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Climate reconstructions and chronology based on luminescent lines in corals

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The discovery of luminescent lines in corals from the Great Barrier Reef, and their correlation with rainfall and coastal runoff, has provided a valuable proxy in coral-based climate research. The yellow-green luminescent lines, oriented parallel to the major coral growth axis, are visible when a slice of coral skeletal material is placed under long-wave UV light. Despite questions surrounding the precise origin of luminescent lines, (either resulting from incorporation of terrestrial fulvic and humic acids or due to changes in coral crystal size and packing), they have been successfully applied in tropical regions worldwide to obtain runoff and precipitation records, as well as for reconstructing El Niño-Southern Oscillation dynamics and detecting land use changes. In recent work, coral luminescent lines have been used for cross-dating, and are proving useful for identify growth hiatuses in coral specimens. To date however, coral luminescence has had limited application in fossil coral samples, either for dating or climate reconstruction. In this presentation, the origin and application of luminescence banding will be reviewed, and challenges and future directions in their application discussed.