Journal of Structural Geology 102 (2017) 75–97

Contents lists available at ScienceDirect

Journal of Structural Geology

journal homepage: www.elsevier.com/locate/jsg

Tectono-stratigraphic evolution of salt-controlled minibasins in a fold and thrust belt, the Oligo-Miocene central Sivas Basin

Charlie Kergaravat [a, b, *], Charlotte Ribes [a, b, 1], Jean-Paul Callot [a], Jean-Claude Ringenbach [b]

[a] E2S-UPPA, IPRA-LFCR, CNRS-TOTAL, Université de Pau et des Pays de l'Adour, Pau Cedex, France
[b] Total SA, CSTJF, Pau, France

ARTICLE INFO

Article history:
Received 19 April 2017
Received in revised form
13 July 2017
Accepted 17 July 2017
Available online 29 July 2017

Keywords:
Salt tectonics
Minibasins
Shortening
Halokinetic sequences
Foreland basin
Sivas Basin

ABSTRACT

The Central Sivas Basin (Turkey) provides an outcrop example of a minibasin province developed above a salt canopy within a foreland-fold and thrust belt. Several minibasins are examined to assess the influence of regional Oligo-Miocene shortening during the development of a minibasin province. The results are based on extensive field work, including regional and detailed outcrop mapping of at least 15 minibasin margins and analysis of the structural elements at all scales. This reveals a progressive increase in shortening and a decrease in salt tectonics during evolution of the province. The initiation of minibasins is driven mostly by the salt-induced accommodation forming a polygonal network of salt structures with mainly local halokinetic sequences (i.e. hooks and wedges). The initiation of shortening is marked by an abrupt increase in sedimentation rate within the flexural foreland basin causing burial of the preexisting salt structures. Subsequently, orogenic compression encourages the rejuvenation of linear salt structures oriented at right angle to the regional shortening direction. The influence of orogenic shortening during the last steps of the minibasin province evolution is clearly shown by: (i) the squeezing of salt structures to form welds which are developed both at right angle and oblique to the regional shortening direction, (ii) the emergence of thrust faults, (iii) the tilting and rotation of minibasins about vertical axis associated with the formation of strike-slip fault zones, and (iv) the extrusion of salt sheets. The pre-shortening geometry of the salt structures pattern, polygonal network of walls and diapirs versus linear and sub-parallel walls, influence the resultant structural style of the minibasin province subjected to shortening. Preexisting linear depocenter limited by sub-parallel walls accommodate preferentially the shortening compare to the preexisting sub-circular depocenter limited by polygonal network of salt walls and diapirs.

© 2017 Elsevier Ltd. All rights reserved.

1. Introduction

In compressive regime, the preferential squeezing of salt structures exerts a powerful control on the resulting deformation and structural style of the fold-and-thrust belt (e.g. Letouzey et al., 1995; Vendeville and Nilsen, 1995; Rowan and Vendeville, 2006; Dooley et al., 2009; Jahani et al., 2009; Callot et al., 2012). Existing field studies focus on preexisting diapirs and salt-withdrawal minibasins developed in rifted, cratonic or passive margin setting which have been uplifted by later shortening, including the Great Kavir (e.g. Jackson et al., 1990); the Artic Canada Axel Heiberg Island (e.g. Jackson and Harrison, 2006; Harrison and Jackson, 2014); the Flinders Ranges (e.g. Rowan and Vendeville, 2006; Kernen et al., 2012; Hearon et al., 2015), the High Atlas (e.g. Saura et al., 2014; Martín-Martín et al., 2017); the South Pyrenean foreland (e.g. López-Mir et al., 2015; Saura et al., 2015); the French Alps (e.g. Graham et al., 2012) and the Zagros fold belt (e.g. Sherkati et al., 2006; Jahani et al., 2009; Callot et al., 2012). However, relatively few examples of minibasin province evolving in synchronous shortening, such as at the toe of continental margins, have been described in the literature and let alone by direct observations (e.g. Peel et al., 1995; Rowan, 2002; Brun and Fort, 2004; Dooley et al., 2013; Kergaravat et al., 2016; Duffy et al., 2017).

The Sivas Basin, in central Anatolia in Turkey, (Fig. 1a), provides very good exposure of salt withdrawal minibasins surrounded by evaporite diapirs, walls, and welds (Ringenbach et al., 2013; Callot

* Corresponding author. E2S-UPPA, IPRA-LFCR, CNRS-TOTAL, Université de Pau et des Pays de l'Adour, Pau Cedex, France.
E-mail address: charlie.kergaravat@univ-pau.fr (C. Kergaravat).
[1] Present address: IPGS-EOST, UMR 7516 CNRS, Université de Strasbourg, Strasbourg, France.

http://dx.doi.org/10.1016/j.jsg.2017.07.007
0191-8141/© 2017 Elsevier Ltd. All rights reserved.

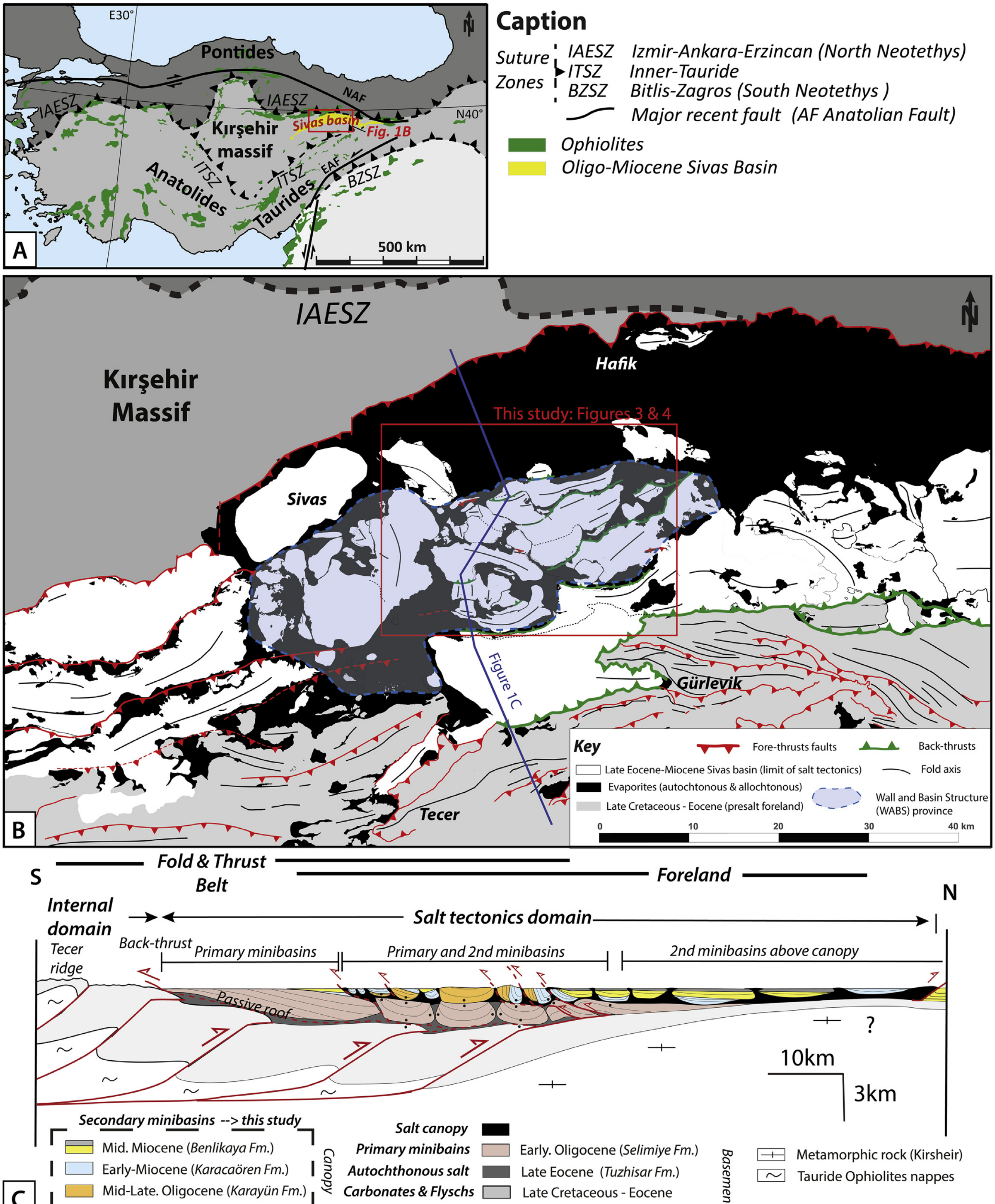

Fig. 1. (A) Tectonic setting of Turkey, showing main continental blocks, Oligo-Miocene Sivas Basin deposits, outcrops of ophiolites, and ophiolitic mélanges belonging to the Tethyan realm and major suture zones including the Izmir-Ankara-Erzincan suture zone (IAESZ), the Inner-Tauride suture zone (ITSZ), the Bitlis-Zagros suture zone (BZSZ), and Oligocene-Miocene deposits of the Sivas Basin after Okay et al. (2006), Stampfli (2000) and Karaoğlan et al. (2013). (B) Map of the distribution of evaporite outcrops at the Sivas Basin scale and Oligocene-Miocene deposits with main thrusts and back thrust faults and folds axes, location of study area corresponding to geological map (Fig. 4A), after Kergaravat (2016). (C) North-South cross section through the center of the Sivas Basin based on seismic line and surface data showing, from south to north the subsalt tectonics wedge of Paleocene-Eocene beneath the autochthonous evaporite, a large asymmetric minibasin belonging to the first generation of minibasins, the second generation of Oligo-Miocene minibasins above an evaporite canopy exposed in the central Sivas Basin, and the flat northern widespread evaporitic domain, after Kergaravat (2016).

Download English Version:

https://daneshyari.com/en/article/5786247

Download Persian Version:

https://daneshyari.com/article/5786247

Daneshyari.com