



SAGE III ISS

Status of Utilization of Disturbance Monitoring Package in Data Products

SAGE III/ISS Science Team Meeting at Georgia Tech

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Utilization of DMP
in Data Products

Charles Hill

DMP Overview

What is it?

Where is it?

Defining Axes

How are we using it?

Go With The Flow

Product
Improvements

The Quick Look

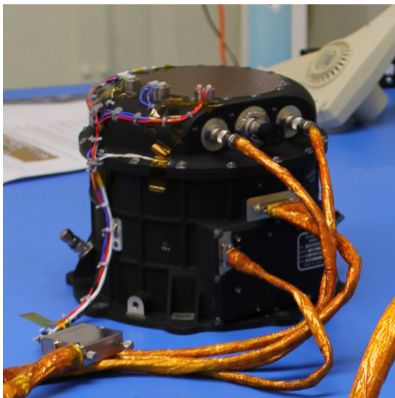
The Statistical Picture

Summary

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Disturbance Monitoring Package (DMP)



- ▶ The DMP is a Honeywell Miniature Inertial Measurement Unit comprised of three orthogonal ring laser gyros to measure angular rates in three orthogonal axes.
- ▶ The DMP's primary requirement was to flag periods when vibration conditions can negatively impact the science data product, but it **has been used successfully to correct the Level 1 transmission retrievals** for payload vibrations.
- ▶ The DMP's **x-axis gyroscope failed on 8 Aug 2023**. The **y- and z-axes have begun to lose laser intensity in a way that suggests they are in a failure mode**.

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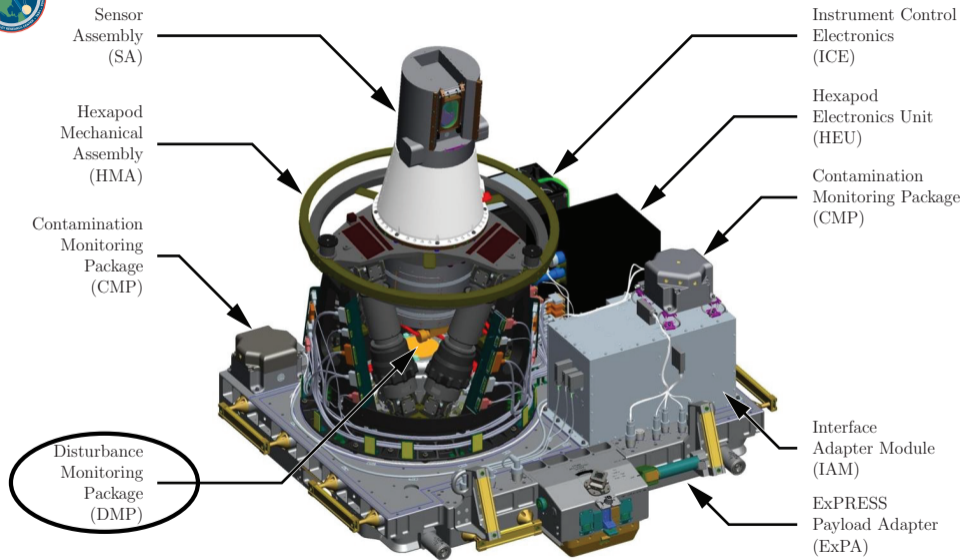
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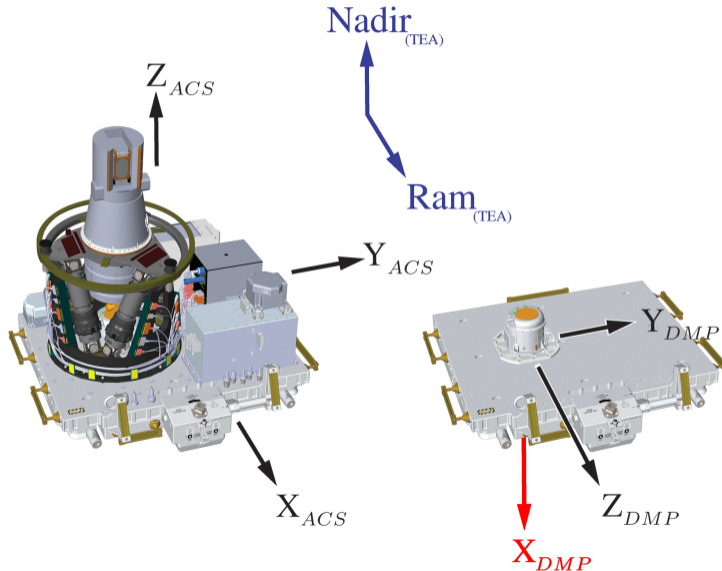
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Payload Axes



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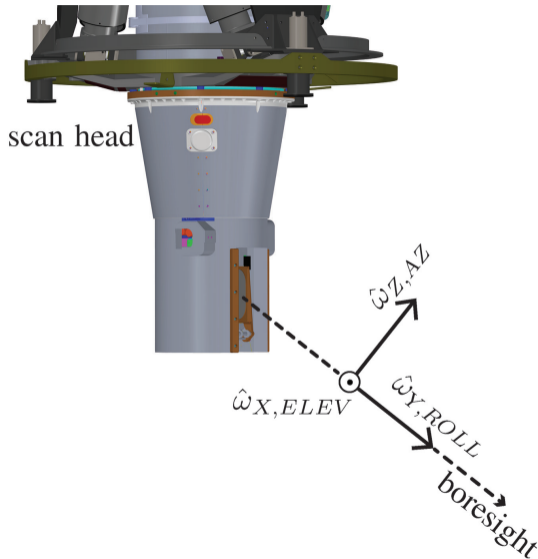
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SAGE III Boresight Coordinates



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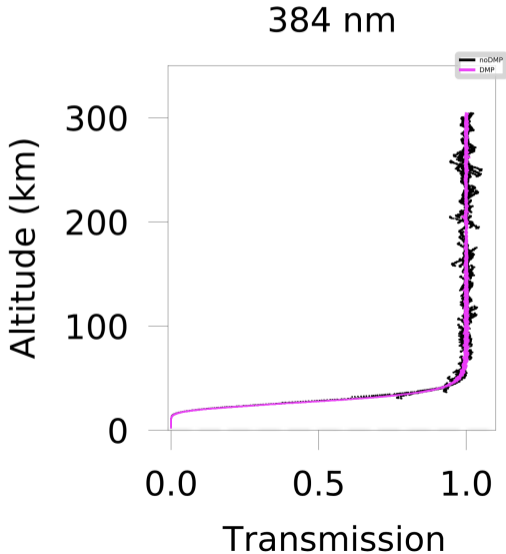
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Elevation Correction Improves Transmission Noise



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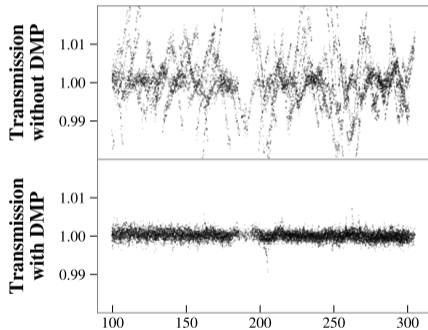
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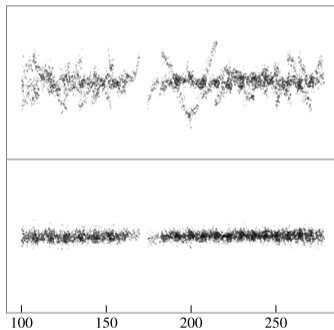
Questions

Elevation Correction Improves Transmission Noise

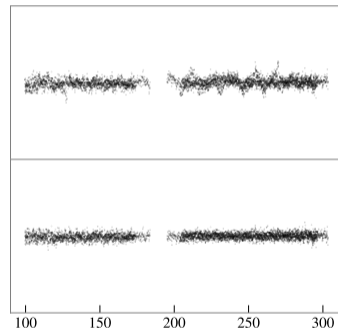
**High Disturbance
Event 2018051633SR**



**Medium Disturbance
Event 2017091637SS**

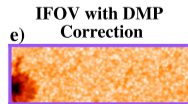
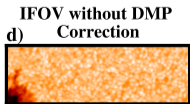
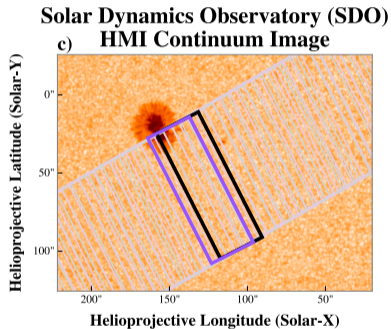
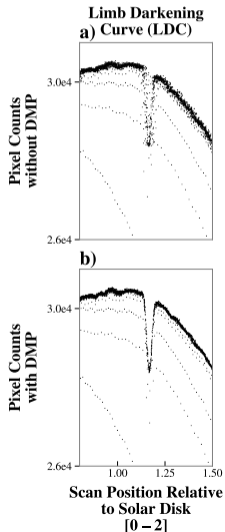


**Low Disturbance
Event 2019082825SR**



Altitude (km)

Medium Disturbance Event 2017091637SS



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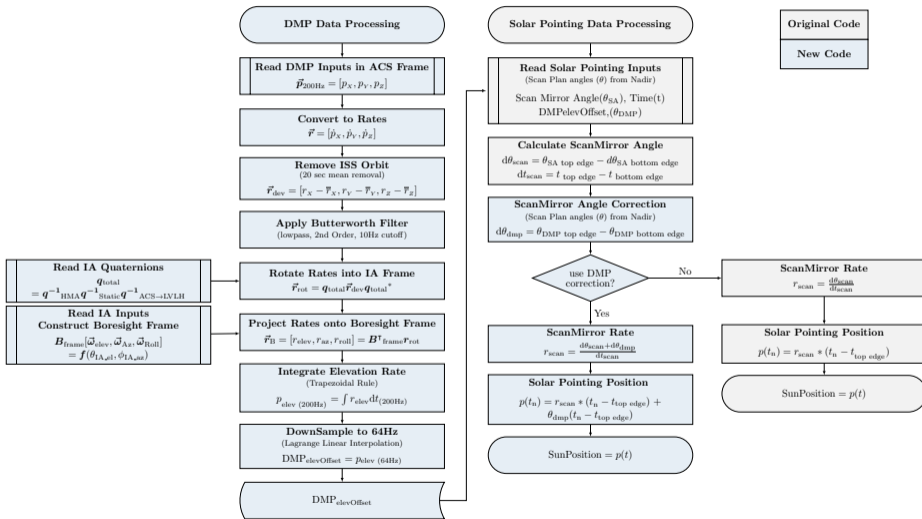
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DMP Correction Added To Science Processing



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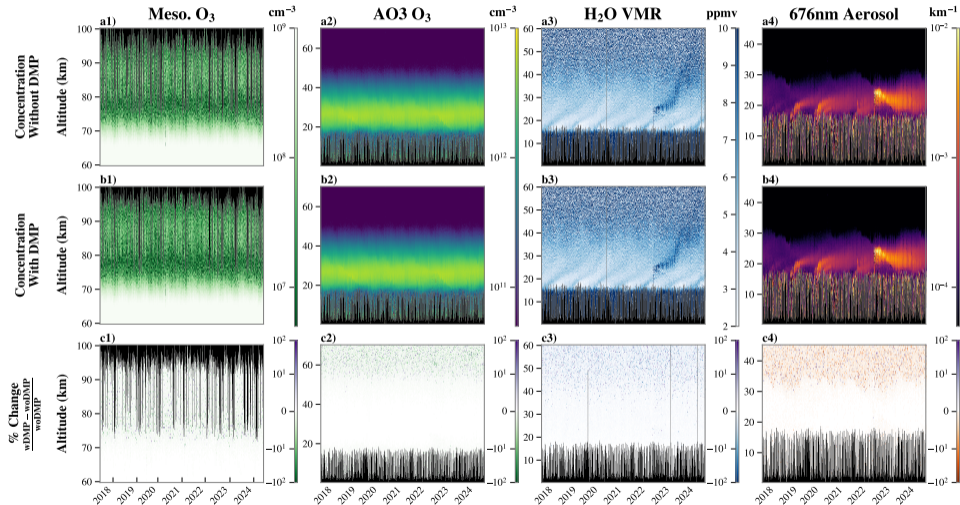
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DMP Doesn't Significantly Change Profiles



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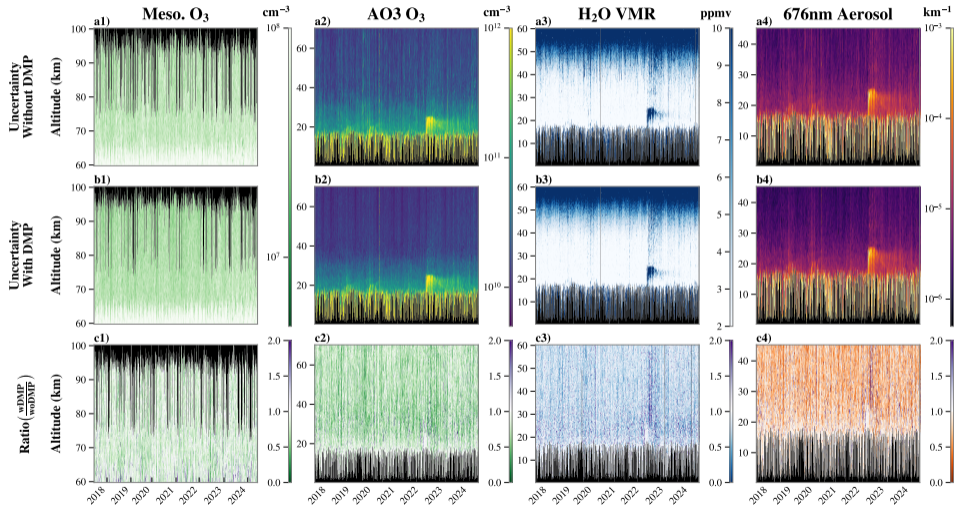
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DMP Correction Improves Uncertainties Significantly



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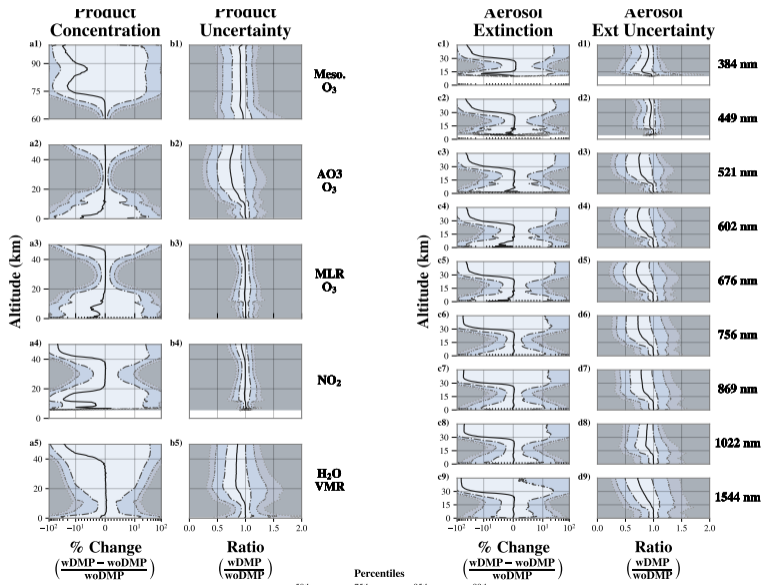
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v5.3 Statistical Summary of Changes



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DMP Utilization is a Success Story



- ▶ The DMP correction to the data product in v5.3 has significantly reduced the product uncertainties caused by ISS vibrations.
- ▶ Level 2 abundances and extinctions have not changed appreciably because of the robust handling of v5.2 binning statistics by the inversion algorithm team.
- ▶ The DMP x-axis gyroscope has failed.
 - The x-axis represents vibrations that are predominantly in the instrument's azimuthal direction and handled by the scan head.
 - The DMP team have shown that loss of the x-axis did not significantly affect the DMP correction to scan plane elevation.
 - Pending loss of y- and z-axes will put an end to the DMP correction.



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