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Respective influence of temperature and light on sclerochrononlogy of coral skeleton

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Sclerochronology is almost always imposed by seasonality such as on the coral skeleton. It depends on two growth rates: the linear extension and the amount of skeleton deposited per time unit. It results banding of alternated dark an clear layers due to high and low density of the skeleton, illustrated by X-ray photos. But we cannot relate precisely a season to a dark or light layer.

Each layer results of embedded biologic and external factors. Cultures allowed separating light and temperature effects. Indeed, coral is an animal living with a symbiotic host: algae (zooxanthellae). Temperature and light increases both drove to enhanced calcification. In opposite, higher temperature caused an increase of extension rate but higher light causes a decrease. Isotopic oxygen and carbon ratio analyzes revealed that processes of skeleton deposit on top and sides of a colony likely differed. This difference could be linked with photosynthetic activity and the amount of zooxanthellae. This evidence supports several observations, made in field and earlier published. Especially, this explains that density resulting of calcification and extension rate is seasonal but cannot be easily converted into environmental factors. By separating temperature and light influence, we also realize that the two external factors have opposite effect on d18O. We will examine the consequences of these influences on paleoclimate studies.