We study the probability distribution of the wave crests under two different scenarios. For sea elevation modelled as a Gaussian random field that evolves in time and when it is modelled at a fixed point by means of a second order model, which is a smooth algebraic function of a vector valued Gaussian process. In the first case, we study the effect of spreading and the role of wave kinematics. It is observed that taking into account time dynamics of spatial characteristics results in distributions different from those obtained for the static case. The resulting distributions are also used to compute return periods for rogue waves. In the second case, we use asymptotic methods to estimate the mean upcrossing intensity, which is then used to determine the density of crest height. In principle these methods could also be extended to the multi-dimensional case. Finally, we illustrate the methods through different numerical examples.