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A 3000-year High-resolution record of stable isotopes and trace elements in a stalagmite from Yongcheon Cave in Jeju Island, Korea

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Yongcheon Cave is located on Jeju Island, the southernmost part of Korea. Climatic setting there is under strong influence of East Asian monsoon as well as typhoon. Our study attempts to reconstruct paleomonsoon and paleo-typhoon activities by using geochemical proxies in speleothem. The cave which contains numerous soda straws and stalagmites was developed from a lava tube that probably formed more than 0.63∼0.60 Ma ago. A 11-cm long stalagmite, YC-1, was collected from the cave in its growth position in 2005. The ^{210}Pb dating results show that the top 0.9cm of YC-1 is less than 100 years old with a growth rate of 0.033mm/yr. Using this growth rate and assuming the stalagmite grew linearly, we estimated that the stalagmite is about 3000 years old. Currently, we have analyzed 100 samples for δ^{18}O and δ^{13}C in the upper 1.25cm part with a sampling interval of 0.125mm. The δ^{18}O ranges from -5.8‰ to -7.4‰ (PDB), and the δ^{13}C varies from -1.7‰ to -8.0‰ (PDB). Both δ^{18}O and δ^{13}C have decreasing trends during the last 60 years, with the δ^{18}O decreases 1.2‰ and the δ^{13}C decreases 4‰. We have also analyzed Mg/Ca, Sr/Ca, Ba/Ca, Al/Ca, P/Ca, Pb/Ca and U/Ca by using a high resolution laser ablation ICPMS (Element II) throughout the entire stalagmite with a sampling interval of 50μm. The analytical results show that there are anti-phase correlations between Mg/Ca and Sr/Ca, and between Ba/Ca and P/Ca. A strong increase trend in Al/Ca ratio in the upper a few mm indicates significant change occurred in the overlying sediments above the cave during the past 50 years. Yongcheon Cave is only a few meters (<5m) below the surface with thin vegetation cover (mainly C3 type plants). The overlying sediments are carbonate beach sediments which are composed of mollusks, echinoderms, coralline algae, ben-

thic foraminifera, etc, deposited by wind above the lava tube. Our preliminary results indicate that the carbon and oxygen isotope compositions and trace elemental ratios in the stalagmite may reflect residence time of groundwater and carbonate dissolution rate under the influence of regional climates. With additional stable isotope analyses and age control using ICPMS U-series dating, we are able to reconstruct climate and environmental changes during the past 3000 years or so.