PERI-TETHYAN BASIN TECTONIC EVOLUTION: FROM OPENING TO INVERSION

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We analyzed the tectonic evolution of the major basins of the peri-tethyan domain. The investigated area includes (1) the northern tethyan margin (Iberia, western and central Europe, Scythian platform and Caucasian domain), and (2) the southern tethyan margin (North Africa and Arabia). It is a work of the Tectonic Group of the Peri-Tethys Programme. This five-years program produced a set of 24 paleoenvironmental maps from Late Paleozoic to Quaternary (scale 1/10 000 000).

Here, we present several examples of tectonic maps, from Late Permian to Quaternary, including the major tectonic and geodynamical features of the tethyan margins, as well as reconstructions of the tethyan domain. For each time slice depicted on a given map, three types of complementary and independent data are incorporated : major tectonic features, reconstructed paleostresses, and depocentral trend axes. These tectonic reconstructions result from a compiling of published works and from original results provided by the projects funded by the Peri-Tethys Programme. They have been elaborated with the help of regional specialists. The compiling of all these tectonic elements on the same map allows to display and to characterize the tectonic evolution at the scale of the peri-tethyan domain

On each map, the major faults active at the time of the map are represented as well as the main structural features such as anticlines and/or synclines, deformation fronts, accretionary ridges, and transform faults. Rifting zones are represented by normal fault patterns and inversions are depicted by major thrusts or reverse faults, anticline and/or syncline axes.

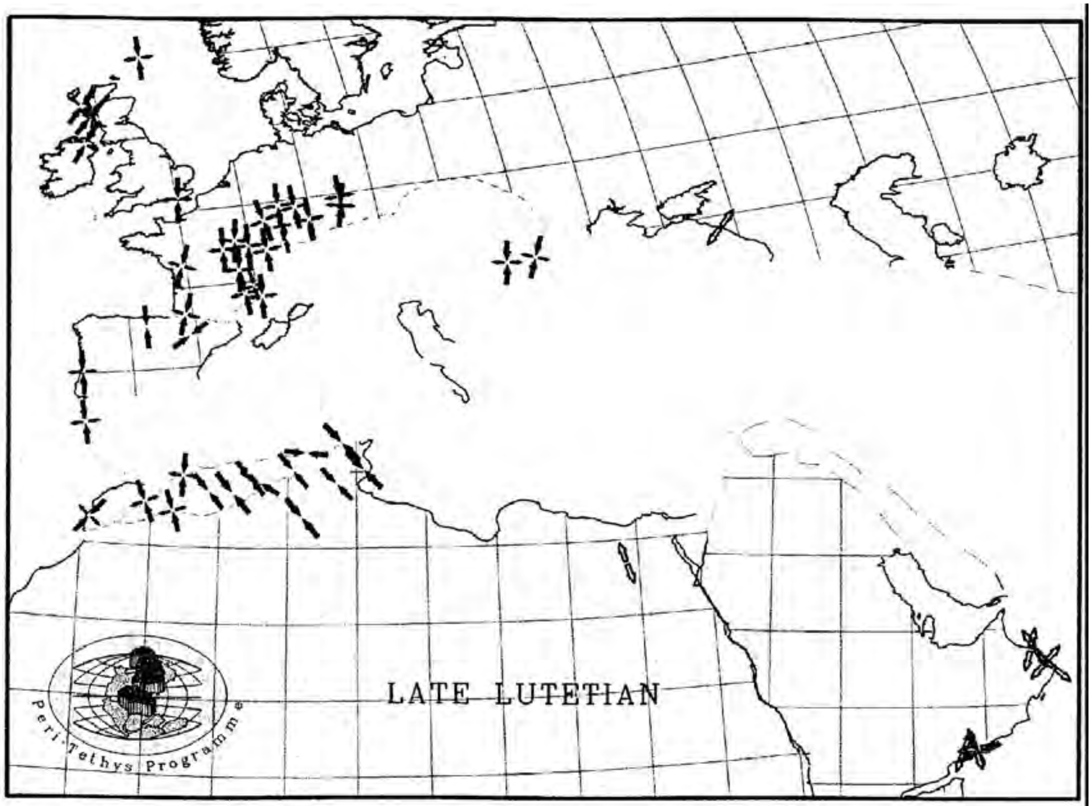
The paleostress fields are shown by arrows, displaying the directions of the main horizontal stress axes for extensional ($\delta3$), compressional ($\delta1$), and strike-slip ($\delta1$ and $\delta3$) regimes. One arrow represents the average stress field reconstructed in a small region from the analysis of fault-slip data sets. Each of these arrows is determined by several homogeneous sites of fault measurements where the stress tensors are well constrained. Poorly defined stress computations resulting from heterogeneous and/or - fault populations have been rejected from the database. Two paleostress maps for Campanian and Lutetian times are shown as examples (Fig.1).

Analyses of basins infilling allow us to characterize tectonic subsidence axes for some major sedimentary basins of the peri-tethyan domain. For rifting periods, the main normal faults are represented as well as the axes of active tectonic subsidence. During the post-rifting period, only the axes of thermal subsidence are indicated. In addition, the axes of the major flexural basins (foreland basins, compressional basins) are shown.

These set of data allow us to synthesize the history and the tectonic evolution of the peri-tethyan basins. For several selected basins, we established tectonic logs showing (1) the major tectonic events (ages, types), (2) possibly synthetic stratigraphic columns, (3) the paleostress evolution (age, tectonic regimes, directions) and/or (4) typical subsidence curves (main events, driving mechanisms proposed). On these tectonic logs, we pay a particular attention to the uncertainties on the dating and on the main characteristics of the tectonic events. In many regions the tectonic events, especially the compressive ones, are dated by analogy with similar events known elsewhere. Commonly their ages are not directly determined. These approximations commonly lead (1) to generalize compressive events at large regional scale whereas they are dated in few areas, and (2) to systematically forget any diachronic tectonics. In the case of extensional tectonics, rifting period must be documented from both normal faulting activity (from field observations and seismic profiles) and subsidence analysis.

In addition we considered the tectonic evolution of the tethyan domain. This domain consists of the oceanic tethyan domains accreted during Late Paleozoic and Mesozoic (Neotethys, Ligurian Tethys, Vardar Ocean, East Mediterranean basin) and the major microplates located between Eurasia and Africa (Apulia s.l., Iberia). We propose a reconstruction of this domain based on the data available (1) in the alpine chains resulting from the closure of the tethyan domain during the Africa-Eurasia convergence, and (2) in the peri-tethyan platforms where consequences of the tectonic evolution of tethyan domain are recorded. We also took into account the plate kinematic evolution, and especially the relative motion between the Eurasian and African plates. The available space between these two major plates controls the tectonic evolution of the tethyan domain and as a consequence of the tethyan margins.

This review of the tectonic data of the vast-tethyan and peri-tethyan domains provides a "checkup " of the knowledge available on the evolution of the major basins. It may be constitute a basis for a future project focused on the evolution of the major tethyan basins, from opening to closure.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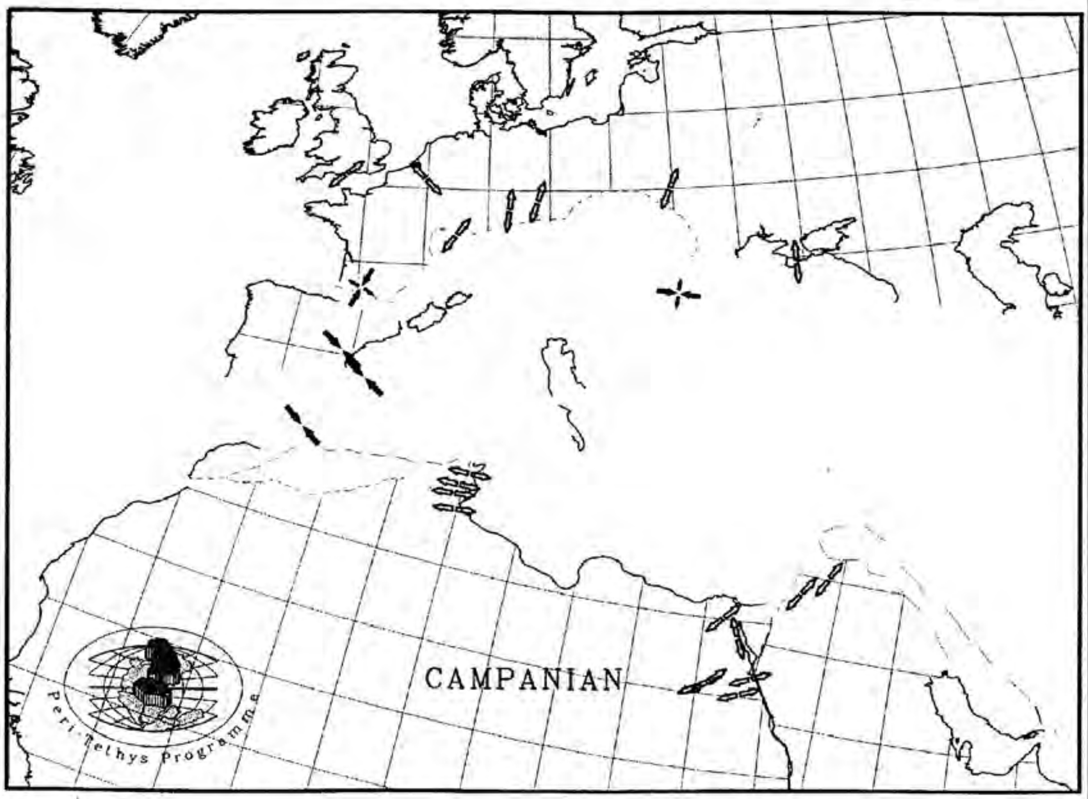
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