Fraction of large forecast errors in global NWP

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The increase of forecast skill over time in numerical weather prediction (NWP) is commonly measured in terms of score averages, representing the first moment of the error distribution. For a range of forecast users, however, the frequency of occurrence of large errors is equally, if not more, relevant. This raises the question how the fraction of large errors has evolved in NWP over time, and whether there have been any significant changes in the shape of the error distribution. For example, if the forecast at day 5 is now as skillful as the day 4 forecast was 10-15 years ago, does this mean that the error distributions are approximately the same? Furthermore, it is investigated to what extent model upgrades which reduce the average error also improve the tails of the error distribution. The user-oriented concept of 'large errors' can also be applied to probabilistic verification. ECMWF has adopted a new supplementary headline score based on the fraction of large 2 m temperature errors as measured by the Continuous Ranked Probability Score exceeding a certain threshold. This methodology is extended to other parameters and global models, and conclusions are drawn with respect to its propriety and usefulness as a complementary metric in performance monitoring.