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Explosive cyclones are rapidly intensifying low pressure systems with severe wind speeds and heavy precipitation, affecting livelihoods and infrastructure primarily in coastal and marine environments. A better understanding of the potential impacts of climate change on these so called meteorological bombs is therefore of great societal relevance. This study evaluates how well the most recent generation of climate models (CMIP5) reproduce explosive cyclones for the period 1980 to 2005 in the extratropics of the northern hemisphere. An objective-feature tracking algorithm is used to identify and track cyclones from 25 CMIP5 models and 3 reanalysis products. Most models accurately reproduce the spatial distribution of bombs when compared to results from reanalysis data (R = 0.92), with high frequencies along the Kuroshio Current and the Gulf Stream. Most models, however, significantly underestimate bomb frequencies, by about a third on average and by up to three quarters in the worst case. Significant correlations suggest that this bias is likely to be the consequence of too weak upper-level divergence (R = 0.53), which in return is probably due to the coarse vertical resolutions of atmospheric models (R = 0.58). Models also tend to underestimate the intensity of bombs, likely because jet streams are simulated to be too slow (R = 0.60). Weak intensities also coincide with jet streams which are too zonal (R = 0.53) and with weak sea surface temperate gradients in the northern Atlantic (R = -0.54). Climate change is simulated to generally decrease the frequency of explosive cyclones. The underlying mechanisms of this decrease are yet to be identified.