



Sea level rise Contribution from High Mountain Asia by 20150

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We estimate individual area and volume change by 2050 of all 83,460 glaciers of high mountain Asia (HMA), with a total area of 118,263 km², delineated in the Randolph Glacier Inventory version 4.0 which separates glacier complexes in its previous version into individual glaciers. We used the 25 km resolution regional climate model RegCM 3.0 temperature and precipitation change projections forced by the IPCC A1B scenario. Glacier simulations were based on a novel surface mass balance-altitude parameterization fitted to observational data, and various volume-area scaling approaches using Shuttle Radar Topography Mission surface topography of each individual glacier. We generate mass balance-altitude relations for all the glaciers by region using nearest available glacier measurements. Two methods are used to model the Equilibrium line altitude (ELA) variation. One is to use ELA sensitivities to temperature and precipitation change vary by region based on the relative importance of sublimation and melting processes. The other is solved ELA implicitly for every year using the temperature at ELA and Degree Day model. We project total glacier area loss in high mountain Asia in 2050 to be 22% of their extent in 2000, and they will contribute 5-8 mm to global sea level rise.