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EDITORIAL

In Memory of Professor Ruiliang Pu

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In 1985, I first met with a young remote sensing lecturer from the Nanjing Institute of Forestry (now Nanjing Forestry University) in a seminar given by Professor Bill Havens at Nanjing University. The seminar was sponsored by the Technology Training Department (based at Peking University) of the National Remote Sensing Center of China (which has ceased functioning in the area of remote sensing and has been renamed as International Collaboration Center in 2024). Bill Havens was a computer scientist specializing on artificial intelligence (AI) in the Department of Computer Science at the University of British Columbia. His trip from Canada to China was supported by the International Development Research Centre of Canada, an international research aid organization based in Ottawa. Havens was commissioned to deliver technological training in China, which included a few talks on AI and computer vision in Beijing, Nanjing, and Shanghai. I served as the translator during Havens' talk at Nanjing University. In the 1980s, it was common that when a foreign expert presented a seminar, teachers and students from relevant programs in multiple local universities gathered together to listen. Out of many attendants, Ruiliang was one of the only few I remembered during that seminar. He left me with an impression of an always smiling face.

Having grown up in a water-rich village in Jiangyin County of Wuxi City in Jiangsu Province, Ruiliang had been a part of the first batch of college students after the Cultural Revolution (participated in the national college entrance exam in 1977 and entered college in early 1978). He studied forestry at Nanjing Institute of Forestry. Due to his excellent academic standing and after completion of his 4-year college studies, in 1982, he continued to become part of the first group of graduate students specializing on forest remote sensing under the supervision of Professor Youqing Fang, a pioneer remote sensing professor at Nanjing Institute of Forestry. Ruiliang remained in his alma mater to be a young lecturer in remote sensing after receiving his master's degree in 1985.

In 1990, I had the pleasure of working with Ruiliang as a colleague when he was accepted as a visiting scholar in Professor John Miller's lab at York University. He came under a scholar exchange program between the sister provinces of Jiangsu, China and Ontario, Canada.

In the 1980s, Professor John Miller, an optical physicist, was probably the only professor working on hyperspectral remote sensing in Canada. He was among the initial developers of the Fluorescence Linear Imager (FLI), one of the first imaging spectrometers in the world. Specifically, he applied FLI to study forest health, particularly mineral stress on plants in certain geological regions in Northern Ontario [1]. At that time, hyperspectral remote sensing of forest was considered a new frontier. In 1990, Miller's group had 3 research scientists, one was Jim Freemantle, who specialized on the data processing of FLI; the second was Benoit Rivard, specializing on hyperspectral remote sensing of mineral geology; and the third was myself, specializing on forest hyperspectral remote sensing. Ruiliang, who specialized on forest remote sensing, was naturally attracted to York University to study hyperspectral remote sensing application in forestry.

In John Miller's lab, Ruiliang Pu, another visitor, Yoshio Awaya from Japan, and I worked in the same team with technical support from Jim Freemantle to apply hyperspectral remote sensing in forest studies. One of the primary projects we participated in was the Oregon Transect Ecosystem Research funded by NASA. Prominent scholars such as Dick Waring, Steve Running, Pamela Matson, Alan Strahler, and Carol Wessman, among others, were all principal investigators on this project. It was a highly interdisciplinary team involving ecologists, ecosystem modelers, physicists, and geographers. The 4 abovementioned Miller lab members participated in field trips in Oregon and a project conference held in NASA Ames Research Center down in Menlo Park, California. This collaboration resulted in our group being the first to extract leaf area index of a forest with hyperspectral remote sensing data, as demonstrated in a series of papers [2–5].

My collaboration with Ruiliang did not end after my short stay at York. In 1991, I took up an assistant professor position in the Department of Surveying Engineering at the University of Calgary. Ruiliang joined my research group in 1992 aiming for doctoral studies in Calgary. He would have become the first doctoral graduate from my lab. However, he quit his doctoral program shortly after 1 month of enrolling in the University of Calgary and returned back to his home institute in Nanjing, at the call of his wife expressing the wishes of the leadership of his alma mater for him to return. Soon after returning back to Nanjing, he had a general feeling of discomfort and wanted to re-join my group in Calgary. Based on our productive collaboration, I supported him to return back to Calgary as a visiting scholar in the fall of 1993. During his Berkeley times, he registered into the PhD program in the Chinese Academy of Sciences supervised by Professor Huadong Guo and myself in the late 1990s. He earned his PhD in 2000. Ruiliang had worked

as a key member of my lab until 2006 when he left Berkeley in a short transition in the University of Maryland with Professor Zhanqing Li, followed by taking up a faculty position in the University of South Florida, where he spent the rest of his life until he passed away in 2023 at an early age of 67.

In daily life, Ruiliang organized himself in good order. He often rode his bike to office from his Albany home. He was one of the earliest to arrive at the office and left the office regularly late in the day. He worked day and nights. He was proactive. Anything he touched upon would have good quality and stable results. He was a quick learner, and highly efficient on producing good-quality research results and publications. He not only was self-driven, but also set an excellent example to lab members.

Since our Oregon field trip in 1991, we had traveled many times into the field. We fabricated a handheld spectrometer and took it to measure tree spectrum over and over again in the Blodgett Field Experiment Station and other sites in the Sierra Nevada mountains and its western foothills. We were the first to use hyperspectral data to separate conifer species of the Sierra Nevada [6,7]. We traveled together to Argentina on a NASA Science Validation Project [8,9]. He was always the one to get everyone well prepared for the entire trip. We drove thousands of miles together in the California territory. Many lab members, students, postdocs, and visiting scholars benefited from his field experiences. Among those are now Professors Peijun Shi, Jin Chen, Yongwei Sheng, Ming Xu, Bing Xu, Le Wang, Qi Chen, Qian Yu, Yongqian Tian, Xin Miao, and Nick Clinton.

From an outstanding undergraduate student to a distinguished scholar, Ruiliang had contributed to the profession of remote sensing. He helped advance the field of hyperspectral remote sensing. He was among the first in the world to extract forest leaf area index using hyperspectral remotely sensed data [2]. He concentrated on vegetation remote sensing. He published the world's first hyperspectral remote sensing textbook that is widely read by thousands of students [10]. From Google Scholar Citations, we can see a list of 195 papers, book chapters, and books he published with over 11,000 citations (https://scholar.google.com/citations?hl=en&user=O6rXzK4AAAAJ).

Hundreds of students from all over the world took his remote sensing courses. He was a great teacher, patient, clear, and responsible. From his humorous presenting style, I can imagine how much enjoyment his students would have gotten from his teaching.

Among the various services he provided to the scientific community, an important role he played was the Executive Editor of the journal *Geographic Information Sciences*. The journal was founded in 1994 at Berkeley, which served as the community journal of the Chinese Professionals of Geographic Information System. Due to the lack of financial support, the journal *Geographic Information Sciences* was edited and typeset in my lab in the first few years. He assisted me in handling the daily operations of this journal, including sending papers out for review. Following the acceptance of each paper, he managed the editing and typesetting tasks after the first issue of the journal.

Ruiliang collaborated with many colleagues in China. He used his vacation time to work in various institutes in China. For example, he worked with colleagues from Beijing Academy of Agriculture and Forestry Sciences (e.g., Yang et al. [11]), the Institute of Remote Sensing Applications of the Chinese Academy of Sciences (e.g., Zhao et al. [12]), Hohai University (e.g., Wang et al. [13]), Capital Normal University (e.g., Gong et al. [14]), Ningbo University (e.g., Li et al. [15]), Northeast University (Ma et al. [16]), and Northeast Institute of Geography and Agroecology of the Chinese Academy of Sciences (e.g., Ren et al. [17]), among others. He contributed to the improvement of remote sensing technology in China. He also contributed to the *Journal of Remote Sensing* by serving on its editorial board. In addition, he published papers in this journal with insightful reviews (Pu [18] and Pu in this issue [19]).

Ruiliang had a great personality. He was humorous and always has a smiling face. As the lab manager, he was a center of support in my lab at Berkeley. He helped everyone in both their daily and academic lives. He and his wife, Guoling Liu, were good cooks. Lab members all enjoyed the delicious food they brought to parties.

I am deeply saddened to have lost a great human, a lovely friend, and a great remote sensing scientist. I am fortunate to have met and worked with such a fantastic individual. Although a great master left us in this physical world, I am sure his books and his articles will be read, and his thoughts will be learned by generations to come!

Acknowledgments

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References

1. Miller J, Hare E, Hollinger A, Sturgeon D. Imaging spectrometry as a tool for botanical mapping. *Imaging spectroscopy II*. 1987;(834):108–113.
2. Gong P, Pu R, Miller JR. Correlating leaf area index of ponderosa pine with hyperspectral CASI data. *Can J Remote Sens*. 1992;18(4):275–282.
3. Gong P, Pu R, Miller JR. Coniferous forest leaf area index estimation along the Oregon transect using compact airborne spectrographic imager data. *Photogramm Eng Remote Sens*. 1995;61(9):1107–1117.
4. Pu R, Gong P, Miller JR. Estimation of coniferous forest leaf area index along the Oregon transect using CASI data. *J Nanjing Forestry Univ*. 1993;17(1):41–48.
5. Pu R, Gong P, Miller JR. Spectral derivative analysis for ponderosa pine leaf area index estimation. *Remote Sens Environ*. 1993;8(2):112–125.
6. Gong P, Pu R, Yu B. Conifer species recognition: An exploratory analysis of in situ hyperspectral data. *Remote Sens Environ*. 1997;62(2):189–200.
7. Yu B, Ostland M, Gong P, Pu R. Penalized discriminant analysis of in situ hyperspectral data for conifer species recognition. *IEEE Trans Geosci Remote Sens*. 1999;37(5):2569–2577.
8. Pu R, Gong P, Biging GS, Larrieu MR. Extraction of red edge optical parameters from Hyperion data for estimation of forest leaf area index. *IEEE Trans Geosci Remote Sens*. 2003;41(4):916–921.
9. Gong P, Pu R, Biging GS, Larrieu MR. Estimation of forest leaf area index using vegetation indices derived from Hyperion hyperspectral data. *IEEE Trans Geosci Remote Sens*. 2003;41(6):1355–1362.
10. Pu R, Gong P. *Hyperspectral remote sensing and its applications*. Beijing (China): Higher Education Press; 2000 (in Chinese).
11. Yang G, Pu R, Huang W, Wang J, Zhao C. A novel method to estimate subpixel temperature by fusing solar-reflective and thermal-infrared remote-sensing data with an artificial neural network. *IEEE Trans Geosci Remote Sens*. 2009;48(4):2170–2178.

12. Zhao Y, Pu R, Bell SS, Meyer C, Baggett LP, Geng X, Pu R, Bell SS, Meyer C, et al. Hyperion image optimization in coastal waters. *IEEE Trans Geosci Remote Sens*. 2012;51(2):1025–1036.
13. Wang H, Pu R, Zhu Q, Ren L, Zhang Z, Pu R, Zhu Q, Ren L, Zhang Z. Mapping health levels of *Robinia pseudoacacia* forests in the Yellow River delta, China, using IKONOS and Landsat 8 OLI imagery. *Int J Remote Sens*. 2015;36(4):1114–1135.
14. Gong Z, Cui T, Pu R, Lin C, Chen Y. Dynamic simulation of vegetation abundance in a reservoir riparian zone using a sub-pixel Markov model. *Int J Appl Earth Obs Geoinf*. 2015; 35(Part B):175–186.
15. Li J, Pu R, Gong H, Luo X, Ye M, Feng B. Evolution characteristics of landscape ecological risk patterns in coastal zones in Zhejiang Province, China. *Sustain*. 2017;9(4):584.
16. Ma B, Pu R, Wu L, Zhang S. Vegetation index differencing for estimating foliar dust in an ultra-low-grade magnetite mining area using landsat imagery. *IEEE Access*. 2017;5:8825–8834.
17. Ren Z, Pu R, Zheng H, Zhang D, He X. Spatiotemporal analyses of urban vegetation structural attributes using multitemporal Landsat TM data and field measurements. *Ann For Sci*. 2017;74:1–14.
18. Pu R., Mapping Tree Species Using Advanced Remote Sensing Technologies: A State-of-the-Art Review and Perspective, Journal of Remote Sensing, vol. 2021, Article ID 9812624, 26 pages, 2021
19. Pu R. Land Surface Temperature and Emissivity Retrieved from Satellite Thermal Sensors: A Comprehensive Review of Current Status and Perspectives. Journal of Remote Sensing. vol 2024. in this issue