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Power law rank-abundance relationships in marine phage populations PETER SALAMON, San Diego State University, KARL HEINZ HOFFMANN, Technical University of Chemnitz, BELTRAN RODRIGUEZ-BRITO, MYA BREITBART, DAVID BANGOR, FLORENT ANGLY, BEN FELTS, JAMES NULTON, FOREST ROHWER, San Diego State University — Phage are the most abundant biological entities in the biosphere, with an estimated 10^{31} particles on the planet. About 25% of oceanic organic carbon is cycled through phage every day. Metagenomic analyses show that the rank-abundance curve for marine phage communities follows a power law distribution. This distribution is consistent with a proposed, modified version of Lotka-Volterra predator-prey dynamics, where blooms of a specific microbial species leads to blooms of their corresponding phage and a subsequent decrease in abundance. The model predicts that the majority of phage types in a population will be rare and it is unlikely that the most abundant phage will be the same at different time points. The model is based on spatial-temporal heterogeneity and a power law phage decay, which are both supported by empirical data.

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