Abstract: Tropical cyclones are responsible for extreme rainfall flooding events in many regions; indeed, quite a few of the world's rainfall records, from 3 hours to 15 days duration, were caused by tropical cyclones. At the same time, the relative rarity of these storms, together with the small correlation lengths and times associated with convective precipitation in general, make it difficult to infer long-term rain risk from historical precipitation records alone. In this talk I will describe a new physics-based technique for estimating long-term tropical cyclone rainfall risk. This technique, building on previous work by the speaker's research team on tropical cyclone wind risk, drives simple tropical cyclone track and intensity models with large-scale variables from global reanalyses or climate models to create very large (10^4 – 10^6) synthetic tropical cyclone event sets. These can then be used to estimate tropical cyclone wind risk at specified points of interest. When coupled with hydrodynamic surge models, storm surge risk can also be estimated. Here I will focus on the latest extension of the technique that infers precipitation from the output of the synthetic tropical cyclone model, allowing one to make estimates of long-term rain and flooding risk.