

Tales from the Mars Science Laboratory Thermal Protection System Development (or, Try Not to Panic When Your Heatshield Material Disappears)

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In 2012, the entry vehicle for the Mars Science Laboratory (MSL) mission was the largest and heaviest vehicle flown to another planet, designed to be able to withstand the largest heat fluxes in the Martian atmosphere ever attempted. The heatshield material that had been successfully used for all previous Mars missions had been baselined in the design, but during the development and qualification testing demonstrated catastrophic and unexplained failures. With only 10 months remaining before the original launch date, the TPS team led by NASA Ames designed and implemented a first-ever tiled, ablative heatshield. Highlights from MSL of the testing difficulties and innovations required to execute a new heatshield design will be presented, along with a sneak peak of the Mars 2020 mission.