Supporting Information for "Positional and Angular Dependence of Jupiter's Thermal Emission: Analysis from Juno's Microwave Radiometer"

F. Oyafuso[1], S. Levin[1], G. Orton[1], S. Brown[1], V. Adumitroaie[1], M. Janssen[1],

M. H. Wong[2,5], L. N. Fletcher[3], P. Steffes[4], C. Li[5], S. Gulkis[1], S. Atreya[6], S.

Misra[1], S. Bolton[7]

[1]Jet Propulsion Laboratory, California Institute of Technology, 4800 Oak Grove Drive, Pasadena, CA 91109, USA.

[2]SETI Institute, Mountain View, CA, 94043-5139

[3]School of Physics and Astronomy, University of Leicester, Leicester, LE1 7RH, UK

[4]Georgia Institute of Technology, Atlanta GA, 30332

[5]Department of Astronomy, University of California Berkeley, Berkeley, CA 94720-3411, USA.

[6]Climate and Space Sciences and Engineering, University of Michigan, 2455 Hayward Street,Ann Arbor, MI 48109-2143, USA

[7]Southwest Research Institute, San Antonio, Texas, TX, USA.

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Introduction

This document contains Supporting Information for our description of the deconvolution algorithm for Juno MWR data. Text S1 explains how fits to the variances shown in Fig.

S1 were obtained. Text S2 explains the primary selection criterion in the deconvolution data screening process.

Text S1: Fitting of Instrument Noise Variances The instrument noise of the MWR antenna temperatures depends on both the characteristics of the individual antennae and the algorithm used to convert from raw counts from each receiver's voltage-to-frequency converter. The algorithm was used to compute covariances from an ensemble of 43,200 synthetic timeseries:

$$S_m = \left\langle (T^{(A)} - \overline{T^{(A)}})(T^{(A)} - \overline{T^{(A)}})^T \right\rangle \tag{1}$$

where $T^{(A)}$ is a matrix whose rows correspond to measurements used for the deconvolution and whose columns comprise the ensemble of synthetic measurements with random noise. A quadratic fit to the variances (diagonal elements of S_m) is shown in Fig. S1.

Text S2: Screening Criterion: Beam Fraction on Planet Figure S2 demonstrates an example of the first screening criterion. Plotted are channel-1 boresight emission angles as a function of the fraction of the beam pattern that falls on Jupiter for all individual measurements whose boresight vector intersects the planet during the first perijove. In the initial step, measurements for which the off-planet beam pattern exceeds 1% are discarded (points to the right of the vertical dashed line). The gray points correspond to measurements that are ultimately rejected after all steps of the screening algorithm, and the green points constitute the set of measurements used in the deconvolution.

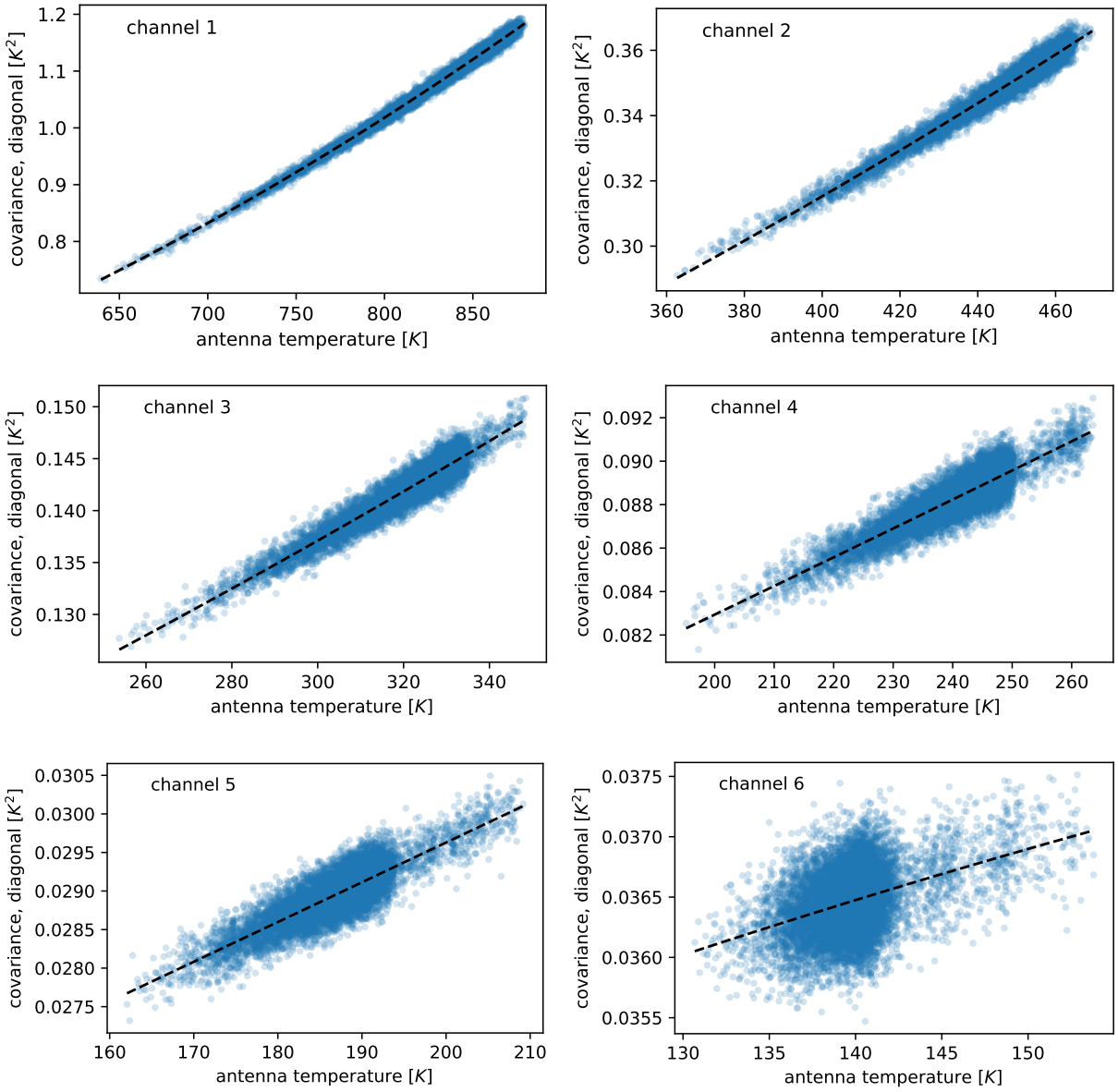

Figure S1. Monte Carlo simulation of measurement variance due to instrument noise for all six channels. Each individual point represents a measurement contained in the dataset used for the deconvolution and is derived from a random ensemble of 43,200 synthetic time series. The dashed lines are least-squares quadratic fits.

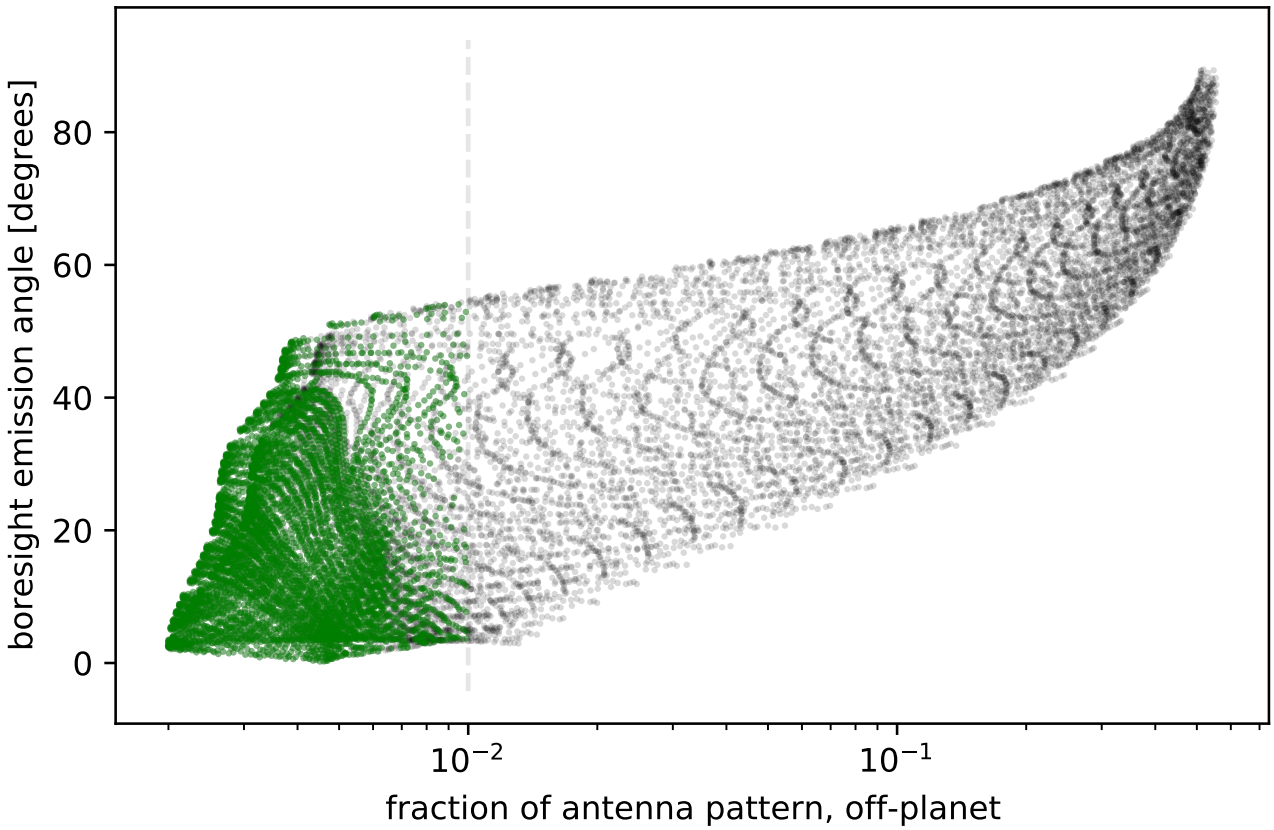

Figure S2. For all measurements during the first perijove whose boresight vector intersects the planet, emission angles are plotted with respect to channel-one off-planet beam fractions. Only those measurements for which at least 99% of the beam falls on the planet (points to the left of the faint dashed line) are retained during this first step of the data screening. Measurements that survive all steps of the screening procedure are indicated by green dots.