

“Coming to grips” with Cordilleran metamorphic core complexes [2014, Geological Society of America Abstracts with Programs, Rocky Mountain and Cordilleran Joint Meeting, 19-21 May 2014]

“The Tucson-based Penrose Conference that introduced *metamorphic core complexes* was convened by Max Crittenden, Peter Coney, and George Davis in 1977 to discuss, comparatively, their geologic characteristics: e.g., two-mica garnet-bearing granitic intrusions; steep metamorphic gradients; older-on-younger fault relations; low-angle detachment faults; high-standing domical topography; shallow-dipping ‘augen gneissic’ foliations; consistently oriented subhorizontal penetrative mineral lineations; horizontal-axis rotation of upper plate rocks; Miocene sediments in low-angle fault contact on sheared ‘basement’; expansive regions of reset K/Ar ages; widespread ignimbritic volcanism contemporaneous with the reset ages. Assimilating key characteristics would foretell the role of metamorphic core complex deformation in Cordilleran tectonic evolution. The Penrose participants, including Art Snoke who held forth on Ruby Range shearing and detachment, systematically addressed what is now a pantheon of Cordilleran metamorphic core complexes: Bitterroot, Albion, Raft River-Grouse Creek, Ruby, Snake, Whipple, Harquavar, Harquahala, South Mountain, Picacho, Tortolita, Catalina-Rincon, Pinaleño, Coyote, and Mazatan. Fundamental issues were on the table at the conference, especially the question of whether metamorphic core complexes south of the Snake River Plain formed in Mesozoic and/or early Cenozoic as a result of compression and thrusting, or, during Oligocene-Miocene through regional extension. In the 5 years following this Penrose Conference, the structure-tectonics community made relatively short work of deciphering the significance of metamorphic core complexes, though this required coming to grips with immediate practical advances in discerning precise timing, understanding deformation mechanisms, ‘reading’ fault-rock kinematics, grasping shear zone deformation, and developing a meaningful taxonomy for discussing and interpreting mylonites and other fault rocks. Achieving such immediate practical knowledge was advanced by yet another GSA Penrose Conference, convened by Jan Tullis, Art Snoke, and Vicki Todd, on the topic of “Significance and Petrogenesis of Mylonitic Rocks”.