

Analysis of ATV-1 Re-entry



Figure: Early and Late Images of the destructive re-entry of ATV-1 (Courtesy of NASA)

ESA has developed the Automated Transfer Vehicle (ATV) to re-supply the International Space Station. At the end of each supply mission, the ATV is directed into a destructive re-entry into the Earth's atmosphere. The destructive re-entry of ATV-1 Jules Verne occurred in September 2008 and was the subject of a joint ESA/NASA airborne observation campaign. The purpose of the campaign was to collect data that could be processed to fully characterise and identify fragmentation and explosive events, including event altitudes and the likely causes (e.g. fuel tank rupture). The resulting fragments were processed for their deceleration and tumble rates during re-entry. The re-entry trajectory was reconstructed, while ablation products were identified from the wake emission spectra.

Hovemere was part of an international ESA team analysing and studying the compendium of Jules Verne re-entry observational data. The study results went beyond the expectations of the initial data analysis, reviewing the overall data from the airborne missions, comparing observational data with the predictions of the existing re-entry models, determining requirements for future airborne campaigns and applying them to possible future re-entry observation mission scenarios, followed by the coordination of data archiving. This included assessment and analysis of combined data from the collaborative observational campaign, identification of fragments and time-tagged 3-D reconstruction of trajectories. Finally system requirements for future airborne observation campaigns were defined, with provision of a generic implementation plan for observing missions for future re-entry events.