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Rise of seismicity correlation range before large events displayed by earthquake chains

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"Earthquake chains" are extending over large distances clusters of epicenters of moderate earthquakes, formed by statistically rare pairs of epicenters that are close in space and time ("neighbors"). Earthquake chains are used as the first stage of the earthquake prediction algorithm RTP (Reverse Tracing of Precursors) that has demonstrated recently several successful documented advance predictions. Here we study properties of earthquake chains. Pairs of "neighbors" are defined by temporal and spatial windows; the latter are scaled by the minimal magnitude $\underline{m}$ in the pair: $r \leq r_0 10^{c(\underline{m}-m_0)}$. Standard value of c used in RTP is 0.35. We show that for the chains preceding large earthquakes a pair of invariant values $(\hat{r_0}, \hat{m_0})$ can be found, so that chains remain stable to variation of the parameter c in large diapason (usually 0.2 to 0.5) with $m_0 = \hat{m_0}$ and $r_0 = \hat{r_0}$. Accordingly, $\hat{r_0}$ can be considered as the definition of the correlation radius in the chain. Values $\hat{m_0}$ and $\hat{r_0}$ demonstrate good covariance with magnitudes of corresponding large earthquakes.