous to recent tectonic evolution of the Ulukisla Basin (Southern Central Anatolia)

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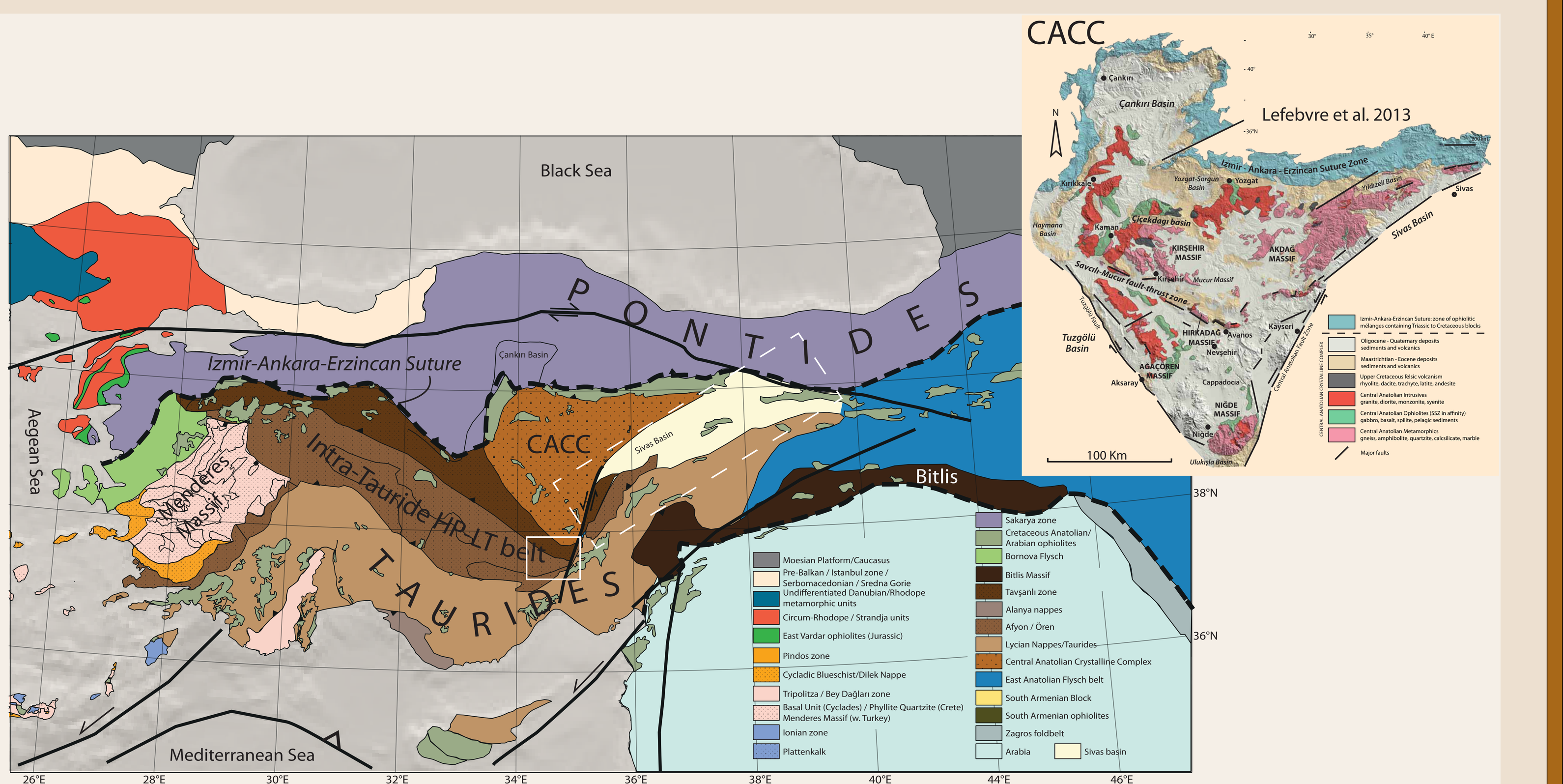
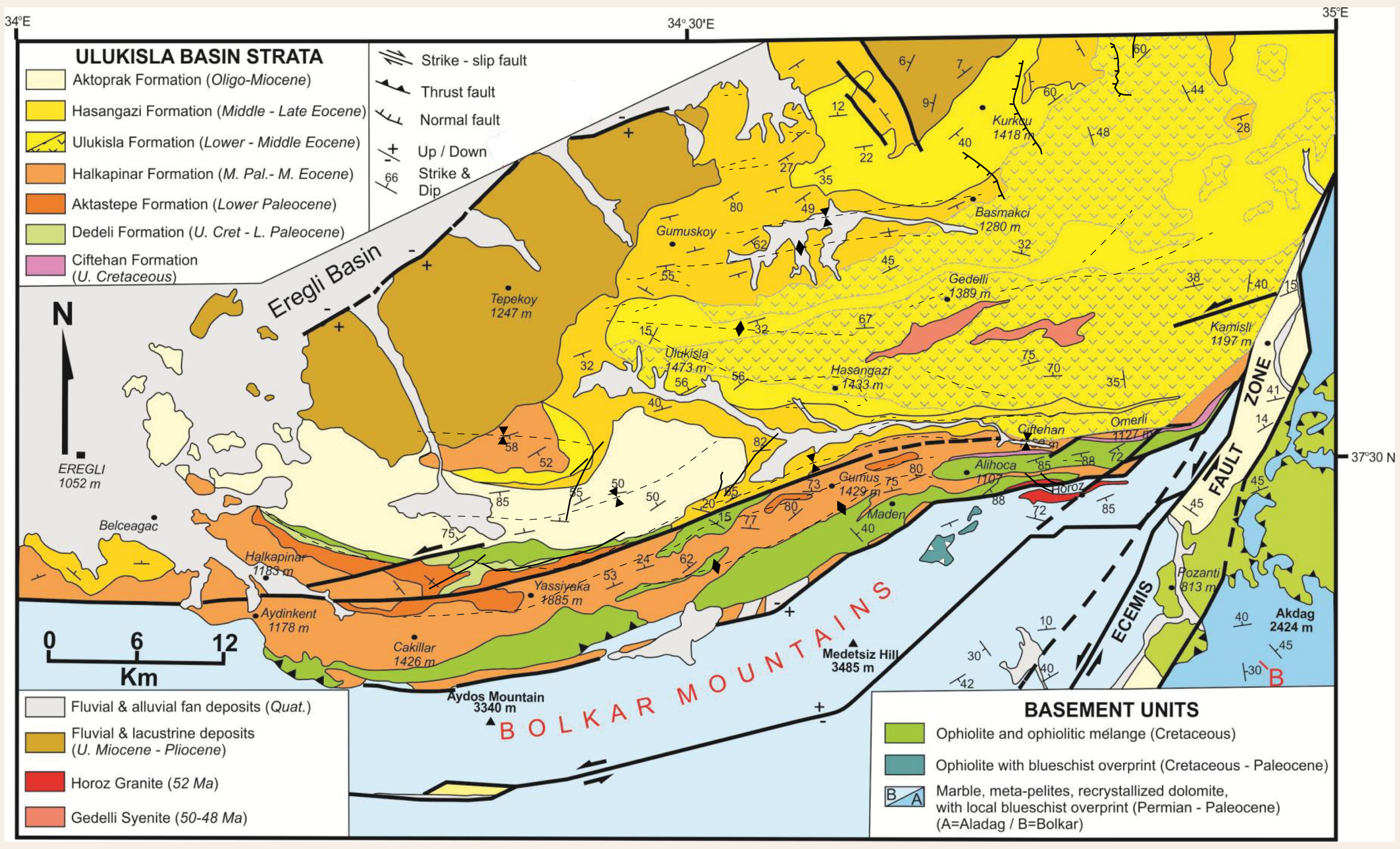
Outline and Geological Setting

Around 90 Ma ago the geology of Turkey exhibited (arguably at least) two subduction zones: one dipping below the Pontides in the North, and one dipping below oceanic lithosphere, now found as ophiolites, to the south of the Pontides. Subsequent subduction led to the accretion of (parts of) the following terranes (from N-S and old to young): the Central Anatolian Crystalline complex (85 Ma); the HP-LT Tavsanli and Afyon belts (until 70-65 Ma); and the essentially non-metamorphic Tauride fold and thrust belt (Paleocene-Eocene). In Central Turkey, continental rocks arrived earliest in the subduction zone below the ophiolites and now form the Central Anatolian Crystalline Complex (CACC) which exhumed along Late Cretaceous extensional detachments. To the east, the continental passive margin was farther to the south and there is no evidence that continental rocks arrived in the southern subduction zone before the Late Cretaceous (70-65 Ma).



Overlying these accretionary wedges and ophiolites are sedimentary basins, which form a geological archive of the subduction history of the region. One of these basins is the Upper Cretaceous to Lower Cenozoic Ulukisla basin, which is straddling and sandwiched between the CACC in the north and the Taurides in the south. We study its stratigraphy and structure to restore the tectonic evolution of ocean floor spreading, CACC underthrusting, exhumation, and uplift.

Regional mapping



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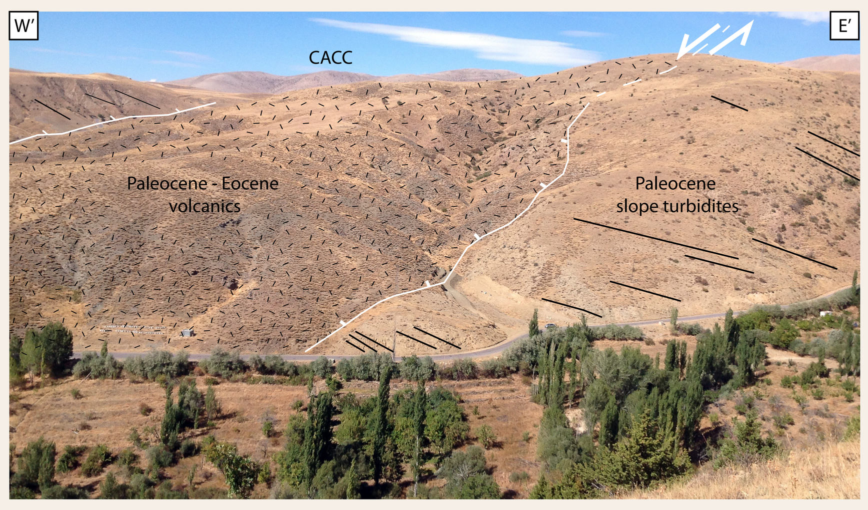
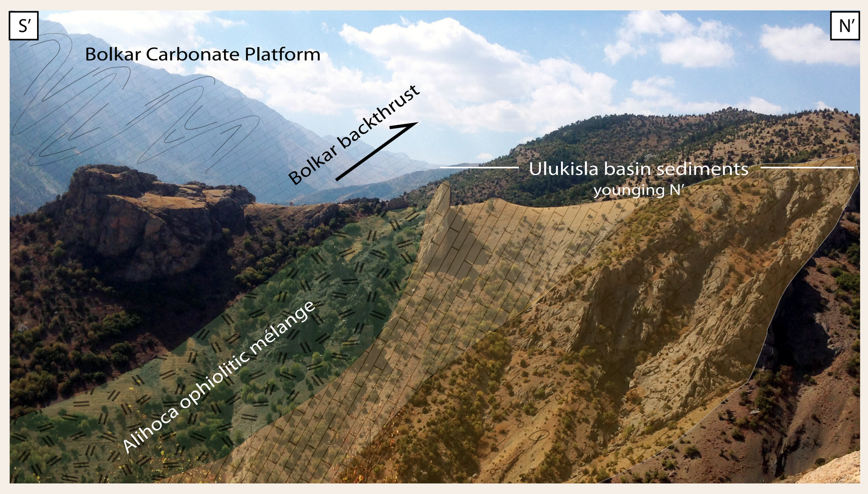


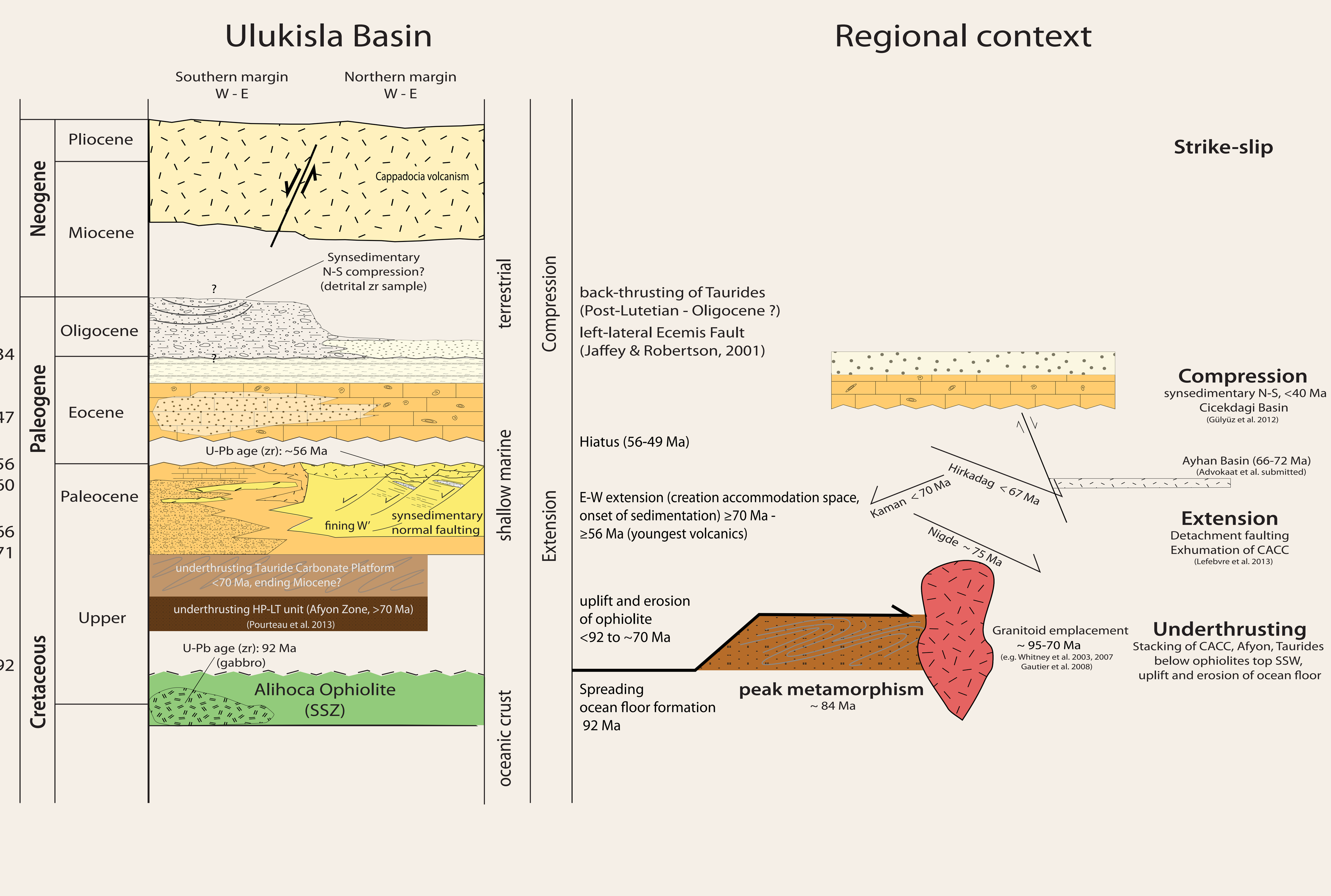
Field photographs of the nothern basin margin, south of the contact with the CACC (above) and the southern basin margin close to the Bolkar Carbonate Platform (below).



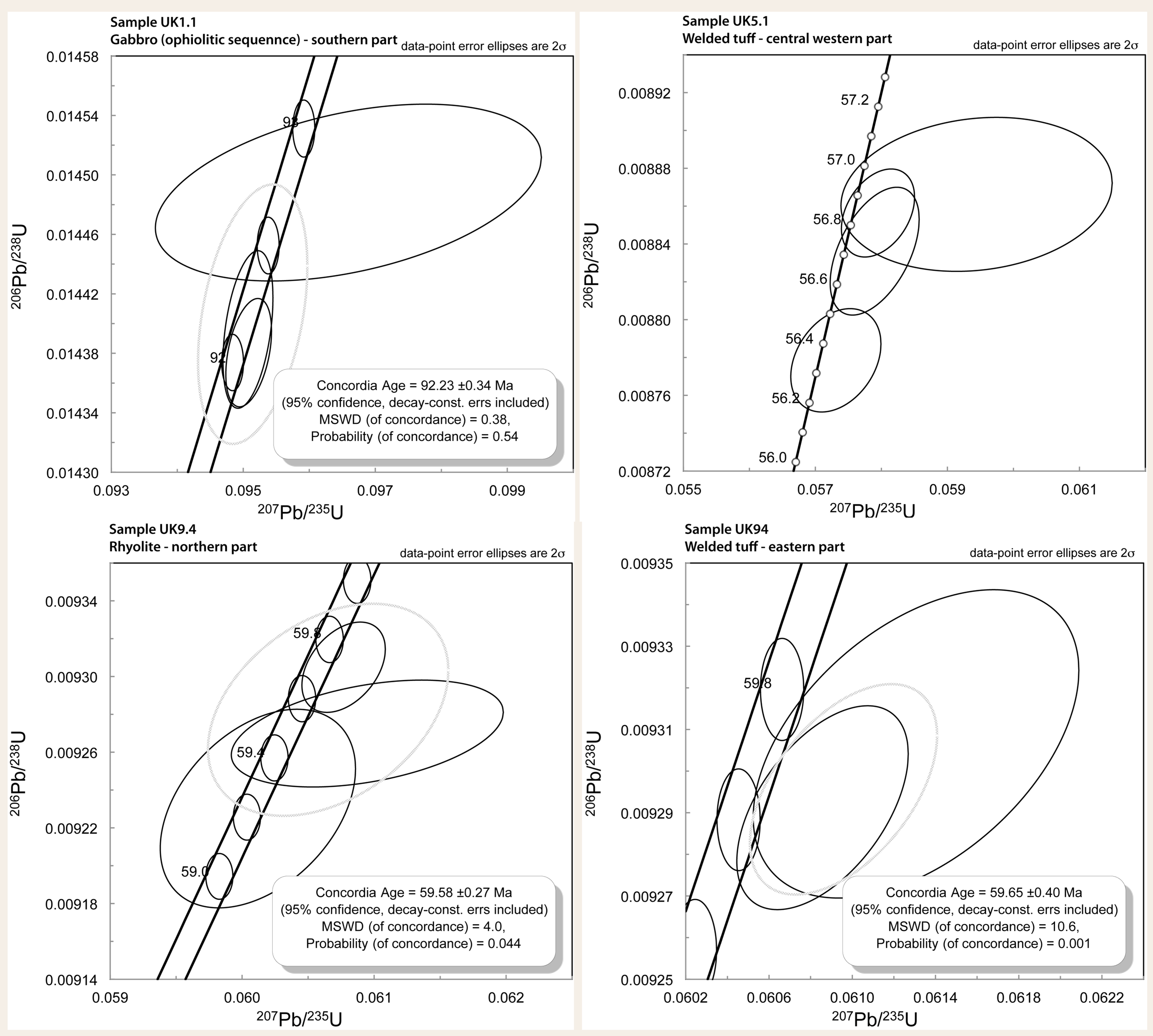
At the northern margin of the basin a series of west-verging normal faults cuts the east-dipping sediments of Paleocene age. Locally, synsedimentary structures were observed.
The fault blocks consist of are tilted sediments and overlying volcanics of Paleocene to Eocene age.
The fault surfaces are locally intruded by mafic dykes.
From east to west, a progressive fining in the sediments from slope turbidites to deeper marine turbidites has been observed. The present day orientation of the faults suggests that sediments were deposited in an E-W extensional regime.
The observed extension direction regionally fits with the extension observed in the CACC and overlying basins.

At its southern margin the basin is truncated by a back-thrust (probably coeval with the deposition of the Aktoprak syncline) placing the Bolkar Carbonate Platform (Taurides) and overlying HP metamorphics above the vertical to overturned basal sediments of the Ulukisla Basin. These consist of a basal conglomerate reworking Bolkar-derived limestones and ophiolite debris, followed limestones intercalating with volcaniclastics. The strata are deformed into an overturned footwall syncline that gradually passes into a monoclinal succession of slope turbidites, locally intercalating with nummulitic limestones and volcanics.

Tectonostratigraphy



ID-TIMS U-Pb ages



Outlook

- Geochronology: U-Pb ages for detrital sample --> age of compressional deformation related to the back-thrusting of the Taurides
- age for basal volcanics --> age of onset of volcanism
- Biostratigraphy & paleobathymetry from marine fossils --> age of onset of sedimentation
- synsedimentary structures to constrain onset of extension and compression

- Paleomagnetism: vertical axis rotations, AMS
- link this study with a paleomagnetic study of the Sivas Basin to constrain the rotation difference between the Taurides and Pontides and constrain resulting convergence
- build regional scale balanced cross-sections to quantify the amount of shortening --> build kinematic reconstruction in GPlates

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