
Project Scientist's Report

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Wow! *Chandra* is now well into its 15th year of operation with every expectation of continuing into the foreseeable future. This Fall (tentatively November 17-21), we shall celebrate 15 Years of *Chandra* Science at a symposium in Boston.

With no new major X-ray-astronomy facility planned to launch before 2028 (ESA's L2 mission), the entire *Chandra* Team recognizes the importance of maintaining *Chandra*'s unique science capabilities for at least another decade. As the Observatory ages, three issues—thermal, contamination, and radiation—are resulting in graceful degradation of the science performance.

Continued breakdown of the thermal insulation makes efficient science operation progressively more challenging, as thermal issues further constrain operations. Growing molecular contamination on the ACIS slowly erodes the net efficiency at low energies. Radiation damage to ACIS results in increasing charge-transfer inefficiency, but at a rate that is now manageable. Project Science (PS) has been particularly engaged in addressing the latter two (ACIS-specific) issues—molecular contamination and radiation damage. PS leads molecular-transport modeling for the ACIS cavity, with the goal of understanding the observed accumulation and then investigating potential scenarios for reduction. Over the past year, PS has also spearheaded efforts to ensure continued availability of real-time space-weather data on the low-energy protons that damage the ACIS front-illuminated CCDs.

With Harvey Tananbaum, Belinda Wilkes, Wallace Tucker, and Peter Edmonds of the CXC, we have prepared a major review article, "Highlights and Discoveries from the *Chandra* X-ray Observatory" to appear in the journal *Reports on Progress in Physics*. Also with the CXC, the *Chandra* Project—including Project Science—is preparing for (*Chandra*'s 4th) biennial Senior Review of Operating Missions, scheduled for 2014 March.

Finally, I would like to acknowledge the extraordinary contributions Harvey Tananbaum has made to the success of the *Chandra* mission during his time as CXC Director. For 37 years, I have worked with Harvey to create and now to operate this Great Observatory. In this day of smartphones and contact lists, his is the only phone number that I can call without invoking

the voice assistant on my iPhone. Harvey's stepping down as CXC Director will mark the end of an era in *Chandra*'s history. Everyone associated with *Chandra* owes him a deep debt of gratitude.