ASTRO-H

INSTRUMENT CALIBRATION REPORT
RIGIDITY AND SAA
ASTH-GEN-CALDB-SAA

Version 0.1

March 2016

ISAS/ GSFC

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DOCUMENT TITLE : Rigidity and SAA			
ISSUE	DATE	PAGES AFFECTED	DESCRIPTION
Version 0.1	March 2016	All	First Release

Introduction

1.1 Purpose

This document has two different sections: one devoted to the rigidity (COR) parameter and one to the South Atlantic Anomaly (SAA).

1.2 Scientific Impact

COR and SAA are two parameters used in the screening process. Both information are calculated and written for each observation in the .ehk file. They are derived for values stored in CALDB.

2 Release CALDB 20160310

Filename	Valid data	Release data	CALDB Vrs	Comments
ah_gen_cor_20140101v001.fits	2014-01-01	20160310	001	First release
ah_gen_saa_20140101v001.fits	2014-01-01	20160310	001	First release

2.1 Data Description

1) The rigidity values in this file are calculated using the International Geomagnetic Reference Field (IGRF) model updated in 2015. This model may be used to derive map of COR for different year. The rigidity map used by Hitomi is calculated for the year 2016.0.

2) The SAA information stored in CALDB determines the origin of the calculation of the satellite position with respect to the SAA, and contains the longitude and latitude of the vertices that define the SAA for each Hitomi instrument. The file contains 6 columns and 6 rows. The columns are associated with the different instruments (SXI SXS HXI1 HXI2 SGD1 SGD2) and the rows are the vertices that defined the SAA. The vertices are different for each instrument.

2.2 Data Analysis

1) Comparison between the rigidity maps derived from the IGRF 2015 model for different years and the rigidity maps used by ASCA and Suzaku are shown in Figure 1. It appears very clearly (upper right corner image) that Suzaku data (COR2, Year 2006) has a distortion at longitude around 0 and positive latitude not seen in the other maps. Figure 2 shows a projection along longitudinal variations for different fixed values of the latitude where the distortion is more clear (upper panel green curve).

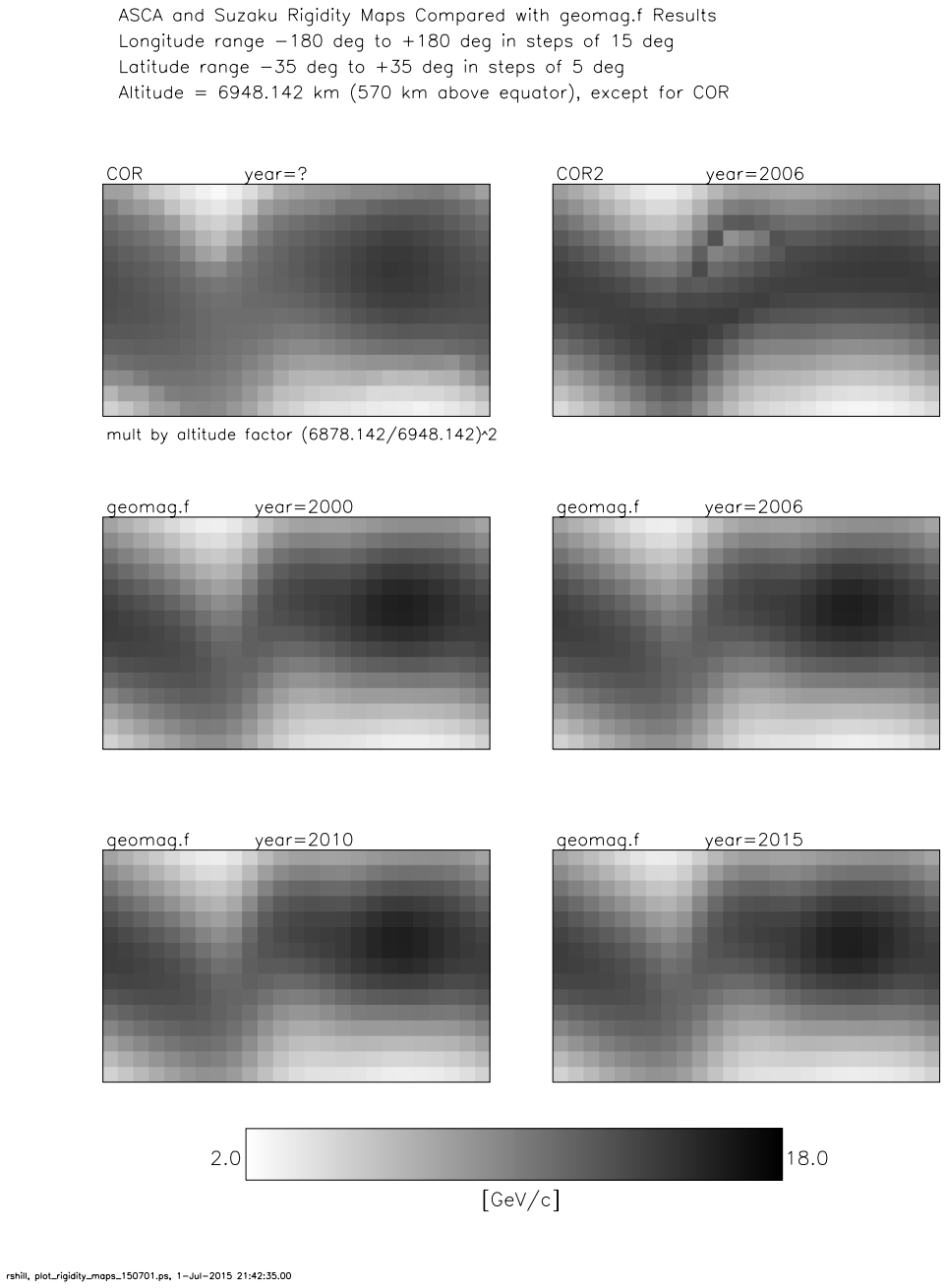

Figure 1: Grayscale renderings of rigidity maps computed with the code "geomag.f " for the epochs 2000.0, 2006.0, 2010.0, and 2015.0, as compared to the COR (ASCA- not dated) and COR2 (Suzaku) maps

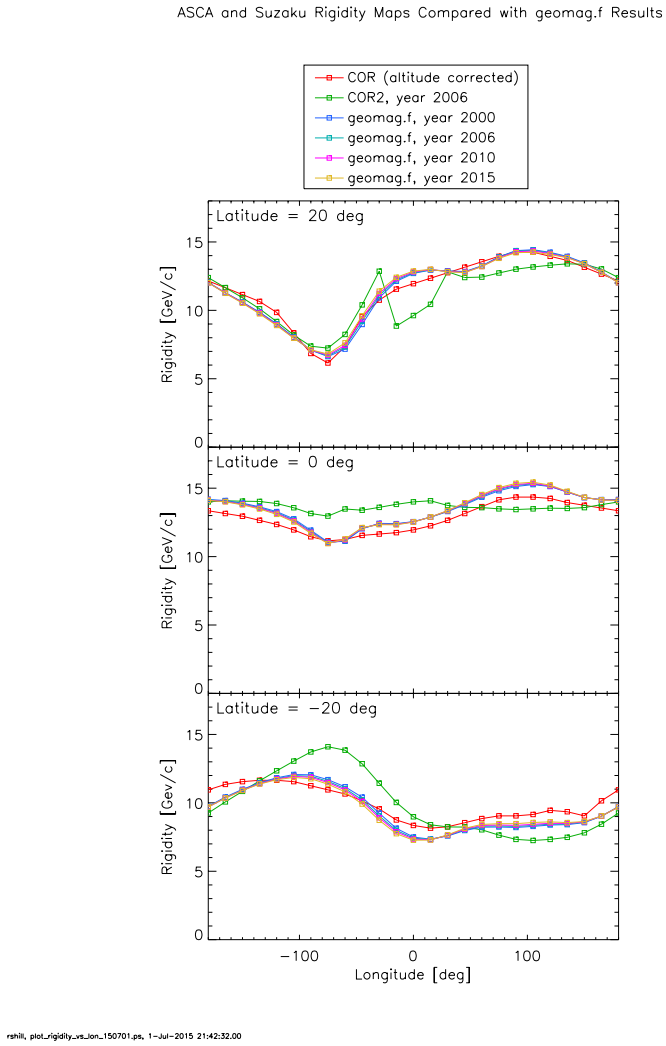

Figure 2: Cuts along latitude +20 deg, 0 deg, and -20 deg, as a function of longitude,for the same set of rigidity maps

2.3 Results

1) The rigidity map in CALDB for Hitomi contains a file based on the data derived from the code, using the 2015 IGRF model and computed for year 2106.0