(De)-Dolomitisation and Brecciation along Fault Zones in the Eastern Part of the Cantabrian Mountains

GRIMMER, J.O.W.*, BAKKER, R.J.**, ZEEH, S.* & BECHSTÄDT, T.*

*Geologisch-Paläontologisches Institut, Universität Heidelberg, Germany, **Institut für Geowissenschaften, Mineralogie & Petrologie, Montanuniversität Leoben, Austria, Corresponding author: jgrimmer@ix.urz.uni-heidelberg.de, INF 234, 69120 Heidelberg, Tel. 00-49-6221-544892 Fax: -545503

The Cantabrian Zone (Fig. 1) has been established as a foreland thrust and fold belt of the Variscan collisional orogen in Northern Spain. The regional structure of this zone represents thin-skinned tectonics which produced complex thrust units. The main thrust units were emplaced by rotational movements at diagenetic-to-shallow metamorphic conditions, causing the typical curved shape of this zone. In the eastern part of the Cantabrian Zone, three tectonic units: Ponga, Picos de Europa and Esla (Fig. 1) are studied to obtain information about their diagenetic history and especially about the origin of fault-related breccias. Calcite-dolomite veins in tectonic breccias associated with faults and thrusts within the Barcaliente Formation are studied. The fault zone consists of a mixture of Alba Fm. (Dinantian) and Barcaliente Fm. (Lower Silesian, Namurian) only in the Pico Jano duplex. The Barcaliente Fm. is characterised for the entire region by a bituminous and micritic bedded limestone, whereas the Alba Fm. consists of red nodular limestone. In all three tectonic units, products of dolomitisation (together with zebra structures), dedolomitisation and brecciation along fault zones have been observed. The fault zones in the studied areas are parallel-to-subparallel in limestone beds of the Barcaliente Fm.

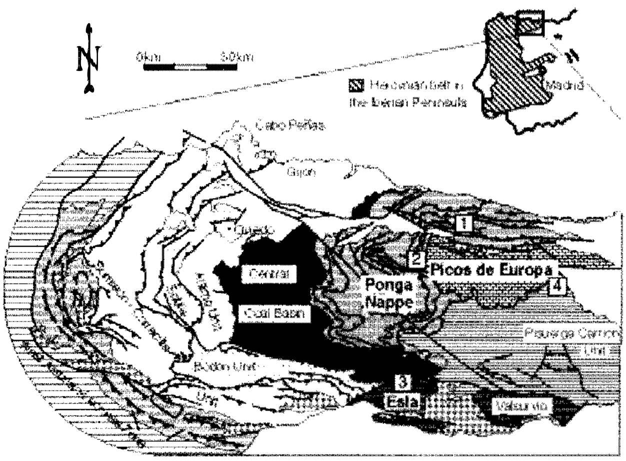

Fig. 1: Tectonic framework of the Cantabrian Zone. Open squares indicate the studied areas 1. Faultzone between the Meré-Peruyes and Cangas de Onis nappe; 2. Rio Color window; 3. Pico Jano duplex; 4. Faultzone between Liebana and Picos region (La Hermida canyon).

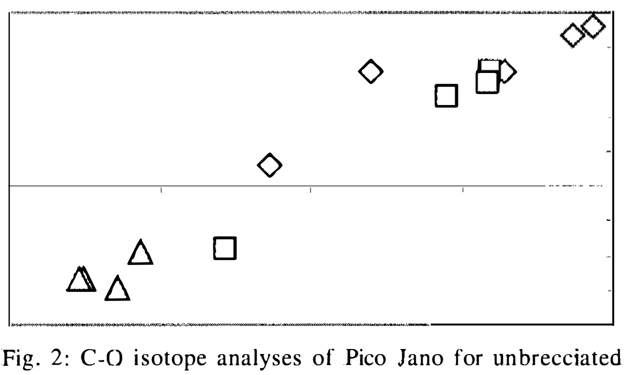

Fig. 2: C-O isotope analyses of Pico Jano for unbrecciated Barcaliente Fm. (diamond), dolomite cements (square) and calcite cements (triangle).

The evolution of the fault zones is illustrated by the precipitation of cements from different types of circulating fluids in several impulses. Fluid inclusion data obtained from several calcite and dolomite cements indicate distinct diagenetic history of the four studied fault zones. Calcite cements are always younger than dolomite cements and have lower or similar formation temperatures. Only the calcite cement in Meré-Peruyes has higher temperatures than dolomites. The cement generations in this fault zone reveal a prograde temperature development from dolomite to calcite precipitation. In Rio Color and La Hermida dolomitisation processes must have occurred at higher temperatures than calcite precipitation and dedolomitisation. Dolomites were precipitated from higher saline fluids than calcite (nearly pure water), except for the La Hermida region where the calcite has the highest observed salinity. The composition of this saline fluid was NaCl-rich and included some other salts, like $MgCl_2$ and $CaCl_2$ (results of combined Raman and microthermometry measurements). A similar type of saline fluid must have circulated in the Meré-Peruyes region. Both fault zones are E-W striking and belong to a regional endphase of nappe emplacement, which is relatively younger than faulting processes in Rio Color and Pico Jano. The observed tendency (Fig. 2) towards lower oxygen and carbon isotopes could be interpreted as the effect of burial diagenesis, especially for the Meré-Peruyes area according to microthermometric data. On the other hand, different intensities of wall-rock interaction during the precipitation of dolomite and calcite cements may have also caused the observed trend. Dolomites reveal an intense interaction and obtain isotopic compositions similar to the wall rock, whereas calcite has only a weak interaction and, therefore, an isotopic composition closely related to the precipitating fluid.

Kohlebildung in Hoch- und Niedermooren entlang der intramontanen Norischen Senke (Miozän, Ostalpen)

GRUBER, W. & SACHSENHOFER, R.F.

Montanuniversität Leoben, Institut für Geowissenschaften, Geologie und Lagerstättenlehre, Peter Tunner Straße 5, A-8700 Leoben, wilfried.gruber@unileoben.ac.at, sachsenh@unileoben.ac.at

Entlang der Norischen Senke, einer sinistralen Seitenverschiebungszone welche dem oberen Murtal und dem Mürztal folgt, bildeten sich im Miozän mehrere Sedimentbecken. In die limnischen (brackischen) und fluviatilen Sedimente sind mehrere Tuffe und Tuffite sowie Braunkohlen eingeschaltet. Letztere wurden im Fohnsdorfer und Leobener Becken bis vor 25 bzw. 35 Jahren abgebaut. Aufzeichnungen der Bergbaubetriebe und Untersuchungen von Glanzbraunkohlen und Sapropeliten aus der Sammlung der Montanuniversität Leoben lassen die Abgrenzung von Moorfaziesbereichen zu. Neben der Bestimmung von Asche-, Kohlenstoff- und Schwefelgehalten wurden Rock Eval Pyrolysen durchgeführt. Eine mikropetrographische Maceralanalyse an Stückschliffen (STACH et al. 1982) ermöglichte die Berechnung von Faziesindikatoren (DIESSEL 1991, CALDER et al. 1991).

Die Sedimentabfolge im Fohnsdorfer Becken beginnt mit einer fluviatilen Liegendserie, die im Nordwestteil von einem über 12 m mächtigem Kohleflöz überlagert wird (PETRASCHECK 1924, POLESNY 1970). Der nur selten abbauwürdige Liegendteil ist asche- und schwefelreich. Dessen detritäre Kohle wurde in einem Niedermoor gebildet. Im mittleren Hangendteil sinkt besonders im Osten der Schwefelgehalt auf unter 1 % ab, wobei Aschegehalte um 6 % und ein niedriger Grundwasserindex vorherrschen. Der hohe Vegetationsindex und vitritische Kohle sprechen für reichen Baumbe-