Supplementary Information

S1 Environmental data acquisition

All sensors connected to the Onset HOBO® Weather Station Data Logger (H21-001) were set to take a measurement every 30 min. Collected data included air RH and temperature, 25 cm above the halite pinnacle surface (the probe was shaded from the sun) and 5 mm beneath the pinnacle surface, using RH/T sensors (HOBO® S-THB-M002; precision, ±2.5% RH/ ±0.2ºC). The temperatures recorded were therefore a function of the air temperature and radiated heat from the halite pinnacles themselves. The interior RH/T sensor was introduced into the pinnacles by drilling a 5 mm-diameter hole from the bottom of the rock to obtain readings close to the colonization zone (Supplementary Fig. S1a). Once introduced, the sensor itself seals the orifice and parafilm foil was used to ensure the sensor was isolated from the atmosphere. The reading volume of the RH/T sensor inside the halite pinnacles was calculated as 0.36 cm^3, which correspond to the volume of frequently occurring large pores or cavities within natural halite samples (see pore indicated with an open arrow in Fig. 1b). Additionally, the pinnacle surface temperature was measured using the thermocouple T sensor (type T, TC6-T; accuracy ±1ºC) connected to the HOBO® U12-014 data logger (Supplementary Fig. S1b). Based on this surface temperature measurement and the air RH and T data, we were able to calculate (Magnus-Tetens formula by Murray (1967)) conditions of dewfall on the pinnacle surface. We claim that during the period of time examined the conditions were not met for liquid water condensation as dew. Solar flux was measured using a photosynthetically active radiation (PAR) sensor for wavelengths of 400–700 nm (measurement range 0–2500 μmol m^{-2} s^{-1}) positioned facing upward to obtain radiation readings at the level of the halite surface. Careful analysis of the PAR data (practically lineal light increasing at the sunshine and almost lineal light decreasing at the afternoon on PAR curve) revealed the practical absence of fog in Yungay over 2010 although on two days we did detect some clouds at around midday. The lack of rainfall over the study year was confirmed using a Rain-o-Matic 100 tipping bucket gauge (resolution of 1 mm). However, the most challenging measurement was the determination of liquid water on the halite pinnacle surface and within it. To do this, we ruled out the use of commercial wetness or moisture sensing grids (Warren-Rhodes et al., 2006), leaf wetness sensors (Warren-Rhodes et al., 2006; Tang and Munkelwitz, 1993) or soil moisture sensors (Warren-Rhodes et al., 2006) and we opted for a 12-bit voltage input adapter (HOBO S-VIA-CM14) interfaced with sensors providing VDC signals to act as a smart sensor with the HOBO data logger. This input adapter provides a trigger source voltage signal (sensor trigger source: voltage 2.5 V ±2.4%; maximum current: 1 mA) that powers external sensors and an open collector trigger. As external sensors, we used platinum wires (diameter 0.8 mm) connected to the trigger source input adapter gate. Two of these 10 mm-long wires were positioned 10 mm apart parallel to and tightly fixed to the halite surface with Araldite ® resin (Fig. S1b). A further two 10 mm-long wires (with their corresponding input adapter) were introduced into the halite pinnacles by drilling parallel, 1 mm-diameter holes from the bottom of the rock (10 mm apart) to obtain readings from the colonization zone (Supplementary Fig. S1a). Once introduced, the orifices were sealed with silicon paste. The occurrence of liquid water on the rock surface or within it was detected as a rise in electrical conductivity (EC) over a baseline voltage of 0.0006 V (cited in the text and figures as EC > 0) up to 2.5 V, assuming that the smallest quantity of liquid water (electrolyte) in the system would produce a voltage increase from its baseline value. We therefore assumed that readings from these EC sensors were a first order approximation to the moisture/dry conditions on and within the pinnacles. Our estimates clearly indicate that despite the extremely dry atmospheric conditions outside the halite pinnacles in 2010, the surface and interior of the pinnacles contained liquid water.

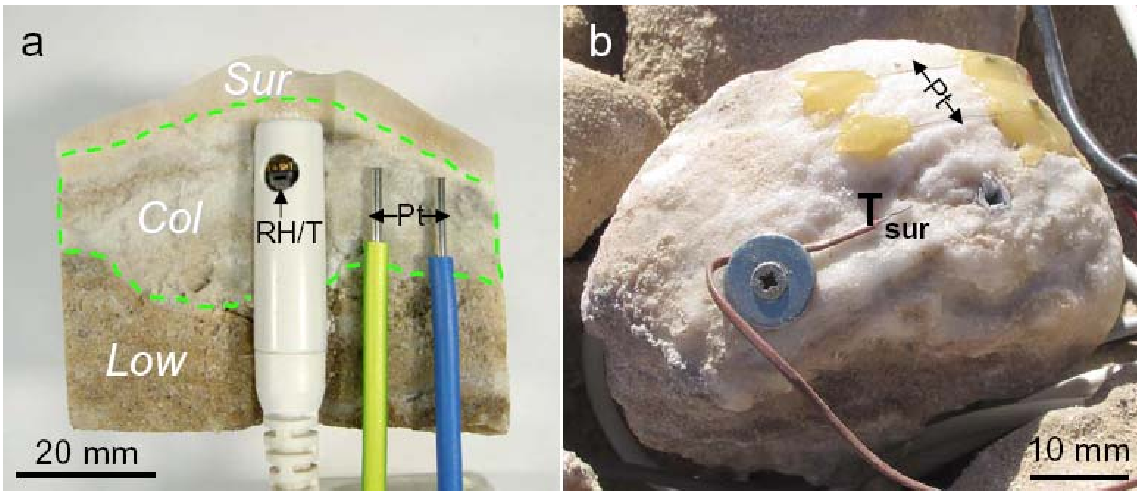

Figure S1. Set up used to monitor nanoclimate data on the surface and within the halite. a, Schematic representation of the emplacement of the relative humidity/temperature (RH/T) sensors within the colonisation zone (*Col*). The RH/T sensor has a protective top but its 5 mm-diameter hole permits the probe to determine conditions in a pore volume of 0.36 cm^3. Two platinum (Pt) wires were also introduced into the colonisation zone to detect the presence of liquid water through electrical conductivity (EC) measurements. **b**, Surface of a halite pinnacle in Yungay fitted with a thermocouple temperature (T_{Sur}) sensor and two platinum electrodes (Pt) for electrical conductivity (EC_{Sur}) measurements.

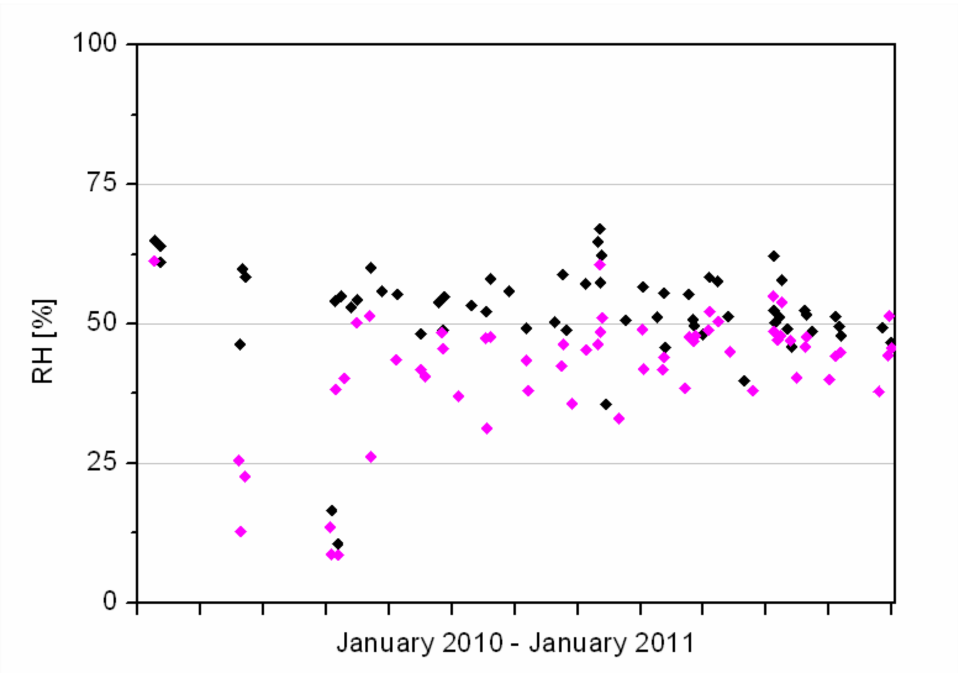

Figure S2 Relative humidity values at the onset (black diamonds) and offset (pink diamonds) of wet events inside the halite pinnacle during the course of one year. Wet events correspond to EC > 0.0006 V (baseline value for this sensor), which indicates the presence of liquid water.

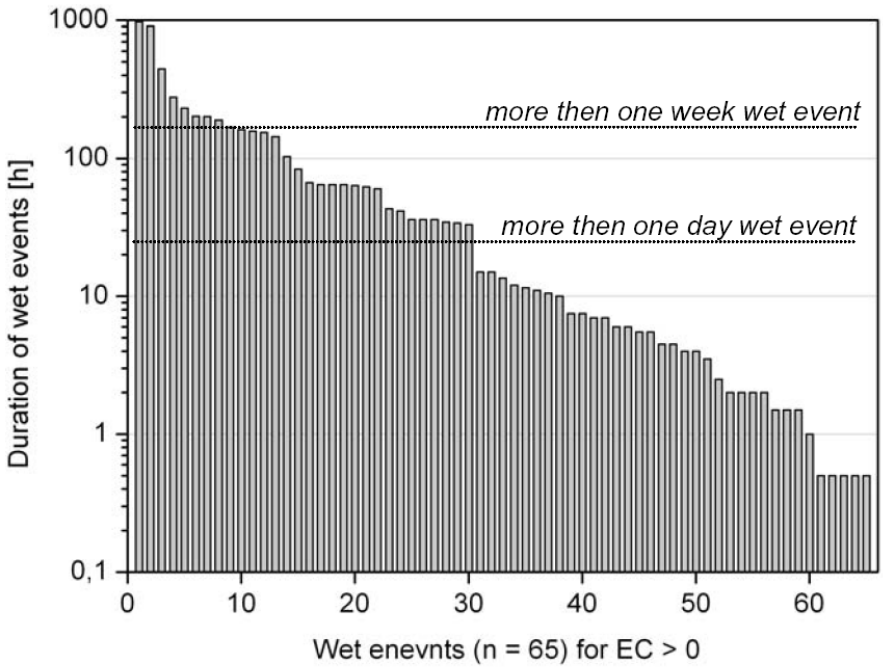

Figure S3 Duration of wet events in the colonisation zone of the halite pinnacle. Wet events correspond to EC > 0.0006 V (baseline value for this sensor), which indicates the presence of liquid water. The total number of wet events was 65: five events lasted 30 minutes; thirty events lasted more than one day; nine events lasted more than one week, and two events lasted more than one month.

S2 Water evaporation-condensation in porous halite model calculations

The following equation according to Benavente et al. (2003) was used for the above simulation of water evaporation-condensation curve vs. pore radius:

$$RH_{eq}(r) = a_w \cdot e^{-\frac{2\sigma v_l^{\rho}}{RTr}};$$

where: $RH_{eq}(r)$ is the RH at equilibrium with the brine in a pore r; a_w, the water activity of an NaCl saturated solution (6.08 M NaCl)($a_w = 0.75$); σ, a surface tension of 727 Pa at 25ºC of pure water assumed according to Benavente et al. (2003), v^{ρ}_{l} , τηε molar volume of the NaCl saturated solution ($v^{\rho}_{l} = 16.26$ cm^3 M^{-1}), and T is 298 K.

References

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