Diagnosis and Identification of Ecological Health in Global Critical Karst Zone

BAI Xiaoyong[1, 2, 3, *], WANG Shijie[1, 4], LI Huiwen[1, 5], WU Luhua[1, 5],CAO Yue[1, 5], LI Chaojun[1, 6], HU Zeyin[1, 5], YANG Yujie[1, 6] and DENG Yuanhong[1, 5]

[1] *State Key Laboratory of Environmental Geochemistry, Institute of Geochemistry, Chinese Academy of Sciences, Guiyang 550081, Guizhou, China*
[2] *CAS Center for Excellence in Quaternary Science and Global Change,Xi'an, 710061,Shanxi,China*
[3] *Guizhou Provincial Key Laboratory of Geographic State Monitoring of Watershed, Guizhou Education University, Guiyang 550018, China*
[4] *Puding Karst Ecosystem Observation and Research Station, Chinese Academy of Sciences, Puding 562100,Guizhou, China*
[5] *University of Chinese Academy of Sciences, Beijing 100049, China*
[6] *School of Geography and Environmental Sciences, Guizhou Normal University, Guiyang 550001, China*

Citation: Bai et al., 2019. Diagnosis and Identification of Ecological Health in Global Critical Karst Zone. *Acta Geologica Sinica* (English Edition), 93(supp.2): 135

The eco-environmental issues in the critical karst zone today are difficult to be solved by a single discipline or single factor, which necessitates multidisciplinary collaborative research (Legrand, 1973; Bai et al., 2013). Based on diverse information from Geography, Geology, Geophysics, Geochemistry, Remote Sensing etc., the global remote sensing geochemical big data and decision support platform has been ensembled to create and form a series of dynamic maps and forecasting systems of spatiotemporal evolution of global vegetation degradation and soil moisture, develop the first spatial distribution maps and simulation system for the weathering and soil formation rates of global carbonate rock and establish a series of dynamic maps and prediction and forewarning system for the global spatiotemporal evolution of rainfall erosion force (Li et al., 2018, 2019); also, a new global ecosystem carrying capacity model is created to realize the spatialization of global water resources carrying capacity, and a series of dynamic maps and the calculating system for global ecological asset including the North and South Poles are established. Moreover, the amazing cooling phenomenon is found under the background of global warming in the past 100 years, and the theoretical maximum potential carbon sink magnitude and its spatiotemporal evolution characteristics caused by the dissolution effect in the global karst region are revealed. The above research achievements provide scientific and technological support for the management and optimal regulation of ecosystems in global critical karst zone.

Key words: karst critical zone, carbon, rock weathering, remote sensing, soil erosion

Acknowledgements: This work is granted by United Fund of Karst Science Research Center (Grant No.U1612441), National Key Research & Development Program of China (Grant No.2016YFC0502102 & 2016YFC0502300), "Western light" Talent Training Plan of Chinese Academy of Sciences (Grant No. Class A 2018), Science and Technology Services Network Initiative Plan (Grant No. KFJ-STS-ZDTP-036), International Cooperation Agency International Partnership Program (Grant No.132852KYSB20170029, 2014-3), Guizhou High-level Innovative Talent Training Program "Ten" Level Talents Program (Grant No. 2016-5648), National Natural Science Foundation of China (Grant No. 41571130074 & 41571130042), Science and Technology Plan of Guizhou Province of China (Grant No. 2017–2966).

References

Bai, X.Y., Wang, S.J. and Xiong, K.N., 2013. Assessing spatial-temporal evolution processes of karst rocky desertification and indications for restoration strategies. *Land Degradation &Development*, 24(1): 47–56.

Legrand, H. E., 1973. Hydrological and ecological problems of karst regions: Hydrological actions on limestone regions cause distinctive ecological problems. *Science*, 179(4076): 859–864.

Li, H.W., Wang S.J., Bai X.Y., Luo W.J., Tang H., Cao Y., Wu L.H., Chen F., Li Q., Zeng C. and Wang M.M., 2018. Spatiotemporal distribution and national measurement of the global carbonate carbon sink. *Science of the Total Environment*, 2018, 643: 157–170.

Li, H.W., Wang S.J., Bai X.Y., Cao Y. and Wu L.H., 2019. Spatiotemporal evolution of carbon sequestration of limestone weathering in China.*Science China Earth Science*, 62: (in publishing)

About the first author

BAI Xiaoyong, male, born in 1978 in Shijiazhuang City, Hebei Province; Ph. D. in Physical Geography; graduated from the Institute of Mountain Hazards and Environment, Chinese Academy of Sciences; researcher of the Institute of geochemistry, Chinese Academy of Sciences. He is now interested in the study on ecological hydrology and global change, remote sensing inversion in karst, the rate of rock weathering and soil formation, and ecological restoration and regional reconstruction. Email: baixiaoyong @126.com; phone: 18085099080.

* Corresponding author. E-mail: baixiaoyong@126.com