Being a disastrous phenomenon, rogue waves are very important for marine structures. However, their physics is still poorly understood and they are hardly detectable in different types of surface wave data. Voluntary observing ships (VOS) provide massive visual wave information worldwide covering the period from 1885 onwards. These data were extensively used for the description of climatological characteristics of wind waves, however, they were not yet employed for the analysis of freak waves. We used these data to quantify the highest observed waves in the World Ocean during the last 120 years and to associate them with forcing conditions in order to attribute the observed wave maxima to extreme waves and to observational artifacts. We analysed all cases when the reported wave height exceeded 15 meters. Sea height and swell height estimates were considered separately for the last 50 years (when VOS provides separate estimates of the two components). There were more than 1000 cases selected for the period from 1958 onwards. Then for every event we considered the local synoptic situation by analyzing wind and SLP conditions in the area of about 200 km around the location of the report for the days prior and after the report time. This allowed for the critical assessment of the reliability of reported wave extremes and their further attribution to extreme wind waves, potentially freak waves, or observational artifacts. Synoptic analysis provided the possibility to clearly classify extreme wind waves associated with the extreme storms. These were analysed using extreme value statistics in order to deliver well justified thresholds for estimation of extreme wind waves over Global Ocean. Few cases which were not classified as storm-associated extremes but also were not observational artifacts could be considered as freak waves. For these cases we analysed wave geometry, including wave period and length characteristics and finally performed analysis of statistical distributions targeted on the pilot statistical description of potentially freak waves in the VOS database.