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# *Interactive comment on* "Surface and subsurface characterisation of salt pans expressing polygonal patterns" *by* Jana Lasser et al.

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Dear Prof. Hu,

many thanks for your suggestions to improve the manuscript!

Regarding other similar data sets: To my knowledge, there is no data set that combines the types of measurements (temperature & humidity, geochemistry, grain size distributions and TLS surface scans) that we present in our data description. Grain size characterizations are commonly used to characterize the sea floor (see for example (1) https://doi.pangaea.de/10.1594/PANGAEA.746830 and (2) https://doi.pangaea.de/10.1594/PANGAEA.728741). Regarding arid regions, there are a few data sets containing grain size distributions ((3) https://doi.pangaea.de/10.1594/PANGAEA.913754, (4) https://doi.pangaea.de/10.1594/PANGAEA.871173 and (5) https://doi.pangaea.de/10.1594/PANGAEA.736624) and one other data set that combines a characterization of both the grain size distribution and the geochemistry ( (6) https://doi.pangaea.de/10.1594/PANGAEA.906582). Terrestrial Laser Scan (TLS) data sets are published for example at https://tls.unavco.org/projects/, with one data set originating from the Death Valley - one of our field sites - (7) https://tls.unavco.org/projects/U-062/, which focuses on larger topographic features. We will add these references to other data sets that could be of interest for a potential reader to the manuscript.

Regarding the research context in which the presented data sets have been collected: the goal of the research we conducted was to uncover the mechanism that drives the formation of salt polygons in Salt Playa (see preprints (8) and (9)). These polygons emerge in a range of Salt Playas across the globe, for example the Death Valley, Salar de Uyuni or at the Dead Sea. So far, the driving mechanism is debated and theories that were brought forward to explain the emergence of these patterns are wrinkling (10, 11, 12) an cracking (13, 14, 15, 16, 17). Both of these mechanisms focus on mechanisms that involve only the salt crust in the pattern formation process. We claim that these previously proposed mechanisms are not able to explain both the length scale of the observed patterns (which is on the order of meters) as well as the consistency with which this length scale is expressed at Salt Playas with otherwise very different environmental parameters. As a solution to this problem we propose a third mechanism that includes dynamics of the subsurface of the Salt Playa into account. It has been known for some time that salt lakes can express salinity driven convective dynamics (18) and these convective dynamics have already been shown to occur in the field (19). We propose that the polygonal salt ridges that are visible on the surface grow at the boundary of the convection cells in the underground, as the salt concentration there is higher and supports increased salt precipitation. To support this claim, we characterized both the surface (TLS scans, temperature and humidity measurements) and the subsurface (grain size distributions, geochemistry, salinity distributions) of two Salt Playas, namely Owens Lake and Badwater Basin in Central California. These characterizations are described in larger detail in the present data publication. We find evidence that supports our claims that convection is the driving mechanism of pattern formation in this region.

As these claims are subject of two separate publications that are in the process of being published in other scientific journals, we would refrain from including a much longer description of the research purpose in the data publication. We can, nevertheless, include a few more details.

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