



Remote Sensing Applications Division (RSAD)

CDR Program Office

Weekly Report for Dec 14, 2012
Jeff Privette, Acting Chief

Atmospheric Temperature Bundle (AMSU/MSU/SSU CDR): Assessment of CDR Readiness

By Hilawe Semunegus, SME

NCDC Remote Sensing and Applications Division

Initial Assessment



- Describe the Atm. Temp Bundle (MSU-AMSU-SSU) CDR Project
- Overview of the assessment for the Integrated Product Team (IPT) and others who have a vested interest in the project.
- Establish the maturity of the CDR
- Identify strengths and weaknesses of the CDR

AMSU



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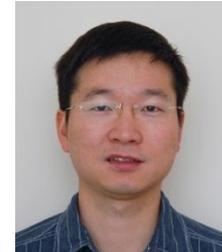


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NCDC Atm. Temp. Bundle IPT
SME – Hilawe Semunegus
Archive – Phil Jones
Ingest – Robert McFadden
Ops – Art Burden
Access – Steve Ansari
CDRP – Daniel Wunder

What is in the Atmospheric Temperature Bundle?

- Temperature sounding data from the Advanced Microwave Sounding Unit (AMSU/MSU) and Stratospheric Sounding Unit (SSU)
- Record extends from 1979 to 2006 (MSU/SSU) and 1998-present (AMSU)
- FCDRs or intercalibrated brightness temperatures
- TCDRs or Gridded brightness temperatures (some blended layers too)

Scientific goals for the Atm. Temp. Bundle CDR?

1. Develop a consistent AMSU/MSU/SSU radiance period of record
2. Blend radiances from MSU/SSU (pre-2006) with the equivalent channels from AMSU (1998-present)
3. Complete the FCDR work for all AMSU/MSU/SSU channels that are not covered in Ferraro's AMSU FCDR/TCDR Hydrological Bundle

FCDR Products

CDR(s) (Validated Outputs)	Period of Record	Spatial Resolution; Projection information	Time Step	Data format	Inputs	Uncertainty Estimates (in percent or error)	Collateral Products (unofficial and/or unvalidated)
MSU FCDR (3 chs)	1979- 2006	110 km	25.6 sec (scan-line)	netCDF	Raw Counts SNO Cal. Coefficients	Abs. Bias: 0.5-1 K Rel. bias 0.05-0.1 K	Limb, diurnal, corrected L1C
AMSU-A FCDR (11 chs)	1998- present	45 km	8 sec. (scan-line)	netCDF	Raw Counts SNO Cal. Coefficients	Abs. Bias: 0.5-1 K Rel. bias 0.05-0.1 K	Limb, diurnal, freq. corrected- L1C
SSU FCDR (3 chs) (Cell pres. CO2 corrected)	1979- 2006	147 km	32 sec. (scanline)	netCDF	SSU L1B MERRA	~ 0.5 K	Limb, Dirunal, Atmo. CO2 corrected L1C

TCDR Products

CDR(s) (Validated Outputs)	Period of Record	Spatial Resolution; Projection information	Time Step	Data format	Inputs	Uncertainty Estimates (in percent or error)	Collateral Products (unofficial and/or unvalidated)
MSU-only TCDR (3 chs)	1979– 2006	2.5° x 2.5°	5-Day Monthly	netCDF ASCII	MSU FCDR	Inter-sat bias: 0.05–0.1 K Inter-sat σ : 0.03–0.05K	
SSU-only TCDR (3 chs)	1979– 2006	2.5° x 2.5°	5-Day Monthly	netCDF ASCII	SSU FCDR	0.5 K	
AMSU-A- only TCDR (11 chs)	1998– presen	2.5° x 2.5°	5-Day Monthly	netCDF ASCII	AMSU-A FCDR MERRA	Inter-sat bias: 0.05–0.1 K Inter-Sat σ : 0.03–0.05K	
MSU/AMSU-A Merged TCDR (3 chs)	1979– present	2.5° x 2.5°	5-Day Monthly	netCDF ASCII	MSU FCDR AMSU-A TCDR MERRA	0.03 – 0.05 K	
SSU/AMSU-A Merged TCDR (3 chs)	1979– present	2.5° x 2.5°	5-Day Monthly	netCDF ASCII	SSU TCDR AMSU-A TCDR MERRA	0.5 K	

Users for FCDRs and TCDRs

1. MSU FCDR: Reanalysis development community including NCEP CFSR, NASA MERRA, ECMWF, etc. (already being used by NCEP and NASA with published papers)
2. AMSU FCDR: International community such as GSICS for satellite consistency/accuracy assessments (no published papers)
3. AMSU FCDR: Academic community for climate change, validation studies
4. AMSU/MSU/SSU TCDRs: Climate science community (e.g. WCRP and IPCC) for upper air temperature trend and anthropogenic forcing assessments (recent Nature and PNAS papers published on this TCDR)
5. AMSU/MSU TCDRs: Used in BAMS report
6. Interest from TCDR development community such as UAH, RSS, and STAR for inter-comparison of algorithm and dataset validity (do we have enough upper air related CDRs?)

Evaluation of Transition Requirements for Atm. Temp. Bundle CDR

CDR Product: FCDR/TCDR – Atmospheric Temperature Bundle, 1979-2012

GEOSS Societal Benefit: Climate

Code

- Code is in **Fortran, Java and IDL**
- Headers not being used at all
- Sparsely commented for AMSU/MSU Fortran/Java code
- Decently commented for SSU IDL code
- No README text files found
- CDRP will request that the code developers work diligently to address coding requirements

Data

- Data provided are netCDF-4 files
- Non merged files are usually < 5 MB
- Merged files are contained in one file for an entire period of record and can be as large as 250 MB. Will probably have to negotiate with PI to break this apart if data production is still active. May be OK for a static or set period of record (1979-2006)
- Not in CF-compliant form
- Filenaming convention not being followed (e.g. delimiters have “+” in them”
- Extensive time will be spent to get investigators to follow CF standards and CDR metadata guidelines

Documentation

- AMSU/MSU CATBD almost completed
- SSU CATBD has not been started
- Flow charts available for AMSU/MSU, not for SSU yet
- OAD was not provided.

❖ Code

- ✓ ➤ Document the code (including header information) **25%**
- Create README (cookbook) – Step by step instructions to run
- Enter code in subversion
- Archive source code and README instructions
- Make source code and README package available (web)

❖ Documents

- ✓ ➤ Flow chart of process **75%**
- ✓ ➤ C-ATBD **75%**
- ✓ ➤ Maturity matrix – level 3 and above **40%**
- Source code headers (robodoc)
- Archive document package
- FGDC metadata for product
- Make docs available (web)

❖ Data

- ✓ ➤ Data in NetCDF format **25%**
- Submission agreement in place
- Archive available Input/Ancillary data
- Product archived
- Product available (THREDDS)

What is the maturity?

Atmospheric Temperature Bundle (AMSU/MSU/SSU)

maturity level as of 12/10/2012

Climate Data Record (CDR) Maturity Matrix

Maturity	Software Readiness	Metadata	Documentation	Product Validation	Public Access	Utility
1	Conceptual development	Little or none	Draft Climate Algorithm Theoretical Basis Document (C-ATBD); paper on algorithm submitted	Little or None	Restricted to a select few	Little or none
2	Significant code changes expected	Research grade	C-ATBD Version 1+ ; paper on algorithm reviewed	Minimal	Limited data availability to develop familiarity	Limited or ongoing
3	Moderate code changes expected	Research grade; Meets int'l standards: ISO or FGDC for collection; netCDF for file	Public C-ATBD; Peer-reviewed publication on algorithm	Uncertainty estimated for select locations/times	Data and source code archived and available; caveats required for use.	Assessments have demonstrated positive value.
4	Some code changes expected	Exists at file and collection level. Stable. Allows provenance tracking and reproducibility of dataset. Meets international standards for dataset	Public C-ATBD; Draft Operational Algorithm Description (OAD); Peer-reviewed publication on algorithm; paper on product submitted	Uncertainty estimated over widely distributed times/location by multiple investigators; Differences understood.	Data and source code archived and publicly available; uncertainty estimates provided; Known issues public	May be used in applications; assessments demonstrating positive value.
5	Minimal code changes expected; Stable, portable and reproducible	Complete at file and collection level. Stable. Allows provenance tracking and reproducibility of dataset. Meets international standards for dataset	Public C-ATBD, Review version of OAD, Peer-reviewed publications on algorithm and product	Consistent uncertainties estimated over most environmental conditions by multiple investigators	Record is archived and publicly available with associated uncertainty estimate; Known issues public. Periodically updated	May be used in applications by other investigators; assessments demonstrating positive value
6	No code changes expected; Stable and reproducible; portable and operationally efficient	Updated and complete at file and collection level. Stable. Allows provenance tracking and reproducibility of dataset. Meets current international standards for dataset	Public C-ATBD and OAD; Multiple peer-reviewed publications on algorithm and product	Observation strategy designed to reveal systematic errors through independent cross-checks, open inspection, and continuous interrogation; quantified errors	Record is publicly available from Long-Term archive; Regularly updated	Used in published applications; may be used by industry; assessments demonstrating positive value

1 & 2	Research
3 & 4	IOC
5 & 6	FOC

CDRP-MTX-0008 V4.0 (12/20/2011)

Recommendations

Start the R2O transition process in FY13 for all products; may be completed in late FY13 or early FY14

- **Weaknesses**

- **SSU development slower than AMSU/MSU development**
- **Source code and documentation progress needs to be accelerated**

- **Strengths**

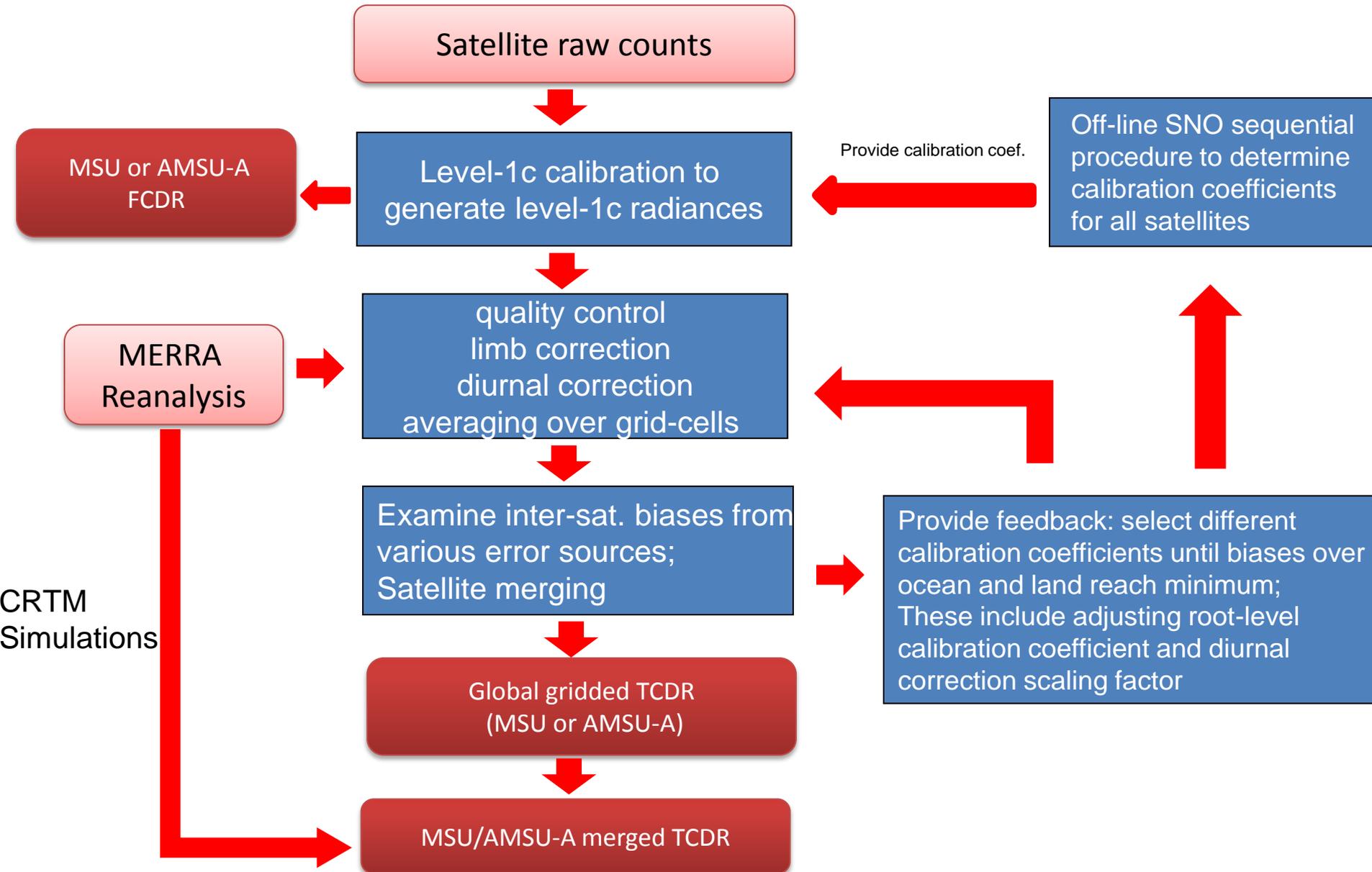
- **Scientific goals are being met. No product development delays yet.**
- **PI can identify many users of the products**
- **PI is exceptionally responsive and easy to work with**

- **The risks**

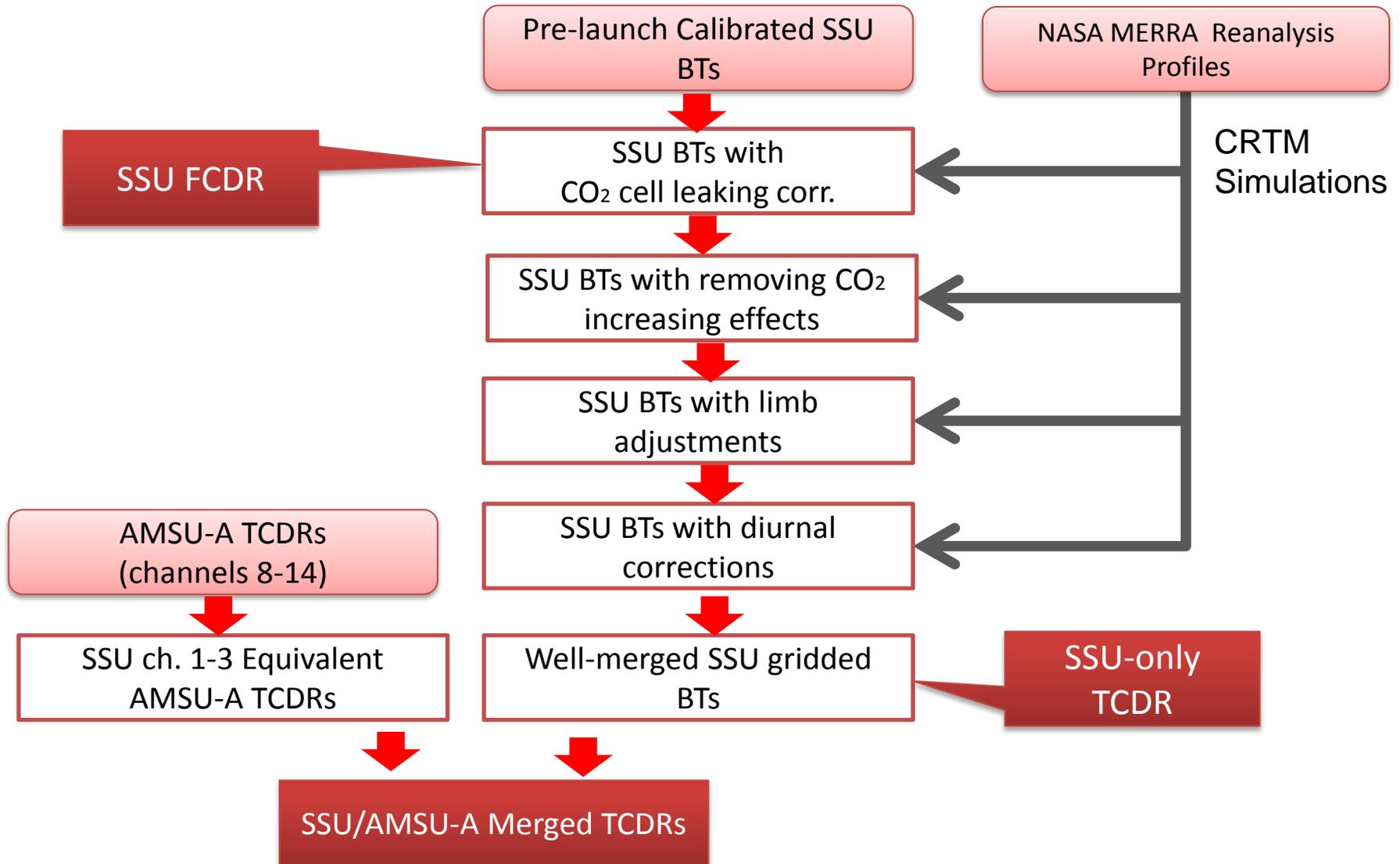
- **Limited source for data comparison for validation purposes beyond the RSS/UTH CDRs.**

Backup slides

Approaches: MSU/AMSU CDR



Approaches: SSU-only & SSU/AMSU Merged CDRs



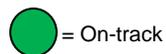
IOC Transition Status – Dec 7, 2012

CDR	Assessment		Deliver Drafts						Review and Provide Feedback						Deliver Final Versions						Misc		Archive			Release		
	Assemble IPT	Perform Assessment	Deliver source code sample and README draft	Deliver Flow Diagram Draft	Deliver C-ATBD Draft	Deliver Maturity Matrix Draft	Deliver Sample netCDF dataset	Deliver SA Draft	Provide feedback on source code and README	Provide feedback on Flow Diagram Draft	Provide feedback on C-ATBD Draft	Provide feedback on Maturity Matrix Draft	Provide feedback on Sample netCDF dataset	Provide feedback on SA Draft	Deliver final source code and README	Deliver final Flow Diagram	Deliver final C-ATBD	Deliver final Maturity Matrix	Deliver final netCDF dataset	Deliver final SA	Create Collection Level Metadata	Conduct Security Review	Archive Code Package	Put Docs in Library	Archive Data	Put dataset on THREDDS access server	Put data, docs, and code on web page	Conduct ORR
1	UAT 4Layer MW RSS	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	28-Nov	x	x	27-Nov	30-Nov	29-Nov	30-Nov	7-Dec	10-Dec	17-Dec
2	Vegetation Bundle	x	1-Jan																									
3	Cryosphere Bundle	x	x																									
4	Solar Irradiance Bundle	x	1-Jan																									
5	PERSIANN precipitation	x	20-Dec			x																						
6	Atmos Temp Bundle (MSU/ AMSU/SSU)	x	x																									
7	Ocean Surface Bundle	x	1-Jan																									
8	Cloud/ Moisture Bundle	x	1-Jan																									
9	OISST	x	x	x	x		x	x	x				x						x							x	x	
10	MSU/AMSU Temp Suite	x	1-Jan																									
11	ISCCP	x	1-Jan																									
12	MW Imager SSM/I(S)	x	x		x	x		x					x															

Notes:

- 1) Code submitted for Security Review; need to document contents of Aux data file before archiving
- 4) PI states, "TSIS mission has been delayed, at least until 2016. For that reason we cannot provide code or data"
- 7) Assessment items: No main script yet, sample Matlab code; sample binary data; draft paper on Ver 1.0 of dataset; PI plans to deliver all CDR parts for Ver 2.0, "but not with in the time/\$ constraints of the original proposal" Estimated completion - Nov 2013
- 8) PI plans to send assessment items by the end of December.
- 10) PI requested 1 year extension; no assessment items available, mainly due to delay in CDAAC's processing/re-processing/validation activities

PREDECISIONAL DRAFT INFORMATION



= On-track



= Potential management action required



= Management attention required

Other CDR Discussion Items

- **Management input needed on:**
 - **Solar time series (Pelewski) – call with PI needed.**
 - **Cryosphere (Key) – split into two IPTs? Proceed with transition on all or just part of CDR bundle?**
 - **Telecon with Key set up for next week**
- **Initial Assessments in progress**
 - **Most of the PIs sent items for assessment**
 - **(Solar Irradiance, Ocean Surface, and Cloud/Moisture Bundles) don't have any items to submit for assessment.**

SCHEDULE OF DELIVERABLES - CDRP 2012 O&M Contracts and Grants

Name of PI/Institution	Period of Performance	Implementation Plan	Main Update	Routine updates	QA Tools/Process	IP License?	CDRP action required?
Christy, J./UAH	9/15/12 - 9/14/13	11/7/2012	To be coordinated with CDRP, new version	Monthly/8th day of the succeeding month	12/15/2012	YES	YES - JG
Evans, B./UM (CICS-NC)	07/01/12 - 06/30/13	9/12/2012	Undergoing final QC at NODC	Monthly/10th day of the succeeding month	NCDC will not be performing QA	NO	YES - JG
Heidinger, A./NOAA-STAR	07/01/12 - 06/30/13	8/16/2012	N/A	Daily/Within 7days of the observation date	9/1/2012	N/A	NO
Ho, B./UCAR	9/17/12 - 9/16/13	11/5/2012	To be coordinated with CDRP, new version	Quarterly/10th day of the month following the end of the quarter	12/17/2012	YES	YES - JG
Mears, C./RSS (CICS-NC)	9/15/12 - 9/14/13	10/30/2012	N/A	Monthly/8th day of the succeeding month	12/15/2012	YES	YES - JG
Meier, W./U of CO	10/01/12 - 09/30/13	11/1/2012	3/31/2013	Quarterly/within 30days of each RSS data delivery	12/1/2012	YES	YES - JG
Robinson, D./Rutgers	09/11/12 - 09/10/13	10/11/2012	N/A	Monthly/5th day of the succeeding month	11/10/2012	YES	YES - JG
Wentz, F./RSS (CICS-NC)	09/15/12 - 09/14/13	11/1/2012	To be coordinated with CDRP, new version	Monthly/10th day of the succeeding month	12/1/2012	YES	YES - JG
	RECEIVED						
	OVER DUE						

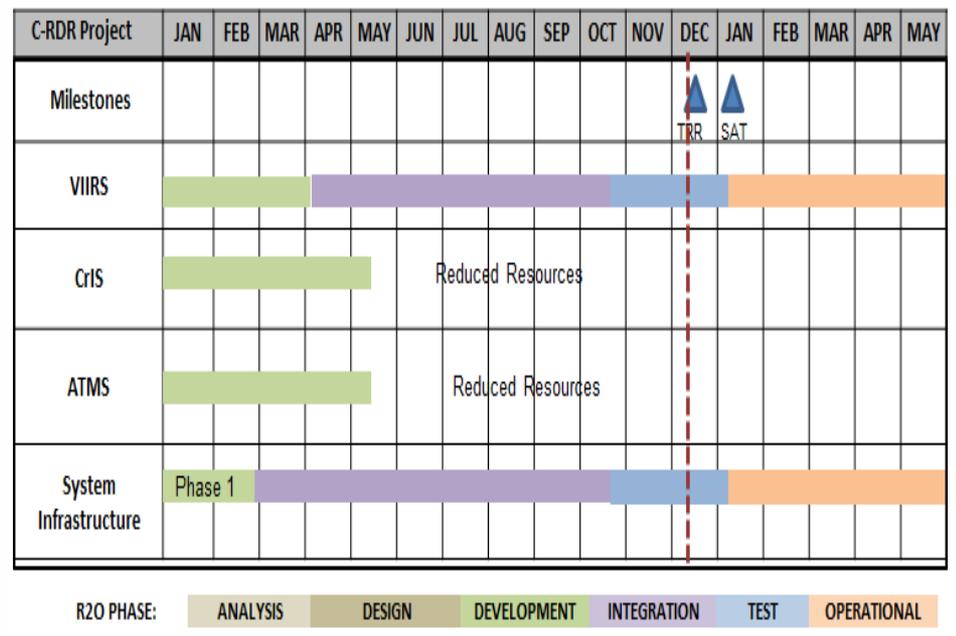


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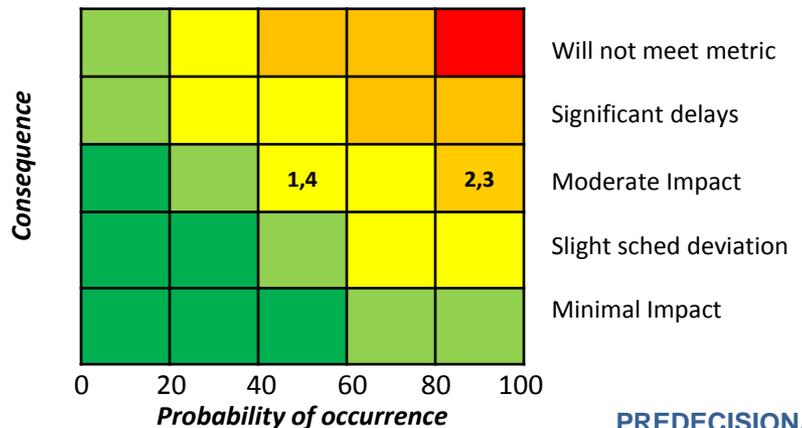
NPP/JPSS Climate Raw Data Records (C-RDRs) Project

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- ① **VIIRS**
 - Completed code for C-RDR and Support Data..
- ② **CrIS**
 - Postponed.
- ③ **ATMS**
 - Postponed.
- ④ **System Infrastructure**
 - Integrating with the VIIRS C-RDR.
 - **Completed Verified RDR comparator and verified the first C-RDR.**
 - **Automating the comparator to be part of the processing.**
 - **Updating the System Acceptance Test procedure.**
 - Integrating: Ingest data from CLASS and producing C-RDRs.
 - Will deliver initial version with ADL 3.1.



Risk Matrix



Risk and Mitigation

VIIRS, CrIS, ATMS –

- Resources are being reduced. Delivery of CrIS and ATMS will be delayed.
- Operational software is under maintenance, updated versions may affect C-RDR ported version.

System Infrastructure –

- Reliability of NPP RDRs from CLASS. Need to test ingest of RDRs from CLASS and develop an automated mechanism for re-requesting data.
- Ability of CLASS to handle the frequency and volume of NPP data. CLASS has been successful during system tests.
- Archive in CLASS is currently cost prohibitive. Need to identify alternate archive. Plan to store C-RDRs on HPSS until migration to CLASS.

PREDECISIONAL DRAFT INFORMATION



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OISST Research to Operations Project

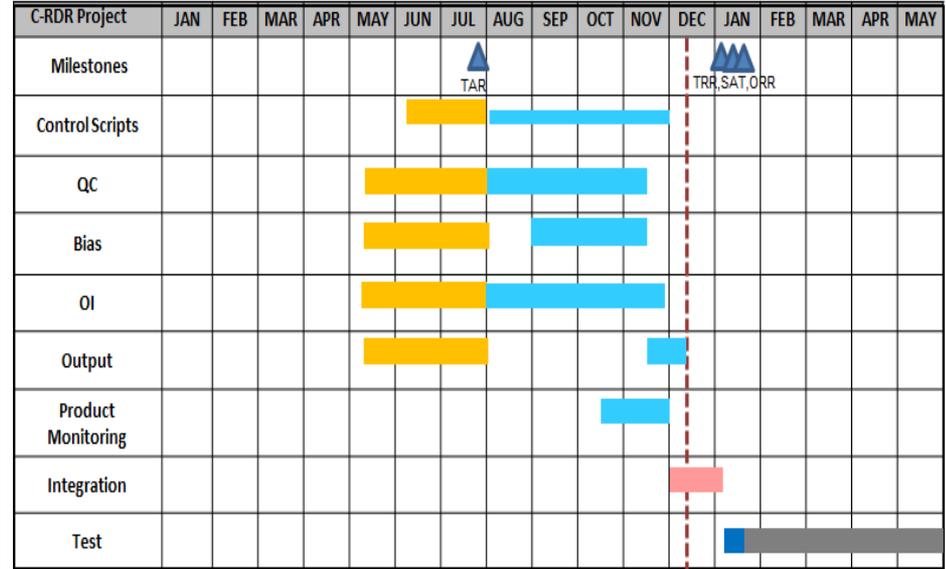
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1 OISST – Optimum Interpolated Sea Surface Temperature

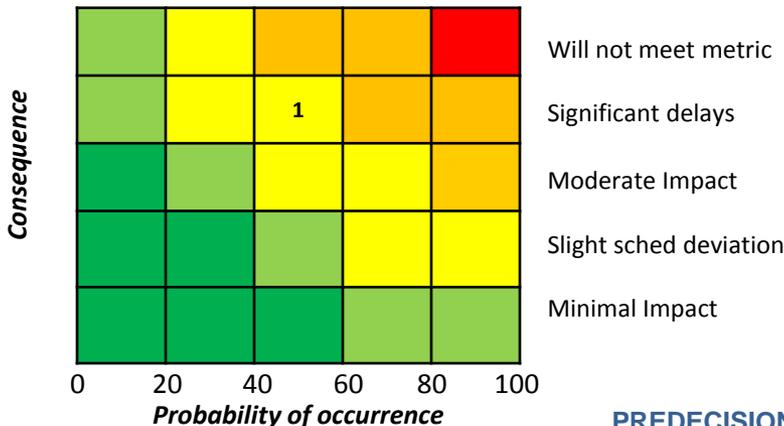
- **Need to update the schedule (2-3 week slip and personnel reductions).**
- **Conducted code review for Bias code.**
- **Refactoring code (Bias, QC, OI).**
- Implementing common logger calls .
- Integrated a common logging utility and identified log levels.
- Investigating the use of SPEC for product monitoring.
- Conducted code review, refactor and unit test of ship_bias.f90.
- Evaluating validity/duplicates in compile options & static analysis.
- Defined list of tasks for refactoring of each component.
- Developing tests (functional & component) to verify code.
- Completed testing of static analysis and complexity tools.
- Conducted Technology Assessment Review July 25.

Operations:

- Updated and tested scripts to handle new sea ice data format.



Risk Matrix



Risk and Mitigation

- Resource availability for performing the transition.
- Configuration Management (CM) process not defined for operations.
- No Quality Assurance team available.
- Modifying existing software for internal software changes. Product output must remain unchanged for users.
- Common infrastructure for operations is not fully defined.
- OISST processing will be on a 64 bit architecture.

PREDECISIONAL DRAFT INFORMATION



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IOC to FOC Transition for Selected CDRs

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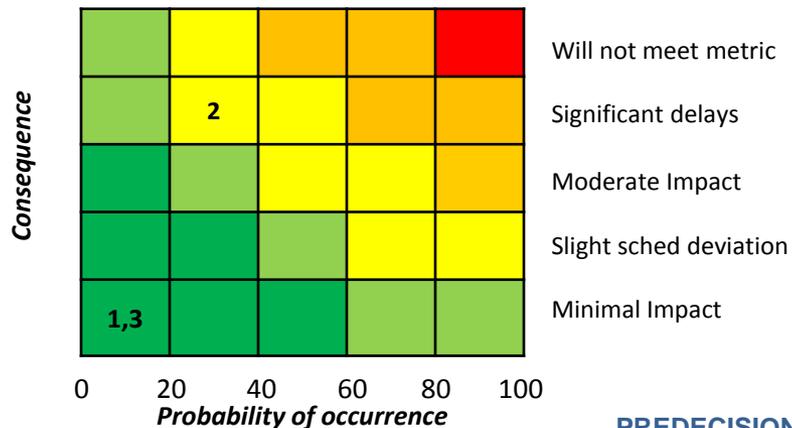
- 1. FY12 PATMOS-x Final Report Presentation**
 - Presentation will be repeated Friday Dec 14 for Products Branch and others who missed the first time.

- 2. IOC to FOC / Software Rejuvenation Decision**
 - Received responses to questionnaire containing the seven evaluation criteria from five NCDC SMEs and PIs, covering 9 of the 11 CDRs at IOC, plus OISST, SSMI_S, and the ATM Temp Bundle. Goal is complete this round by Friday Dec 14.
 - Decision-making process will include steps to assure stakeholder representation and consensus development. Guided by CMMI specific and generic practices for Decision Analysis and Resolution.

- 3. Process**
 - The first sprint will complete Friday Dec 14 with the Sprint Review meeting at 11 am. All welcome.

FY13 IOC to FOC		Dec				Jan				Feb				Ma			
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Sprint	Principal Focus	4-30	1-7	8-14	15-22	22-29	29-45	45-11	12-19	19-26	26-1	2-8	9-15	16-23	23-1	2-8	9-15
A	IOC to FOC Selection																
B	IOC to FOC Selection																
C	Project Planning																
D	TBD																
E	TBD																
F	TBD																
G	TBD																
H	TBD																
I	TBD																

Risk Matrix



Top Risks and Mitigation

- R8. Personnel on task at maximum work load**
 - With recent budget cuts to the CDRP the personnel still engaged on this task are at maximum work level. More budget challenges could result in the loss of the remaining key personnel and jeopardize the completion of this task.
- R10. No sustainable commitment for independent Quality Assurance**
 - QA will be performed by team. Risk is that this work will not be performed as well as it would be by an experienced, independent QA expert.
- RXX. Delays in receiving responses to the seven evaluation criteria will delay the IOC to FOC decision making process.**

Risk list needs update