CRaTER Project

Instrument Preliminary Design Review (I-PDR)
September 28th, 2005
CRaTER Team

- CRaTER is a multi-Institutional Project lead by Harlan Spence of B.U.
  - Aerospace Corporation
  - Air Force Research Laboratory
  - Boston University
  - Massachusetts Institute of Technology
  - National Oceanographic and Atmospheric Administration
  - University of Tennessee
- Science Mission involves all of the Institutions
- Flight Hardware Design, Fabrication, Test & Calibration is being done by three of the Institutions
  - Aerospace Corp
  - B.U.
  - MIT
- Detailed roles and responsibilities within the hardware team have been defined and documented.
CRaTER Project Science Team

Friday, June 17, 2005

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Principal Investigator
Boston University

University of Tennessee

Aerospace Corp

Boston University

MET

NOAA

AFRL

Larry Townsend
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Co-I

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Co-I

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Co-I & Project Scientist

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Collaborator

Michael Golightly
Collaborator

Cosmic Ray Telescope for the Effects of Radiation

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MIT
Project Engineer

Boston University
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I&T Lead

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Albert Lin
Mechanical Engineer

MIT
Dorothy Gordon
Sr. Electrical Engineer

Matt Smith
Mech. Engineer

Mike Doucette
Test Engineer

Cosmic Ray Telescope for the Effects of Radiation
Cosmic Ray Telescope for the Effects of Radiation
**General Organizational Roles in the Project**

<table>
<thead>
<tr>
<th>Organizational Roles</th>
<th>Design</th>
<th>Fab.</th>
<th>Assembly</th>
<th>Test</th>
<th>Calib.</th>
<th>S.C. I&amp;T</th>
<th>Launch</th>
<th>Ops</th>
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<td>GSE</td>
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<tr>
<td>MIT</td>
<td>Digital PWB Power Supply Exchanger</td>
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<td>Note: CRaTER GSE used only for Post-Shipment Testing. Not used once integrated with SC</td>
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**Cosmic Ray Telescope for the Effects of Radiation**

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*Sept 28, 2005 CRaTER Project Overview ... Rick Foster (rickf@space.mit.edu)*
What are we building?

• Flight Model CRaTER Instrument (Deliverable to NASA)
  – Fully Qualified and Calibrated
• Flight Spare Instrument
  – Fully Qualified and Calibrated
  – The incremental costs associated with putting spare components together is minimal
  – CRaTER Project has only budgeted for a few spare detectors. Yield may be a factor
  – The science team will utilize the spare for instrument characterization at different particle accelerators, both pre and post launch to help develop SOC analysis tools. Using the spare reduces risk to the flight unit.
• Engineering Model Instrument
  – Fairly high fidelity model
  – Not Flyable
• Mass/CG Simulator
• Command & Data Handling Simulator
  – It may be possible that we will use the EM for this function, but still under review.
• M&E GSE for internal CRaTER project use
  – Will be used up thru post shipment testing at NASA-GSFC
• Various jigs and fixtures for instrument testing and calibration
• Shipping containers for instrument transportation
CRaTER Project Schedule

- The CRaTER Project Schedule tracks the NASA LRO Top Level Schedule
  - LRO schedule being used by CRaTER currently at Rev 0.7
  - The CRaTER Project Schedule Holy Grail
    - A fully qualified & calibrated flight unit to NASA-GSFC by Oct 2007
- Even with some problems getting the project started, the schedule prognosis is *plausible*.
- After I-PDR, the next technical milestone will be the submittal of the Engineering Model detector technical specification to Micron Semiconductor for quotation and subsequent procurement.
  - Oct 2005
- Near I-PDR, the next programmatic milestones will be the issuance of a no cost extension to the Phase ABCbridge contract and then completion of the Phase CDE contract (extension).
  - Current estimation for the completion of the Phase CDE contract extension signoff is before the end of November 2005
Sept 28, 2005 CRaTER Project Overview ... Rick Foster (rickf@space.mit.edu)
Phase C Milestones

CRaTER Master Milestone Rev05.vsd

- **Oct-05**: EM Detectors Ordered (6 mo lead)
- **Oct-05**: EM Detectors Arrived @Aerospace
- **Jun-05 - Dec-05**: Preliminary and EM Model Design
- **Sep 28, 2005**: I-PDR (Rescheduled from 6/05)
- **Jun-05 - Dec-05**: Engineering Model Fabrication
- **Dec-05 - Apr-06**: EM System Integration
- **Apr-06 - May-06**: EM Initial Performance Testing
- **May-06 - Jun-06**: EM System Integration
- **Nov-05 - Jun-06**: Flight Critical Design
- **May-06**: EM Detectors Arrive @Aerospace
- **May-06**: EM Telescope arrives @MIT
- **Jun-06**: I-CDR
- **June 2005**: CRaTER Project Overview... Rick Foster (rickf@space.mit.edu)
Phase D1 Milestones

- Jun-06 - Dec-06: Fabrication
- Dec-06 - Mar-07: Instrument Integration and Test
- Mar-07 - Jun-07: Environmental Testing
- Jun-07 - Aug-07: Calibration at Berkeley
- Aug-07 - Oct-07: Schedule Margin

Note: During the flight fabrication phase, significant beamline characterization by the Science team of the Engineering Model Instrument will be occurring in parallel.

Jun-06 - Nov-06

I-PSR

Oct-07

I-CDR

Oct-07

June 2006
### Phase D2 Milestones

<table>
<thead>
<tr>
<th>Month</th>
<th>Event Description</th>
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<td>Nov-07</td>
<td>Instrument I&amp;T @ NASA-GSFC</td>
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<tr>
<td>Oct-07</td>
<td>Launch Site Operations @ NASA-KSC</td>
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<tr>
<td>Oct-07</td>
<td>Aug-08 - Oct-08</td>
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<tr>
<td>Aug-08</td>
<td>Launch Site Operations @ NASA-KSC</td>
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<tr>
<td>Sep-08</td>
<td>Oct-08 - Aug-08</td>
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<tr>
<td>Apr-08</td>
<td>Oct-07 - Aug-08</td>
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</tbody>
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**Cosmic Ray Telescope for the Effects of Radiation**
Risk Management

- CRaTER Risk Management methodology detailed in CRaTER plan doc# 32-01202
- Classification of risk modeled on NASA methodology
  - Likelihood and impact assessment.
- At I-PDR, there is one green level identified risk.
  - The identified risk is the possibility of receiving the flight detectors and finding or developing problems with them during flight instrument I&T
    - These detectors are “made to order” and typically have a 6 month lead time.
    - 2 detectors have been beam tested already, two more on order
    - 6 detectors will have been tested in the EM model prior to I-CDR
    - CRaTER Plans to build a flight and flight spare instrument