



## **Tectonic evolution of the Lesser Caucasus (Armenia) revisited in the light of new structural and stratigraphic results**

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### **Introduction**

Between Black and Caspian seas, the Lesser Caucasus in Armenia is a Tethyan mountain belt which is composed from southwest to northeast by three main lithostratigraphic and tectonic units : i) an accreted terrane (South Armenian Block: SAB), ii) ophiolites, and iii) the Eurasian margin. Thanks to the MEBE programme support, new structural and stratigraphic data allow to specify the tectonic evolution of this segment of the Alpine (s.l.) belt.

### **Tectonic evolution**

Upper Jurassic to the Upper Cretaceous :

During this interval of time the SAB (exotic terrane of Gondwanian origin) and the Eurasian margin were disconnected due to the presence of the Palaeotethys and to the opening of the Neotethys oceans.

#### **- i) South Armenian block : SAB**

Sedimentary formations ranging from the Late Devonian to the Late Triassic, un-

conformably overlie a Proterozoic metamorphic basement. They define a platform-type environment characteristic of the Gondwanian series. During the Lower Jurassic period, some evidences of rifting can be deduced from the volcanic rocks contained within the series. Paleomagnetism of volcanic rocks indicate a paleo-position of  $21.5^{\circ}\text{N} \pm 3.7^{\circ}$  latitude for the SAB in that period (Bazhenov et al., 1996). Lower Cretaceous to Turonian reef limestones and marls overlie those previous formations. Further above, a Lower Coniacian sedimentary *mélange* containing ophiolitic blocks is observed in the Vedi area. The *mélange* is overlain by the obducted ophiolitic units (see below). Finally, Upper Cretaceous platform carbonates unconformably overlie the SAB and the ophiolites. These carbonates evolve northeastward to a deeper marine environment.

#### **- ii) Sevan-Akera, Vedi, Stepanavan Ophiolitic Complexes**

Upper Jurassic (and Lower Cretaceous ?) ophiolitic complexes (peridotites, gabbro-norite pods, plagiogranite, basalts and radiolarites) are found in the Stepanavan, Sevan-Akera, and Vedi areas. The age of the two former complexes is constrained by Late Jurassic radiolarians yielded from cherts intercalated with basaltic lavas (see Rolland et al., this session). Ophiolite rocks correspond to oceanic lithosphere relics that we attribute to the Lherzolite Ophiolite Type (slow-spreading). These ophiolites were previously considered as three oceanic domains and two sutures zones (Knipper and Khain, 1980; Zakariadze et al., 1983). Based on our structural and preliminary biostratigraphic results we argue that the three Armenian's ophiolitic complexes correspond to only one oceanic lithosphere and one suture zone (Sevan-Akera, Stepanavan ophiolites). The Vedi ophiolites are over-thrusted in a folded klippe onto the SAB.

During the Late Early Cretaceous to Early Coniacian times, one part of this ocean subducted intra-oceanically as evidenced by Blueschists of the Stepanavan area (c. 94 Ma, Ar/Ar phengite age, see Rolland et al. this session), and produced andesitic arc magmatism on the overriding plate. In the West – Northwest (Stepanavan area), opening of a back-arc system is ascertained by N-S, west dipping, normal faults.

The Early Coniacian obduction over the SAB (well evidenced at Vedi) allows to suggest a north-eastward dipping subduction of the SAB under the obducted oceanic lithosphere.

#### **- iii) Eurasian Margin**

The outcropping magmatic rocks of the Eurasian margin in Armenia indicate an magmatic arc-type activity ranging in age from the Upper Jurassic to the Lower Cretaceous periods.

Upper Cretaceous to Upper Eocene

Unconformably overlying the SAB, the obducted ophiolites and the intra-oceanic arc, pelagic limestones and turbidites characterize a basin environment that was deeper NE than in the SW. Tectonic subsidence is indicated by N-S to N 160°E trending syn-sedimentary normal faults, associated to the basin opening.

Collision of the SAB with the Eurasian margin occurred during Paleocene to Lower Eocene and resulted in the folding of the ophiolites, arc and Upper Cretaceous basin sediments.

#### Upper Eocene to Quaternary

- Extensional tectonics occurred during the Upper Eocene, coeval to a widespread magmatic activity on both the SAB and the Eurasian plate.

- From Late Eocene to Miocene, a shortening event is indicated by N120°E trending folds and SW verging thrusts along the suture zone. Most thrusts and reverse faults of this age are reactivations of inherited normal faults in the SAB basement.

- Finally, during the late Miocene to Quaternary periods, the Lesser Caucasus region underwent NNW-SSE evolving to NNE-SSW shortening (Rebaï et al., 1993), denudation, uplift and intense magmatic activity.

#### References

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