

Introduction

Geometry, thermal structure and kinematics of the metamorphic dome of Ikaria (eastern Cyclades, Greece): implication for Aegean tectonics









Alexandre Beaudoin^{1,2,3}, Valentin Laurent^{1,2,3}, Romain Augier^{1,2,3}, Laurent Jolivet^{1,2,3}, Abdeltif Lahfid^{2,3}, Laurent Arbaret^{1,2,3}, Aurélien Rabillard^{1,2,3}

(1) Université d'Orléans, ISTO, UMR 7327, 45071, Orléans, France, (2) CNRS/INSU, ISTO, UMR 7327, 45071 Orléans, France, (3) BRGM, ISTO, UMR 7327, BP 36009, 45060 Orléans, France

The Aegean domain (Figure 1) has been characterized since the Oligocene by extensional tectonics caused by the southward retreat of the African slab subducting beneath Eurasia. Crustal structures and associated kinematics relative to this extensional tectonics are well constrained in the western Cyclades and the Menderes massif of western Turkey. However, the transition between the two areas is currently not understood. This transition is located Menderes cover Aegean slab and its effects on the + Amorgos ; Ikaria) ornova Flysch zone P-T-t evolution of the overlying Cenozoic volcanics of Turkey thinned crust are not known. The Lycian nappes geology of Ikaria Island, located in Lycian melange this region, remains poorly known and the few existing studies are strikingly conflicting. This work attempts to clarify the geology of Ikaria by a new geological mapping Gavrovo and structural field study coupled -36°N with a thermometric study by Raman spectrometry of carbo-Phyllite-Quartzite naceous material (RSCM). (Miocene) egean quaternary Figure 1: Geological map of the Aegean

Geological map and finite structure of Ikaria

Ikaria Island consists in (Figures 2a and d):

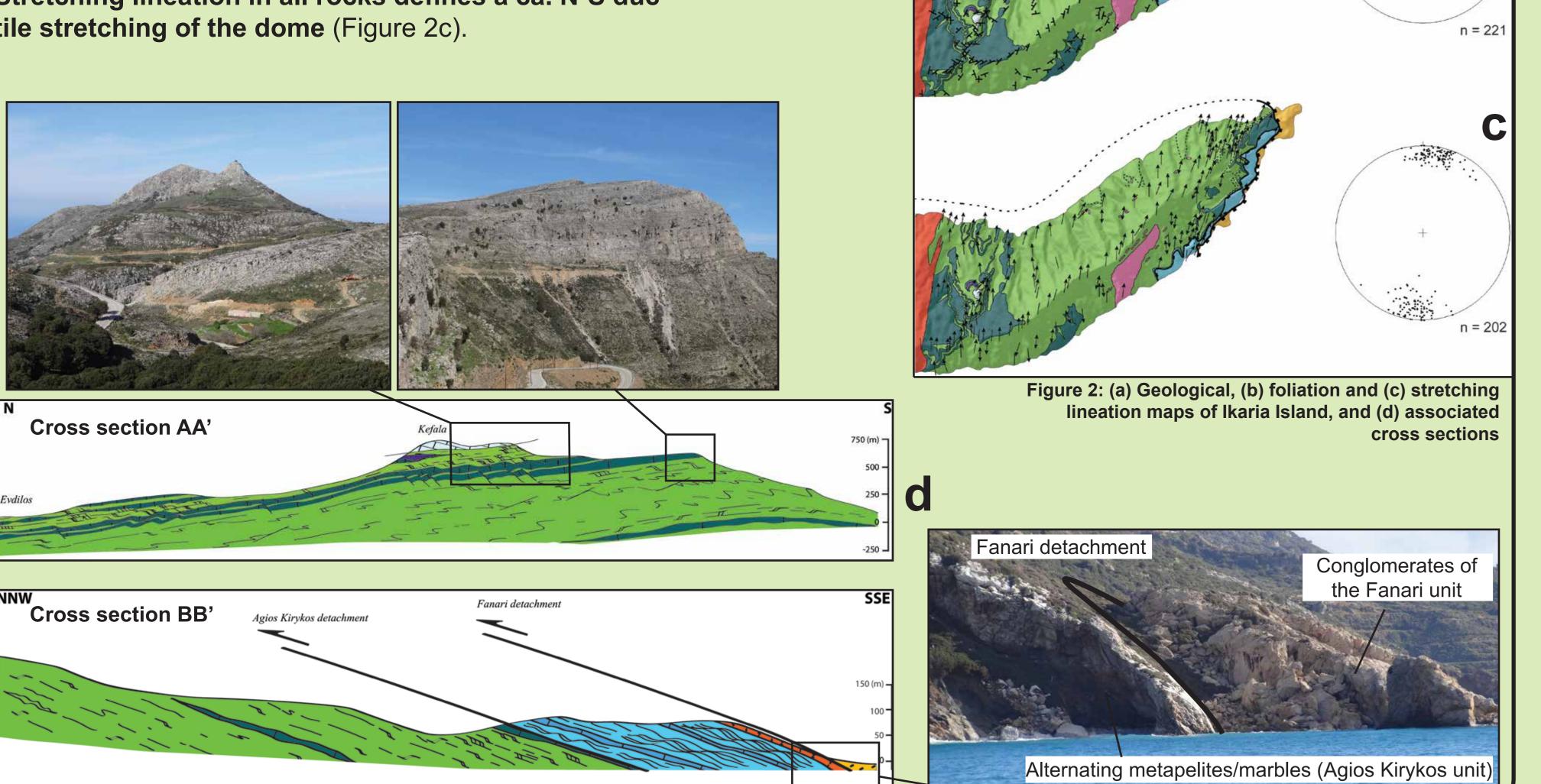
- A metamorphic pile comprising two units (from bottom to
- The Ikaria unit (metapelites, marbles and quartzites) - The Agios Kirykos unit (metapelites and marbles) Those two units are separetad by a first detachment called Agios Kirykos detachment.

Foliation map defines a structural dome (Figure 2b).

Intrusive miocene granites of I and S-type

- The upper sedimentary unit of Fanari, juxtaposed on both granitic and metamorphic rocks through the Fanari-Gialiskari detachment

Stretching lineation in all rocks defines a ca. N-S ductile stretching of the dome (Figure 2c).



Upper unit of Fanari

(Neogene sediments)

Miocene granite of I-type

Miocene granite of S-type

Cretaceous diorite

Fanari-Gialiskari detachment

Metapelites, quartzites and minor

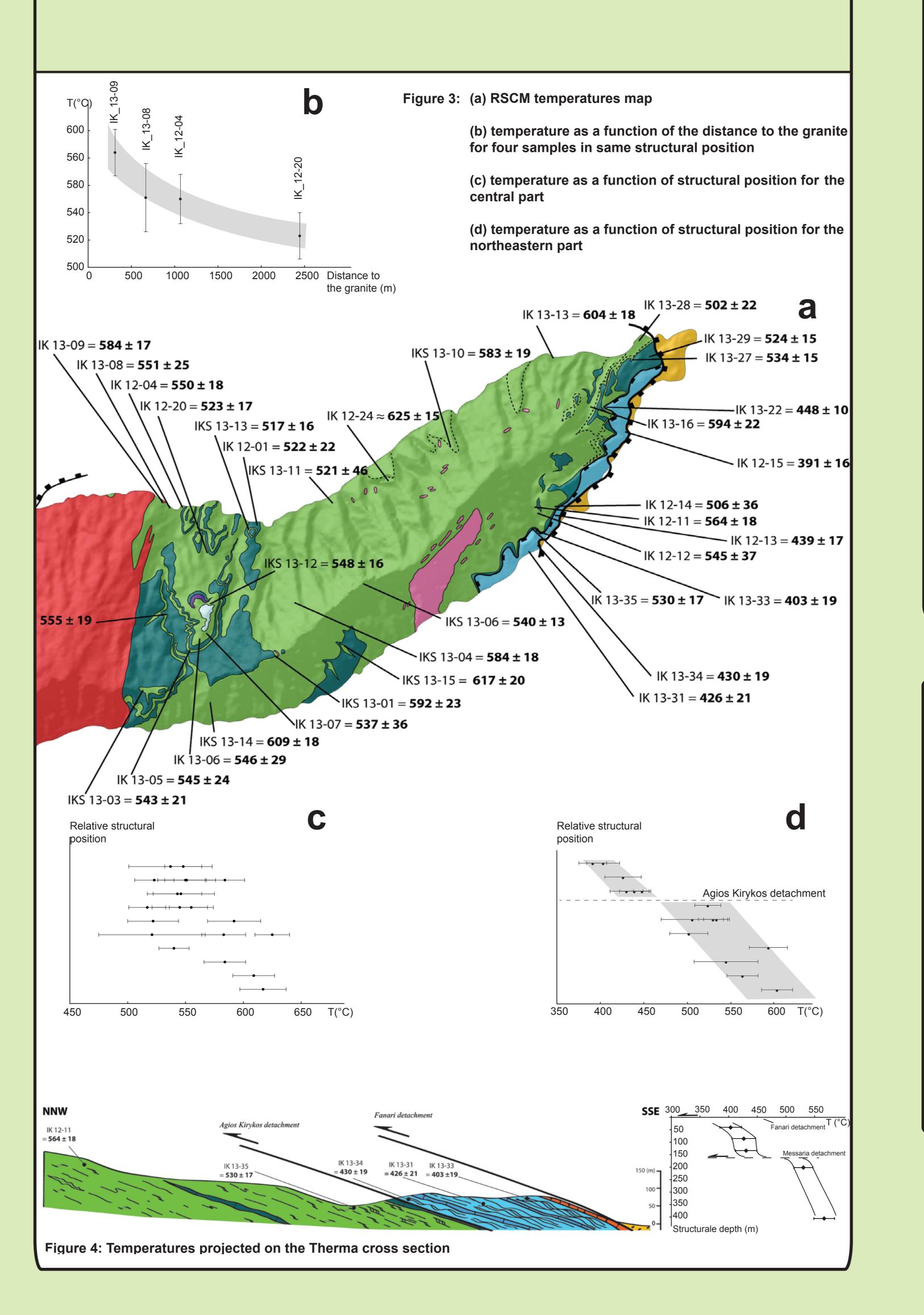
Thermal structure as revealed by RSCM temperatures

In order to compare the geometry and the thermal structure of Ikaria, we performed a cartographical estimation of peak metamorphic temperature (Tmax) based on the RSCM method (Beyssac et al., 2002).

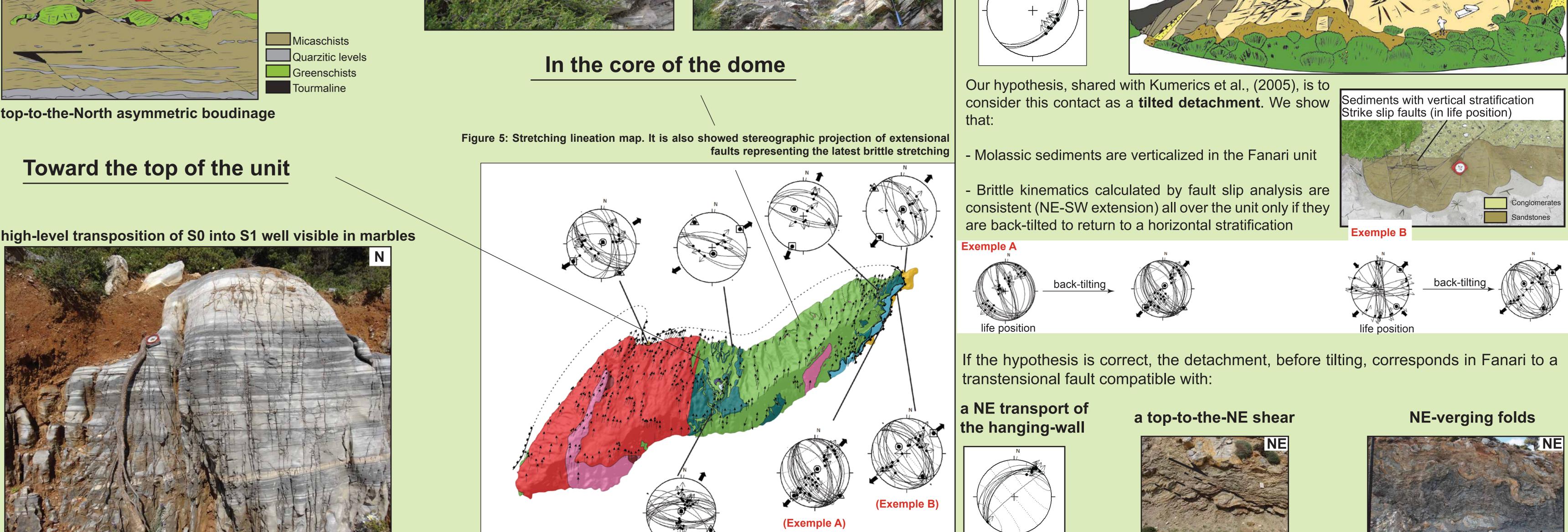
Distribution of Tmax (see Figure 3a for sampling map) depends on:

- -The structural position within the metamorphic succession (Figures 3c, 3d and 4)
- -The distance to the main intrusive body (Figure 3b)
- -The presence of major shear zones (Figures 3d and 4)

We show that Tmax decreases toward the top of the structure and increases close to the Raches granite. A temperature gap is also highlighted in the same structural position as the Agios Kirykos detachment.



Deformation and kinematics in Ikaria unit The Fanari detachment and the deformation in the two upper-most units Deformation in Ikaria is characterized by an overall N-S stretching. Ductile deformation is mostly weak and symmetric in the core of the structure and becomes strong and asymmetric toward the detachments, associated with a top-to-the-North sense of shear. Interestingly, stretching as recorded in the brittle field by inversion of fault slip data is rather NE-SW (Figure 5). Main kinematics Symmetric boudinage (left photo) and weak parallel-stretching folds of S0 (right photo) (here in quartzites) Micaschists Micaschists Quarzitic levels In the core of the dome Greenschists





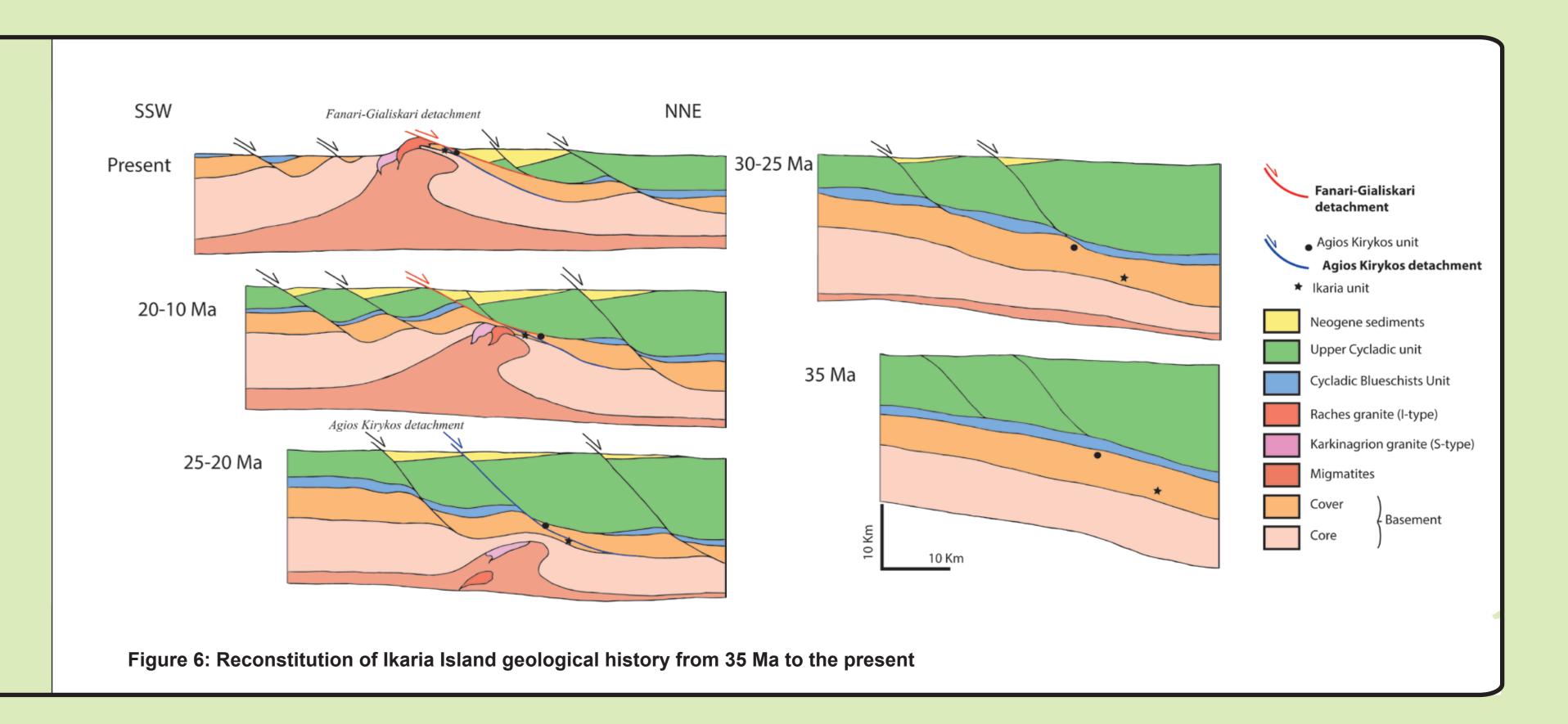
The eastern part of Ikaria is a structural and thermal dome, intruded by magmatic bodies.

- It is structured by two major structures considered as detachments. The Agios Kirykos detachment is responsible for a T gap between two metamorphic units. The Fanari detachment juxtaposes sediments on metamorphic rocks.

- Deformation is represented by a ca. NNE-SSW stretching in both the ductile and brittle fields. It is achieved in a extensional regime, as recorded by brittle faults.

- Final exhumation is completed by the two detachments, operating in the ductile and then the brittle field.

Conclusions permit to consider Ikaria as an Aegean migmatite-cored metamorphic core complex such as Naxos but particular as no HP relics are found (Photiades, 2002). The most important result is that the tectono-metamorphic evolution is more similar to the Aegean one in a hot lithosphere than to the Menderes one and that the NCDS continues estward.



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