Multiferroicity in the Mixture of Orthorhombic and Hexagonal RMnO$_3$ (R=rare earths) CHENGLIN ZHANG, GUHA SABYASACHI, SANG-WONK CHEONG, Rutgers University — Orthorhombic perovskite RMnO$_3$ (R = Tb, Dr) shows an incommensurate magnetic/lattice modulation below $\sim 40$ K and a lock-in transition below $\sim 25$ k. The system becomes ferroelectric at the lock-in transition. On the other hand, hexagonal RMnO$_3$ (R = Ho-Lu, Y) exhibits ferroelectricity with a much higher transition temperature ($\sim 1000$ K) and a magnetic ordering transition at $\sim 100$ k. We will report the results of our comprehensive study of what happens when these two types of ferroelectric 113 compounds are mixed.