

**AAPG International Conference  
Barcelona, Spain  
September 21-24, 2003**

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**3D Regional Deformation Patterns Associated to Thrust Sheet Rotation of the Gavarnie - Sierras Exteriores Thrust Sheet, Spanish Pyrenees**

Late Eocene deformational style along the Southern Pyrenean thrust sheets varies along strike. During this time the Montsec thrust sheet is carried passively on the Gavarnie - Sierras Exteriores thrust sheet. Whereas the Sierras Exteriores records along-strike contraction, the Montsec thrust sheet records an along-strike extension. Both are overimposed on the general N-S contraction. Formation of N-S trending extensional faults in the frontal sector of the Montsec thrust sheet, evident from field studies and seismic surveys, is coeval with southward thrusting. The E-W extension is caused by regional clockwise rotations occurring to the east in the Gavarnie thrust sheet, some of which have already been documented along the Sierras Exteriores. Paleomagnetic studies of the Gavarnie thrust sheet in the Ainsa Basin area reveal regional clockwise rotations of up to 80° in sediments of Lower Eocene age. The amount of rotation decreases with age, providing a precise dating for this rotation. Rotation in the Ainsa Basin area is coeval with the formation of 3 kilometeric scale N-S trending anticlines (the Mediano, Añisclo and Boltaña anticlines), and with the growth of extensional faults westwards in the Montsec thrust sheet.