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Interactive comment on "Polyphase evolution of Pelagonia (northern Greece) revealed by geological and fission-track data" *by* F. L. Schenker et al.

Anonymous Referee #2

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The paper by Schenker et al. reports new thermochronological and paleontological data from the Pelagonian and Vardar zones, and together with the existing thermochronological data investigates the thermal history of these internal parts of the Hellenides. The geology of the internal Hellenides is still poorly understood and such new data are welcome. The paper is concise and the data are of good quality and precise, the discussions are generally logical. Ironically the new thermochronological data from the Pelagonian are all young (Oligo-Miocene), whereas the discussion is mostly on the data with old ages (Cretaceous).

On the down side, the section on the "Tectonic setting and geological overview" is poorly written and confusing. As discussed below there are a few other problems,

which if addressed properly will turn the paper to a fine contribution to a geologically complicated part of our planet.

1. Section on the "Tectonic setting and geological overview" I have difficulty in understanding and following this section, which reads:

"The Pelagonian zone in the Internal Hellenides is delimited by two ophiolitic domains: The AVAZ to the northeast and the Pindos Ophiolites to the southwest (Fig. 1). The Pelagonia block has been detached from southern Eurasia (Anders et al., 2007), together with the lower unit of Rhodope (Schenker et al., 2014), during Gondwana breakup and subsequent opening of the Tethys Ocean. In the late Early Jurassic, plate convergence and N–NE dipping subduction caused the Late Jurassic-to-Early Cretaceous southwestward obduction of an AVAZ segment onto Pelagonia (Bernoulli and Laubscher, 1972). The obducted Late Triassic-to-Cretaceous carbonates and hemipelagic marls, ultramafic rocks and metavolcanites are attributed to the Permian–Early Jurassic southwestern passive margin of the Tethys Ocean (Sharp and Robertson, 2006). Subsequent continent-continent collision between Eurasia and Pelagonia (Schenker et al., 2014) was responsible for Early Cretaceous tectono-metamorphic events..

a. How can a block detach from Eurasia during Gondwana breakup? The core of Eurasia is Baltica, the opposite of Gondwana. A block can detach from Gondwana during its breakup but not from Eurasia.

b. How can late Early Jurassic plate convergence and N–NE dipping subduction cause Late Jurassic-to-Early Cretaceous southwestward obduction of an AVAZ segment onto Pelagonia? The statement is problematic in two ways. First, early Jurassic subduction can hardly cause Late Jurassic – Early Cretaceous obduction, this is not logical. Second obduction is used for thrusting of ophiolite over the continent (or rather subduction of continent) and it is not correct to use it for the AVAZ, most of which is not ophiolite.

c. How can "obducted Late Triassic-to-Cretaceous carbonates and hemipelagic marls, ultramafic rocks and metavolcanites" can be "attributed to the Permian–Early Jurassic southwestern passive margin of the Tethys Ocean"? Besides the mistaken usage of the term obduction, how is it possible for the Cretaceous carbonates be part of an early Jurassic continental margin?

2. I had also difficulty in understanding the following paragraph in the Introduction (p. 3, l, 20-25):

This study identified four major cooling events: (i) post-collisional, Late Createaceous (sic.) cooling and subsidence from 102 to ca. 68Ma as shown by ZFT ages coeval with the development of marine basins; cooling was heterogeneous in time and space over Pelagonia, AVAZ and western Rhodope, (ii) faster cooling and erosion rates during the Late Cretaceous. . .

The first two cooling events are both "Late Cretaceous". How and why are they distinguished?

3. Fig. 4 gives the geological map of the area studied with geological cross-sections given in Fig. 5. It needs structural data (orientation of foliation and lineation). This is especially relevant as the structure of the area is discussed in the text (e.g., p. 5, l.2-5). There is enough space on the map to show at least representative structural data.

4. The paper would be more comprehensive if the available Ar-Ar mica data are also used for the thermochronological analysis.

5. The term "post-collisional cooling" is used in the text for the Cretaceous thermochronological data (p. 3, 20, p. 12, l. 15) and it is not clear what it means in this context. Do the authors envisage an Early Cretaceous collision between Rhodope and Pelagonian? They should be explicit.

6. Marls covering unconformably the AVAZ thrust sheets contain the Turonian Helvetoglobotruncana Helvetica (Figs. 3 and 7b), setting the lower deposition limit. . .(p. 8, l. 19)

Please show the location of this sample on the map in Fig. 4. This sample is important in providing an upper limit for the metamorphism. It would be useful also to show the Upper Cretaceous marine sediments, and the location of the rudist-bearing sample (Appendix A) on the map in Fig. 4.

7. There is confusion with the sample numbers 10.028 and 10.029. They refer probably to the same sample since there is only one 10.028 on the map, which is referred to as 10.029 (p. 8, l.1, p. 12, l. 4) and as 10.028 (p. 9, l. 6) in the text.

8. The AVAZ is referred to as "Vardar unit" (a simpler and probably better name) on page 10, l. 19. It is good to be consistent.

Interactive comment on Solid Earth Discuss., 6, 3075, 2014.