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From Arabian Platform to Great Caucasus, tectonic and geodynamic evolution

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The MEBE (Middle East Basins Evolution program) fieldwork initiated through the Arabian-Eurasian collision zone from Eastern Anatolia to the Great Caucasus allowed the acquisition of new stratigraphic, structural, petrological, and geochronological data that provide good constraints on a North-South transect for elucidating the basins and geodynamic evolution of this part of the Tethyan belt since the Jurassic. The MEBE Caucasus Group integrates 5 projects (CNRS, University of Nice Sophia-Antipolis, University P. & M. Curie Paris, University of Potsdam, University of Fribourg, Keele University, Free University of Amsterdam) involving a number of local collaborations (Turkish Universities, Geological Institutes of Armenia and Azerbaijan, Russian and Georgian Universities). Main key results of these projects are presented here along a transect from Arabian platform to the Great Caucasus.

From the Arabian platform toward the Lesser Caucasus, the Bitlis metamorphic complex (30 km wide and 500 km long) rests directly on top of the peri-arabic ophiolitic suture. The Eastern Bitlis massif therefore must be considered as a nappe complex that strongly deformed rocks of the Arabian platform. Since the metasedimentary sequence of the eastern Bitlis complex contains low-grade HP-LT metamorphic minerals it is obvious that they were involved in a subduction-related setting very similar to that of western Anatolia. Lithological considerations of Proterozoic to Late Cretaceous aged successions suggest that the Bitlis nappe complex could be related to the South Armenian block (SAB) to the north..

The SAB is characterized by a basement and sedimentary cover characteristic of a gondwanian platform-type environment. Ophiolites were southward obducted over the SAB during the Late Cretaceous. These ophiolites (Sevan-Akera, Vedi, and Amassa-Stepanavan ophiolites) correspond to an oceanic lithosphere formed with a slow rate of extension (LOT ophiolites). The outcropping rocks of the Eurasian margin in the Lesser Caucasus suggests magmatic arc activity occurring from Middle Jurassic to Upper Cretaceous times. Collision between the SAB and Eurasia occurred during the Eocene and produced folding of ophiolites, the magmatic arc, and the unconformable overlying Late Cretaceous basin. During Late Eocene to Miocene times, the Lesser Caucasus underwent NE-SW shortening along the suture zone propagating to the SW external part of the belt

As results of previous works and in the light of the new MEBE data the Great Caucasus correspond to the inverted back-arc Jurassic basin in front of the Eurasia. The rifting phase occurred during the Jurassic and sedimentary basins entered a post-rift subsidence phase in Late Jurassic times. Basin inversion occurred in the Late Eocene. The central part of the belt corresponds in the past to the thinner part of the rifted lithosphere: the present-day high elevation could be due to the subduction of this highly thinned lithosphere.

Key outcrops were visited in the eastern Great Caucasus, including the central part, its termination with the Caspian Sea, and the northern and southern fold- and -thrust fronts. The different structures pertain to a series of large tectonic zones that subdivide the mountain range. The main structural style is one of a fold and thrust belt.