Preliminary remarks on the genesis of carbonates and coelestine in the hypersaline Qaidam basin, China

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The nonmarine, hypersaline Qaidam basin of Western China comprises a ca. 6–16 km thick fill which is dominated by Oligocene to recent clastic rocks. Because of nearly entirely endorheic drainage, the infilling history is governed by erosion of surrounding mountain belts (Altyn, Kunlun, Qilian), climate and tectonic evolution. An increasing aridity trend has been reported throughout the lake history. Superimposed on this trend, hypersaline and terrestrial stages have been documented. Marls are common in the lake floor facies. A carbonate content of up to 30 percent is estimated for the lake floor facies.

Distinct cm- to several meter thick limestone layers are intercalated within Oligocene to Pliocene levels. These are mostly oolites deposited in prodelta regions. Oxygen isotopic composition of limestones of mainly the Shizigou section range from $\delta^{18}O$ -4.0‰ (PDB) in the Upper Oligocene Xiaganchaigou Formation to –7.6‰ in the Pliocene Xiayoushashan Formation. These increasingly negative isotopic composition values may reflect increasing aridity, respectively temperature and maybe also precipitation at higher elevations in surrounding mountains. The $\delta^{13}C$ values (PDB) display an even larger variation from –6.0‰ in the Oligocene Xiaganchaigou Formation to -1.1‰ in the Pliocene Xiayoushashan Formation. The shift in the carbon isotopic composition can be related to the increasing aridity condition which had induced changes in the vegetation pattern in the area surrounding the basin.

Coelestine was deposited in the basin center facies of the Pleistocene Qigequan Formation. At the Dafengshan mine, coelestine forms several decimeter to meter thick layers overlying a marl which is rich in bivalve shells. Coelestine layers display framboidal depositional fabrics with radial needles and plates of coelestine. Post-depositional mobilization resulted in formation of epigenetic subvertical, NNE-trending, ca. 1–3 decimeter thick extensional veins which are filled with coelestine, too. This coelestine veins formed during regional SSW-NNE compression, consistent with basin-scale structures.

Strontium isotopic compositions of the limestones and coelestine from the Dafeng deposit have been measured on unspiked samples because these should represent a perfect mixture between various sources in surrounding mountain belts due to endorheic drainage. Miocene limestones from the Shizigou section gave $^{87}Sr/^{86}Sr$ ratios of 0.711578 ± 0.000006 to 0.711679 ± 0.000008. Samples from syn- and epigenetic coelestine from the Pleistocene Dafeng deposit yield values of 0.711414 ± 0.000005 and 0.711418 ± 0.000006, respectively, which show (1) the same composition for these two textural types and (2) slightly lower values than those from limestones. Strontium isotopic ratios are much higher than strontium isotopic compositions of Neogene and Pleistocene seawater and reflect, therefore, the erosion of relatively old continental crust.

Die Unterscheidung von Rutschfalten und tektonischen Falten - Beispiele aus alpinen synorogenen Ablagerungen

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Wenn es möglich ist, Rutschfalten und frühe tektonische Falten zu unterscheiden, ist es möglich, durch Datierung der Sedimente direkt die Verformung zu datieren. An zwei Beispielen sollen die Unterschiede von direkt tektonisch induzierter Verfaltung und Rutschfaltung aufgezeigt werden.

Oberkretazische synorogene Klastika am Muttekopf (Lechtaler Alpen, Tirol) wurden während der Auffaltung in der frontalen Synklinale eines Synklinal-Antiklinal-Systems über einer blinden Überschiebung abgelagert, was durch mehrere progressive Diskordanzen in der Sedimentabfolge dokumentiert ist (Ortner, 2001). Durch die Aufkippung des südlichen Schenkels kam es zu Rutscherscheinungen im weichen Sediment. An Zweigüberschiebungen zu der blinden Überschiebung, die in die syndeformative Sedimentabfolge hineinreichen, kam es zur Verkürzung und Faltung in den noch nicht vollständig verfestigten Ablagerungen. Meter bis Zehner-