UC RIVERSIDE
UNIVERSITY OF CALIFORNIA
School of Medicine
BREATHE Center

BREATHE

(Bridging Regional Ecology, Aerosolized Toxins, and Health Effects)

An interdisciplinary research center at UC Riverside

Our Mission

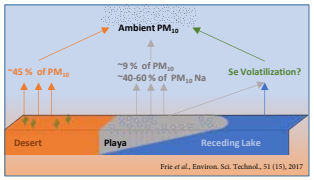
Our network of UCR researchers and community organizations (including CE-CERT, Center for Conservation Biology, School of Medicine, HARC, etc.) is developing multidisciplinary research projects to **study the health impacts of air quality changes**, such as those resulting from chronic drought, climate change, and resulting ecological change. **Health impacts of interest include pulmonary diseases such as asthma, and the systemic effects on neurodevelopmental and neurodegenerative diseases**. Our studies can model effects in many different regions, but one major focus is on the Coachella Valley, including the rapidly changing Salton Sea ecosystem, as **a living laboratory to follow the dynamic changes occurring in a complex ecology that includes agricultural, rural desert, and urban areas, as well as an ethnically and economically diverse community**. Our work will have public policy implications including aspects of environmental justice.

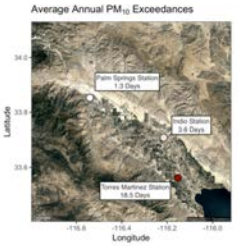
Historical Perspectives; Geoengineering

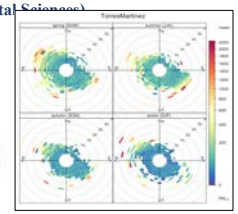
Philipp Lehmann (History) tells us that European countries explored geoengineering the Sahara Desert, in hopes of recovering arable land from the desert. The figure here shows one proposal "Atlantropa" (1930) which would have involved damming the Mediterranean and letting the sea dry up to support hydroelectric power to provide energy to irrigate the dry land exposed. Geoengineering on a similar scale is being proposed for the Salton Sea to mitigate dust production and restore wetland habitat.

Climate Modeling and Particle Transport Studies

Analysis of PM10 material collected in the Coachella Valley show that a measurable contribution of the material originates from the exposed playa by the Salton Sea (Roya Bahreini, Environmental Sciences). As the Salton Sea dries, up to 5000 acres of additional playa will be exposed each year. The dusts in the valley are blown considerable distances, with seasonal shifts carrying dusts to the north and west of Salton Sea during the summer and fall months (Will Porter, Environmental Sciences)

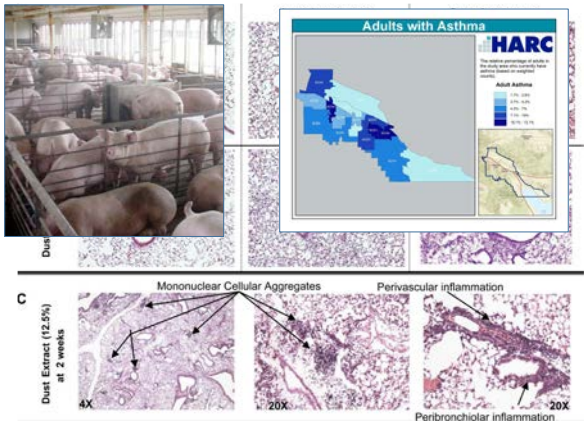






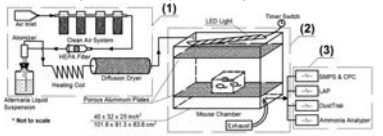
Air Quality and Health Epidemiology

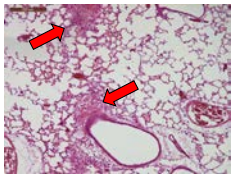
Poor air quality, especially high PM10, is known to be associated with high rates of asthma and other pulmonary diseases. This is especially true in the Coachella Valley where asthma rates are up to twice as high as the rest of California. Our studies examine the role of aerosol particle components in driving lung inflammation and susceptibility to chronic inflammatory diseases. (HARC, Tara Nordgren, Biomedical Sciences)



Environmental Chamber Exposure Studies

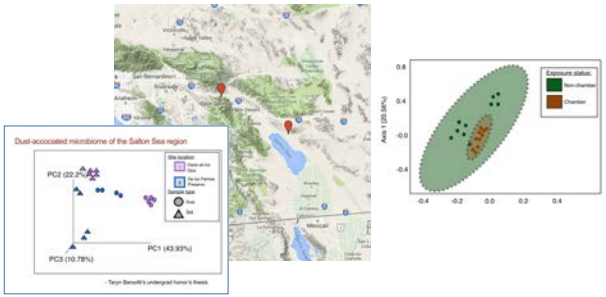
To dissect the mechanisms behind aerosol particulate effects in the lung, we developed a small scale environmental chamber to enable steady state exposures of models of inflammation (David Cocker, CE-CERT). This chamber allows us to test aerosols from allergens, ground silica, particulate material collected in the field, and volatile organic compounds. Studies have already shown that low dose exposure of allergen can induce lung inflammation but also brainstem innate immune responses (Monica Carson, Meera Nair, David Lo, Biomedical Sciences)





Microbial Ecology and Clinical Microbiomes

The ecology of the soil microbiome has health impacts; fungal spores of Coccidioides can cause clinical disease such as Valley Fever. A complex microbiome also exists in the lung, and may be an important component of disease development in response to inhaled particulate matter. (Emma Aronson, Microbiology and Plant Pathology/Center for Conservation Biology)



The Salton Sea – An Environmental Crisis with Air Quality Impacts

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