HEAT FLOW AND CRUSTAL STRUCTURE ASSOCIATED WITH BACK ARC BEHAVIOR IN THE NORTH AMERICAN CORDILLERA

BLACKWELL, David. D., and MCKENNA, Jason. R., Dept. of Geology, SMU, Dallas, TX 75275-0395 USA

For much of the Cenozoic, western NA, like western SA, has been the site of subduction of various oceanic plates in the Pacific Ocean. Although the subduction has stopped over part of the strike length of the NA Cordillera, the imprinted pattern still dominates the lithospheric geophysical characteristics from Mexico to Alaska. The main feature of the thermal pattern is the surprisingly uniform, broad, high heat flow of the back arc region. The parameters of the heat flow are statistically equivalent to the classical Basin and Range heat flow. The Q-A relationship with an intercept value of 60±20 mWm-2 and a slope of 10±2 km applies to all of these areas. The asso-iated crustal structure is uniformly thin, demonstrating that a hot upper mantle, i. e. thin lithosphere, is associated with the back arc region. The characteristics of the extended crust are not consistent with gravi-tational collapse by large scale stretching. Thus even though there has been intensive study of the effects of late Cenozoic exten-sion in the Basin and Range province, this area is not very different from the back arc regions to the north and south. The east edge of the back arc high heat flow from Alaska to southern Mexico is closely associ-ated with the east edge of the Mesozoic Cordilleran thrust belt. Thus the basic high heat flow/thin crust pattern may have been imprinted as early as the Mesozoic. The source of the energy to generate and maintain the high heat flow in the back arc is postulated to be the continuous loss of gravitational potential energy by the sinking slabs as they penetrate into the mantle.