MISSE Science Experiments

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Objective:

- To fly material experiments on the exterior of ISS to evaluate the long-duration environmental durability of materials for spacecraft applications

Relevance/Impact:

- Space environment exposure experiments enables:
  - Prediction of material and component lifetimes in space, e.g. MISSE 2 data has had a direct impact on materials design choices for: Operational Land Imager, Global Precipitation Measurement-Microwave Imager, Standard Interface Vehicle & WorldView-2
  - Development of predictive tools, e.g. atomic oxygen erosion yield for polymers
  - Correlation factors between space-exposure & ground-facilities, enabling more accurate in-space performance predictions based on ground-testing, e.g. MISSE data directly impacted EVA decision for Hubble Space Telescope (HST) 5th servicing mission
  - Provides long-duration environmental data to the space community, e.g. 30+ requests for MISSE 2 PEACE data: ARC, GSFC, JSC, Aerospace Corp., AFRL, Ball Aerospace, Boeing, DARPA, Lockheed Martin, SpaceX, United Solar Ovonic LLC., etc.
  - MISSE Science experiments progress the SOA in durability understanding

Development Approach:

- Conduct post-flight analyses of Glenn’s MISSE 1-8 fundamental science experiments
- Publish MISSE based Handbook under the NASA Tech Standards Program
- Develop and publish an Atomic Oxygen Erosion Yield Predictive Tool
- Add MISSE data to environmental durability databases
- Student collaboration

Project Life Cycle Schedule

<table>
<thead>
<tr>
<th>Milestones</th>
<th>MISSE Science Experiments</th>
<th>SCR</th>
<th>RDR</th>
<th>PDR</th>
<th>CDR</th>
<th>VRR</th>
<th>Fit Safety</th>
<th>FHA</th>
<th>Launch</th>
<th>Return</th>
<th>Reports</th>
</tr>
</thead>
<tbody>
<tr>
<td>MISSE 8</td>
<td>1 (40 samples)</td>
<td>N/A</td>
<td>N/A</td>
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<td>11/2010+</td>
<td>TBD</td>
<td>2013</td>
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<td>2009</td>
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<td>8/2006</td>
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<td>2010-2011</td>
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<td>MISSE 5</td>
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<td>9/2006</td>
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ISS Resource Requirements: None (post-flight analyses)

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