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4D basin analysis of the intra-continental Hefei Basin in correlation with adjacent Dabie Orogen (East China)

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The Hefei Basin is an intra-continental basin located north of the Dabie Mountains in East China. These mountains which formed during the Triassic collision between the North China Block and the South China Block, supplied sediments that have accumulated in the Hefei Basin from the Lower Jurassic to the Quaternary. Both, the basin and the mountains, are bounded to the East by the NNE-trending Tanlu Fault.

The aim of the work is to correlate the structural development of the Hefei Basin to the late and post-orogenic evolution of the adjacent Dabie Mountains and the Tanlu Fault. In the Hefei Basin, we achieved a 4-D basin analysis. The data consist in fourteen 2-D seismic-reflexion profiles, nineteen boreholes, gravimetric maps and field data. We proceeded to seismic interpretations (Kingdom Suite), density anomaly modelling, quantitative fault analysis, restoration and back-stripping (2DMove), numerical modelling (gOcad) and subsidence analysis as well as paleostress calculations.

The Hefei Basin is divided into (i) a northern part where the amount of deforma-

tion is low and the sedimentary pile reaches up to 2000 m, (ii) a southern part where the amount of deformation is large and the sedimentary accumulation reaches up to 8000 m. In this southern part, three S-dipping faults generate tilted blocks. Reverse faulting, normal and syn-sedimentary activities are determined through time showing tectonic inversion and reactivation. Analysis of the basement structures shows that the Mesozoic faults are branched at depth on N-vergent thrusts, indicating a structural inheritance.

The activity of the main faults in the basin is linked to the late and post-orogenic evolution of the Dabie Mountains and the activity of the Tanlu Fault. In a first stage (Jurassic–Lower Cretaceous), the basin is controlled by the mountain belt. Compressive structures are due to the collision. In Cretaceous, a major magmatic event occurs and extension affects the Mountain belt as well as the basin (syn-sedimentary faults). From the Upper Cretaceous, the Tanlu Fault influences the sedimentary deposition in the basin, and the depocenter migrates northeast-wards. Later, in Eocene time the basin has undergone the far-field effects of the India-Asia collision. During the last stage of basin development (Neogene), the sediments deposited in the western part of the basin and blanketed the major faults. A good correlation exists between the mountains belt and the surrounding sedimentary basin. Therefore, a good knowledge of the orogenic belt evolution allows a better understanding of the structures of the connected sedimentary basins.