

# GRACE Level-1 Status

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# Overview

- **Level-0/level-1 processing status**
- **GRACE alignment status**
- **Level-1 reprocessing (V02)**
  - **Improved level-1 orbit determination**
  - **New SCA/ACC alignments (QSA)**
  - **New KBR boresight vectors (VKB)**
- **Level-1 V02 distribution plans in 2011**
- **ACC Level-1 data advisory**
- **Summary**



# Level-0/Level-1 Processing Status

- **Standard automatic Level-0/Level-1 processing is fully operational at PO.DAAC (JPL) since 2004-01-01. Only manual interventions during off-nominal operations of the GRACE spacecraft. SDS is responsible for final L1B product quality. Level-1 distribution by PO.DAAC to the level-2 centers. (latency ~12 days)**
- **Quick look Level-0/Level-1 processing is fully operational at JPL (section 335) since 2003-09-01 to monitor for non-nominal states of the science payload. Quick look Level-1 data distributed to CSR for early gravity field analysis since 2008-02-06 (latency ~24 hours).**

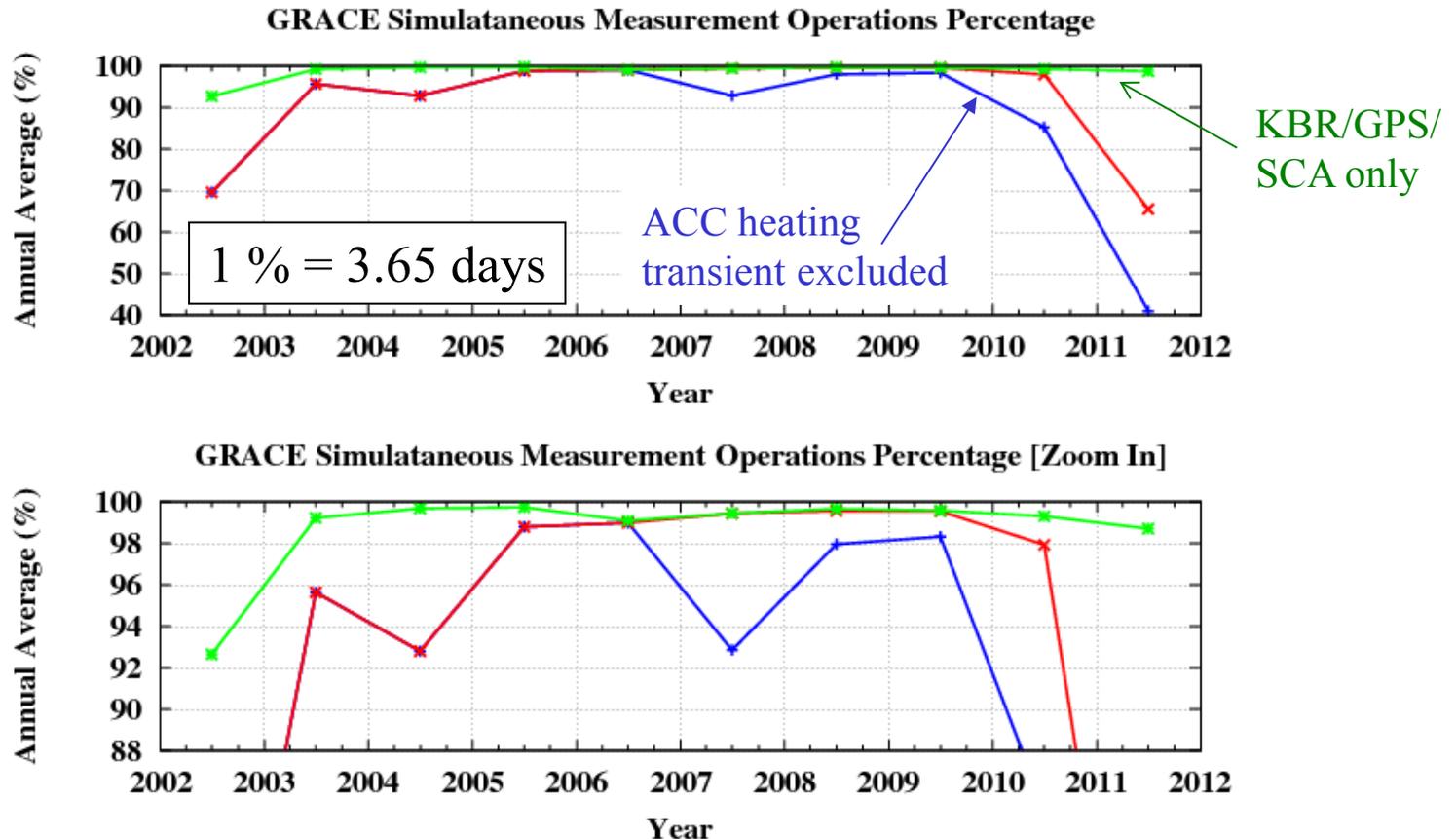


# Data Flow Statistics as of 04 August 2011

- **> 99.9 %** of raw data has been retrieved successfully and reformatted by the Science Data System (data latency < 1.0 hour)
- **3412** days of Level-1B data have been distributed to the level-2 centers (CSR, GFZ ,JPL) ( data latency < 12 days)
  - **3356** days pass KBR quality check, which serves as proxy for overall data quality
  - **3086** days all measurements simultaneously available, required for nominal level-2 processing
- **Number of nominal level-2 days in 2011 has dropped due to powering off the ACC, to reduce the power load on the batteries during maximum eclipse season. (KBR, GPS and SCA data were unaffected)**



# GRACE Simultaneous Measurement Operations



**Definition:** Time percentage for which GPS, KBR, SCA and ACC measurements exist *simultaneously* for *both* spacecraft and measurements are *valid*. (ACC heating transient event data are considered valid)



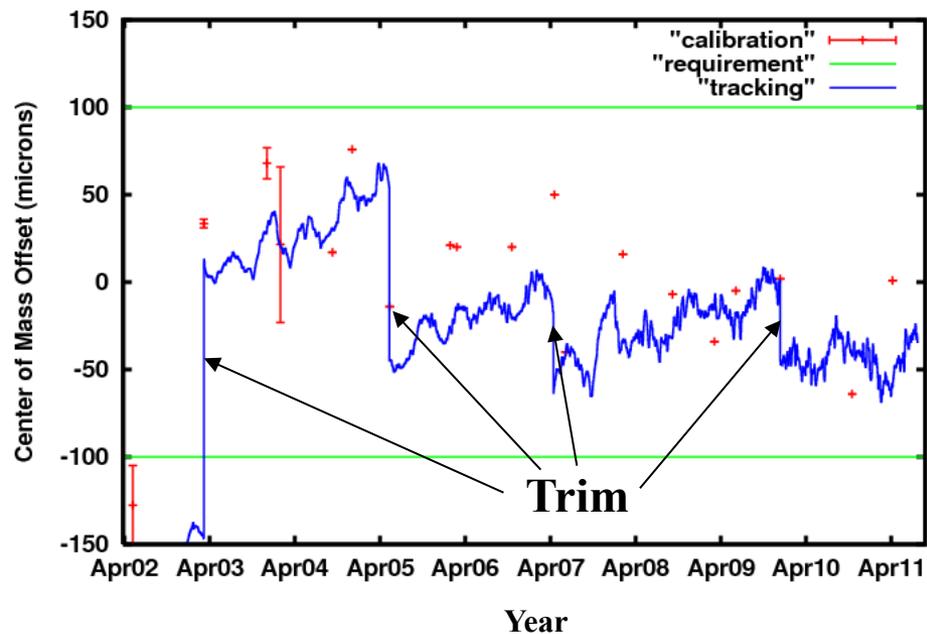
# GRACE Alignment Status

- **15 simultaneous COM calibration maneuvers performed since July 2004**
  - **Center of Mass for both GRACE S/C are located within the required 100 microns of the ACC proof mass COM.**
  - **COM calibration analysis continues to be limited by ACC “twangs” except (31 May 2007) COM calibration maneuver**
  - **Last trim performed 8 December 2009 (X-component)**
  - **Proposal to trim in late 2011 (X-component)**
- **CSR has re-analyzed the KBR boresight calibration maneuvers and determined new solutions for the star camera to accelerometer alignment (QSA) and KBR boresight vector (VKB)**
- **New alignments will be used in Level-1 V02 data products**

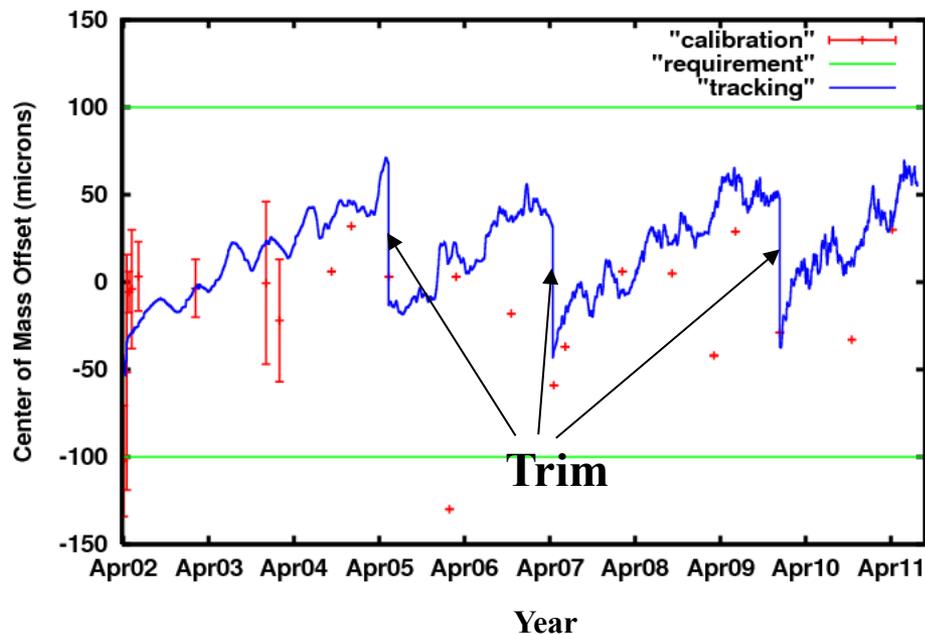


# Center of Mass X-Alignment; Calibration & Tracking

## GRACE-A

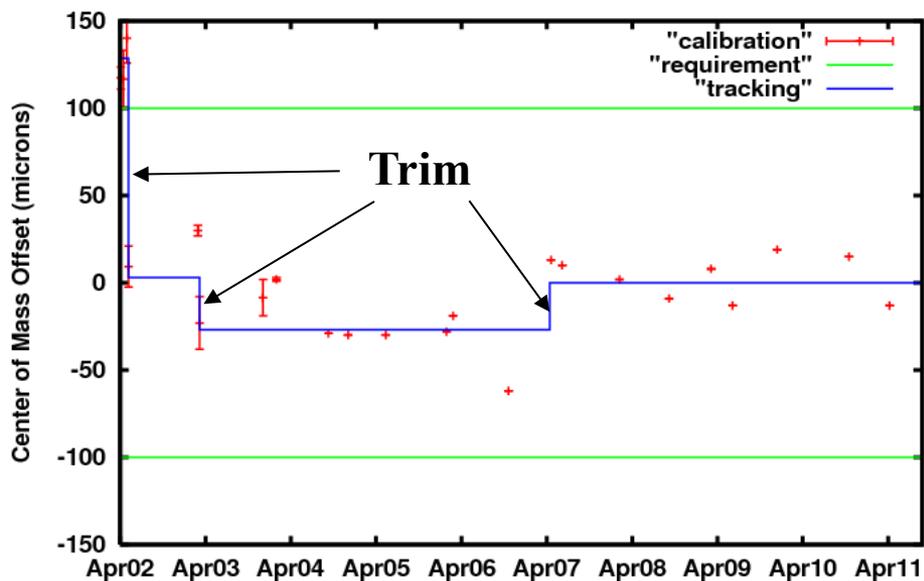


## GRACE-B

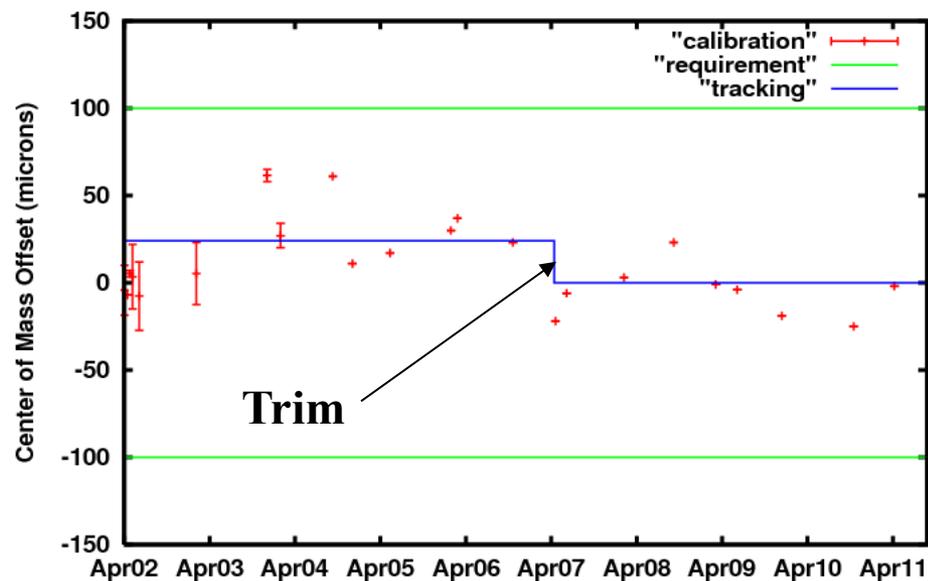


# Center of Mass Y-Alignment; Calibration & Tracking

## GRACE-A

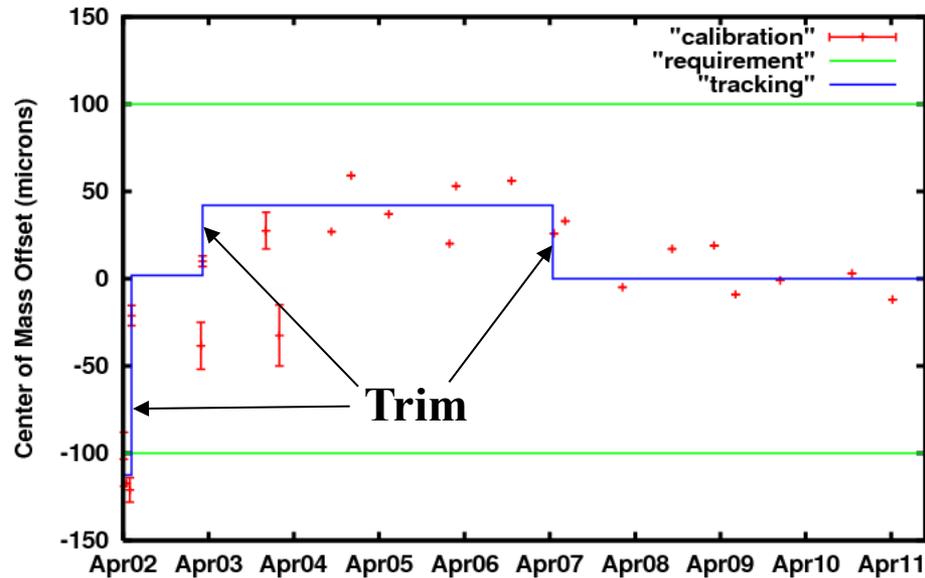


## GRACE-B

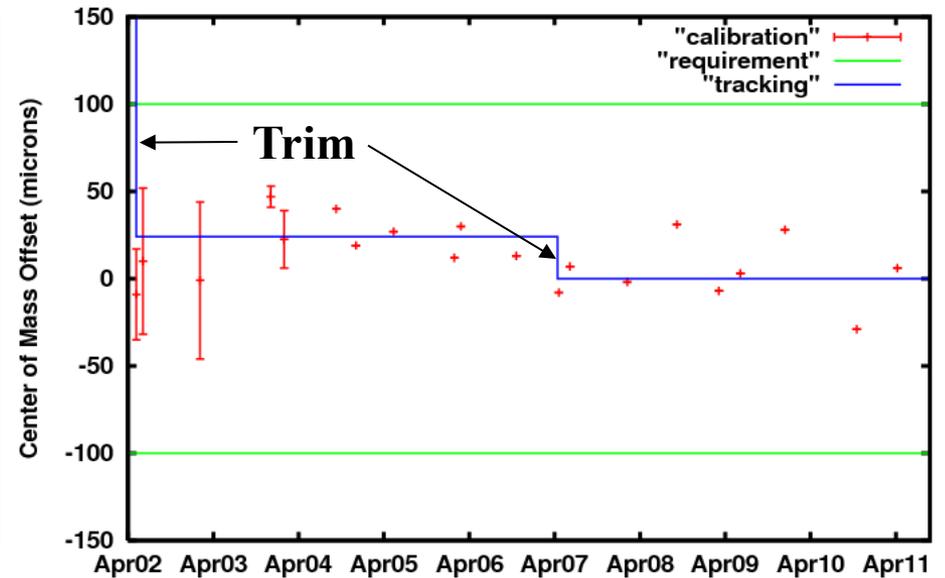


# Center of Mass Z-Alignment; Calibration & Tracking

## GRACE-A



## GRACE-B



## Level-1 Reprocessing (V02)

- **As part of the preparation for the Level-2 release 05, the SDS is working on a new version of Level-1 data (V02)**
  - **Test year (2008) provided to CSR, GFZ and JPL**
- **New SCA/ACC alignment product (QSA) from CSR ( F. Wang).**
- **New KBR boresight vectors (VKB1B) determined from KBR boresight calibration maneuvers by CSR (F. Wang 2011)**
- **Improved Level-1 orbit determination using JPL FLINNR GPS orbit and GPS clock solutions**
  - **Includes ambiguity resolution between GRACE spacecraft and ground stations.**
  - **No GRACE inter-satellite ambiguity resolution**



# Level-1 V02 Distribution Plans

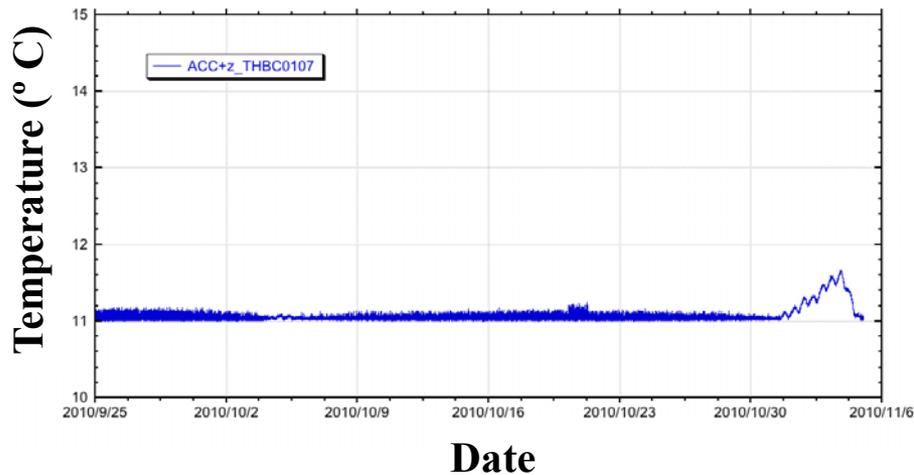
- **Level-1 release policy remains unchanged:**
  - **Level-1 data are distributed when the associated Level-2 gravity fields are released to the science community**
- **Upon verification of the V02 test year 2008, the complete mission is reprocessed and new Level-2 products will be generated (release 05).**
- **Starting in September 2011, V02 Level-1 production will start for current data.**
  - **SDS will cease Level-1 V01 production (aging 32-bit hardware)**



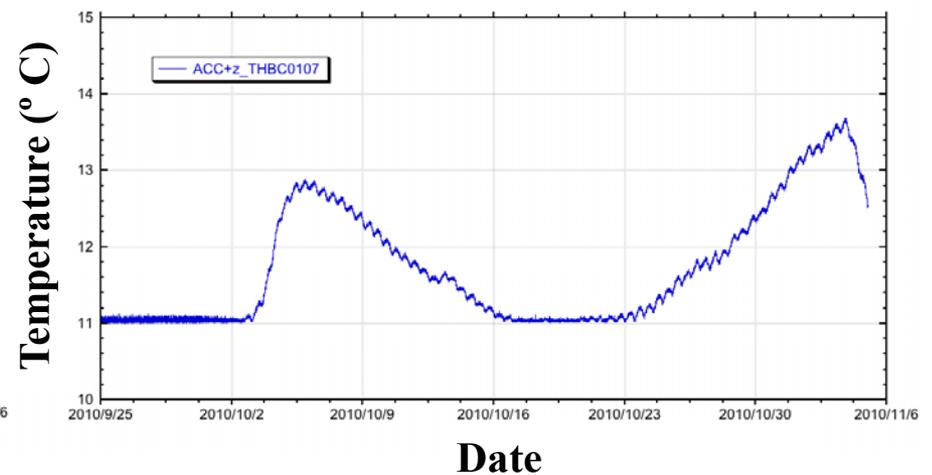
# ACC1B Data Advisory (1)

On 2010-10-03 the GR-B ACC Sensor Unit (SU) was no longer under thermal control due to a lower SU temperature set point (new battery management strategy) in the full sun orbit. SU will return to thermal control once eclipses return (thermal control expected early November)

GRACE-A SU cage temperature history

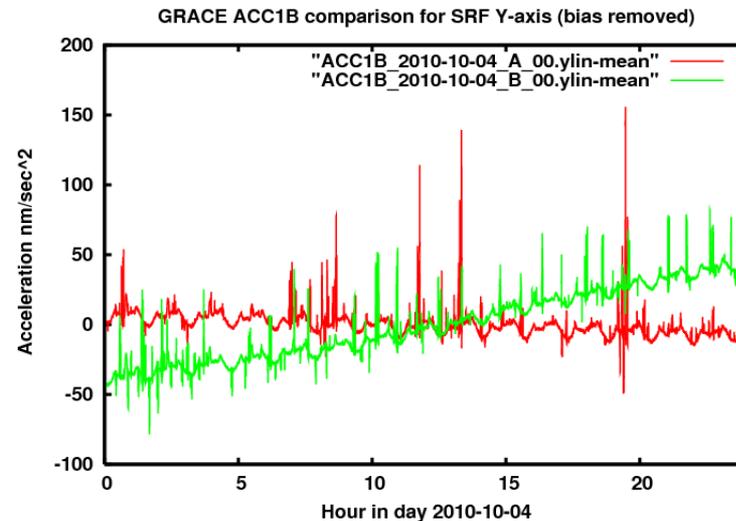
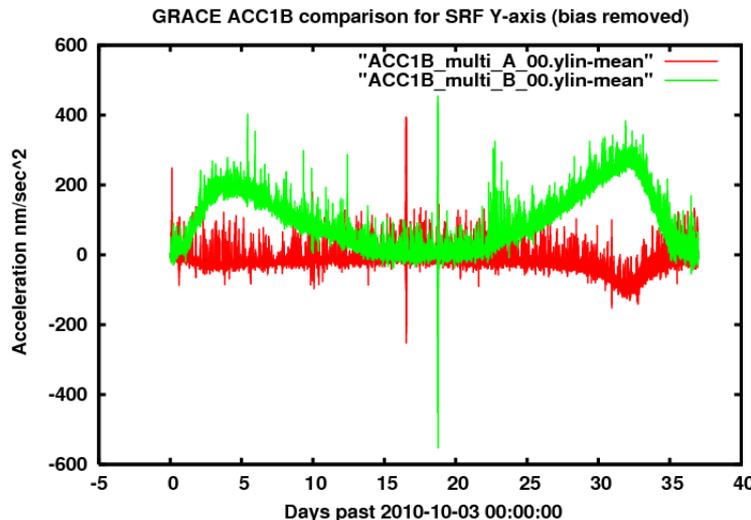


GRACE-B SU cage temperature history



# ACC1B Data Advisory (2)

ACC Y-axis (SRF) mainly affected. Daily linear fit of ACC bias is showing promising result. ACC1B data in original form will degrade orbit integration.  
SDS recommends to accommodate ACC bias drift, during SU temperature transients, for orbit determination and gravity recovery



# Summary

- **Number of days in 2011 which can be processed nominally (including daily linear bias trend estimation) has dropped to about 65 %. Drop due to powering off ACC, to reduce the power load on the batteries during maximum eclipse season.**
  - **KBR, GPS and SCA are available for 98 % of all days**
- **Level-1 V02 production will start in September 2011**
  - **Distribution to science community commensurate with level-2 release 05**
- **SDS recommends that the ACC user community accommodates daily ACC Y-linear bias (SRF) drift during ACC Sensor Unit temperature transients.**
- **SU temperature transients time intervals identified in SDS newsletter**



# Back up slides

