



Neogene sedimentary history of the Cilicia Basin, eastern Mediterranean: a contribution to the TopoEurope VAMP project

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The Vertical Anatolian Movements Project (VAMP) addresses the Neogene uplift of the Taurides and the Central Anatolian Plateau. While terrestrial studies are focussed on erosion in the sediment source area, and deposition within the Turkish landmass, our marine work is intended to provide a history of deposition in one of the ultimate sinks: the eastern Mediterranean. In particular, we are mapping the distribution in space and time of sediment deposited from the Göksu River into the Cilicia Basin.

The Miocene to Recent tectonic evolution of the Cilicia Basin near the present day mouth of the Göksu River is studied using ~2000 km of high-resolution 96-channel seismic reflection profiles collected in 2008 using the RV Koca Piri Reis of the Institute of Marine Sciences and Technology. Seismic stratigraphic correlations with deep offshore exploration wells provided the chronology for the seismic data. Four units are identified in the seismic reflection profiles: Unit 1 – Pliocene-Quaternary, Unit 2 – Messinian evaporites, Unit 3 – pre-Messinian Miocene and Unit 4 – pre-Miocene basement.

Detailed interpretation and mapping of the seismic reflection profiles showed that during the Miocene a major south- and southeast-verging fold-thrust belt developed across the entire Cilicia Basin. The belt is composed of 3-5 imbricate thrust panels involving the pre-Messinian Late Miocene strata of Unit 3. The thrusts sole into the basement successions of Unit 4, whereas tip points of the thrusts lie within the uppermost portion of Unit 3. The leading portion of this fold-thrust belt is well imaged in the Inner Latakia Basin, south east of the present-day Misis-Kyrenia Fault Zone. The trailing portion of the fold-thrust belt is believed to constitute the thrust panels which form the core of the central Taurus Mountains of southern Turkey. A north- and northwest-verging fold-thrust belt is locally mapped in the Outer Cilicia Basin. The belt is composed of 1-3 thrust panels involving Units 3, 2 and 1. The thrusts sole into the basement and exhibit tip points extending into the Pliocene-Quaternary. The belt is overprinted by 4-5 smaller positive flower structures all soling into the primary thrust surface(s), and showing tip points extending to the depositional surface. This structural architecture suggests that they are developed within a transpressional regime during the Pliocene-Quaternary.

A thick evaporite succession (i.e. Unit 2) is unconformably deposited (i.e. the N-reflector) over topographically deeper portions of the fold-thrust belt. This evaporite succession presently forms numerous salt pillows and salt rollers in Inner Cilicia Basin, and salt diapirs and salt walls in the Outer Cilicia Basin. The boundary between the evaporite Unit 2 and the overlying siliciclastic successions of Unit 1 is marked by a very prominent angular unconformity (i.e. the M-reflector).

The Pliocene-Quaternary Unit 1 is variably deposited over the Messinian evaporites of Unit 2, when present and Unit 3 when evaporites are absent. The unit is thickest in the northeastern portion of the Inner Cilicia Basin, near the mouths of the Seyhan, Ceyhan and Tarsus Rivers, as well as along the northwestern margin of the Cilicia Basin near the mouth of the present-day Göksu River. Thus, the Pliocene-Quaternary successions are composed predominantly of deltaic sediments. In fact, near the mouth of the Göksu River, the shelf successions are composed of numerous vertically stacked and east-prograded delta successions. The oldest and the most prominent of these delta successions rests over the M-reflector. These stacked delta successions record the rise of the Tauride Mountains during the Pliocene-Quaternary and the concomitant down-cutting and denudation by the Göksu River of the former marine Miocene Mut Basin. Careful tracing of time lines from the exploration wells allowed calculations of sediment volumes contained within prograded delta successions, providing estimates of rates of sediment input by the Göksu River.

