Changes in the regional climate depend on different temporal and spatial scales of interactions within the climate system, which bring great uncertainties into the regional climate prediction. The surface temperature is one of the most important climate variables, which has the longest observational records in many places of the world and which is widely used for estimation of the climate sensitivity and for the assessment of climate feedbacks. In this paper we use observations, model simulations and reanalysis data to assess differences in trends and decadal climate variability in different Earth’s regions, outlined by the IPCC AR4. We show that absence of long-term continuous observations in some of these regions strongly limit our confidence in future climate prediction.