

EOS Production Sites Network Performance Report: April 2011

This is a monthly summary of EOS network performance testing between production sites -- comparing the measured performance against the requirements. Significant improvements are noted in Green, Network problems in Red, System problems and Requirements issues in Gold, Issues in Orange, and other comments in Blue

Highlights:

- **Mostly stable flows**
 - **GPA 3.69** (was 3.73 last month)
- **Requirements:** updated to Handbook 1.4.3 in May '09 (was 1.4.2 previously)
 - Many Requirements dropped significantly (under review)
- **Only 3 flows below "Excellent"; only 1 below "Adequate":**
 - **GSFC MODAPS-PDR to EROS ("Almost Adequate")**
 - EROS Circuit upgraded from 622 mbps to 2.5 gbps on 4 March
 - Reduced user flow this month: 58 mbps average (was 85 mbps last month and 162 mbps in February).
- **RSS:**
 - Comcast circuit installed: 50 mbps download, 12 mbps upload
 - Existing circuit: 4 x T1 (6 mbps) to NISN at ARC
 - Added testing from RSS (Comcast) to GHRC – for AMSR
- **ALOS:** Satellite failed – mission complete; testing terminated

Ratings Changes:

Upgrades: ↑ None

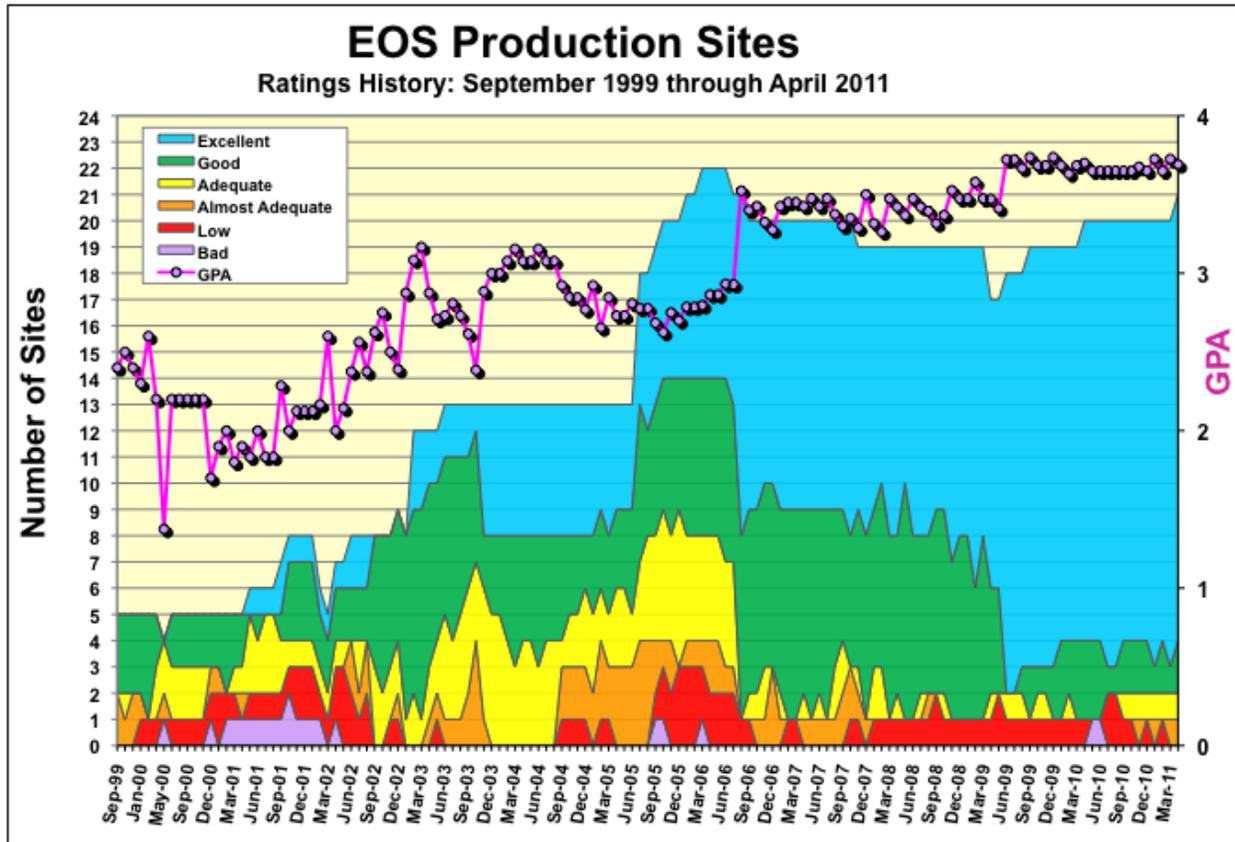
Downgrades: ↓ GSFC → NSIDC: **Excellent** → **Good**

Ratings Categories:

Rating	Value	Criteria
Excellent:	4	Total Kbps > Requirement * 3
Good:	3	1.3 * Requirement <= Total Kbps < Requirement * 3
Adequate:	2	Requirement < Total Kbps < Requirement * 1.3
Almost Adequate:	1.5	Requirement / 1.3 < Total Kbps < Requirement
Low:	1	Requirement / 3 < Total Kbps < Requirement / 1.3
Bad:	0	Total Kbps < Requirement / 3

Where Total Kbps = Integrated Kbps (where available), otherwise just iperf

Ratings History:



The chart above shows the number of sites in each classification since EOS Production Site testing started in September 1999. Note that these ratings do NOT relate to absolute performance – they are relative to the EOS requirements.

Requirements Basis:

While the long-term plan is to use the requirements from the EOSDIS network requirements database, the database does not appear ready to be used for that purpose at this time. ESDIS is in process of reviewing its network ICD's with each instrument team. When these ICDs are completed, the database will be updated with the ICD values, and those values will be used here as well.

Until then, the requirements are based on the EOS Networks Requirements Handbook, Version 1.4.3 (from which the original database requirements were derived). Previously, the requirements were derived from version 1.4.2.

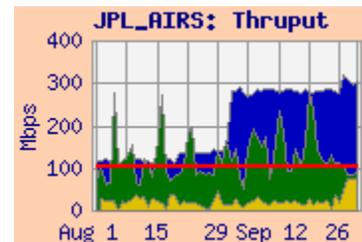
One main difference between Handbooks 1.4.2 and 1.4.3 is that most flows which occur less than once per day were averaged over their production period. These flows were typically monthly Level 3 data transfers, which were specified to be sent in just a few hours. However, they could easily be accommodated either between the per-orbit flows, or within the built-in contingency. Previously, these flows were added in linearly to the requirements, making the requirements unrealistically high.

Additionally, the contingency for reprocessing flows greater than 2X reprocessing was reduced. These flows WERE a major component of the contingency, so adding additional contingency on top of these flows was considered excessive.

However, it seems likely that there are some flows which have been omitted from version 1.4.3. For example, the GES DISC to KNMI requirement for Level 1+ data (without contingency) was 1.4 mbps in version 1.4.2, but only 22 kbps in version 1.4.3. The user flow has been averaging about 1.4 mbps, suggesting that version 1.4.2 was correct, and that version 1.4.3 has omitted something.

Integrated Charts:

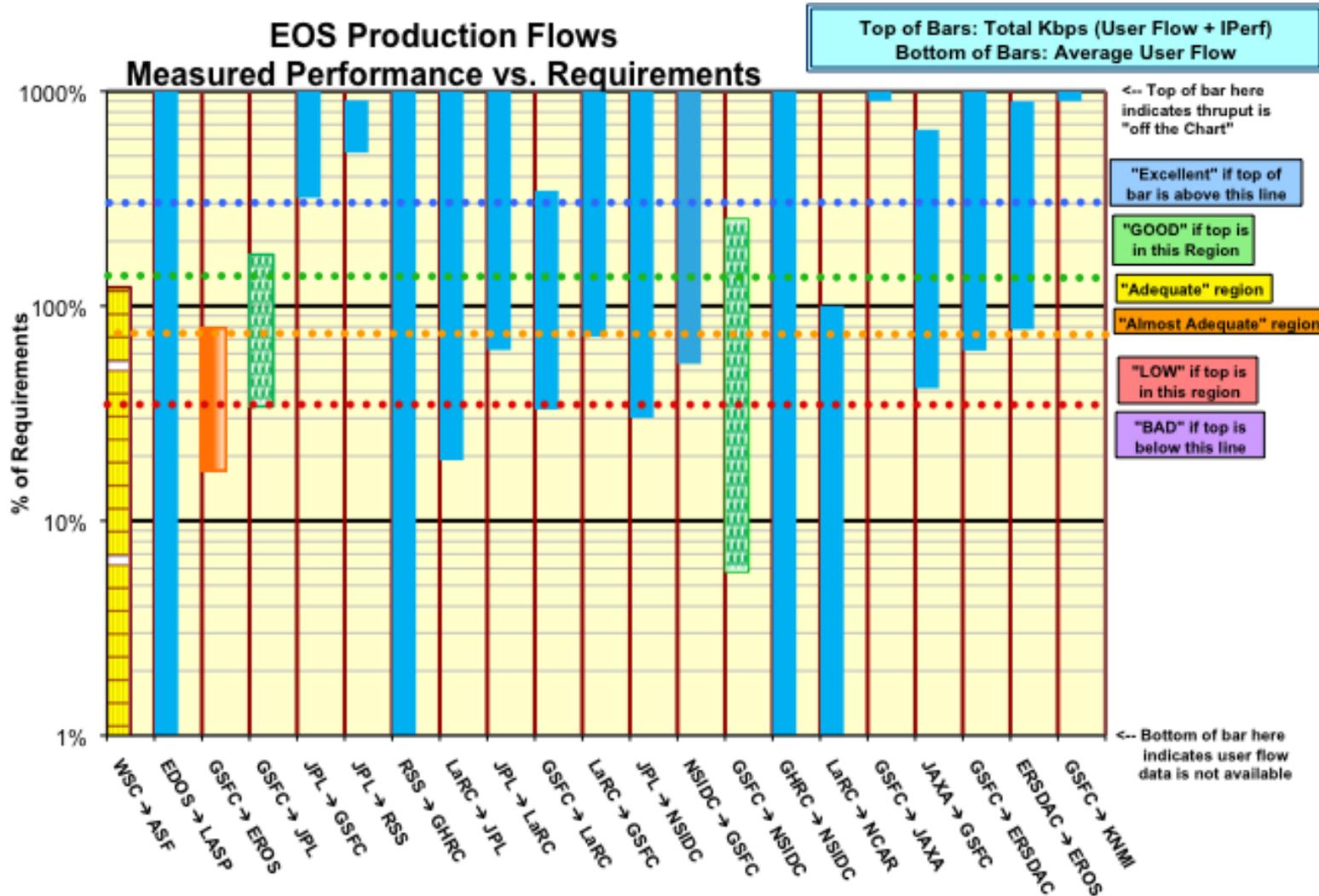
Integrated charts are included with site details, where available. These charts are "Area" charts, with a "salmon" background. A sample Integrated chart is shown here. The yellow area at the bottom represents the daily average of the user flow from the source facility (e.g., GSFC, in this example) to the destination facility (JPL, in this example) obtained from routers via "netflow". The green area is stacked on top of the user flow, and represents the "adjusted" daily average iperf thrupt between the source-destination pair most closely corresponding to the requirement. This iperf measurement essentially shows the circuit capacity remaining with the user flows active. Adjustments are made to compensate for various systematic effects, and are best considered as an approximation. The red line is the requirement for the flow from the source to destination facilities. On some charts a blue area is also present – usually "behind" the green area – representing adjusted iperf measurements from a second source node at the same facility.



Network Requirements vs. Measured Performance

April 2011		Requirements (mbps)		Testing			Ratings			
Source → Destination	Instrument (s)	Current	Old	Source → Dest Nodes	Average User Flow mbps	iperf Median mbps	Integrated mbps	Ratings re HB 1.4.3 Requirements		
		HB 1.4.3	HB 1.4.2					This Month	Last Month	
WSC → ASF	ALOS	96.0	n/a	WSC → ASF		117.2		Adequate	Adq	
EDOS → LASP	ICESat, QuikScat	0.4	0.4	GSFC-EDOS → LASP (blue)	0.0002	4.9		Excellent	Ex	
GSFC → EROS	MODIS, LandSat	342.9	345.9	MODAPS-PDR → EROS LPDAAC	58.3	240.9	267.1	AA	AA	
GSFC → JPL	AIRS, MLS, ISTs	101.7	43.6	GES DISC → JPL-AIRS	34.6	164.9	176.1	Good	Good	
JPL → GSFC	MLS	0.6	7.4	JPL-PTH → GSFC-ESDIS-PTH	1.8	85.9	86.0	Excellent	Ex	
JPL → RSS	AMSR-E	0.5	2.5	JPL-PODAAC → RSS	2.5	3.1	4.4	Excellent	Ex	
RSS → GHRC	AMSR-E	0.3		RSS (Comcast) → GHRC		10.3		Excellent	Ex	
LaRC → JPL	TES, MISR	23.0	43.7	LARC-ASDC → JPL-TES	4.4	374.7		Excellent	Ex	
JPL → LaRC	TES	1.5	4.4	JPL-PTH → LARC-PTH	0.92	63.8		Excellent	Ex	
GSFC → LaRC	CERES, MISR, MOPITT	31.3	60.5	GSFC-EDOS → LaRC ASDC	10.3	106.9	107.9	Excellent	Ex	
LaRC → GSFC	CERES, MODIS, TES	0.4	0.2	LDAAC → GES DISC	0.26	479.5	479.5	Excellent	Ex	
JPL → NSIDC	AMSR-E	0.2	1.3	JPL-PODAAC → NSIDC	0.048	23.9		Excellent	Ex	
NSIDC → GSFC	MODIS, ICESAT, QuikScat	0.6	0.5	NSIDC DAAC → GES DISC	0.31	325.5	325.5	Excellent	Ex	
GSFC → NSIDC	MODIS, ICESAT, QuikScat	27.6	34.5	MODAPS-PDR → NSIDC-DAAC	1.6	70.2	70.2	Good	Ex	
GHRC → NSIDC	AMSR-E	0.5	7.5	GHRC → NSIDC DAAC (ftp)		6.6		Excellent	Ex	
LaRC → NCAR	MOPITT	0.1	5.4	LDAAC → NCAR		274.2		Excellent	Ex	
GSFC → JAXA	QuikScat, TRMM, AMSR	0.1	2.0	GSFC → JAXA	5.6	Testing discontinued:		Excellent	Ex	
JAXA → GSFC	AMSR-E	0.5	1.3	JAXA → GSFC	3.0	31 March 2009		Excellent	Ex	
GSFC → ERSDAC	ASTER	5.4	12.5	GSFC-EDOS → ERSDAC	3.3	77.2	77.7	Excellent	Ex	
ERSDAC → EROS	ASTER	8.3	26.8	ERSDAC → EROS PTH	6.4	74.1	74.1	Excellent	Ex	
GSFC → KNMI	OMI	0.03	3.3	GSFC-OMISIPS → KNMI ODPS	2.2	132.7	134.3	Excellent	Ex	
				Significant change from v 1.4.2 (5/09) to v 1.4.3						
				Value used for ratings						
							Ratings Summary		HB 1.4.3 Req	
									Score	Prev
*Criteria:	Excellent	Total Kbps > Requirement * 3						Excellent	17	17
	Good	1.3 * Requirement <= Total Kbps < Requirement * 3						Good	2	1
	Adequate	Requirement < Total Kbps < Requirement * 1.3						Adequate	1	1
	Almost Adequate	Requirement / 1.3 < Total Kbps < Requirement						Almost Adequate	1	1
	Low	Requirement / 3 < Total Kbps < Requirement / 1.3						Low	0	0
	Bad	Total Kbps < Requirement / 3						Bad	0	0
							Total Sites		21	20
Notes:	Flow Requirements include: TRMM, Terra, Aqua, Aura, ICESAT, QuikScat, GEOS						GPA		3.69	3.73

This graph shows a bar for each source-destination pair – relating the measurements to the requirements for that pair. The bottom of each bar represents the average measured user flow from the source site to the destination site (as a percent of the requirement) – it indicates the relationship between the requirements and actual flows. Note that the requirements generally include a 50% contingency factor above what was specified by the projects, so a value of 66% (dotted orange line) would indicate that the project is flowing as much data as requested. The top of each bar similarly represents the integrated measurement, combining the user flow with Iperf measurements – this value is used to determine the ratings.



1) EROS:

Ratings: GSFC→ EROS: Continued **Almost Adequate**
 ERSDAC→ EROS: Continued **Excellent**

Web Page: <http://ensight.eos.nasa.gov/Organizations/production/EROS.shtml>
http://ensight.eos.nasa.gov/Organizations/production/EROS_PTH.shtml

Test Results:

Source → Dest	Medians of daily tests (mbps)			User Flow	Integrated
	Best	Median	Worst		
MODAPS-PDR → EROS LPDAAC	346.2	240.9	128.6	58.3	267.1
GSFC-EDOS → EROS LPDAAC	214.5	165.1	40.3		
GES DISC → EROS LPDAAC	289.6	164.5	61.9		
ERSDAC → EROS LPDAAC	74.5	74.1	45.9	6.4	74.1
NSIDC SIDADS → EROS PTH	96.3	69.0	47.5		
GSFC-ENPL → EROS PTH	817.8	681.3	362.1		
GSFC-NISN → EROS PTH	464.0	349.5	112.2		
LaRC PTH → EROS PTH	188.7	160.2	96.4		

Requirements:

Source → Dest	Date	mbps	Rating
GSFC → EROS	CY '08-11	343	Almost Adequate
ERSDAC → EROS	FY '06 -'10	8.3	Excellent

Comments:

1.1 GSFC → EROS: The rating is based on the MODAPS-PDR Server to EROS LP DAAC measurement, since that is the primary flow. The route is via the Doors to NISN SIP, via the NISN 10 gbps backbone to the NISN Chicago CIEF, then via GigE to the StarLight Gigapop, peering with the EROS tail circuit. EROS upgraded this tail circuit from OC-12 (622 mbps) to OC-48 (2.5 gbps) on March 4, 2011 – Performance improved from most sources at that time.

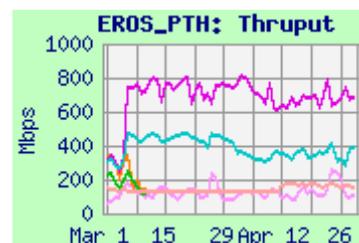
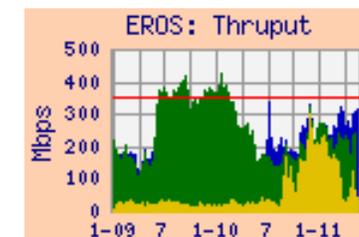
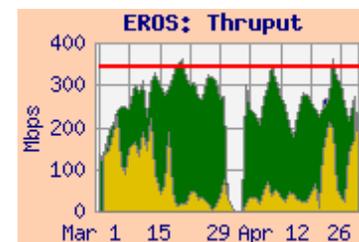
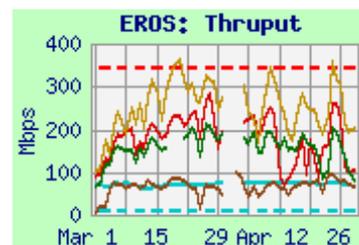
The user flow dropped off mid March, after about 5 months of high user flow, reportedly based on a science user at EROS acquiring MODIS data. This month it averaged only about 17% of the nominal requirement (which includes MODIS reprocessing). The steady high user flow began in October '10, as seen on the long term integrated graph.

Iperf performance from GSFC-NISN and GSFC-ENPL to EROS-PTH improved with the EROS circuit upgrade. The GSFC-ENPL host has a direct connection to the MAX; its route is via MAX to Internet2 to StarLight in Chicago. Performance is now better than the GSFC-NISN source. Both are no longer limited by the OC-12 to EROS.

1.2 ERSDAC → EROS: **Excellent**. See section 9 (ERSDAC) for further discussion.

1.3 NSIDC → EROS: Performance improvement observed on January 28 due to route change (using Internet2 from FRGP vs NLR previously), and again with the EROS upgrade in March.

1.4 LaRC → EROS: The throughput from LaRC-PTH to EROS-PTH was stable. The route is via NISN SIP to the Chicago CIEF to StarLight.



2) to GSFC

Ratings: NSIDC → GES DISC: Continued **Excellent**
 LDAAC → GES DISC: Continued **Excellent**
 JPL → GSFC: Continued **Excellent**

Web Pages:

<http://ensight.eos.nasa.gov/Organizations/production/GDAAC.shtml>

http://ensight.eos.nasa.gov/Organizations/production/ESDIS_PTH.shtml

http://ensight.eos.nasa.gov/Missions/icesat/GSFC_ISIPS.shtml

Test Results:

Source → Dest	Medians of daily tests (mbps)			User Flow
	Best	Median	Worst	
EROS LPDAAC → GES DISC	249.6	169.4	97.0	
EROS PTH → GSFC-ESDIS PTH	379.5	259.0	107.2	
JPL-PTH → GSFC-ESDIS PTH	88.4	85.9	80.4	1.8
LDAAC → GES DISC	602.0	479.5	151.0	0.20
LARC-ANGe → GSFC-ESDIS PTH	517.4	418.9	349.5	
NSIDC DAAC → GES DISC	363.0	325.5	120.8	0.31
NSIDC DAAC → GSFC-ISIPS	133.0	130.4	120.6	

Requirements:

Source → Dest	Date	Mbps	Rating
NSIDC → GSFC	CY '06 – '10	0.6	Excellent
LDAAC → GES DISC	FY '07 – '10	0.4	Excellent
JPL → GSFC combined	CY '06 – 10	3.2	Excellent

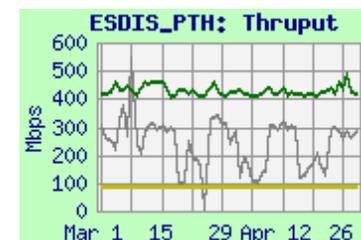
Comments:

EROS, EROS-PTH → GSFC: The thruput for tests from EROS and EROS-PTH to GES DISC and ESDIS-PTH were mostly stable.

JPL → GSFC: Thruput was again very stable this month. With the modest requirement (reduced from 7.4 mbps in May '09), the rating remains "**Excellent**". The actual user flow is consistent with the reduced requirement.

LaRC → GSFC: Performance from LDAAC to GES DISC and LaRC ANGe to ESDIS-PTH remained way above 3 x the modest requirement, so the rating continues as "**Excellent**". The user flow this month was consistent with the requirement.

NSIDC → GSFC: Performance from NSIDC to GSFC (DAAC and ISIPS) was mostly steady this month. The user flow was below the low requirement (reduced from 13.3 mbps in May '09); the rating remains "**Excellent**".

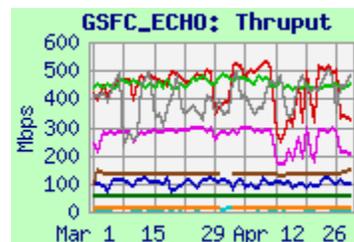


2.2 GSFC-ECHO: EOS Metadata Clearinghouse

Web Page: http://ensight.eos.nasa.gov/Organizations/gsfcc/GSFC_ECHO.shtml

Test Results:

Source	Medians of daily tests (mbps)		
	Best	Median	Worst
EROS LPDAAC	121.3	99.9	58.3
EROS LPDAAC ftp	10.8	10.6	8.8
GES DISC	540.4	480.6	186.3
GES DISC ftp	305.1	281.0	97.6
LaRC ASDC DAAC	516.1	446.9	390.2
LaRC ASDC DAAC ftp	59.0	58.0	34.1
MODIS-LADSWEB	523.8	438.6	321.4
NSIDC DAAC	137.8	134.1	122.1
NSIDC DAAC ftp	11.2	11.1	4.4



Comments:

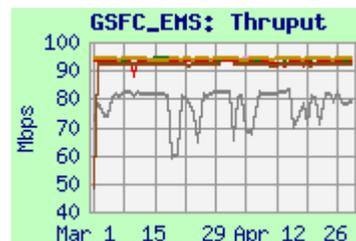
Performance was relatively stable from all sources. Thruput from NSIDC improved in January with the route change from NLR to Internet2. Performance is mostly limited by TCP window size – especially on ftp with long RTT.

2.3 GSFC-EMS: EOS Metrics System

Web Page: http://ensight.eos.nasa.gov/Organizations/gsfcc/GSFC_EMS.shtml

Test Results:

Source	Medians of daily tests (mbps)		
	Best	Median	Worst
EROS-PTH	89.7	80.6	59.6
ESDIS-PTH	94.2	94.1	84.5
GES DISC	93.8	93.4	82.6
LARC-PTH	94.1	94.0	67.0
MODAPS-PDR	94.1	94.1	88.9
NSIDC-SIDADS	92.9	92.3	83.8



Comments:

Testing is performed to GSFC-EMS from the above nodes, iperf only. Results are very steady. Performance limitation is from the 100 mbps fast-E connection.

3) JPL:

3.1) GSFC → JPL:

Ratings: GSFC → JPL: Continued **Good**

Web Pages: http://ensight.eos.nasa.gov/Missions/aqua/JPL_AIRS.shtml
http://ensight.eos.nasa.gov/Missions/aura/JPL_MLS.shtml
http://ensight.eos.nasa.gov/Organizations/production/JPL_QSCAT.shtml
http://ensight.eos.nasa.gov/Organizations/production/JPL_PODAAC.shtml

Test Results:

Source → Dest	Medians of daily tests (mbps)			User Flow	Integrated
	Best	Median	Worst		
GSFC-GES DISC → JPL-AIRS	254.6	164.9	61.0	34.6	176.1
GSFC-NISN → JPL-AIRS	276.5	261.8	148.8		
ESDIS-PTH → JPL-AIRS	224.5	138.1	83.6		
GSFC-NISN → JPL-PODAAC	100.9	67.7	35.6		
ESDIS-PTH → JPL-PODAAC	77.7	43.6	25.7		
GSFC-NISN → JPL-QSCAT	88.4	78.5	54.1		
ESDIS-PTH → JPL-QSCAT	59.1	46.6	26.1		
GSFC-NISN → JPL-MLS	262.6	219.2	138.3		
ESDIS-PTH → JPL-MLS	165.1	92.9	46.4		

Requirements:

Source → Dest	Date	Mbps	Rating
GSFC → JPL Combined	FY '08-'10	101.7	Good
GSFC → JPL AIRS	FY '08-'10	98	Good
GSFC → JPL PODAAC	FY '08-'11	1.5	Excellent
GSFC → JPL QSCAT	FY '08-'11	0.6	Excellent
GSFC → JPL MLS	FY '08-'10	2.1	Excellent

Comments: The user flow from GSFC/EOS to JPL combined was steady this month (very similar to the last 2 months).

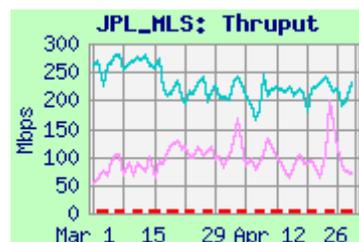
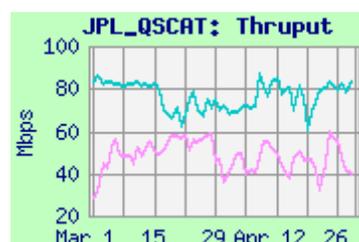
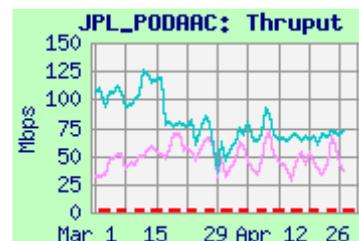
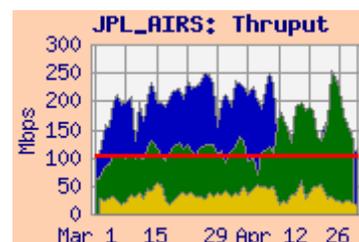
The GSFC-NISN test node was replaced in mid-March. Thruput was different to some destinations compared to the previous node.

AIRS, Overall: Thruput from GES DISC was about 1.7 x the AIRS requirement, so the AIRS rating remains "Good". The JPL overall rating is based on this test compared with the sum of all the GSFC to JPL requirements – the thruput is also below 3x this requirement, so the overall rating remains "Good". Testing to JPL-AIRS was returned in April, with a big improvement from GSFC-NISN.

PODAAC: ESDIS-PTH is connected at 1 gig to the 10 gig EBnet backbone. Performance is lower than from GSFC-NISN, and previously from EBnet-PTH due to packet loss on EBnet, but is still way above the 1.5 mbps PODAAC requirement, rating "Excellent".

QSCAT: Thuput from ESDIS-PTH to QSCAT was also lower than from GSFC-NISN, or previously from EBnet-PTH, but is also well above the modest requirement, rating "Excellent". User flow from GSFC to QSCAT averaged only about 1.2 kbps again this month.

MLS: Thruput from ESDIS-PTH was mostly stable, but thruput was much better from GSFC-NISN. The rating remains "Excellent".



3.2) LaRC → JPL

Rating: Continued **Excellent**

Web Pages:

- http://ensight.eos.nasa.gov/Organizations/production/JPL_TES.shtml
- http://ensight.eos.nasa.gov/Missions/terra/JPL_MISR.shtml
- http://ensight.eos.nasa.gov/Organizations/production/JPL_PTH.shtml

Test Results:

Source → Dest	Medians of daily tests (mbps)			User Flow	Integrated
	Best	Median	Worst		
LaRC DAAC → JPL-TES	461.5	374.7	132.2	0.66	374.7
LaRC PTH → JPL-TES	164.2	153.9	126.6		
LaRC PTH → JPL-TES sftp	3.7	3.6	3.4		
GSFC-NISN → JPL-TES sftp	3.2	3.2	3.2		
LaRC ANGE → JPL-PTH	78.8	75.9	71.8	4.4	75.9
LaRC PTH → JPL-PTH	87.2	52.8	37.1		
LaRC PTH → JPL-PTH sftp	32.3	32.3	31.4		
LaRC DAAC → JPL-MISR	69.2	57.9	39.3	3.2	58.8
LaRC PTH → JPL-MISR	85.2	74.3	40.7		

Requirements:

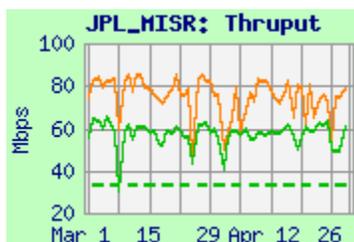
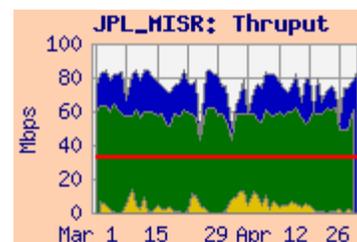
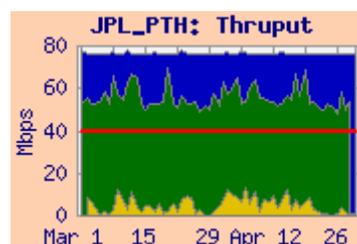
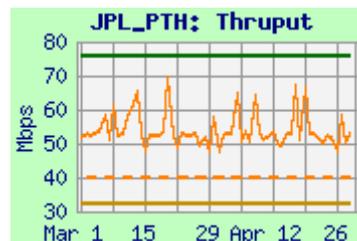
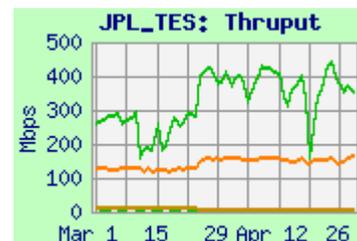
Source → Dest	Date	Mbps	Rating
LaRC DAAC → JPL-TES	FY '07 – '10	7.0	Excellent
LaRC DAAC → JPL-MISR	FY '07 – '10	32.9	Good
LaRC → JPL-Combined	FY '07 – '10	39.9	Excellent

Note: The overall flow increased to an average of 4.4 mbps, from 3.8 mbps last month. About 73% of the LaRC to JPL flow this month was for MISR. The JPL-PTH integrated graph shows the overall LaRC to JPL user flow (vs. the overall requirement).

LaRC → JPL (Overall, TES): The TES node was upgraded in late March, with improved throughput. Median performance from LaRC ASDC DAAC to JPL-TES remains well over 3 x the TES and combined requirements, so the TES and Overall ratings remain "Excellent". User flow to TES is very low.

Sftp performance from LaRC-PTH to JPL-TES is quite low, apparently limited by the Sftp application on the TES node. An additional Sftp test to JPL-TES was initiated from GSFC-NISN (Not graphed), with similar poor results to LaRC-PTH. It has been determined that the Sftp window size on the new TES node is quite large, and not the problem. Instead, it appears that the TES sftp application is throttling the sender. Note that Sftp results are much better from LaRC-PTH to JPL-PTH (than to TES), even though iperf results from the same source are better to TES than JPL-PTH.

LaRC → JPL (MISR): the median throughput is above the requirement, by more than 30%, so the MISR rating remains "Good". The average user flow to MISR increased from 1.9 mbps last month, and is only about 8.5% of the requirement.



3.3) JPL → LaRC Rating: Continued **Excellent**

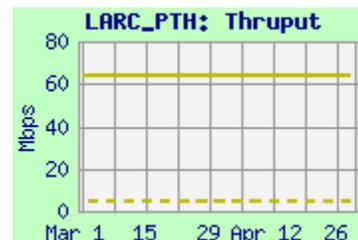
Web Page: http://ensight.eos.nasa.gov/Organizations/production/LARC_PTH.shtml

Test Results:

Source → Dest	Medians of daily tests (mbps)			User Flow	Integrated
	Best	Median	Worst		
JPL-PTH → LaRC PTH	63.9	63.8	63.1	0.92	63.8

Requirements:

Source → Dest	Date	Mbps	Rating
JPL-PTH → LaRC PTH	FY '07 – '10	1.5	Excellent



Comment: This requirement is primarily for TES products produced at the TES SIPS at JPL, being returned to LaRC for archiving; it was reduced from 4.4 mbps in May '09 (and had been reduced in April '08 from 52.6 mbps). This month the thrupt was stable at the lower of its two common states – 64 and 85 mbps. The rating remains “**Excellent**”. The user flow was small consistent with the requirement.

4) GSFC → LaRC:

Rating: Continued **Excellent**

Web Pages : <http://ensight.eos.nasa.gov/Organizations/production/LARC.shtml>
http://ensight.eos.nasa.gov/Organizations/production/LARC_ANGe.shtml
http://ensight.eos.nasa.gov/Organizations/production/LARC_PTH.shtml

Test Results:

Source → Dest	Medians of daily tests (mbps)			User Flow	Integrated
	Best	Median	Worst		
GES DISC → LaRC ASDC	439.4	327.3	168.4	10.3	327.3
GSFC-EDOS → LaRC ASDC	154.4	106.9	35.0		
ESDIS-PTH → LaRC-ANGe	412.7	344.3	221.0		
GSFC-NISN → LaTIS	477.2	449.6	264.9		

Requirements:

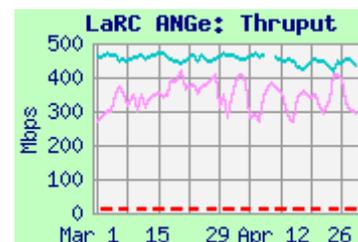
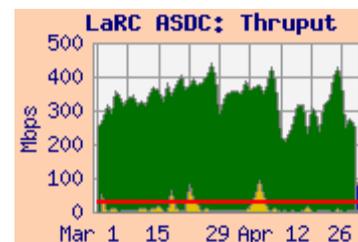
Source → Dest	Date	Mbps	Rating
GSFC → LARC (Combined)	CY '09 – '11	31.3	Excellent

Comments:

GSFC → LaRC ASDC: The rating is based on the **GES DISC** to LaRC ASDC DAAC thrupt, compared to the combined requirement. The integrated thrupt remains well above 3 x this requirement, so the rating remains “**Excellent**”.

As seen on the Integrated graph, the user flow is often lower than the requirement, except for frequent bursts.

ANGe (LaTIS): Testing to ANGe from **ESDIS-PTH** gets steady performance. Testing to LaTIS (Darrin) from **GSFC-NISN** was similar, with very consistent results.



5) Boulder CO sites:

5.1) NSIDC:

Ratings: GSFC → NSIDC: **Excellent** → **Good**
 JPL → NSIDC: Continued **Excellent**
 GHRC → NSIDC: Continued **Excellent**

Web Pages: <http://ensight.eos.nasa.gov/Organizations/production/NSIDC.shtml>
http://ensight.eos.nasa.gov/Organizations/production/NSIDC_SIDADS.shtml
http://ensight.eos.nasa.gov/Organizations/production/NSIDC_PTH.shtml

The NSIDC DAAC was disconnected from NISN PIP in December '09 – all flows now go via the UCB campus, usually via FRGP to Internet2 or NLR. Thus the DAAC competes with the students for network capacity, and there is often significant diurnal variation. DAAC performance improved in mid March, when the students left for winter break, but the diurnal characteristic resumed when the students returned at the end of March.

In late January the path to selected destinations switched from using NLR to Internet2. This improved performance in some cases (e.g., GHRC, see next section).

It is planned to upgrade the UCB connection to FRGP from 1 gbps to 10 gbps in 2011.

Test Results: NSIDC S4PA

Source → Dest	Medians of daily tests (mbps)			User Flow	Integrated
	Best	Median	Worst		
MODIS-PDR → NSIDC DAAC	150.4	70.2	19.7	1.6	70.2
GES-DISC → NSIDC DAAC	180.3	64.9	25.9		
GSFC-EDOS → NSIDC DAAC	95.0	43.3	10.5		
GSFC-ISIPS → NSIDC (iperf)	102.2	58.6	14.0		
JPL PODAAC → NSIDC DAAC	36.3	23.9	4.7		

Requirements:

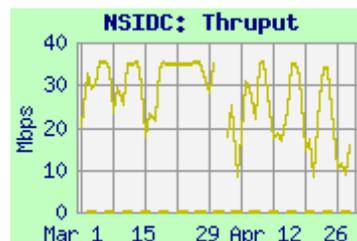
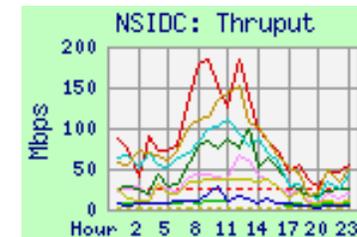
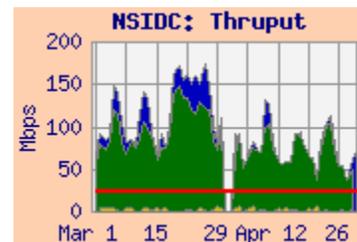
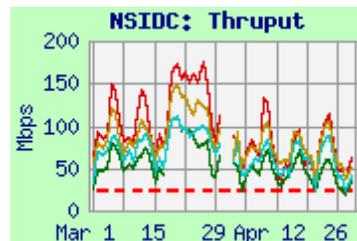
Source → Dest	Date	Mbps	Rating
GSFC → NSIDC	CY '07 – '10	27.6	Good
JPL → NSIDC	CY '07 – '10	0.2	Excellent
GHRC → NSIDC	CY '07 – '10	0.5	Excellent

Comments: GSFC → NSIDC S4PA: This rating is based on testing from the MODIS-PDR server to the NSIDC DAAC, since this is the primary production flow. The requirement was reduced in May '09 from 34.5 mbps (and was 64 mbps in April '08). **Thruput from all GSFC sources decreased this month, with student returned from holidays.**

The integrated thruput from MODIS remains above the requirement, **now by slightly less than 3x, so the rating drops to Good**. The user flow was similar to last month, and remains less than 10% of the reduced requirement. Testing from other GSFC sources, including GES DISC, EDOS, and ISIPS, is similar to MODIS.

As the hourly graph shows, performance to NSIDC exhibits a strong diurnal variation – thruput is better in the middle of the night when the students are not on line, but decreases significantly when they are.

JPL PODAAC → NSIDC S4PA: The requirement was reduced from 1.34 mbps in May '09. Thruput from PODAAC to NSIDC has been mostly stable with a similar diurnal cycle since testing was moved to use Internet2 in September '09; the rating remains **Excellent**.



5.1) NSIDC: (Continued): Test Results: GHRC to NSIDC

Source → Dest	Medians of daily tests (mbps)		
	Best	Median	Worst
GHRC → NSIDC DAAC (nuttcp)	16.9	7.2	2.2
GHRC → NSIDC DAAC (ftp pull)	29.1	6.6	1.1

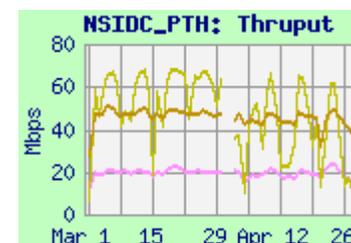
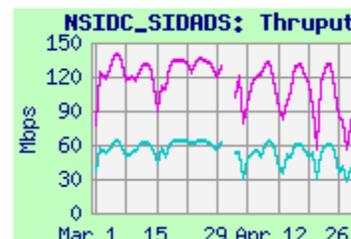
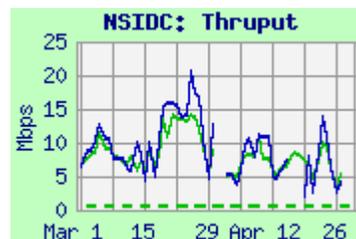
GHRC, GHRC-ftp → NSIDC S4PA: GHRC (NSSTC, UAH, Huntsville, AL) sends AMSR-E data to NSIDC via NLR / Internet2. The rating is now based on this reverse nuttcp testing. The median nuttcp throughput is more than 3x the 0.5 mbps requirement, so the rating remains "Excellent". Performance improved at the end of January, with the switch from NLR to I2 at FRGP.

Test Results: NSIDC SIDADS, NSIDC-PTH

Source → Dest	Medians of daily tests (mbps)		
	Best	Median	Worst
GSFC-ENPL → NSIDC-SIDADS	136.8	112.7	34.9
GSFC-NISN → NSIDC-SIDADS	62.9	52.4	18.3
ESDIS-PTH → NSIDC-PTH	23.2	18.9	8.2
MODIS-PDR → NSIDC-PTH	51.6	44.6	18.2
JPL PTH → NSIDC-PTH	67.7	39.6	5.9

GSFC → NSIDC-SIDADS: Thruput via Internet2 to SIDADS from ENPL and GSFC-NISN showed similar diurnal variation but was otherwise steady. Thruput from GSFC-NISN, ESDIS-PTH, and JPL dropped at the end of January due to increased RTT from the NLR to I2 switch.

NSIDC-PTH: Testing to NSIDC-PTH also displays similar diurnal variation.



5.2) LASP:

Ratings: GSFC → LASP: Continued **Excellent**

Web Page: <http://ensight.eos.nasa.gov/Organizations/production/LASP.shtml>

Test Results:

Source → Dest	Medians of daily tests (mbps)		
	Best	Median	Worst
GSFC EDOS → LASP blue	7.69	4.90	2.66
ESDIS-PTH → LASP blue (iperf)	8.25	7.23	6.05
ESDIS-PTH → LASP blue (scp)	3.28	3.17	2.59
GSFC ENPL → LASP green	172.6	80.0	10.8

Requirement:

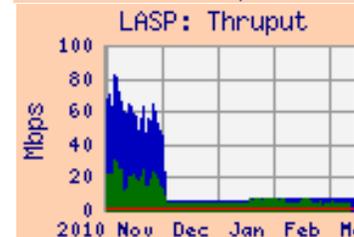
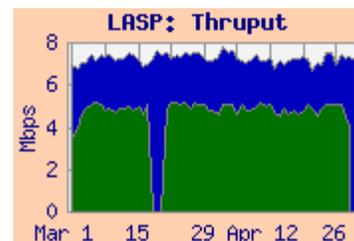
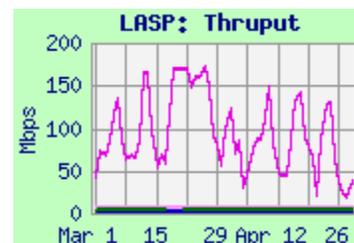
Source → Dest	Date	Mbps	Rating
GSFC-EDOS → LASP (blue)	CY '07 – '10	0.4	Excellent

Comments: In mid January '11, LASP's connection to NISN PIP was rerouted: previously was 100 mbps from CU-ITS via NSIDC; this was changed to a 10 mbps connection to the NISN POP in Denver.

Thruput was consistent with the new circuit limitation. The median thruput from EDOS remained well over 3x the requirement, so the rating remains "Excellent". The average user flow again this month was below typical at only 0.2 kbps.

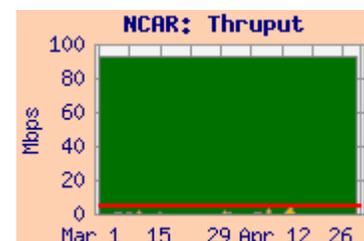
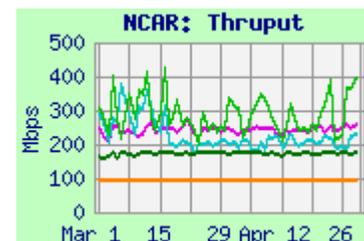
ESDIS-PTH also tests to the test node on LASP's blue network with steady thruput. SCP performance from ESDIS-PTH to LASP was also very steady.

Performance from GSFC-ENPL to a node on LASP's green network via Internet2 / UCB was much higher, but also was subject to congestion from students -- like NSIDC systems.



5.3) NCAR:Ratings: LaRC → NCAR: Continued **Excellent**Web Pages <http://ensight.eos.nasa.gov/Missions/terra/NCAR.shtml>**Test Results:**

Source	Medians of daily tests (mbps)			Requirement
	Best	Median	Worst	
LaRC ASDC	426.3	274.2	180.7	0.1
LaRC PTH	179.9	173.9	133.9	
GSFC-ENPL-GE	312.4	241.2	172.3	n/a
GSFC-ENPL-FE	93.6	93.5	93.3	
GSFC-NISN	273.1	206.1	112.0	



Comments: NCAR (Boulder, CO) has a SIPS for MOPITT (Terra, from LaRC), and has MOPITT and HIRDLS (Aura, from GSFC) QA requirements.

Thruput from **LaRC ASDC** was somewhat noisy (2.4:1 best : worst ratio), but the median (and daily worst, for that matter) remained well above 3 x the reduced requirement, so the rating remains “**Excellent**”.

From **GSFC-NISN**, the route is via NISN to the MAX (similar route and a bit lower performance as from LaRC). From **GSFC-ENPL-GE**, with a Gig-E connection to MAX, the median thruput was a bit higher. Performance from all sources is somewhat noisy but mostly stable. The average user flow from GSFC this month was 0.69 mbps, similar to last month.

6) ASFRatings: WSC → ASF: Continued **Adequate**Web Page: <http://ensight.eos.nasa.gov/Organizations/production/ASF2.shtml>**Test Results:**

Source	Medians of daily tests (mbps)			Requirement	Rating
	Best	Median	Worst		
WSC	121.2	117.2	99.4	96	Adequate
WSC-SFTP	67.9	64.4	43.7		
GSFC ENPL	175.1	145.7	107.0		
GSFC-SCP	17.1	16.8	16.3		

Comments: **IONet:** The ASF IONet host and firewall was reconfigured in October '07, and all IONet testing stopped at that time.

Testing to ASF is for the ALOS mission. The ALOS satellite failed in May, and testing has been terminated.

The route from **WSC** is via NISN SIP, peering with Internet2 at one of several possible peering points (usually StarLight in Chicago). Internet2 connects to the “Pacific Northwest Gigapop” (PNW) in Seattle. From there the University of Alaska – Fairbanks (UAF) has a dedicated OC-12 circuit to campus, then via campus LAN to the Alaska Satellite Facility (ASF). In February 2010, policing was installed at the WSC source at 250 mbps. That steadied the thruput significantly.



The median iperf thruput from **WSC** remains above requirement, but by less than 30%, so the rating remains “**Adequate**”. Testing from **WSC** was returned in mid April, with improved thruput – but too late in the month to affect the monthly medians. The thruput after retuning would be rated **Good**.

From **GSFC**, iperf thruput was higher, but SCP thruput is lower, even though the RTT is also lower. This is under investigation.

7) Remote Sensing Systems (RSS): Ratings: JPL → RSS: Continued **Excellent**
 RSS → GHRC: **Excellent**

Web Page <http://ensight.eos.nasa.gov/Missions/aqua/RSS.shtml>

Test Results:

Source → Dest	Medians of daily tests (mbps)			User Flow	Integrated	Req
	Best	Median	Worst			
JPL → RSS (NISN)	5.64	3.08	1.18	2.50	4.38	0.49
JPL → RSS (Comcast)	42.4	41.6	39.0			
RSS (Comcast) → GHRC	11.7	10.3	3.9			0.34

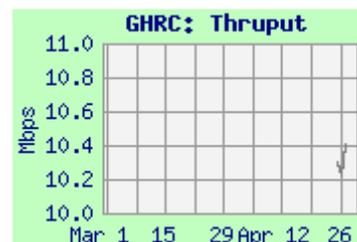
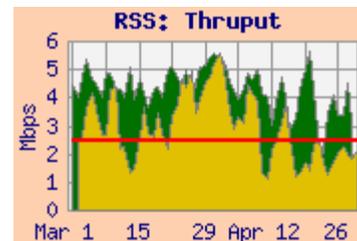
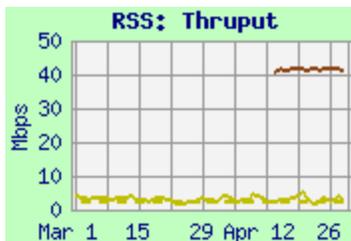
Comments: RSS (Santa Rosa, CA) is a SIPS for AMSR-E (Aqua), receiving L1 data from JAXA via JPL, and sending its processed L2 results to GHRC (aka NSSTC) (UAH, Huntsville, AL).

User flow data on this circuit is now being obtained from the NISN SIP router at ARC. The integrated graphs show that periods of low iperf performance are attributable to higher user flow.

The requirement was reduced with handbook 1.4.3 (was 2.5 mbps previously). The median iperf was more than 3 x the reduced requirement, so the rating remains “**Excellent**”.

RSS currently is using a NISN SIP circuit: 4 x T1s to NASA ARC (total 6 mbps). In April a new Comcast circuit was installed, rated at 50 mbps incoming, and 12 mbps outgoing. Testing from JPL began on this circuit in April, with improved results.

RSS → GHRC: In addition, the new server at RSS connected to the Comcast circuit allows “3rd party testing”, as does the server at GHRC. Testing has therefore been initiated from RSS to GHRC, with results around 10 mbps, rating “**Excellent**” re the 0.34 mbps requirement.



8) KNMI: Rating: Continued **Excellent**

Web Pages http://ensight.eos.nasa.gov/Missions/aura/KNMI_ODPS.shtml

Test Results:

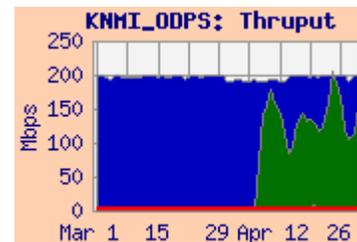
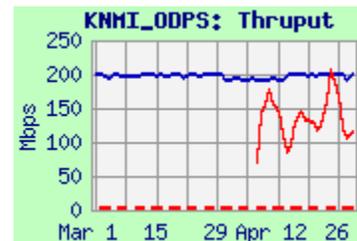
Source → Dest	Medians of daily tests (mbps)			Reqmt
	Best	Median	Worst	
OMISIPS → KNMI-ODPS	187.3	132.7	72.2	0.03
GSFC-ENPL → KNMI-ODPS	202.5	196.7	176.6	

Comments: KNMI (DeBilt, Netherlands) is a SIPS and QA site for OMI (Aura). The route from GSFC is via MAX to Internet2, peering in DC with Géant’s 10 gbps circuit to Frankfurt, then via Surfnet through Amsterdam.

The rating is again based on the results from OMISIPS at GSFC to the ODPS primary server. Testing from OMISIPS went down in late February due to the OMISIPS address change, and was fixed in April.

The thruput was much more than the tiny requirement, so the rating remains “**Excellent**”. Thruput was higher and quite steady from GSFC-ENPL (outside the ESDIS firewall).

The user flow averaged 2.2 mbps this month, (hard to see on the integrated graph). This is more consistent with the previous 3.3 mbps requirement than the current 0.03 mbps requirement (This new requirement remains under review).



9) ERSDAC:

Ratings: **GSFC → ERSDAC: Continued Excellent**
ERSDAC → EROS: Continued Excellent
ERSDAC → JPL-ASTER-IST: Continued Excellent

Web Page : <http://ensight.eos.nasa.gov/Organizations/production/ERSDAC.shtml>

US ↔ ERSDAC Test Results

Source → Dest	Medians of daily tests (mbps)			User Flow	Integrated
	Best	Median	Worst		
GSFC-EDOS → ERSDAC	81.4	77.2	22.5	3.3	77.7
GES DISC → ERSDAC	37.8	31.5	13.6		
GSFC ENPL (FE) → ERSDAC	89.5	89.4	89.0		
ERSDAC → EROS	74.5	74.1	45.9	6.4	
ERSDAC → JPL-ASTER IST	90.0	89.9	89.6		

Requirements:

Source → Dest	FY	Mbps	Rating
GSFC → ERSDAC	'05 - '09	5.4	Excellent
ERSDAC → JPL-ASTER IST	'07- '09	0.31	Excellent
ERSDAC → EROS	'07- '09	8.3	Excellent

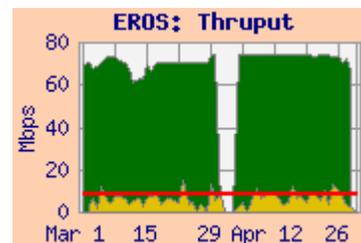
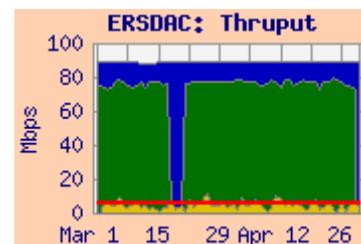
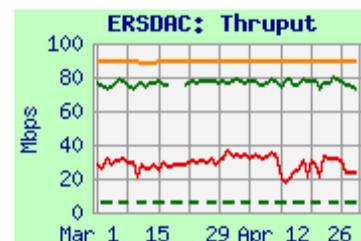
Comments:

GSFC → ERSDAC: The median thrupt from EDOS remains well above 3 x the reduced requirement; the rating remains “Excellent”. The integrated chart shows that the user flow is stable, and consistent with the new requirement.

Thruput from GES DISC to ERSDAC is limited by packet loss at the GigE to FastE switch at Tokyo-XP. The GES DISC GigE source does not see any bottlenecks until this switch (The Internet2 and APAN backbones are 10+ Gbps). It thus exceeds the capacity of the switch’s FastE output circuit, causing packet loss. But the FastE connected ENPL node is limited to 100 mbps by its own interface, so does not suffer performance degrading packet loss – and the performance is much higher. EDOS uses QoS (HTB) to limit its burst rate, and thus gets much better thrupt than GES DISC – thrupt similar to ENPL-FE.

ERSDAC → JPL-ASTER-IST: The median thrupt is very stable, and remains well above the [unstated] requirement (IST requirements are generally 311 kbps), so the rating remains “Excellent”.

ERSDAC → EROS: The thrupt is mostly stable and remains well above the reduced requirement (was 26.8 mbps previously). The new 8.3 mbps requirement is much closer to the actual flow (especially when contingency is added). The median thrupt is more than 3 x the reduced requirement, so the rating remains “Excellent”.



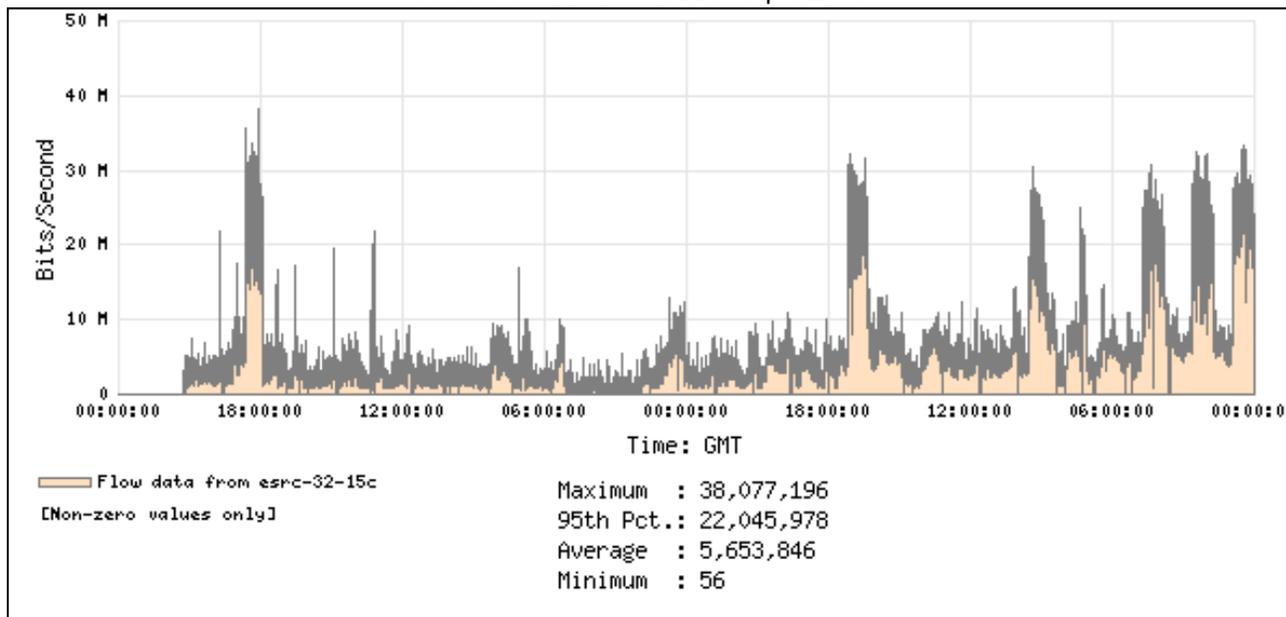
10) US ↔ JAXA

Ratings: US → JAXA: Continued **Excellent**
JAXA → US: Continued **Excellent**

The JAXA test hosts at EOC Hatoyama were retired on March 31, 2009 (the end of the Japanese government's fiscal year). No additional testing is planned for AMSR or TRMM. All testing to JAXA-TKSC for ALOS was terminated at the end of June '09.

However, the user flow between GSFC and JAXA continues to be measured. As shown below, the average user flow this month averaged 5.6 mbps from GSFC to JAXA (with peaks above 30 mbps), and 205 kbps from JAXA to GSFC (with regular peaks to 3 mbps). Comparing these values to the new requirement of 0.1 mbps produces a rating of "Excellent" in both directions. Note that the user flow to JAXA is much more consistent with the old 2.0 mbps GSFC → JAXA requirement.

Flow from GSFC to JAXA – April 2011



Flow from JAXA to GSFC – April 2011

