Fiscal Year: FY 2013  
Task Last Updated: FY 08/05/2013

**PI Name:** Wyatt, Sarah E Ph.D.  
**Project Title:** Proteomics Analysis of Arabidopsis Seedlings in Microgravity  
**Division Name:** Space Biology  
**Program/Discipline:** SPACE BIOLOGY  
**Program/Discipline--Element/Subdiscipline:** SPACE BIOLOGY--Developmental biology  
**Human Research Program Elements:** None  
**Human Research Program Risks:** None  
**Space Biology Element:** (1) Cell & Molecular Biology  
(2) Plant Biology  
**Space Biology Cross-Element Discipline:** None  
**Space Biology Special Category:** None  
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**Congressional District:** 15  
**Comments:**  
**Project Type:** FLIGHT  
**Solicitation:** 2012 Space Biology NNN12ZZT001N  
**Start Date:** 09/01/2013  
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**No. of Post Docs:**  
**No. of PhD Degrees:**  
**No. of PhD Candidates:**  
**No. of Master’s Degrees:**  
**No. of Master's Candidates:**  
**No. of Bachelor’s Candidates:**  
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**Flight Program:** ISS  
**Flight Assignment:** Rapid Turn Around Flight  
**COI Name (Institution):** Luesse, Darron Ph.D. (Southern Illinois University, Edwardsville)  
**Grant/Contract No.:** NNX13AM48G  
**Performance Goal No.:**  
**Performance Goal Text:**  
**Task Description:** The space flight environment provides a unique environment to understand how gravity informs plant growth, development, and physiological processes. The central objective of this study is to determine what proteins are differentially expressed during space flight in developing Arabidopsis seedlings. A body of research has evaluated the differential gene expression on space flight vs ground controls, but gene expression provides an indirect measure of what proteins are expressed. Genes may be transcribed but the transcripts degraded, or translated proteins may be regulated through post translational modifications. Our hypothesis is simple: Some components of plant physiology that are informed by gravity are regulated by post transcriptional or post translational mechanisms. Proteomic analysis is the best/only method to identify these components. We propose to use BRIC-PDFU hardware on a Rapid Turn-Around Space Flight Experiment to gain insights into differences in protein profiles between Arabidopsis seedlings grown...
during space flight and ground based controls. Arabidopsis seedlings will be germinated, grown, and tissues fixed on orbit. Once returned to Earth, total protein will be extracted, labeled with iTRAQ reagents and analyzed for differences in protein profiles. These data will complement the gene expression data currently available from space flight experiments and also provide novel insights by supplying data on differences in post-transcriptional regulation. They will also provide a foundation for a network analysis to generate additional hypotheses as to the mechanisms involved in gravity perception/response in plants.

| Rationale for HRP Directed Research: |  
| Research Impact/Earth Benefits: | 0  
| Task Progress: | New project for FY2013.  
| Bibliography Type: | Description: (Last Updated: 03/30/2018) |