

## Michael Juda (1959–2016)



We join with the extended *Chandra* team (CXC, MSFC, the Northrop Grumman and instrument teams) in mourning the untimely loss, on Dec 3<sup>rd</sup> 2016, of our colleague and friend Dr. Michael (Mike) Juda after a long and valiant fight with cancer. He died surrounded by family, friends, and colleagues, many of whom had kept a vigil at Beth Israel Deaconess Medical Center since his admission just before Thanksgiving.

Mike has long been a critically important leader in the *Chandra* flight and science teams, serving as lead Flight Director and Mission Operations Manager since 2004. His deep knowledge of the spacecraft and its operations, calm and unflappable leadership during spacecraft anomalies, and astute guidance of the development of upgrades and improvements to the spacecraft operations procedures and software have contributed directly to *Chandra's* longevity and scientific productivity.

Mike received his BSc at Caltech in 1981 followed by his PhD at the University of Madison, Wisconsin in 1988. His doctoral thesis involved very difficult measurements and interpretation of the soft X-ray background below 0.2 keV. Subsequently, as a Research Scientist in the Wisconsin Space Physics Group, he worked with the GSFC/Wisconsin team developing microcalorimeters as high throughput, high spectral resolution X-ray detectors. Mike was hired in 1993 to become the AXAF Science Center (now the *Chandra* X-ray Center) instrument scientist for the microcalorimeter detector, part of the original suite of instruments on the AXAF mission, later rechristened as the *Chandra* X-ray Observatory. However, by the time Mike arrived in January 1994, the calorimeter instrument and its AXAF-S mission

had been cancelled. Mike willingly took on the role of instrument operations scientist for the AXAF-I High Resolution Camera (HRC), the radiation monitor detector, and the two transmission gratings—all instruments he had never previously worked on. He was embedded with the HRC instrument Principal Investigator team to help prepare and calibrate that detector, leading to seamless transfer of HRC calibration, software, and operations to the CXC. He provided important insights to ameliorate high HRC background, to deal with misplaced events, and to create and use a timing simulator to restore precise timing capabilities. He monitored the radiation detector through years of extended operations, including dealing with degradation due to increasing temperatures, and salvaging the system's ability to autonomously shut down during high radiation. When the unit finally failed, the *Chandra* software was reprogrammed to utilize the HRC anticoincidence rates to recognize and trigger shut down during high radiation events.

Mike was recognized early for his general understanding of instruments and mission operations. Coupled with his calm and objective approach, he was asked and agreed to become a *Chandra* Flight Director one year after launch. This is an extremely critical assignment. In times of crisis the flight director has ultimate authority over the fate of the mission. In 2004 he became the Lead Flight Director, and the Mission Operations Manager. In the latter role, he oversaw the Northrop-Grumman flight operations team, and the SAO Operations Control Center team. He also continued in his role as HRC operations instrument scientist, supporting and providing operations training to the team through the difficult personnel transition following the death of the PI, Dr. Stephen Murray, in Aug 2015 (see article in 2016 Newsletter). As Flight Director and chairman of the Level 4 Flight Director Board, Mike ensured careful consideration and control of upgrades and improvements to *Chandra's* flight software and operations, and provided close oversight of all spacecraft commanding.

Through his actions and leadership, Mike provided an impeccable approach to *Chandra* mission operations, overseeing the safety and health of the Observatory. As a result, he contributed directly to maximizing the scientific return and high impact of *Chandra* and to ensuring that the mission continues to operate at a high level of performance 17 years after launch. Mike's exemplary leadership of the *Chandra* operations teams—including during special maneuvers and spacecraft anomalies, at all hours of the day or night—were essential to *Chandra's* longevity and scientific productivity. During spacecraft anomalies he directed the complex activities of multiple teams with consummate skill and poise. Under his leadership the team efficiently recovered from 100% of anomalies with no harm to the spacecraft, and successfully implemented a wide variety of flight software and operational improvements.

Mike made many contributions to the *Chandra* program's success. One notable example is his leadership of the development and implementation of a new paradigm for protecting the Observatory's X-ray detection instruments from solar radiation. In contrast to the previously used procedure, the new process maintains active control of the spacecraft's pointing while the instruments are safed, greatly reducing the risk of spacecraft component overheating, decreasing the time needed to create a new set of command loads, and increasing the amount of science observing time available. Because the new process affected a great many operational systems, careful planning and exhaustive testing were imperative. Mike led this multi-year effort, working closely with the flight, science and ground operations teams to plan and monitor all aspects of the work, from design to testing and implementation. The new process has performed flawlessly during many uses since installation, decreasing risk to the spacecraft and increasing *Chandra*'s scientific productivity. Mike's leadership was critical to the successful completion of this vital project. A second notable example was his capable and calm leadership during the mission's most exciting (i.e., scariest) event: the thruster gas tank pressure anomaly (see *Chandra* News Issue 17, p26). Sudden drops in pressure seen first on July 19, 2009 and subsequently 12 days later opened the possibility of a ruptured tank or line, which would lead to damage from hydrazine and the loss of momentum unloading capability. Immediate operational constraints were imposed and daily meetings assessed all possible causes. The ultimate conclusion that the issue was a faulty sensor reading was verified in late August via carefully planned thruster firing tests.

From Belinda Wilkes: "As Director, my most vivid memory of Mike in action is answering a phone call while I was driving along the M6 motorway in the UK during a summer vacation in July 2014 to hear Mike's calm and precise voice letting me know that *Chandra* was in Normal Sun Mode. He provided a description of the cause (not acquiring stars), the most likely explanation (a gyro bias jog), a detailed timeline for recovery, answered all my questions, and continued to keep me informed via email and alerts until recovery was complete only ~13 hours later. His detailed understanding of all aspects of the process, technical, procedural and organisational, and his calm, careful and methodical approach, always inspired me with confidence that *Chandra* was in excellent hands."

Mike's effective, unflappable leadership, whether during long-term planning or in the face of the urgency of a spacecraft anomaly, and his ability to enable disparate groups to work smoothly toward a common goal, earned deep respect from all those who worked with him, and represent an aspirational model for staff at all levels. The CXC will never be the same without him, but during his tenure he trained the two current flight directors, the HRC team, and all those around him. We will continue to aspire to his high standards and put into practice the lessons we learned from him, remembering him as we go about our work each day. ■

**Prepared by Belinda Wilkes, Dan Schwartz,  
Roger Brissenden, Harvey Tananbaum, Ralph Kraft**