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Deformation of the Western Caribbean and Northwestern South America From GPS Geodesy

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We investigate the current kinematics of the western Caribbean and northwestern South America, two regions that are affected by ongoing collision of aseismic ridges and the motion of forearc slivers. We investigate these regions using a new PS derived surface velocity field spanning from Guatemala to Ecuador. The new velocity field and published earthquake slip vectors are inverted to solve for the Euler vectors of forearc blocks and interseismic elastic strain accumulation on block bounding faults using a block modeling approach. Along the western Caribbean margin, it has been demonstrated that the Cocos Ridge collision drives the Central American forearc block to the northwest. GPS network expansion in Panama and Colombia allows us to investigate the effect of ridge collision on the Panama region. In northwestern South America, the North Andes block (NAB) is a hypothesized tectonic block that migrates north-northeast relative to a stable South American reference frame. The motion of this block is thought to be derived by the collision of the Carnegie Ridge in southern Ecuador or by oblique convergence and high degrees of interplate coupling north of the ridge (i.e. strain partitioning). We test a suite of block models to investigate the tectonic nature of the Panama Region and North Andes block and the style of faulting in the upper plate accommodating block motion. Through the estimation of elastic strain accumulation on all block bounding faults, we improve the understanding of interseismic coupling along a convergent margin capable of producing M>8 earthquake and upper plate faults capable of M>6 earthquake.