Weixing Wan (万卫星)

The space and planetary science community lost a great leader, Professor Weixing Wan, on 20 May 2020, aged 62. He was a world-leading space scientist and a pioneer in China's planetary science programme.

Weixing Wan was born in July 1958, several months after the launch of the world's first satellite. His given name, Weixing, literally means 'satellite' in Chinese. He grew up in Tianmen, Hubei province; Tianmen means 'a gate from Earth to Heaven'. Hubei gave birth to China's first great poet, Qu Yuan, 2,300 years ago, whose masterpiece, *Tianwen* (*Questions to Heaven*), asked more than 150 important questions about nature and humanity, the first of which is how the Universe originated. Qu Yuan also died at the age of 62. China's first Mars mission was named Tianwen-1 in April, when Wan, the chief scientist of the mission, was already in hospital.

Wan received his BS degree in 1982 from Wuhan University and his PhD in space physics from the Wuhan Institute of Physics and Mathematics at the Chinese Academy of Sciences in 1989. From October 1990 to July 1991, Wan visited the Center for Atmospheric Research at the University of Massachusetts Lowell in the United States, hosted by Professor Bodo Reinisch, an expert in ionospheric detection using digisonde. They investigated ionospheric disturbance with digisonde electron density profiles and drift measurements. In 1994, Wan became a professor of space physics and director of the Wuhan Ionospheric Observatory, which was the first ionospheric observatory in China, having been founded in the 1940s. In 2004, the observatory was led by Professor Wan to join the Institute of Geology and Geophysics in Beijing. In 2012, he reformed the observatory into the Key Laboratory of the Ionospheric Environment, and then successfully promoted the laboratory to the Key Laboratory of Earth and Planetary Physics in 2014, expanding the scope of its research to include the field of planetary science.

Wan published over 400 papers about the ionosphere, earning a significant reputation in a number of topics in space physics that included the theory of radio wave propagation, upper atmospheric physics, and ionospheric instrument development. He proposed a mechanism and corresponding model for the ionospheric longitude structure driven by atmospheric tides, demonstrating key evidence of atmosphere–ionosphere coupling. He also revealed that the topography of the

Weixing Wan (1958–2020).

Qinghai–Tibet Plateau plays a critical role in the formation of travelling ionospheric disturbances. In addition to his many other scientific outputs, he also established a comprehensive observatory chain of various instruments measuring the ionosphere, upper atmosphere, and geomagnetic field from high to low latitudes along the 120° E meridian, and he recently began building an incoherent scatter radar at Sanya in southern China, which will soon become the first such instrument at low latitudes to explore the energy coupling and particle transport between the magnetosphere and ionosphere over the equatorial region. Under Wan's leadership, an enormous amount of scientific data has been produced, with much more to come in the near future. Moreover, he promoted a policy of routinely releasing almost all the data to the international academic community, and greatly helped to advance understanding of the behaviour of the ionosphere on Asian and global scales. For his outstanding contributions to space sciences, Wan was elected as an academician of the Chinese Academy of Sciences in 2011.

At the age of 50, Wan developed a strong interest in the planetary sciences, particularly in planetary ionospheres such as that of Mars, and in early 2010 he attracted a group of Chinese scientists from several

universities and institutes and eventually proposed a Venus exploration project. In January 2020, about four months before he passed away, he was still actively organizing a workshop on this project. Many currently active planetary scientists in China were originally encouraged by Professor Wan during his later years to shift their research focuses from other fields. Wan also urged Chinese scientists to contribute to humankind's planetary explorations. He was the chief scientist of China's first mission to Mars, Tianwen-1, to be launched in late July or early August 2020. To prepare for this Mars mission, he organized the first national-level team of planetary scientists, and established the precedent for the science and engineering communities to actively cooperate. He founded the largest Key Laboratory of the Chinese Academy of Sciences, that of Earth and Planetary Physics, as well as the Division of Planetary Physics of the Chinese Geophysical Society. With foresight of the frontiers of the discipline and national needs, Wan proposed a set of planetary exploration plans with the help of ground-based, near-space, space station, moon-based and spacecraft detection methods. The planetary community in China will continue to benefit from the path designed by Wan.

Wan was a strong supporter of the establishment of planetary science as an academic discipline in China. He presided over the organization of the curricula of courses related to planetary physics at the College of Earth and Planetary Sciences, University of the Chinese Academy of Sciences, which began the cultivation of talented students and researchers in planetary physics in China. Wan supervised more than 60 PhD students in space physics, and most of them have already become faculty or research scientists of space physics in universities and institutes either in China or in other countries. He helped to create China's first journal of planetary science, *Earth and Planetary Physics*, and served as its first editor-in-chief.

Besides conducting research or teaching, Wan also enjoyed reading history books, particularly during his very busy trips. He and one of his students compiled a book of ancient Korean aurorae records from the past 1,000 years that was formally published one day before his passing. Wan had a

great enthusiasm for sports, and once won a ping-pong championship when he was a college student. He also liked volleyball and was known for his obsession with soccer. He often stayed up late to watch English Premier League or Italian Serie A matches, sometimes causing him trouble in getting to academic meetings the next morning. As a scientist, every statement of his had to be supported by data, but his unyielding faith in Chinese soccer was often the source of jokes

from his students as it seemed to not be well supported by data. To watch some important soccer matches of Wuhan and Beijing, he would even fight for the TV remote with his own son.

Wan was respected for making scientific breakthroughs while at the same time leading a whole community, from the present generation to many generations to come. The planetary community will continue to benefit from his legacy now and

in the future. He will be greatly missed for his outstanding scientific achievements and his noble personality.

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