

Jianwu (Jim) Tang (1970–2023)

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Ecosystem ecologist who made fundamental contributions to carbon cycle science and advocated for the next generation of scientists

Jianwu (Jim) Tang, who passed away at the age of 52 on 4 January 2023 in Shanghai, China, was an inspirational scientist who made tremendous contributions to our understanding of ecosystem ecology, the terrestrial carbon cycle and vegetation remote-sensing. Moreover, Jim always advocated for early-career ecologists, and mentored and supported many undergraduate students from underrepresented groups via several programmes. He also had a key role in international and national ecological networks, including the [National Ecological Observatory Network \(NEON\)](#).

Born to a family of factory workers in the city of Wenzhou in southeastern China, Jim found a new world in books when he was a kid – the high-school library was his second home. In an [interview](#) in 2008, he recounted how, in his endless reading, he became fascinated by nature and asserted that “the 21st century will be the century of biology”. Deciding to pursue a career in ecology, he received his bachelor’s (1988–1992) and master’s (1992–1996) degrees from Peking University, where he worked as an assistant professor and lecturer for four years before he started his PhD studies at the University of California, Berkeley.

During his PhD and postdoctoral research at UC Berkeley, Jim did pioneering work in understanding the linkage between soil respiration and photosynthesis in savannah ecosystems. He developed a flux gradient method to measure soil respiration continuously under trees and in the open grassland with novel CO₂ sensors ([J. Tang et al. *Agric. For. Meteorol.* **118**, 207–220; 2003](#)). He also measured soil respiration across natural spatial gradients in an oak–grass ecosystem, which helped to describe the role of tree photosynthesis on root respiration and isolate soil respiration into its autotrophic and heterotrophic components ([J. Tang et al. *Glob. Change Biol.* **11**, 1298–1304; 2005](#)). The methods in this highly cited paper inspired many other groups to use similar approaches to understand the linkages



between photosynthesis and respiration in different ecosystems. Jim continued this line of work, in old-growth forests instead of savannahs, during a postdoctoral position with Paul Bolstad at the University of Minnesota between 2004 and 2006.

Jim joined the Ecosystem Center at the Marine Biological Laboratory as an assistant scientist in 2008. As the head of a research team, he continued to conduct cutting-edge work to advance our understanding of the two main components of the terrestrial carbon cycle – photosynthesis and respiration. Their papers using solar-induced chlorophyll fluorescence (SIF) to estimate photosynthesis were among the earliest efforts to quantify the relationship between SIF and photosynthesis at the local forest scale (for example, [X. Yang et al. *Geophys. Res. Lett.* **42**, 2977–2987; 2015](#)). Now, the analysis of fluorescence data from satellites is an important way to constrain estimates of global photosynthesis. By developing tools and synthesizing such data, Jim made important contributions to the field of ecosystem ecology and global change biology.

While working in the USA, Jim maintained fruitful collaborations with East China Normal University (ECNU), focusing on carbon and nutrient cycles in coastal ecosystems and other ecosystems. In 2022, he became a founding director of the Center for Blue

Carbon Science and Technology of ECNU to promote international collaboration in blue carbon research. Jim expanded the scientific concept of coastal blue carbon, and systematically expounded on the types and key processes of the coastal blue-carbon ecosystems. Researchers are still using techniques that he developed to quantify the complete carbon budget of coastal ecosystems, including vertical and lateral carbon fluxes. Jim predicted the future development trends of coastal blue carbon under climate change scenarios ([F. Wang et al. *Nat. Commun.* **10**, 5434; 2019](#)) and evaluated how coastal conservation and restoration help carbon storage, which can be quantified as carbon credit used for carbon trading.

Jim exerted intellectual leadership in national and international collaborative networks. He led working groups that envisioned the design of NEON and was instrumental in creating a global ecological observatory network, now the Global Ecosystem Research Infrastructure, which involves coordinated observation networks in China, Germany, Finland, Australia, South Africa and the USA. Jim was a steering-committee member of the Coastal Carbon Research Coordination Network, which focuses on understanding and quantifying coastal blue carbon. In addition, he was a [committee member](#) for the US National Academy of Science on carbon dioxide

removal and reliable sequestration, and was instrumental in the decision to adopt coastal management as an approach to remove carbon dioxide and offset climate change.

Jim mentored a substantial number of undergraduate and graduate students and postdoctoral researchers in his short career. Many of these students were from underrepresented groups, via programmes including the Woods Hole Partnership Education Program, the Semester in Environmental Sciences at the Marine Biological Laboratory and the Harvard Forest Summer Research Program. Besides mentoring many graduate students and postdoctoral researchers, Jim served as a bridge between the bright minds of the USA and China – he was the president of Sino-Eco ([Sino-Ecologists Association Overseas](#)), which supports numerous young Chinese ecologists pursuing a career in ecology.

Jim will be remembered by many as a great scientist, colleague, mentor and friend, as we have seen from the outpouring of comments on the news of his death by people from all around the world. Many of us recall how Jim's character exemplifies the best human attributes, and how much his science and mentoring affected us. Jim used to say "I am passing the torch to you" when he gave students classic books in ecology. Indeed, he passed the torch to many people who will continue his unfinished work to understand how the changing climate affects our ecosystems.

Additional information

X.Y. was Jim's PhD student between 2009 and 2014. D.B. was Jim's PhD coadvisor and postdoctoral advisor. H.Y. was Jim's joint PhD student between 2013 and 2015, and postdoctoral researcher between 2017 and 2020.

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Competing interests

The authors declare no competing interests.