



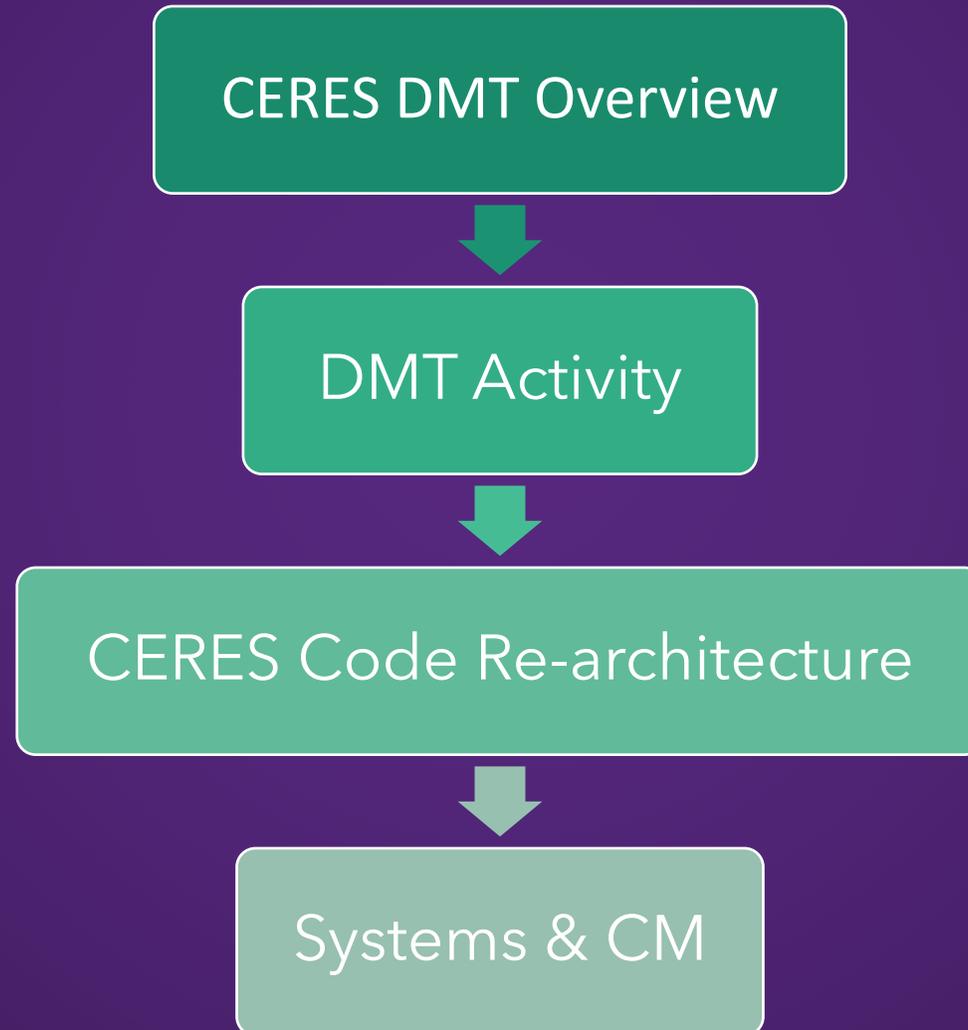
CERES Data Management Team Working Group Report

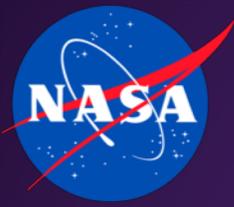
May 7, 2019

Katie Moore Deiwakh



Outline





DMT Overall Tasks

Algorithms

- Implementation
- Verification
- Validation assistance

Software

- Maintenance
- Configuration management

$$Z = \sum_{i=0}^n (\Delta C_i / \sigma C_i)^2 + \sum_{j=1}^m (\Delta v_j / \sigma v_j)^2 + \sum_{k=1}^l (\Delta F_k / \sigma F_k)^2 \quad (3)$$

where on the r.h.s. the first term represents the cloud fraction adjustment, the second term represents the model variable adjustments, and the third term the flux component adjustments.

Equation (4) below restricts the solution such that the sum of the adjustments is zero. This prevents unrealistic solutions (i.e., sum of adjusted total fraction of cloud cover is not zero).

$$X = \sum_{i=0}^n \Delta C_i = 0 \quad (4)$$

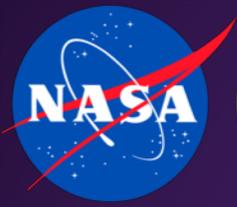
```
if ( dato(i,1) == -1 .and. dat(i,1) > 0.0 .and. dat(i,1) < 10000 ) then
  if ( ifill == 1 ) then
    qc_validflag_sahclim_global (i) = 1
  endif

  if ( ifill == 2 ) then
    qc_validflag_epoch_global (i) = 1
  endif

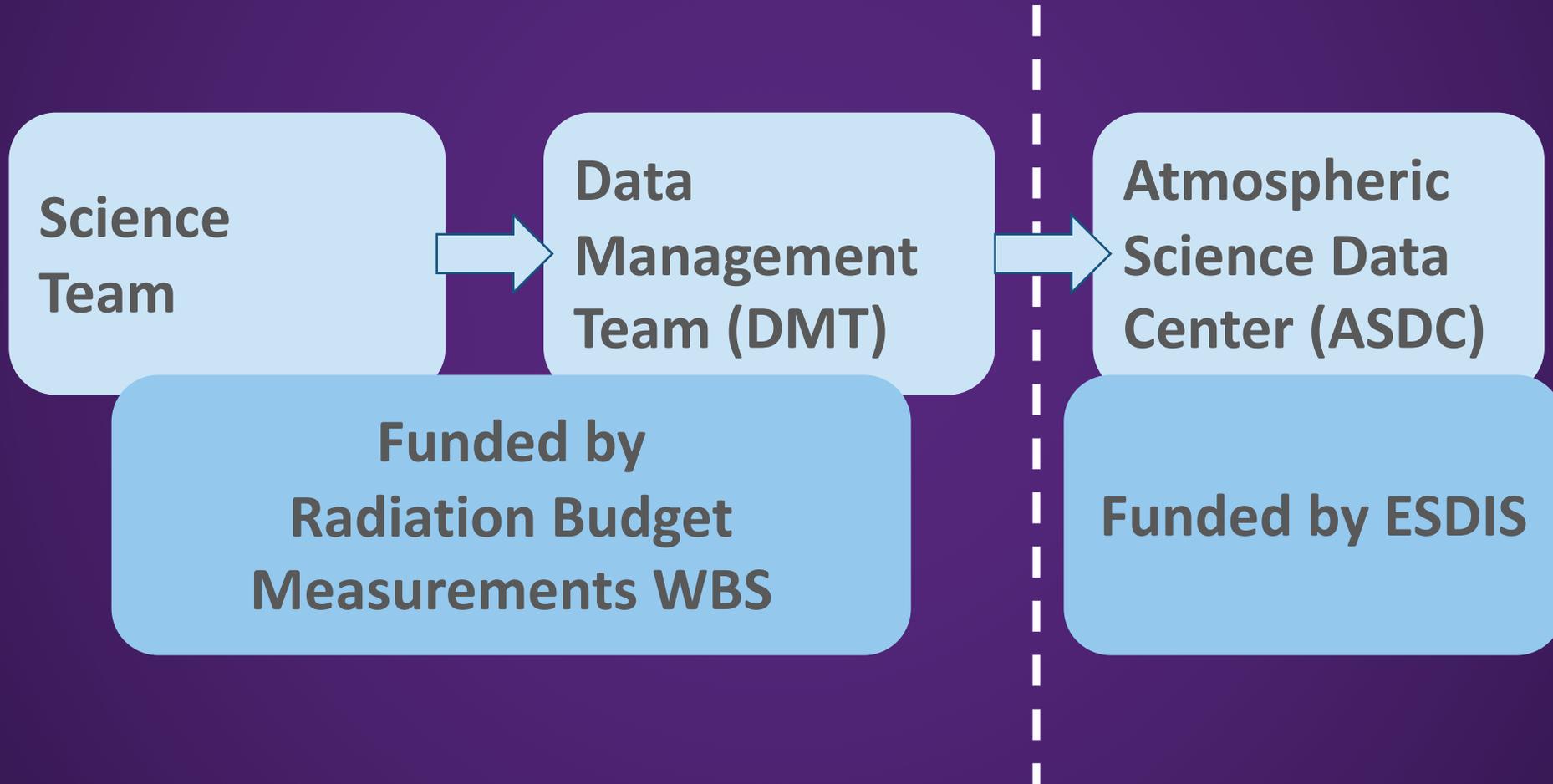
  qc_validflag_all_global(i) = 1

  dato(i,1:np) = dat(i,1:np)
endif

if ( dato(i,1) == -1 .and. ifill .eq. 2 ) then !LAST RESORT IGBP Based
  igbp1 = igbp(i)
  u0ohs = 1.0
  wv = 1.0 ! Pw(cm)
  call land_spec (igbp1, u0ohs, wv, spec18_dum, bbalb)
  dato(i,1) = bbalb * 10000
  dato(i,2) = u0ohs * 1000
```



DMT-ASDC Interface





Software Development / Recent DMT Activity



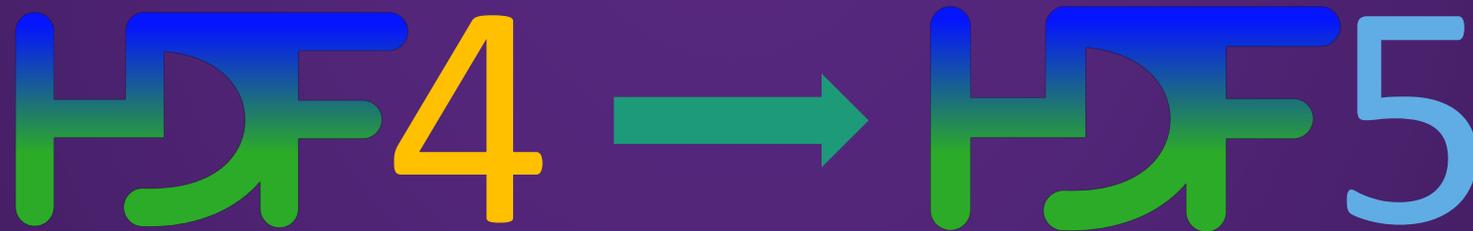
Notable Software Changes

- **ALL** instrument Level-0 processing simultaneous
- New production stream just for **FLASHFlux**
- **MATCH** for MODIS Collection 6.1
- CERES Level 0 data files now **SIX-HOURLY**
- **CATALYST** high-level summaries



Ongoing Software Development

- Eliminating extraneous, intermediate files (IES)
- Trailblazing ordering tool migration to OpenShift



- Metadata updates



Product Availability

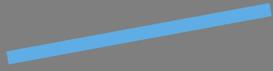


Edition 4 Terra and Aqua

<u>Product</u>	<u>Platform</u>	<u>Processed Thru</u>	<u>Publically Available?</u>
BDS	Terra, Aqua	Dec. '18	Yes
SSF		Dec. '18	Yes
SSF1deg-Hour		Nov. '18	Yes
SSF1deg-Day/-Month		Nov. '18	Yes
SYN1deg-Hour/3Hour/MHour	Terra+Aqua	Nov. '18	Yes
SYN1deg-Day/-Month		Nov. '18	Yes



Edition 4 Terra and Aqua

<u>Product</u>	<u>Platform</u>	<u>Processed Thru</u>	<u>Publically Available?</u>
CldTypHist	Terra+Aqua	Dec. '18	Yes
FluxByCldTyp	Terra+Aqua		Sept. '19
EBAF Surface	Terra+Aqua	Mar. '18	Yes
EBAF ToA	Terra+Aqua	Dec. '18	Yes



Edition 1 S-NPP

<u>Product</u>	<u>Platform</u>	<u>Processed Thru</u>	<u>Publically Available?</u>
BDS	Terra, Aqua	Mar. '19	Yes
SSF		Feb. '19	Yes
SSF1deg-Hour		Jan. '19	Yes
SSF1deg-Day/-Month		Jan. '19	Yes
SYN1deg-Hour/3Hour/MHour	Terra+S-NPP	Nov. '17	Yes
SYN1deg-Day/-Month		Nov. '17	Yes



Upcoming Editions

Ed 1
J1/NOAA-20

- Sensor gain has stabilized
- Accommodate LW channel

Ed 2 S-NPP

- Incorporate new VIIRS data
- Same radiometric scale as FM3

EBAF 4.1

- Only either C5 or C6.1 MODIS
- C6.1-based MATCH aerosols
- Corrected Clouds inconsistencies

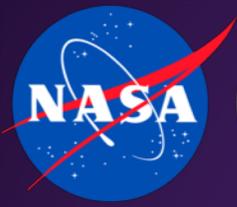


Code Re-architecture



TISA

- Edition 4 baseline
- Members: mix of "online" (CERES PGE) and "offline" code developers
- Weekly code review meetings
- Use of:
 - Jira/Bitbucket/Confluence
 - "Understand" static code analysis tool



TISA

LOW-LEVEL (Nov. '18)

- Remove "dead" code
- De-duplicate
- Generalize
- Collect multi-purpose routines for library

HIGH-LEVEL (Apr. '19)

- Designing future system
- General library in mind
- Time/space agnostic



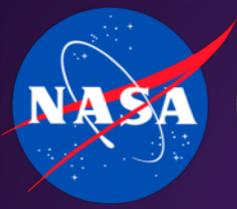
TISA Code Reduction

<u>Product</u>	<u>LoC Before</u>	<u>LoC After</u>	<u>% Reduction</u>
SSF1 deg	1,598	1,433	10.3%
SSF1 deg-Hourly	11,835	11,718	0.9%
SSF1 deg post-proc.	4,086	3,921	4.0%
SSF1 deg-Month	20,275	16,941	16%
TSI	40,945	34,986	15%
GGEO Driver	5,776	1,448	75%
GGEO Daily/Monthly	8,729	5,929	32%
SYN1 deg	34,847	31,248	11%



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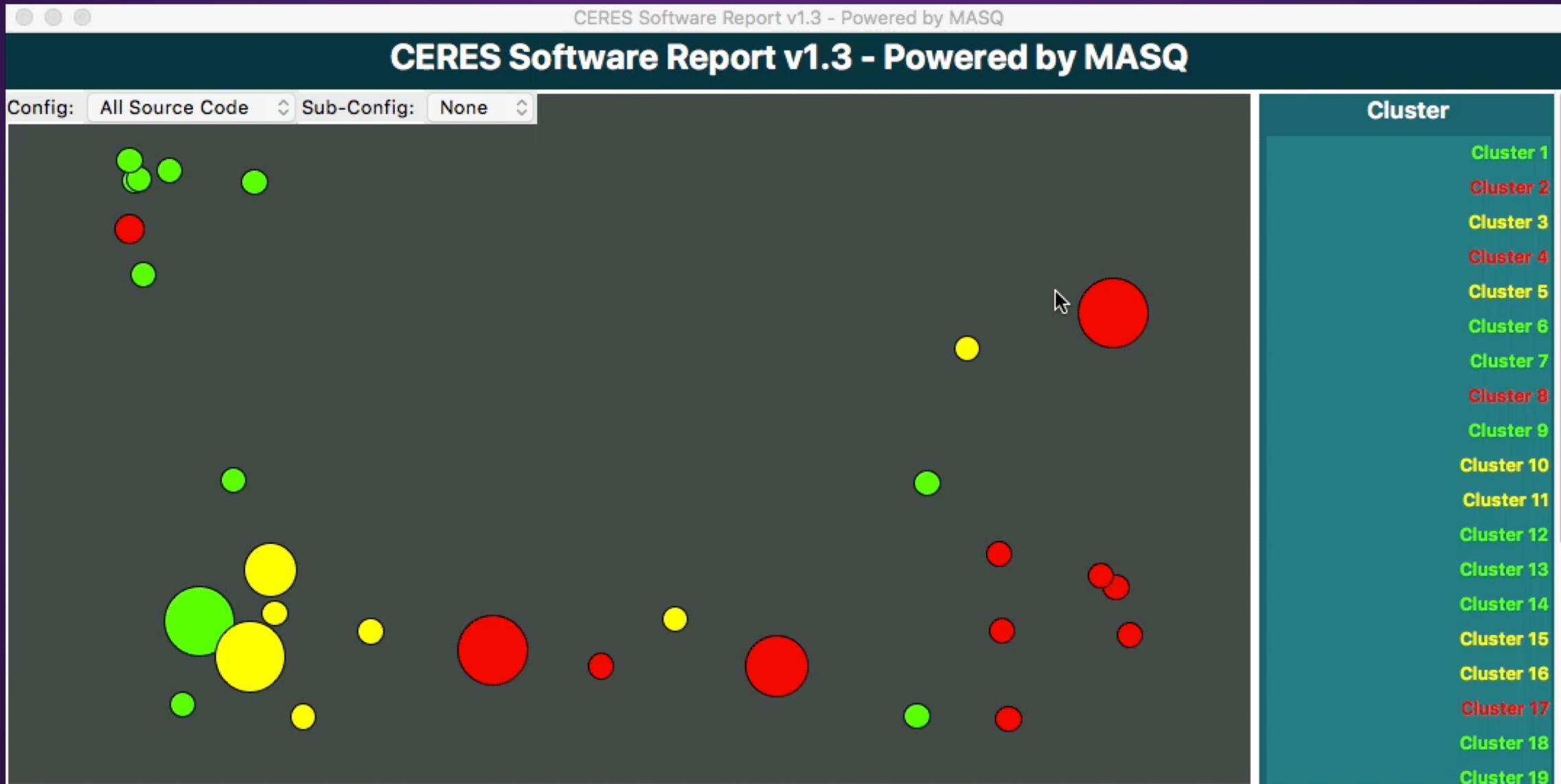


Clouds

- Edition 4 MODIS/VIIRS & GEO baseline
- Goals:
 - Clean up code
 - Generalize for enhanced library
 - Improve validation capabilities
 - Improve code documentation



BAH Collaboration



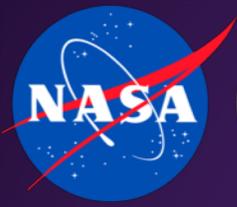


Updating File Formats

- Training: The HDF Group, October 2018
- Broaden usability of data; maintain user-base
- Public products: HDF5 or netCDF4
- Clouds (first to be released) target: Dec. 2019



Systems & CM



Production

- Close production requests (PRs)
 - CATALYST (directly)
 - PR Tool (indirectly)
- NPP Clouds remain on P7 blades



CERES Website Re-design

Collaboration with ODYSEA, thru SSAI

- Functionality

- Responsive
- Data-driven
- Shadowbox
- Rotating content
- Galleries
- Search
- Content Management System [CMS]

- Content

- Inventory
- New resources
- Review and approval

- Technical

- Development site
- Configuration management
- Security Guidelines

Reaches scientific crowd as well as casual visitor.

Multi-platform-compatible

Hardware Updates



- New x86 blades installed
 - Overall: 55% wall-time reduction
 - Biggest gain:
 - SYN1 processing
 - 78% wall-time reduction
- Subsetter/Ordering Tool
 - More hardware - subsetting
 - "DMZ" OpenShift - poised
- Other websites: migration in progress



Conclusions

- Poised to implement updated algorithms and file formats...
- ...with sustainable coding practices
- CATALYST running smoothly
- Efficient production process and interface/hand-off to ASDC operations