Numerical evidence against both mean field and droplet scenarios of the Edwards-Anderson model JULIO F. FERNANDEZ, Universidad de Zaragoza, Spain, JUAN J. ALONSO, Universidad de Granada, Spain — From tempered Monte Carlo simulations, we have obtained accurate probability distributions $p(q)$ of the spin-overlap parameter $q$ for finite Edwards-Anderson (EA) and Sherrington-Kirkpatrick (SK) spin-glass systems at low temperatures. Our results for $p(q)$ follow from averages over $10^5$ disordered samples of linear sizes $L = 4 – 8$ and over 15 000 samples for $L = 10$. In both the SK and EA models, at temperatures as low as $0.2T_{sg}$, where $T_{sg}$ is the transition temperature, $p(q)$ varies insignificantly with $L$. This does not fit the trend that the droplet model predicts for large $L$. We have also calculated correlation functions, $F(q_1, q_2)$, from which rms deviations, $\delta p$, over different realizations of quenched disorder, as well as thermal fluctuations, $w$, of $q$ values, follow. Our numerical results for $\delta p$ and $w$ scale as $\sqrt{L}$ and $1/L$, respectively, in the SK model. This fits in well with mean field predictions. On the other hand, our data for $w$ and $\delta p$ vary little, if at all, for the EA model.