We present the current status of our efforts to produce a global catalog of instrumentally recorded earthquakes with homogeneous locations obtained using the same methodology and complete down to the lowest magnitude threshold possible (Ms 5.5 on a global scale for the time period 1964-present). This project is currently being carried out under the auspices of GEM (Global Earthquake Model), and the resulting earthquake catalog will be a fundamental dataset not only for earthquake risk modeling and assessment on a global scale, but also for a large range of global and regional seismological studies. In this presentation we will only report on our interim results for the period 1978-1999.

Phase arrival-time data are available in digital form from the International Seismological Centre (ISC). These data are processed in two steps. First, the EHB location methodology (Engdahl, van der Hilst and Buland, 1998) is applied to earthquakes near the magnitude threshold in order to significantly improve locations and, by using reported depth phases, focal depth as well. Second, a new ISC location algorithm (Bondár and Storchak, 2011) is applied with depths fixed at EHB estimates that accounts for correlated error structure, and uses all IASPEI standard phases with a valid ak135 travel-time prediction to obtain more accurate event locations.

We will illustrate some of the most significant results of this relocation effort, including systematic differences in epicenter and depth with respect to previous locations, identification of grossly mislocated events, aftershock distributions for large earthquakes, and subduction zone cross sections.