

# Unprecedented rains decimate surface microbial communities in the hyperarid core of the Atacama Desert

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The hyperarid core of the Atacama Desert, the driest and oldest desert on Earth, has experienced a number of highly unusual rain events over the past three years, resulting in the formation of previously unrecorded hypersaline lagoons, which have lasted several months. We have systematically analyzed the evolution of the lagoons to provide quantitative field constraints of large-scale impacts of the rains on the local microbial communities. Here we show that the sudden and massive input of water in regions that have remained hyperarid for millions of years is harmful for most of the surface soil microbial species, which are exquisitely adapted to survive with meager amounts of liquid water, and quickly perish from osmotic shock when water becomes suddenly abundant. We found that only a handful of bacteria, remarkably a newly identified species of *Halomonas*, remain metabolically active and are still able to reproduce in the lagoons, while no archaea or eukaryotes were identified. Our results show that the already low microbial biodiversity of

extreme arid regions greatly diminishes when water is supplied quickly and in great volumes. We conclude placing our findings in the context of the astrobiological exploration of Mars, a hyperarid planet that experienced catastrophic floodings in ancient times. © 2018, The Author(s).