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Smaller land-sea contrast on probability of precipitation (POP) of warm clouds over globe

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Proper observation of global warm rain and understanding of its formation processes can significantly advance our understanding on aerosol-cloud-precipitation interactions. Previous study shows that due to smaller cloud effective radii (Re), rain from liquid clouds over land is sharply reduced compared to oceans (Mülmenstädt, 2015). However, in our study, we use A-Train satellite observations to show that there should be smaller land-sea difference on probability of precipitation (POP) of warm clouds between land and oceans. The discrepancy is probably because the algorithm bias in CloudSat precipitation flag products over land, which may mistakenly treat drizzle as no rain. We also find that if Re is smaller than 14 mm, no matter how thick the warm cloud is it can hardly produce significant precipitation (here defined as radar reflectivity factor lager than 0dBZ), which can generate dynamic feedback on the development of clouds.