EVIDENCE FOR MAJOR SHORTENING ON THE EASTERN EDGE OF THE BOLIVIAN ALTIPLANO : THE CALAZAYA NAPPE

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Résumé

Dans la zone de transition entre Altiplano et Cordillere Orientale vers 20° S, la cartographie d'une nappe dont la flèche est d'au moins 42 km fournit une nouvelle preuve de l'existence de raccourcissements considérables dans les Andes boliviennes. A l'échelle régionale, la géométrie de l'allochtone apparaît gouvernée par celle du bassin ashgillien-silurien.

Key-words : Bolivia, eastern Altiplano, thrusts, nappe, paleogeographic control.

Introduction

At about 20° S, the transition zone between the Altiplano and the Cordillera Oriental shows an unusual structural complexity, which happens to be illustrated on the advertising poster of the symposium. Field mapping and satellite imagery analysis demonstrate the existence in this area of an extensive tectonic nappe, the Calazaya nappe, emplaced on a previously deformed domain (1).

Structure and stratigraphy

The Calazaya nappe (fig. 1) overlies the Ayoma-Atocha (relative) autochthon by means of a subhorizontal contact, which is the southern prolongation of the Main Altiplanic Thrust (CALP) (2). The nappe "roots" westwards into the Uyuni allochthon.

The base of the allochthon consists of non-stratified fine-grained diamictites of Ashgillian age, in which the décolle-

Several klippes define an "envelope" for the initial extension of the nappe (irregular folding within the southernmost klippes suggests that gravity played some role in their final emplacement). The geological map (fig. 1) shows that the horizontal amplitude of the tectonic covering is at least 42 km.

The eastern part of the autochthon shows elongated and narrow synclines with Cretaceous strata, locally deformed by a N-S-trending left-lateral transcurrent deformation, and thrusts. Some of these synclines are partly hidden below klippes of the Calazaya nappe. The western part of the autochthon shows wider synclines, E-verging thrusts and, in two places, duplexes. Because they are beheaded by the basal overthrust of the nappe, both duplexes formed prior to the nappe emplacement, as did the thrusts.

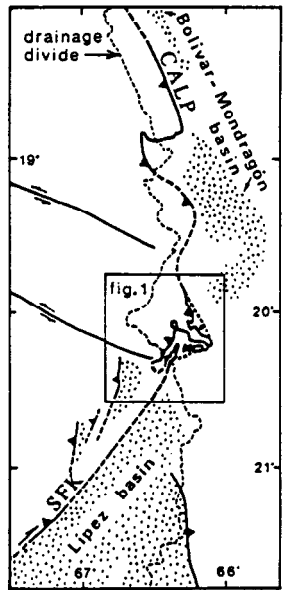

Fig.2. Structural setting of the Calazaya area (framed). The CALP-SFK system is the eastern boudary of the Uyuni allochton and the western boudary of the Ayoma-Atocha domain. The boudary line of the Calazaya nappe is shown with its envelope (see fig.1). Dotted areas: Late Oligocene-Early Miocene foreland basins of the CALP-SFK system, and minor piggyback basins.

Regional significance and paleogeographic control

The basal overthrust of the Calazaya nappe connects northwards with the CALP and southwestwards with the Khenayani Fault System (SFK) (fig. 2). The CALP-SFK E-verging system is a major tectonostratigraphic boundary which separates the (western) Uyuni allochthon from the (eastern) Ayoma-Atocha domain (2). The SFK is a complex thrust system, with a basal décollement also located in the Ashgillian non-stratified diamictites (3). Based on cartographic and sedimentological grounds, the CALP-SFK seems directly controlled by the geometry of the Ashgillian-Silurian basin (1,3) : the Uyuni allochthon contains thick and deep facies of that age, and its

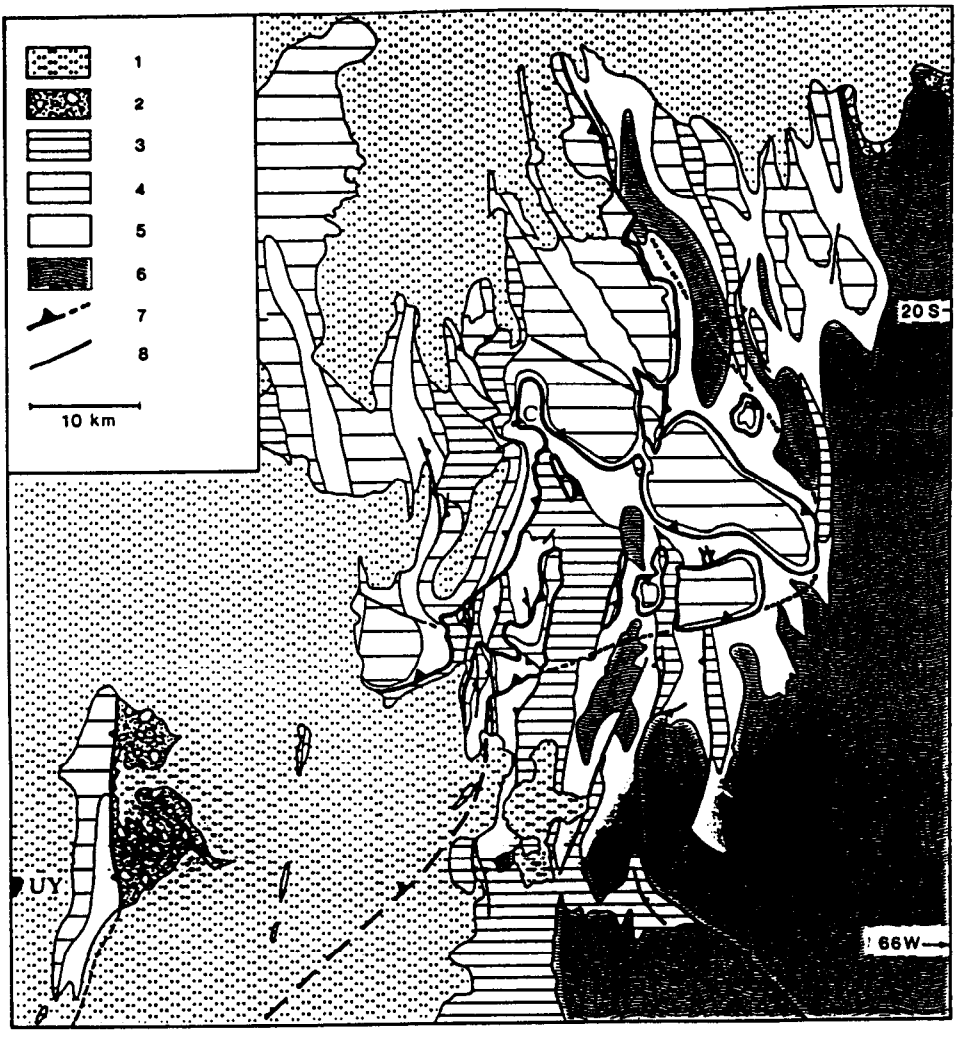

Fig.1.Geological map of Calazaya area. 1: Middle Miocene and younger rocks. 2: Late Oligocene-Early Miocene. 3: Mesozoic-Paleocene. 4:Silurian.5:Ashgillian. 6:pre-Ashgillian Ordovician. 7:basal overthrust of Calazaya nappe and envelope of the nappe. 8:other faults. C:Calazaya village. UY:Uyuni city.

ment is located; these rocks are overlain by thick Silurian turbidites and shales, on which rest unconformably mainly continental deposits of Mesozoic-Paleogene age. The autochthon shows extensive outcrops of pre-Ashgillian strata and thick Ashgillian diamictites; the basal Silurian unit is comparatively thinner (when preserved below the Mesozoic unconformity, which rarely occurs). Mesozoic - Paleogene deposits are simi-

basal décollement is located in the lowest part of this series; in the autochthon, Ashgillian facies are more proximal and apparently thinner.

Thick continental sedimentation of Late Oligocene-Early Miocene age is recorded in the autochthonous Bolívar-Mondragón and Lípez basins (fig. 2), and is believed to represent the correlative foreland deposits of the E-verging deformations described above (1,3,4).

Conclusions

The Uyuni allochthon was overthrust onto the Ayoma-Atocha domain during the Late Oligocene-Early Miocene time span. In the studied area, this overthrust appears as a spectacular nappe, which post-dates some deformations in both allochthon and autochthon. The Ashgillian-Silurian basin geometry seems to have deeply controlled the Uyuni allochthon geometry.

References

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