4) small atmospheric (barometric) tides with 8H, 12H/S2, 24H/S1 periodicities, are the causes of short terms drip changes which sensitivity is controlled by the karst saturation. Mechanism of the influence of air pressure wiggles on the dripping rate is put in relation with the humid/dry season of each site, leading to a conceptual physical model. The barometric effect, quantified in several dripping sites, is compared with the physical characters and to the geology of the sites.

Near Chauvet and Aven d'Orgnac sites (Ardèche, S-France), an associated borehole monitoring demonstrates the close but complex relationship between piezometric level, stalactite drip rates and water excess, giving detailed evidence of interconnections at various spatial scales in karst aquifer. Finally, we observe and describe, for the first time, the strange graphic patterns that appear when comparing two or three synchronized dripping time series each other in the same cave. These enigmatic figures, which suggest non-linear couplings with bifurcation dynamics, may be related to reservoir interconnections or disconnections above the stations opening a potential window to the infiltration processes and micro-fissure geometry.

M3: In situ optical measurements of water film thickness on caves walls and speleothems

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Most walls of karstic cavities are coated with a thin film of water involved in the thermo-hydric and gaseous exchanges between rock walls and cave atmosphere. In painted caves, thickness and stability of the water film are critical to the conservation conditions of paintings. Indeed, the water film can either run off, be involved in condensation/corrosion processes, or induce concretionning by degassing or evaporation. The thickness measurement of the water film on the cave wall and its temporal evolution are essential parameters for the conservation of rock art heritage that have not been measured until now. They are also key parameters for the modelling of cave concretions growth. Those parameters are sensitive to the internal areological conditions of the cavity and could be impacted by global warming.

A contactless optical sensor, commercialized by Micro-epsilon with resolution levels of 1 µm and a measuring range of 0 to 300 µm, was selected as the most suitable measuring device for water film thickness. When the light is reflected by a surface, a single wavelength is focused at the object interface (two wavelengths for thickness measurement), and is then selected by the confocal configuration. The system is passive (no moving part) and does not generate any significant heat as light is transported from the generator through an optical fiber. The measuring device can be powered by 12V rechargeable batteries, and can then be used in caves with no access to the electrical network.

Preliminary laboratory tests performed on natural limestone surfaces, gave a range of measurable thicknesses from 25 to 220 µm (thickness sensor range begin at 15 µm; uncertainties of <±0.3 µm). Water film thickness measurements were then conducted in various french caves (Orgnac, Beideilhac, Gargas, Niaux...). The in-situ thickness measurements on vertical cave walls give a common value of 30-50 µm associated with a good stability in time. Visual contrasts on painted walls are consistent with the presence/absence of measurable thin water films (Gargas cave). Thicker films 80-100 µm are measured on active speleothems. In the latter case, we were able to observe short time dynamic variations on the film thickness due to water flows on walls and calcite.

M4: Daily resolution electrical conductivity of drip water measured in slow-drip sites - implementation in Stara Jametina Cave (Croatia)

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Paleoclimate studies for long-term records are often obtained from speleothems fed with very slow drips that have a diffusional flow and consequently a limited amount of water available for monitoring studies. Using a HOBO U24-001 data logger, we have implemented a methodology for measuring electrical conductivity (EC) in drip water samples with volume <2 ml. After applying a filter, we provide daily resolution drip water EC data during the period 2019-2020 in a 60 m deep hall within the cave Stara Jametina (Croatia). EC data was calibrated with data obtained from aggregated samples measured monthly using a Myron L Ultrameter 6P that is calibrated with standard solution prior to every use. Both datasets show same variability, allowing us to correct the continuous dataset and obtain accurate daily values of drip water EC and to record high-frequency events that were not observed during monthly monitoring campaigns.

The cave of Stara Jametina is characterized by Mediterranean climate (Csa) with dry and hot summers. Here, the mean annual temperature recorded during the 2019-2020 period was 14.7 °C, while the mean annual amount of precipitation was 1050 mm. Together with EC measurements, temperature, drip rate, concentration of cave air CO_2 and drip water hydrochemistry were monitored. Results show that Ca2+ and dissolved inorganic carbon are major chemical species affecting EC of drip water. The outstanding seasonal variability of drip water hydrochemistry is the result of prior calcite precipitation (PCP), a process driven by