

11:29 AM 2/19/2003, Fwd: FW: Image Data

To:
From: Michael Card <mcard@hq.nasa.gov>
Subject: Fwd: FW: Image Data
Cc:
Bcc:
Attached: C:\Documents and Settings\mcard\My Documents\Data\attach\65712_256.txt;C:\Documents and Settings\mcard\My Documents\Data\attach\pow3.jpg;

Ivar, may be of interest, mike

From: "HILL, PAUL S. (JSC-DA8) (NASA)" <paul.s.hill@nasa.gov>
To: DL ESAT <DL-ESAT@ems.jsc.nasa.gov>
Subject: FW: Image Data
Date: Wed, 19 Feb 2003 07:06:02 -0600
X-Mailer: Internet Mail Service (5.5.2653.19)

Greg Byrne -

I meant to send you this yesterday. This is the electronic version of the hardcopy I handed you.

Everyone else -

Don't misinterpret the picture. It isn't IR, it's simply a display of the raw pixel value. Consider this FYI, but don't do anything with it. Doug White has a team that is working this.

PSH

-----Original Message-----

From: Bob Fugate [<mailto:bob.fugate@kirtland.af.mil>]
Sent: Tuesday, February 18, 2003 8:37 AM
To: HILL, PAUL S. (JSC-DA8) (NASA); White, Doug; Roberts Katherine E Col USSTRATWEST/J3V; Michael.Caylor@wpafb.af.mil; Earl Good; Stephen Mark D Col AFRL/DE; Baker William L Civ AFRL/DE; Fugate Robert Q Civ AFRL/DES; Robert Johnson; Cleis Richard A Contr AFRL/DES
Subject: Image Data

17 February 2003

Paul and Doug,

I have attached two files, a JPEG image made by displaying the square root of the raw data (the color bar shows corresponding actual value) from the file 6.57.12.tif, and a text file with the raw 16 bit pixel values for a 256x256 region selected from the entire image. I have verified that all other pixels in the image have a value of zero.

The JPEG image clearly shows an illuminated pixel behind the longer part of the plume, suggesting glowing material shed from the orbiter (or maybe structure in the plume?). I have tried to set the saturated pixels to white in this rendering, to get some idea of the outline of the orbiter. I am still working on algorithms to deconvolve our best estimate of the point spread function from this image (that may make the edges crisper), but this is proving difficult since

the majority of the pixels are saturated, generating lots of artifacts.

There is, however, a group at the University of Arizona that has some specialized code that may be able to restore this image to some extent. Paul, Col Roberts described a process that (as I understand it) requires you to ask her for assistance from Air Force related groups and contractors-like the Arizona image processing group. Actually, I would guess they would be willing to do this on their own nickel (or dime) and in that case it wouldn't hurt to let them have a go at this. There is another group at ERIM, in Michigan, who is also very good and whom we have worked with in the past. Please let us know how to proceed.

Is there anyway we could get an estimate from telemetry of what the orientation of the orbiter was at the time (current estimate is 13:57:14) this image was made? We would like to try to project a 3D orbiter model onto the outline in the image.

Bob Fugate

Mark D. Stephen, Colonel, USAF
Deputy Director, Directed Energy Directorate

-----Original Message-----

From: HESS, DAVID C. (DAVE) (JSC-ZR) (NASA) [mailto:david.c.hess@nasa.gov]
Sent: Monday, February 10, 2003 3:19 PM
To: 'White Richard W Jr. Col SMC Det 12/ST'; 'McCann, Lt Col Jeffrey'
Cc: CARD, MIKE (JSC-REMOTE); Good Earl Civ AFRL/DE; Bednarz Eugene J Civ AFRL/DEFP; Baker William L Civ AFRL/DE; Fugate Robert Q Civ AFRL/DES; Stephen Mark D Col AFRL/DE; Giuliano Concetto R Civ AFRL/DEB; Dinwiddie David L Civ AFRL/DEB; Skarupa Valerie B Civ AFRL/DEBI; Kress John C Lt Col AFSPC/DOOM (E-mail)
Subject: RE: AMOS data sent via Fed-Ex to NASA
Importance: High

Gentlemen,

I have been directed by the folks at US Strategic Command and Air Force Space Command (email from Lt Col John Kress, AFSPC/DOO excerpted below) to forward ALL data to them for distribution and release. This is in conjunction with the DoD Columbia Investigation Support Team (DCIST). Here is the email excerpt that directs this:

Mr Hess - Per our discussion, I telephoned Col Roberts and asked for direction with regards to where you should send data. She reiterated her direction yesterday and directed me to inform you to send the data here. The DoD Columbia Investigation Support Team (DCIST) is the official collector of any data from DoD sources; it will release information as quickly as possible in assisting in the recovery of debris and will work closely with NASA for the analysis required of DoD data for the on-going investigation. There is no effort to withhold or slow down the release of information, but we have quick access to expert analysis that might reveal crucial information from the data itself, or can be effectively merged with other DoD data to produce something of use, so we need to get the data here. In addition, it is important to observe proper management of any classified data.

Should you be contacted by DoD agencies that feel they have relevant information, data, or analysis, please direct them to the DCIST. The DCIST includes Maj Gen Hamel, Col Roberts, Lt Col Cindy Visel (USSTRATCOM-West, Maj Paul Pease (USSTRATCOM-West, Maj Eric Olson (HQ AFSPC, some folks at Vandenberg AFB, and myself. I have given you the phone numbers of those here in Colo Sprgs since the official collection and storage will be here. Also, if you have questions or need to direct someone to the DCIST, these numbers may expedite the process.

Based on this hardcore direction I am obligated, until directed otherwise, to forward the AMOS data up to them at AFSPC so they can review and determine where it should go from there. If this direction should change before I get the FedEx on Wednesday, then naturally I will get the data to the right folks here at JSC.

For Jeff McCann: Jeff, I noticed the FTP AMOS data showed up on the logs briefed to Mr Dittmore, so obviously they got to the folks here at JSC
I truly apologize if this causes any delays. I had thought the Maui data was sent last

From:

To: "david.c.hess@nasa.gov" <david.c.hess@nasa.gov>

Cc: "mcard@hq.nasa.gov" <mcard@hq.nasa.gov>

Subject: Request for SOR image and USAF Maui MSSS images of Columbia

Date: Mon, 10 Feb 2003 09:31:08 -0500

X-Mailer: Internet Mail Service (5.5.2653.19)

David,

Hi; thanks for your call to my office on Friday, 2/7, regarding the image of Columbia during reentry. We would appreciate your forwarding the image back to my

Mike Card/NASA HQ (202-358-4481) has authorized our receipt of that image to support NASA's investigation. We did similar work during the Challenger accident investigation and our analysis (NPIC at the time) was used then in an appendix to the Rogers Commission report.

I understand that additional images may have also been taken by the Air Force' during Columbia's mission and we would very much appreciate being forwarded those images as well.

Thanks for your help; it's appreciated.

Regards,

H E S S , D A V I D C . (D A V E) (J S C - Z R) (N A S A) , 1 0 : 4 2 A M 2 / 1 0 / 2 0 0 3 , R E : R e q u e s t f o r S O R i m a g e a n d U

From: "HESS, DAVID C. (DAVE) (JSC-ZR) (NASA)" <david.c.hess@nasa.gov>
To:
Cc: "CARD, MIKE (JSC-REMOTÉ)" <mcard@hq.nasa.gov>,
"White Richard W Jr Col (Det 12/ST)" <richard.white@kirtland.af.mil>,
"MCGRATH, STEPHEN F. (STEVE) (JSC-ZR1) (USAF)"
<stephen.f.mcgrath1@jsc.nasa.gov>
Subject: RE: Request for SOR image and USAF Maui MSSS images of Columbia
Date: Mon, 10 Feb 2003 08:42:11 -0600
X-Mailer: Internet Mail Service (5.5.2653.19)

Ivar,

Just a slight glitch to all of this. I have been directed by the folks at US Strategic Command and Air Force Space Command to forward ALL data to them for distribution and release. This is in conjunction with the DoD Columbia Investigation Support Team (DCIST). Here is the email excerpt that directs this:

Mr Hess - Per our discussion, I telephoned Col Roberts and asked for direction with regards to where you should send data. She reiterated her direction yesterday and directed me to inform you to send the data here. The DoD Columbia Investigation Support Team (DCIST) is the official collector of any data from DoD sources; it will release information as quickly as possible in assisting in the recovery of debris and will work closely with NASA for the analysis required of DoD data for the on-going investigation. There is no effort to withhold or slow down the release of information, but we have quick access to expert analysis that might reveal crucial information from the data itself, or can be effectively merged with other DoD data to produce something of use, so we need to get the data here. In addition, it is important to observe proper management of any classified data.

Should you be contacted by DoD agencies that feel they have relevant information, data, or analysis, please direct them to the DCIST. The DCIST includes Maj Gen Hamel, Col Roberts, Lt Col Cindy Visel (USSTRATCOM-West, Maj Paul Pease (USSTRATCOM-West, Maj Eric Olson (HQ AFSPC, some folks at Vandenberg AFB, and myself. I have given you the phone numbers of those here in Colorado Springs since the official collection and storage will be here. Also, if you have questions or need to direct someone to the DCIST, these numbers may expedite the process.

You may wish to contact Mr Bob Fugate at the SOR directly. He can be reached at

It is my understanding the Maui data have been sent directly to NASA's ftp website. The POC for those images is Lt Col Jeff McCann, who can be reached at

David C. Hess
David C. Hess, DAF
Director, DoD Human Space Flight Payloads
DoD Space Test Program
email: david.c.hess1@jsc.nasa.gov
voice: 281.483.3498
fax: 281.483.4651

-----Original Message-----

From: .
Sent: Monday, February 10, 2003 8:31 AM
To: HESS, DAVID C. (DAVE) (JSC-ZR) (NASA)
Cc: CARD, MIKE (JSC-REMOTE)
Subject: Request for SOR image and USAF Maui MSSS images of Columbia

David,

Hi; thanks for your call to my office on Friday, 2/7, regarding the SOR image of Columbia during reentry. We would appreciate your forwarding the image back to my

Mike Card/NASA HQ (202-358-4481) has authorized our receipt of that image to support NASA's investigation. We did similar work during the Challenger accident investigation and our analysis (NPIC at the time) was used then in an appendix to the Rogers Commission report.

I understand that additional images may have also been taken by the Air Force' during Columbia's mission and we would very much appreciate being forwarded those images as well.

Thanks for your help; it's appreciated.

Regards,

James Lloyd, 11:08 AM 2/4/2003, Fwd: SOR image of Columbia

To: James Lloyd <jlloyd@hq.nasa.gov>
From: Michael Card <mcard@hq.nasa.gov>
Subject: Fwd: SOR image of Columbia
Cc:
Bcc:
Attached: C:\Documents and Settings\mcard\My Documents\Data\attach\Columbia65712.pdf;

User-Agent: Microsoft-Entourage/10.1.0.2006
Date: Mon, 03 Feb 2003 17:09:52 -0700
Subject: SOR image of Columbia
X-Sybari-Space: 00000000 00000000 00000000 00000000
From: Bob Fugate <bob.fugate@kirtland.af.mil>
To: <mcard@hq.nasa.gov>

Sir,

It was suggested by LtC Jeff McCann at Maui that I send the attached photo of Columbia.
~~Please note that we have been directed not to release this to the public or news groups.~~
However, also note that we directed locally on Saturday 1 Feb 2003 to email the raw TIFF image (without notes) to the columbiainages@nasa.gov web site before higher authorities requested no public release.

Please confirm that you have received and are able to open the attached file.

Thank you.
Bob Fugate

Beveridge, Capt Brian, 11:12 AM 2/4/2003, Re: Data from Maui

To: "Beveridge, Capt Brian"
From: Michael Card <mcard@hq.nasa.gov>
Subject: Re: Data from Maui
Cc:
Bcc:
Attached:

Thanks Brian, got the files. Please call me when you get in, 202-358-4481. Have some questions. Thanks again. Mike

At 05:06 AM 2/4/2003, you wrote:

Mike,

My commander, Lt Col Jeff McCann, should have sent you some data this evening. I'm not sure if he told you that we are preparing a comprehensive data package of everything we collected on STS-107 in addition to the quick look he sent out tonight. We had worked on some of the data over the weekend and today, but we had several people doing several different things. We'd like to spend the next day or so pulling together the best data we can and packaging it so that it is useful to you all. We'll have folks post-processing data to pull out the highest resolution imagery, adding time stamps and other header information, etc. We'll also add information on the sensors and telescopes used to collect the data.

I also contacted our sister site, the _____) in Albuquerque, NM. Dr. Robert Fugate, the _____ chief scientist, said he would send you their data.

This task is our top priority. Please let me know if we can do anything else to help.

Bob Fugate, 11:45 AM 2/4/2003, Re: SOR image of Columbia

To: Bob Fugate <bob.fugate@kirtland.af.mil>
From: Michael Card <mcard@hq.nasa.gov>
Subject: Re: SOR image of Columbia
Cc:
Bcc:
Attached:

Thank you for the data, most interesting. It will be treated appropriately. Here at HQ we are interested in any available data. You can send to me and I will ensure proper distribution
Thanks for your help. Mike

whawes@hq.nasa.gov, 12:26 PM 2/4/2003, Fwd: Data from Maui

To: whawes@hq.nasa.gov
From: Michael Card <mcard@hq.nasa.gov>
Subject: Fwd: Data from Maui
Cc:
Bcc:
Attached:

Will forward 3 emails, also sent to Lee Briscoe, pictures in two of the three. mike

From: "Beveridge, Capt Brian"
To: "mcard@hq.nasa.gov" <mcard@hq.nasa.gov>
Cc: "McCann, Lt Col Jeffrey"
Subject: Data from Maui
Date: Tue, 4 Feb 2003 00:06:48 -1000
X-Mailer: Internet Mail Service (5.5.2653.19)

Mike,

My commander, Lt Col Jeff McCann, should have sent you some data this evening. I'm not sure if he told you that we are preparing a comprehensive data package of everything we collected on STS-107 in addition to the quick look he sent out tonight. We had worked on some of the data over the weekend and today, but we had several people doing several different things. We'd like to spend the next day or so pulling together the best data we can and packaging it so that it is useful to you all. We'll have folks post-processing data to pull out the highest resolution imagery, adding time stamps and other header information, etc. We'll also add information on the sensors and telescopes used to collect the data.

I also contacted our sister site, the _____ in Albuquerque, NM. Dr. Robert Fugate, _____ chief scientist, said he would send you their data.

This task is our top priority. Please let me know if we can do anything else to help.

To: whawes@hq.nasa.gov
From: Michael Card <mcard@hq.nasa.gov>
Subject: Fwd: STS-107 images from Air Force Maui Optical & Supercomputing (AMOS) Site
Cc:
Bcc:
Attached: C:\Documents and Settings\mcard\My Documents\Data\attach\STS-107 images from AMOS(28Jan03).ppt;

From: "McCann, Lt Col Jeffrey"
To: "mcard@hq.nasa.gov" <mcard@hq.nasa.gov>,
"David Hess(NASA) (E-mail)" <david.c.hess@nasa.gov>,
"nasamitimages@ems.jsc.nasa.gov" <nasamitimages@ems.jsc.nasa.gov>
Cc: "Good (E-mail)" <earl.good@kirtland.af.mil>,
"Baker (E-mail)"
<william.baker@kirtland.af.mil>,
"Col Stephen (E-mail)"
<mark.stephen@kirtland.af.mil>,
"Col Rich White (E-mail)"
<Richard.White@kirtland.af.mil>,
"Col DeLorenzo (E-mail)"
<Michael.DeLorenzo2@wpafb.af.mil>,
"MajGen Paul Nielsen (E-mail)"
<Paul.Nielsen@wpafb.af.mil>,
"Bob Fugate (E-mail)"
<robert.fugate@kirtland.af.mil>,
"Skarupa, Valerie"
<valerie.skarupa@kirtland.af.mil>
Subject: STS-107 images from Air Force Maui Optical & Supercomputing (AMOS) Site
Date: Mon, 3 Feb 2003 18:28:44 -1000
X-Mailer: Internet Mail Service (5.5.2653.19)

All...

Attached is a partial set of images (still frames) collected on 28 Jan 03 from the Air Force Research Laboratory's AMOS site on Maui. Important facts regarding the images:

- This is a partial set of the total data collected by AMOS
- For research purposes, we routinely image the shuttle on a non-interference basis with our other operational and research requirements
- These images were post-processed by an algorithm called multi-frame blind deconvolution...then compressed. The raw and uncompressed data is available upon request.
- Movies (i.e., the total set of frames for each of the 4 passes collected) will be complete by COB Tuesday (Hawaii time). I will send them as they

become available.

<<STS-107 images from AMOS(28Jan03).ppt>>

Please advise if you need additional information or clarification. We have a substantial set of data for your use in a variety of formats.

Regards,

Jeffrey McCann, Lt Col, USAF

whawes@hq.nasa.gov, 12:27 PM 2/4/2003, Fwd: SOR image of Columbia

To: whawes@hq.nasa.gov
From: Michael Card <mcard@hq.nasa.gov>
Subject: Fwd: SOR image of Columbia
Cc:
Bcc:
Attached: C:\Documents and Settings\mcard\My Documents\Data\attach\Columbia65712.pdf;

This is the most interesting. mike
User-Agent: Microsoft-Entourage/10.1.0.2006
Date: Mon, 03 Feb 2003 17:09:52 -0700
Subject: SOR image of Columbia
X-Sybari-Space: 00000000 00000000 00000000 00000000
From: Bob Fugate <bob.fugate@kirtland.af.mil>
To: <mcard@hq.nasa.gov>

Sir,
It was suggested by LtC Jeff McCann at Maui that I send the attached photo of Columbia.
Please note that we have been directed not to release this to the public or news groups.
However, also note that we directed locally on Saturday 1 Feb 2003 to email the raw TIFF
image (without notes) to the columbiainages@nasa.gov web site before higher authorities
requested no public release.
Please confirm that you have received and are able to open the attached file.
Thank you.
Bob Fugate

Mike Hawes, 03:05 PM 2/4/2003, Re: Fwd: Data from Maui

To: Mike Hawes <whawes@hq.nasa.gov>
From: Michael Card <mcard@hq.nasa.gov>
Subject: Re: Fwd: Data from Maui
Cc:
Bcc:
Attached:

Lee passed the data to Paul Hill /Kelly Berk for use by a team I believe recently formed. He told me they would call me. To best of my knowledge this is first Maui data Lee has received. He said not to pass it to him but set up the relationship with Paul/Kelly. When the complete data set is ready he would like it Fedexed somewhere TBD. I will try to get data set here also. Bryan wants the data sent to the MRT. Data came to me because I met the AF Captain who is Maui technical director in Florida two weeks ago. Mike

At 12:43 PM 2/4/2003, you wrote:

I'll contact Lee about how he is handling this. We need to figure how to characterize the AF organization and how we got the data. Hasn't Lee already gotten some of the Maui stuff?
Mike

--
W. Michael Hawes
Special Assistant to the Associate Administrator
Office of Space Flight
NASA Headquarters

HILL, PAUL S. (JSC-DA8) (NASA), 04:11 PM 2/13/2003, Friday tagup and things

From: "HILL, PAUL S. (JSC-DA8) (NASA)" <paul.s.hill@nasa.gov>
To: DL ESAT <DL-ESAT@ems.jsc.nasa.gov>,
"MARRS, CATHERINE M. (JSC-DA82) (BAS)" <clatherine.m.marrs1@jsc.nasa.gov>
Subject: Friday tagup and things
Date: Thu, 13 Feb 2003 14:11:17 -0600
X-Mailer: Internet Mail Service (5.5.2653.19)

Ms. Koerner reminds me that tomorrow is Valentine's Day and Friday. Thus we will tag up tomorrow at 0800 as usual. Starting Tuesday we will tag up at 1600 in the action center.

As for Saturday and the Monday holiday, if you're working something hot that is crucial to us finding video, analyzing relative motion, etc for key holes in the views or for significant debris events, consider putting in some time Saturday or Monday morning. Don't work Sunday. Everything else can wait until Tuesday. Overall, bias your decision on getting some rest and having a life.

This has been a long two weeks. Every one of you is doing great work at an impressive rate. Be very proud of what you've done. We all will need to ratchet back a little more for the long haul though. That's o.k. What you've done already is Herculean, and we need you to still be doing good work in a month, and 6 months after that...

PSH

Dee Dee -

Will you please confirm we can reserve the action center M - F at 4PM or get us another room that will hold 20?

From: "Dr. J. Steven Newman" <snewman@hq.nasa.gov>
To: <dvecellio@arescorporation.com>, <snewman@hq.nasa.gov>, <boconnor@hq.nasa.gov>, <prutledg@hq.nasa.gov>, <jlloyd@hq.nasa.gov>, <pnapala@hq.nasa.gov>, <wfrazier@hq.nasa.gov>, <fchandle@hq.nasa.gov>, <Tom.Whitmeyer@hq.nasa.gov>, <mkowales@hq.nasa.gov>, <wbihner@mail.hq.nasa.gov>, <jlemke@hq.nasa.gov>, <Laura.W.Doty@nasa.gov>, <Humberto.T.Garrido@nasa.gov>, <Amanda.H.Goodson@nasa.gov>, <Michael.D.Smiles@nasa.gov>, <yolanda.y.marshall@nasa.gov>, <mark.d.erminger@nasa.gov>, <A.H.Phillips@larc.nasa.gov>, <Wentworth.O.Denoon@nasa.gov>, <jmullin@hq.nasa.gov>, <alex.c.adams@nasa.gov>, <Clifton.T.Arnold@nasa.gov>, <matthew.bettridge@fema.gov>, <Steven.Brisbin-1@ksc.nasa.gov>, <david.m.browne1@jsc.nasa.gov>, <mcard@mail.hq.nasa.gov>, <jcastell@mail.hq.nasa.gov>, <ron.castleman@fema.gov>, <Nick.A.Cenci@nasa.gov>, <Lawrence.R.Davis@nasa.gov>, <John.Dollberg-1@ksc.nasa.gov>, <james.duffer@fema.gov>, <moises.dugan@fema.gov>, <mgaier@mail.hq.nasa.gov>, <Mark.Gordon-1@ksc.nasa.gov>, <dominic.l.gorie1@jsc.nasa.gov>, <mgreenfi@mail.hq.nasa.gov>, <Michael.Haddad-1@ksc.nasa.gov>, <wharkins@mail.hq.nasa.gov>, <william.j.harris1@jsc.nasa.gov>, <William.Higgins-1@ksc.nasa.gov>, <malcolm.j.himel1@jsc.nasa.gov>, <jerry.b.holsomback1@jsc.nasa.gov>, <Sharolee.Huet-1@ksc.nasa.gov>, <Bruce.Jansen-1@ksc.nasa.gov>, <m.s.johnson@nasa.gov>, <Wayne.Kee-1@ksc.nasa.gov>, <mlandano@mailhost4.jpl.nasa.gov>, <Roger.Langevin-1@ksc.nasa.gov>, <Edmundo.Leborn-1@ksc.nasa.gov>, <jlyver@mail.hq.nasa.gov>, <roy.w.malone@nasa.gov>, <pmartin@mail.hq.nasa.gov>, <daniel.j.mullane@nasa.gov>, <rpatrica@mail.hq.nasa.gov>, <pphillip@mail.hq.nasa.gov>, <eraynor@mail.hq.nasa.gov>, <scott.a.sey1@jsc.nasa.gov>, <lsirota@hq.nasa.gov>, <mstamate@mail.hq.nasa.gov>, <Michael.Stevens-1@ksc.nasa.gov>, <Burton.Summerfield-1@ksc.nasa.gov>, <david.f.thelen1@jsc.nasa.gov>, <Randall.Tilley-1@ksc.nasa.gov>, <swander@hq.nasa.gov>, <Vernon.W.Wessel@grc.nasa.gov>, <gwhite1@mail.hq.nasa.gov>, <david.w.whittle1@jsc.nasa.gov>, <gary.w.johnson@nasa.gov>, <Oscar.Toledo-1@nasa.gov>, <joan.w.broadfoot@nasa.gov>, <deborah.s.bazan1@jsc.nasa.gov>, <Brenda.P.Willis@nasa.gov>, <john.h.casper1@jsc.nasa.gov>, <david.cazes1@jsc.nasa.gov>, <Joseph.C.Cianciola@nasa.gov>, <frank.l.culbertson1@jsc.nasa.gov>, <Angela.V.Daniels@msfc.nasa.gov>, <Diana.Heberling@ssc.nasa.gov>, <marla.g.duhon1@jsc.nasa.gov>, <keith.w.dyer1@jsc.nasa.gov>, <richard.d.gardner1@jsc.nasa.gov>, <whill@mail.hq.nasa.gov>, <cheryl.a.inman1@jsc.nasa.gov>, <Leigh.Martin@msfc.nasa.gov>, <hugo.e.martinez1@jsc.nasa.gov>, <desiree.c.patterson1@jsc.nasa.gov>, <Robert.Nagy-1@ksc.nasa.gov>, <cyndi.l.skains1@jsc.nasa.gov>, <Stephen.Ernest-1@ksc.nasa.gov>, <elizabeth.torres1@jsc.nasa.gov>, <Vicki.W.Rorex@msfc.nasa.gov>, <angelia.d.walker@nasa.gov>, <rosalyn.m.patrick@nasa.gov>, <randall.h.tucker@nasa.gov>

Dr. J. Steven Newman, 11:38 AM 2/4/2003, 107-Team

<foster.e.anthony@nasa.gov>, <mike.kennedy@msfc.nasa.gov>,
<allan.k.layne@nasa.gov>, <lwalton@arescorporation.com>,
<rmoyer@mail.hq.nasa.gov>, <ajohnson@mail.hq.nasa.gov>,
<Donald.J.Campbell@grc.nasa.gov>, <prichard@mail.hq.nasa.gov>,
<Thomas.W.Hartline@nasa.gov>

X-your-intranet: <http://107team.intranets.com>

X-Intranets-helpdesk: <mailto:help@intranets.com>

Date: Tue, 04 Feb 2003 15:38:02 GMT

X-mailer: AspMail 4.0 4.03 (SMT412E7EF)

Subject: 107-Team

X-OriginalArrivalTime: 04 Feb 2003 15:38:09.0679 (UTC) FILETIME=[6B7A21F0:01C2CC63]

107-Team

Reminder: This functionality is operating on a third party server operating under an approved, NASA NPG 2810 compliant IT security plan.

As discussed in our telecons the site operates under a set of special ground rules: No ITAR Data, No Export Controlled Data, No Competition Sensitive Data. We can add to that No Investigation Sensitive Data.

Please call if you have any questions (202-358-1408).

Regards/Steve

The site will continue to support NASA SMA community in communication (members & contacts) and public domain information / document / link exchange to support NASA SMA 107-activity.

We are working with GRC and NASA IT community to implement an Enhanced Security functionality that will allow sharing of sensitive information (data covered under ITAR/Export Control). More on this capability in the near future.

Dale Moore, 03:38 PM 2/4/2003, Accident Investigation Cost Accounting

X-Authentication-Warning: spinoza.public.hq.nasa.gov: majordom set sender to owner-code-q using -f

X-Sender: dmoore@mail.hq.nasa.gov

X-Mailer: QUALCOMM Windows Eudora Version 4.3.2

Date: Tue, 04 Feb 2003 14:38:07 -0500

To: code-q@lists.hq.nasa.gov

From: Dale Moore <dmoore@hq.nasa.gov>

Subject: Accident Investigation Cost Accounting

Sender: owner-code-q@lists.hq.nasa.gov

This is the current guidance for tracking investigation costs. There is no way to track labor costs at HQ, but Codes C & B are working on a separate code to use for travel expenses. In the meantime if you are traveling as part of the investigation, please make a note in the purpose section of the travel order that you are traveling to support the Columbia accident investigation.

NAKAMURA, STACEY T. (JSC-NS) (NASA), 11:34 AM 2/5/2003 -0600, RE: updated version of the g

From: "NAKAMURA, STACEY T. (JSC-NS)-(NASA)" <stacey.t.nakamura@nasa.gov>
To: "Camomilli-1, Guy" <Guy.S.Camomilli@nasa.gov>
Cc: "Angotti, Cathy" <cangotti@hq.nasa.gov>,
"Mullin, Jonathan"
<jmullin@mail.hq.nasa.gov>
Subject: RE: updated version of the general guidelines for field team PPE
Date: Wed, 5 Feb 2003 11:34:12 -0600
X-Mailer: Internet Mail Service (5.5.2653.19)

My error - i'm tired....

we don't know who authorized it. we all can review the process after things settle down. the important thing will be to get the additional info / pictures from WSTF.

thx,

-
Stacey T. Nakamura
Phone: (281) 483-4345
Fax: (281) 483-6275

-----Original Message-----

From: Camomilli-1, Guy [mailto:Guy.S.Camomilli@nasa.gov]
Sent: Wednesday, February 05, 2003 10:37 AM
To: NAKAMURA, STACEY T. (JSC-NS) (NASA)
Cc: Angotti, Cathy; Mullin, Jonathan
Subject: FW: updated version of the general guidelines for field team PPE
Importance: High

Stacey,

If I understood Jon correctly, it has been implied that a one-page document entitled "Guidelines for the Collection of Space Shuttle Material by Public Service Personnel" originated with our OCHMO tenant office at KSC. This is not true. The information that we worked on and provided to Wayne Kee, and the HCAT is attached and provided as text below.

Hope this helps.

Guy Camomilli, MPH, CSP
Senior Environmental Health Officer,
OCHMO Tenant Office
guy.camomilli-1@ksc.nasa.gov
Voice (321) 867-1417

Fax (321) 867-8870

> -----Original Message-----

> From: Camomilli-1, Guy

> Sent: Tuesday, February 04, 2003 3:21 PM

> To: Angotti, Cathy; 'Barry Hill (E-mail)'; 'Loyd, David'; 'Williams, Rich'; Barry-1, William; Geyer-1, Bart; 'hcat@hq.nasa.gov'; Keppta, Sean; Mullin, Jonathan; Lloyd, James

> Cc: Cardinale-1, Michael; Creech-1, Joanne; Taffer-1, James

> Subject: FW: updated version of the general guidelines for field team PPE

> Importance: High

>

> All,

>

> Jim Taffer, Joanne Creech, and Mike Cardinale have provided excellent guidance for debris collection PPE. Please take a look at the attached file. The information is also provided as text (in the event that you're unable to open the file).

>

> Please remember that these are guidelines that are to be used within the context of specific field conditions, and that the industrial hygienist or environmental health field representative must use their professional judgment in implementing them.

>

> Also please remember that is more than one right way to do this. There are other organizations with other procedures that are collecting debris; and that they're experienced with the associated hazards. Their procedures may be slightly different from these; but as good in controlling the hazards.

>

> Thank you.

>

>

2003

>

4 February

> GENERAL GUIDELINES FOR PERSONNEL HEALTH PROTECTION FOR FIELD TEAMS DURING RECOVERY OF SHUTTLE DEBRIS

>

> The following recommendations are provided for personnel health protection for field teams assigned to pick up debris / materials associated with the Columbia accident. These protection guidelines are for activities including investigation, recovery, and cleanup operations. Additional guidelines may be provided for other downstream activities such as working in Shuttle debris staging areas and/or handling cataloged items.

>

1:18 AM 2/19/2003, Fwd: FW: Image Data

To:
From: Michael Card <mcard@hq.nasa.gov>
Subject: Fwd: FW: Image Data
Cc:
Bcc:
Attached: C:\Documents and Settings\mcard\My Documents\Data\attach\65712_256.txt;C:\Documents and Settings\mcard\My Documents\Data\attach\pow3.jpg;

var, this might be of interest. Mike

From: "HILL, PAUL S. (JSC-DA8) (NASA)" <paul.s.hill@nasa.gov>
To: DL ESAT <DL-ESAT@ems.jsc.nasa.gov>
Subject: FW: Image Data
Date: Wed, 19 Feb 2003 07:06:02 -0600
X-Mailer: Internet Mail Service (5.5.2653.19)

Greg Byrne -

I meant to send you this yesterday. This is the electronic version of the hardcopy I handed you.

Everyone else -

Don't misinterpret the picture. It isn't IR, it's simply a display of the raw pixel value. Consider this FYI, but don't do anything with it. Doug White has a team that is working this.

PSH

-----Original Message-----

From: Bob Fugate [<mailto:bob.fugate@kirtland.af.mil>]
Sent: Tuesday, February 18, 2003 8:37 AM
To: HILL, PAUL S. (JSC-DA8) (NASA); White, Doug; Roberts Katherine E Col USSTRATWEST/J3V; Michael.Caylor@wpafb.af.mil; Earl Good; Stephen Mark D Col AFRL/DE; Baker William L Civ AFRL/DE; Fugate Robert Q Civ AFRL/DES; Robert Johnson; Cleis Richard A Contr AFRL/DES
Subject: Image Data

17 February 2003

Paul and Doug,

I have attached two files, a JPEG image made by displaying the square root of the raw data (the color bar shows corresponding actual value) from the file 6.57.12.tif, and a text file with the raw 16 bit pixel values for a 256x256 region selected from the entire image. I have verified that all other pixels in the image have a value of zero.

The JPEG image clearly shows an illuminated pixel behind the longer part of the plume, suggesting glowing material shed from the orbiter (or maybe structure in the plume?). I have tried to set the saturated pixels to white in this rendering, to get some idea of the outline of the orbiter. I am still working on algorithms to deconvolve our best estimate of the point spread function from this image (that may make the edges crisper), but this is proving difficult since

the majority of the pixels are saturated, generating lots of artifacts.

There is, however, a group at the University of Arizona that has some specialized code that may be able to restore this image to some extent. Paul, Col Roberts described a process that (as I understand it) requires you to ask her for assistance from Air Force related groups and contractors-like the Arizona image processing group. Actually, I would guess they would be willing to do this on their own nickel (or dime) and in that case it wouldn't hurt to let them have a go at this. There is another group at ERIM, in Michigan, who is also very good and whom we have worked with in the past. Please let us know how to proceed.

Is there anyway we could get an estimate from telemetry of what the orientation of the orbiter was at the time (current estimate is 13:57:14) this image was made? We would like to try to project a 3D orbiter model onto the outline in the image.

Bob Fugate

mike Hawes, 07:15 PM 2/6/2003, Fwd: STS-107 observations at the Air Force Maui Optical & Super

To: mike Hawes <whawes@hq.nasa.gov>
From: Michael Card <mcard@hq.nasa.gov>
Subject: Fwd: STS-107 observations at the Air Force Maui Optical & Supercomputing (AMOS) site (part 1 of 5)
Cc:
Bcc:
Attached: C:\Documents and Settings\mcard\My Documents\Data\attach\AMOS sensor & processing background.ppt;C:\Documents and Settings\mcard\My Documents\Data\attach\AMOS_STS-107 Data Index.doc;

FYI, mikr

From: "McCann, Lt Col Jeffrey" <jeffrey.mccann@maui.afmc.af.mil>
To: "david.c.hess1@jsc.nasa.gov" <david.c.hess1@jsc.nasa.gov>
Cc: "John Haynes(SAF/AQR) (E-mail)" <HaynesJ@pentagon.af.mil>, "Baker (E-mail)" <william.baker@kirtland.af.mil>, "Col Stephen (E-mail)" <mark.stephen@kirtland.af.mil>, "Bob Fugate (E-mail)" <robert.fugate@kirtland.af.mil>, "Good (E-mail)" <earl.good@kirtland.af.mil>, "Col Rich White (E-mail)" <Richard.White@kirtland.af.mil>, "Mike Card (HQ NASA) (E-mail)" <mcard@hq.nasa.gov>
Subject: STS-107 observations at the Air Force Maui Optical & Supercomputing (AMOS) site (part 1 of 5)
Date: Thu, 6 Feb 2003 12:34:19 -1000
X-Mailer: Internet Mail Service (5.5.2653.19)

Sirs,

I will Fed-Ex a CD with all the data AMOS collected (~~it's all unclassified~~) to Mr. Hess. It takes 2 days for Fed-Ex to deliver it from Maui. I will notify you when the CD departs my office. The CD will include (for each of the 4 passes collected):

- Movies (MPEG and AVI format)
- Individual imagery frames (JPEG and TIFF format)
- Summary of data collected (Word document)
- Background charts on sensors used to collect data

This e-mail plus 4 others I will send promptly (note the "part 1 of 5" in the subject line) include background data and the MPEG movie files of the four passes in which AMOS collected imagery.

Is an FTP site available to your office?

As a reminder, the four passes in which we collected imagery are as follows:

1. 17 Jan 03 (0406 zulu): Mount/sensor: 1.6m telescope using daylight acquisition sensor. The visible imagery is post-processed using an algorithm called multi-frame blind deconvolution (MFBD) to clean-up the images.
2. 22 Jan 03 (1706 zulu): Mount/sensor: 1.6m telescope using daylight acquisition sensor. The visible imagery is post-processed using an algorithm called multi-frame blind deconvolution (MFBD) to clean-up the images.
3. 28 Jan 03 (1351 zulu): Long Wave InfraRed (LWIR) imagery. I sent the "raw" data (in a compressed file format) to you previously. Attached in "part 3 of 4" in this series of e-mails is the post-processed imagery (using MFBD).
4. 28 Jan 03 (2148 zulu): Mount/sensor: 1.6m telescope using daylight acquisition sensor. The visible imagery is post-processed using an algorithm called multi-frame blind deconvolution (MFBD) to clean-up the images.

Regards,
Jeff

Jeffrey McCann, Lt Col, USAF
Commander, AF Maui Optical & Supercomputing Site
AFRL/DEBI

jeffrey.mccann@maui.afmc.af.mil

To: Svenl@nima.mil, bburns@hq.nasa.gov
From: Michael Card <mcard@hq.nasa.gov>
Subject: Fwd: RE: AMOS data sent via Fed-Ex to NASA
Cc:
Bcc:
Attached:

Following message is self explanatory. Mike

From: Stephen Mark D Col AFRL/DE <Mark.Stephen@kirtland.af.mil>
To: "HESS, DAVID C. (DAVE) (JSC-ZR) (NASA)" <david.c.hess@nasa.gov>
Cc: "CARD, MIKE (JSC-REMOTE)" <mcard@hq.nasa.gov>,
Good Earl Civ AFRL/DE
<earl.good@kirtland.af.mil>,
Bednarz Eugene J Civ AFRL/DEFP
<eugene.bednarz@kirtland.af.mil>,
Baker William L Civ AFRL/DE
<william.baker@kirtland.af.mil>,
Fugate Robert Q Civ AFRL/DES
<Bob.Fugate@kirtland.af.mil>,
Giuliano Concetto R Civ AFRL/DEB
<concetto.giuliano@kirtland.af.mil>,
Dinwiddie David L Civ AFRL/DEB
<david.dinwiddie@kirtland.af.mil>,
Skarupa Valerie B Civ AFRL/DEBI
<Valerie.Skarupa@kirtland.af.mil>,
Kress John C Lt Col AFSPC/DOOM
<John.C.Kress@PETERSON.af.mil>,
"White Richard W Jr. Col SMC Det 12/ST"
<Richard.White@kirtland.af.mil>,
"McCann, Lt Col Jeffrey"
<jeffrey.mccann@maui.afmc.af.mil>,
Good Earl Civ AFRL/DE
<earl.good@kirtland.af.mil>

Subject: RE: AMOS data sent via Fed-Ex to NASA
Date: Mon, 10 Feb 2003 22:25:24 -0000
X-Mailer: Internet Mail Service (5.5.2653.19)

Mr. Hess,

We have orders directly from the Secretary of the Air Force to release data directly to NASA.
We are also providing copies of everything we have to STRATCOM.

Do you think NASA will want us to take higher quality pictures for future shuttle launches?
As you know, we can do much better than we did this time if NASA wants us to.

Mark

Friday (before I got this direction) and had I know it wasn't going out till today, I would have had it redirected. I'm starting to feel caught between several rocks and even sharper rocks (the "hard spot" went by the wayside a long time ago).

Salutin' and steppin' off smartly here!

David C. Hess
David C. Hess, DAF
Director, DoD Human Space Flight Payloads
DoD Space Test Program
NASA JSC Houston, TX
Voice: 281.483.3498
Fax: 281.483.4651

-----Original Message-----

From: White Richard W Jr. Col SMC Det 12/ST
[mailto:Richard.White@kirtland.af.mil]
Sent: Monday, February 10, 2003 3:13 PM
To: 'McCann, Lt Col Jeffrey'; HESS, DAVID C. (DAVE) (JSC-ZR) (NASA)
Cc: CARD, MIKE (JSC-REMOTE); Good Earl Civ AFRL/DE; Bednarz Eugene J Civ AFRL/DEFP; Baker William L Civ AFRL/DE; Fugate Robert Q Civ AFRL/DES; Stephen Mark D Col AFRL/DE; Giuliano Concetto R Civ AFRL/DEB; Dinwiddie David L Civ AFRL/DEB; Skarupa Valerie B Civ AFRL/DEBI
Subject: RE: AMOS data sent via Fed-Ex to NASA

Jeff,

Many thanks for this. In view of the fact that Eglin AFB radar tracked an object moving away from the Shuttle on 17 Jan, photos of Columbia taken before re-entry take on increased importance.

<http://www.cnn.com/2003/TECH/space/02/10/spri.colu.investigation/index.html>

Rich

Richard W. White Jr., Col, USAF
Director, DoD Space Test Program
SMC Det 12, Kirtland AFB, NM

-----Original Message-----

From: McCann, Lt Col Jeffrey [mailto:jeffrey.mccann@maui.afmc.af.mil]

Sent: Monday, February 10, 2003 1:42 PM
To: David Hess(NASA) (E-mail)
Cc: Mike Card (HQ NASA) (E-mail); Good (E-mail); Gene Bednarz (E-mail);
Baker (E-mail); Bob Fugate (E-mail); Col Rich White (E-mail); Col
Stephen (E-mail); Connie Giuliano (E-mail); Dinwiddie (E-mail); Skarupa,
Valerie
Subject: AMOS data sent via Fed-Ex to NASA

Dave,

A CD of the AMOS data was sent this morning...should arrive on Wednesday.
Below you will find the tracking number and link to the Fed-Ex site if you
should need it.

Attached to this e-mail is a file describing all AMOS data and status of
such.

On Friday afternoon (Hawaii time) we FTP'd two of the movies since they were
too large over normal e-mail...did you receive them?

Please let me know if you have any questions,
Jeff

Jeffrey McCann, Lt Col, USAF
Commander, AF Maui Optical & Supercomputing Site
AFRL/DEBI

jeffrey.mccann@maui.afmc.af.mil

-----Original Message-----

From: linda.martin@maui.afmc.af.mil
[mailto:linda.martin@maui.afmc.af.mil]
Sent: Monday, February 10, 2003 9:40 AM
To: jeffrey.mccann@maui.afmc.af.mil
Subject: FedEx shipment 792188638869

L. A. MARTIN of BOEING LTS, INC sent David Hess of NASA Johnson Space Center
a Priority Overnight FedEx Envelope.

This shipment is scheduled to be sent on 10FEB03.

The tracking number(s) are: 792188638869

To track this shipment online click on the following link:

[http://www.fedex.com/cgi-bin/tracking?tracknumbers=792188638869&action=track
&language=english&cntry_code=us](http://www.fedex.com/cgi-bin/tracking?tracknumbers=792188638869&action=track&language=english&cntry_code=us)

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https://www.fedex.com/cgi-bin/ship_it/interNetShip?us

Disclaimer

FedEx has not validated the authenticity of any email address.

Beveridge, Capt Brian, 06:06 AM 2/4/2003, Data from Maui

From: "Beveridge, Capt Brian" ·
To: "mcard@hq.nasa.gov" <mcard@hq.nasa.gov>
Cc: "McCann, Lt Col Jeffrey"
Subject: Data from Maui
Date: Tue, 4 Feb 2003 00:06:48 -1000
X-Mailer: Internet Mail Service (5.5.2653.19)

Mike,

My commander, Lt Col Jeff McCann, should have sent you some data this evening. I'm not sure if he told you that we are preparing a comprehensive data package of everything we collected on STS-107 in addition to the quick look he sent out tonight. We had worked on some of the data over the weekend and today, but we had several people doing several different things. We'd like to spend the next day or so pulling together the best data we can and packaging it so that it is useful to you all. We'll have folks post-processing data to pull out the highest resolution imagery, adding time stamps and other header information, etc. We'll also add information on the sensors and telescopes used to collect the data.

I also contacted our sister site, the Starfire Optical Range (SOR) in Albuquerque, NM. Dr. Robert Fugate, the SOR chief scientist, said he would send you their data.

This task is our top priority. Please let me know if we can do anything else to help.

v/r,
Brian

Capt Brian J. Beveridge

Stephen Mark D Col AFRL/DE, 06:25 PM 2/10/2003, RE: AMOS data sent via Fed-Ex to NASA

From: Stephen Mark D Col AFRL/DE <Mark.Stephen@kirtland.af.mil>
To: "HESS, DAVID C. (DAVE) (JSC-ZR) (NASA)" <david.c.hess@nasa.gov>
Cc: "CARD, MIKE (JSC-REMOTE)" <mcard@hq.nasa.gov>,
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<earl.good@kirtland.af.mil>,
Bednarz Eugene J Civ AFRL/DEFP
<eugene.bednarz@kirtland.af.mil>,
Baker William L Civ AFRL/DE
<william.baker@kirtland.af.mil>,
Fugate Robert Q Civ AFRL/DES
<Bob.Fugate@kirtland.af.mil>,
Giuliano Concetto R Civ AFRL/DEB
<concetto.giuliano@kirtland.af.mil>,
Dinwiddie David L Civ AFRL/DEB
<david.dinwiddie@kirtland.af.mil>,
Skarupa Valerie B Civ AFRL/DEBI
<Valerie.Skarupa@kirtland.af.mil>,
Kress John C Lt Col AFSPC/DOOM
<John.C.Kress@PETERSON.af.mil>,
"White Richard W Jr. Col SMC
<Richard.White@kirtland.af.mil>,
"McCann, Lt Col Jeffrey"
<jeffrey.mccann@maui.afmc.af.mil>,
Good Earl Civ
<earl.good@kirtland.af.mil>

Subject: RE: AMOS data sent via Fed-Ex to NASA
Date: Mon, 10 Feb 2003 22:25:24 -0000
X-Mailer: Internet Mail Service (5.5.2653.19)

Mr. Hess,

We have orders directly from the Secretary of the Air Force to release data directly to NASA.
We are also providing copies of everything we have to STRATCOM.

Do you think NASA will want us to take higher quality pictures for future shuttle launches?
As you know, we can do much better than we did this time if NASA wants us to.

Mark

Mark D. Stephen, Colonel, USAF
Deputy Director, Directed Energy Directorate
-----Original Message-----

From: HESS, DAVID C. (DAVE) (JSC-ZR) (NASA) [mailto:david.c.hess@nasa.gov]
Sent: Monday, February 10, 2003 3:19 PM
To: 'White Richard W Jr. Col SMC Det 12/ST'; 'McCann, Lt Col Jeffrey'
Cc: CARD, MIKE (JSC-REMOTE); Good Earl Civ AFRL/DE; Bednarz Eugene J Civ AFRL/DEFP; Baker William L Civ AFRL/DE; Fugate Robert Q Civ AFRL/DES; Stephen Mark D Col AFRL/DE; Giuliano

Concetto R Civ AFRL/DEB; Dinwiddie David L Civ AFRL/DEB; Skarupa Valerie B Civ AFRL/DEBI; Kress John C Lt Col AFSPC/DOOM (E-mail)

Subject: RE: AMOS data sent via Fed-Ex to NASA

Importance: High

Gentlemen,

I have been directed by the folks at US Strategic Command and Air Force Space Command (email from Lt Col John Kress, AFSPC/DOO excerpted below) to forward ALL data to them for distribution and release. This is in conjunction with the DoD Columbia Investigation Support Team (DCIST). Here is the email excerpt that directs this:

Mr Hess - Per our discussion, I telephoned Col Roberts and asked for direction with regards to where you should send data. She reiterated her direction yesterday and directed me to inform you to send the data here. The DoD Columbia Investigation Support Team (DCIST) is the official collector of any data from DoD sources; it will release information as quickly as possible in assisting in the recovery of debris and will work closely with NASA for the analysis required of DoD data for the on-going investigation. There is no effort to withhold or slow down the release of information, but we have quick access to expert analysis that might reveal crucial information from the data itself, or can be effectively merged with other DoD data to produce something of use, so we need to get the data here. In addition, it is important to observe proper management of any classified data.

Should you be contacted by DoD agencies that feel they have relevant information, data, or analysis, please direct them to the DCIST. The DCIST includes Maj Gen Hamel, Col Roberts, Lt Col Cindy Visel (USSTRATCOM-West, Maj Paul Pease (USSTRATCOM-West, Maj Eric Olson (HQ AFSPC, some folks at Vandenberg AFB, and myself I have given you the phone numbers of those here in Colo Sprgs since the official collection and storage will be here. Also, if you have questions or need to direct someone to the DCIST, these numbers may expedite the process.

Based on this hardcore direction I am obligated, until directed otherwise, to forward the AMOS data up to them at AFSPC so they can review and determine where it should go from there. If this direction should change before I get the FedEx on Wednesday, then naturally I will get the data to the right folks here at JSC.

For Jeff McCann: Jeff, I noticed the FTP AMOS data showed up on the logs briefed to Mr Dittmore, so obviously they got to the folks here at JSC

I truly apologize if this causes any delays. I had thought the Maui data was sent last Friday (before I got this direction) and had I know it wasn't going out till today, I would have had it redirected. I'm starting to feel caught between several rocks and even sharper rocks (the "hard spot" went by the wayside a long time ago).

Salutin' and steppin' off smartly here!

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David C. Hess, DAF
Director, DoD Human Space Flight Payloads
DoD Space Test Program
NASA JSC Houston, TX
Voice: 281.483.3498
Fax: 281.483.4651

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Subject: RE: AMOS data sent via Fed-Ex to NASA

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object moving away from the Shuttle on 17 Jan, photos of Columbia taken
before re-entry take on increased importance.
<http://www.cnn.com/2003/TECH/space/02/10/spri.colu.investigation/index.html>
Rich

Richard W. White Jr., Col, USAF
Director, DoD Space Test Program
SMC Det 12, Kirtland AFB, NM

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Cc: Mike Card (HQ NASA) (E-mail); Good (E-mail); Gene Bednarz (E-mail);
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Subject: AMOS data sent via Fed-Ex to NASA

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Jeff

Jeffrey McCann, Lt Col, USAF
Commander, AF Maui Optical & Supercomputing Site
AFRL/DEBI

jeffrey.mccann@maui.afmc.af.mil

—Original Message—

From: linda.martin@maui.afmc.af.mil
[mailto:linda.martin@maui.afmc.af.mil]
Sent: Monday, February 10, 2003 9:40 AM
To: jeffrey.mccann@maui.afmc.af.mil
Subject: FedEx shipment 792188638869

L. A. MARTIN of BOEING LTS, INC sent David Hess of NASA Johnson Space Center a Priority Overnight FedEx Envelope.

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To track this shipment online click on the following link:
http://www.fedex.com/cgi-bin/tracking?tracknumbers=792188638869&action=track&language=english&cntry_code=us

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Stephen Mark D Col AFRL/DE, 06:25 PM 2/10/2003, RE: AMOS data sent via Fed-Ex to NASA

Disclaimer

FedEx has not validated the authenticity of any email address.

From: "White Richard W Jr. Col SMC Det 12/ST"
<Richard.White@kirtland.af.mil>
To: "McCann, Lt Col Jeffrey" <jeffrey.mccann@maui.afmc.af.mil>,
"David Hess(NASA) (E-mail)" <david.c.hess@nasa.gov>
Cc: "Mike Card (HQ NASA) (E-mail)" <mcard@hq.nasa.gov>,
Good Earl Civ AFRL/DE <earl.good@kirtland.af.mil>,
Bednarz Eugene J Civ AFRL/DEFP <eugene.bednarz@kirtland.af.mil>,
Baker William L Civ AFRL/DE <william.baker@kirtland.af.mil>,
Fugate Robert Q Civ AFRL/DES <Bob.Fugate@kirtland.af.mil>,
Stephen Mark D Col AFRL/DE <Mark.Stephen@kirtland.af.mil>,
Giuliano Concetto R Civ AFRL/DEB <concetto.giuliano@kirtland.af.mil>,
Dinwiddie David L Civ AFRL/DEB <david.dinwiddie@kirtland.af.mil>,
Skarupa Valerie B Civ AFRL/DEBI <Valerie.Skarupa@kirtland.af.mil>
Subject: RE: AMOS data sent via Fed-Ex to NASA
Date: Mon, 10 Feb 2003 21:12:47 -0000
X-Mailer: Internet Mail Service (5.5.2653.19)

Jeff,

Many thanks for this. In view of the fact that Eglin AFB radar tracked an object moving away from the Shuttle on 17 Jan, photos of Columbia taken before re-entry take on increased importance.

<http://www.cnn.com/2003/TECH/space/02/10/spri.colu.investigation/index.html>

Rich

Richard W. White Jr., Col, USAF
Director, DoD Space Test Program
SMC Det 12, Kirtland AFB, NM

-----Original Message-----

From: McCann, Lt Col Jeffrey [<mailto:jeffrey.mccann@maui.afmc.af.mil>]
Sent: Monday, February 10, 2003 1:42 PM
To: David Hess(NASA) (E-mail)
Cc: Mike Card (HQ NASA) (E-mail); Good (E-mail); Gene Bednarz (E-mail);
Baker (E-mail); Bob Fugate (E-mail); Col Rich White (E-mail); Col
Stephen (E-mail); Connie Giuliano (E-mail); Dinwiddie (E-mail); Skarupa,
Valerie
Subject: AMOS data sent via Fed-Ex to NASA

Dave,

A CD of the AMOS data was sent this morning...should arrive on Wednesday.
Below you will find the tracking number and link to the Fed-Ex site if you

should need it.

Attached to this e-mail is a file describing all AMOS data and status of such.

On Friday afternoon (Hawaii time) we FTP'd two of the movies since they were too large over normal e-mail...did you receive them?

Please let me know if you have any questions,
Jeff

Jeffrey McCann, Lt Col, USAF
Commander, AF Maui Optical & Supercomputing Site
AFRL/DEBI

jeffrey.mccann@maui.afmc.af.mil

-----Original Message-----

From: linda.martin@maui.afmc.af.mil
[mailto:linda.martin@maui.afmc.af.mil]
Sent: Monday, February 10, 2003 9:40 AM
To: jeffrey.mccann@maui.afmc.af.mil
Subject: FedEx shipment 792188638869

L. A. MARTIN of BOEING LTS, INC sent David Hess of NASA Johnson Space Center a Priority Overnight FedEx Envelope.

This shipment is scheduled to be sent on 10FEB03.

The tracking number(s) are: 792188638869

To track this shipment online click on the following link:
http://www.fedex.com/cgi-bin/tracking?tracknumbers=792188638869&action=track&language=english&cntry_code=us

FedEx Ship Manager at fedex.com is the world's first shipping application accessible via the internet. With FedEx Ship Manager, you no longer need to handwrite airbills or install additional software.

Register for FedEx Ship Manager and try the future of shipping today!
https://www.fedex.com/cgi-bin/ship_it/interNetShip?us

Disclaimer

FedEx has not validated the authenticity of any email address.

From: "McCann, Lt Col Jeffrey" <jeffrey.mccann@maui.afmc.af.mil>
To: "david.c.hess1@jsc.nasa.gov" <david.c.hess1@jsc.nasa.gov>
Cc: "John Haynes(SAF/AQR) (E-mail)" <HaynesJ@pentagon.af.mil>,
"Baker (E-mail)" <william.baker@kirtland.af.mil>,
"Col Stephen (E-mail)"
<mark.stephen@kirtland.af.mil>,
"Bob Fugate (E-mail)"
<robert.fugate@kirtland.af.mil>,
"Good (E-mail)"
<earl.good@kirtland.af.mil>,
"Col Rich White (E-mail)"
<Richard.White@kirtland.af.mil>,
"Mike Card (HQ NASA) (E-mail)"
<mcard@hq.nasa.gov>

Subject: STS-107 observations at the Air Force Maui Optical & Supercomputing (AMOS) site (part 1 of 5)

Date: Thu, 6 Feb 2003 12:34:19 -1000

X-Mailer: Internet Mail Service (5.5.2653.19)

Sirs,

I will Fed-Ex a CD with all the data AMOS collected (it's all unclassified) to Mr. Hess. It takes 2 days for Fed-Ex to deliver it from Maui. I will notify you when the CD departs my office. The CD will include (for each of the 4 passes collected):

- Movies (MPEG and AVI format)
- Individual imagery frames (JPEG and TIFF format)
- Summary of data collected (Word document)
- Background charts on sensors used to collect data

This e-mail plus 4 others I will send promptly (note the "part 1 of 5" in the subject line) include background data and the MPEG movie files of the four passes in which AMOS collected imagery.

Is an FTP site available to your office?

As a reminder, the four passes in which we collected imagery are as follows:

1. 17 Jan 03 (0406 zulu). Mount/sensor: 1.6m telescope using daylight acquisition sensor. The visible imagery is post-processed using an algorithm called multi-frame blind deconvolution (MFBD) to clean-up the images.

2. 22 Jan 03 (1706 zulu): Mount/sensor: 1.6m telescope using daylight acquisition sensor. The visible imagery is post-processed using an algorithm called multi-frame blind deconvolution (MFBD) to clean-up the images.


3. 28 Jan 03 (1351 zulu): Long Wave InfraRed (LWIR) imagery. I sent the "raw" data (in a compressed file format) to you previously. Attached in "part 3 of 4" in this series of e-mails is the post-processed imagery (using MFBD).

4. 28 Jan 03 (2148 zulu): Mount/sensor: 1.6m telescope using daylight acquisition sensor. The visible imagery is post-processed using an algorithm called called multi-frame blind deconvolution (MFBD) to clean-up the images.

Regards,
Jeff

Jeffrey McCann, Lt Col, USAF

 AMOS sensor & processing background.ppt

 AMOS STS-107 Data Index.doc

Air Force Maui Optical & Supercomputing (AMOS) Site

Index to STS-107 Columbia Data

	17 Jan 03 Visible Sensor	22 Jan 03 Visible Sensor	28 Jan 03 Visible Sensor	28 Jan 03 LWIR Sensor
Releasable Data				
Uncompressed, optimized movie with annotations				
Compressed, optimized movie with annotations				
Uncompressed Best Frames with annotations	in-work	in-work	in-work	in-work
Compressed Best Frames with annotations	in-work	in-work	in-work	in-work
Processed Data (Multi-Frame Blind Deconvolution (MFBD))				
All frames uncompressed with annotations				
All frames compressed with annotations				
All frames uncompressed				
Background Subtraction for LWIR data				
All frames uncompressed with annotations				
All frames compressed with annotations				
All frames uncompressed				
Raw Data				
Raw Sensor Imagery Files	in-work		in-work	
Raw Subset of Frames Used for MFBD				
All Calibration Files	in-work		in-work	
Ancillary Data				
Sensor Status Logs	in-work	in-work	in-work	in-work
Element sets used for tracking	in-work	in-work	in-work	in-work
Atmospherics Data				
Nightly Status Reports, Operator Logs, comments	Available	Available	Available	Available
Tasking Messages, Telephone Messages, etc	in-work	in-work	in-work	in-work

From: "Beveridge, Capt Brian"
To: "Michael Card" <mcard@hq.nasa.gov>
Subject: RE: Data from Maui
Date: Tue, 4 Feb 2003 09:44:37 -1000
X-Mailer: Internet Mail Service (5.5.2653.19)

Mike,
I tried to call you back...your voicemail box is full. I'll be here all day, but if I'm not at my desk, you can page me at 800-306-0392.

Brian

-----Original Message-----

From: Michael Card [mailto:mcard@hq.nasa.gov]
Sent: Tuesday, February 04, 2003 5:13 AM
To: Beveridge, Capt Brian
Subject: Re: Data from Maui

Thanks Brian, got the files. Please call me when you get in, 202-358-4481. Have some questions. Thanks again. Mike

At 05:06 AM 2/4/2003, you wrote:

>Mike,
>My commander, Lt Col Jeff McCann, should have sent you some data this
>evening. I'm not sure if he told you that we are preparing a comprehensive
>data package of everything we collected on STS-107 in addition to the quick
>look he sent out tonight. We had worked on some of the data over the
>weekend and today, but we had several people doing several different
>things.
>We'd like to spend the next day or so pulling together the best data we can
>and packaging it so that it is useful to you all. We'll have folks
>post-processing data to pull out the highest resolution imagery, adding
>time
>stamps and other header information, etc. We'll also add information on
>the
>sensors and telescopes used to collect the data.
>
>I also contacted our sister site, the Starfire Optical Range (SOR) in
>Albuquerque, NM. Dr. Robert Fugate, the SOR chief scientist, said he would
>send you their data.
>
>This task is our top priority. Please let me know if we can do anything
>else to help.
>
>v/r,
>Brian
>

>Capt Brian J. Beveridge

>
>
>

From: "HILL, PAUL S. (JSC-DA8) (NASA)" <paul.s.hill@nasa.gov>
To: DL ESAT <DL-ESAT@ems.jsc.nasa.gov>
Subject: FW: Image Data
Date: Wed, 19 Feb 2003 07:06:02 -0600
X-Mailer: Internet Mail Service (5.5.2653.19)

Greg Byrne -

I meant to send you this yesterday. This is the electronic version of the hardcopy I handed you.

Everyone else -

Don't misinterpret the picture. It isn't IR, it's simply a display of the raw pixel value. Consider this FYI, but don't do anything with it. Doug White has a team that is working this.

PSH

-----Original Message-----

From: Bob Fugate [mailto:bob.fugate@kirtland.af.mil]
Sent: Tuesday, February 18, 2003 8:37 AM
To: HILL, PAUL S. (JSC-DA8) (NASA); White, Doug; Roberts Katherine E Col USSTRATWEST/J3V; Michael.Caylor@wpafb.af.mil; Earl Good; Stephen Mark D Col AFRL/DE; Baker William L Civ AFRL/DE; Fugate Robert Q Civ AFRL/DES; Robert Johnson; Cleis Richard A Contr AFRL/DES
Subject: Image Data

17 February 2003

Paul and Doug,

I have attached two files, a JPEG image made by displaying the square root of the raw data (the color bar shows corresponding actual value) from the file 6.57.12.tif, and a text file with the raw 16 bit pixel values for a 256x256 region selected from the entire image. I have verified that all other pixels in the image have a value of zero.

The JPEG image clearly shows an illuminated pixel behind the longer part of the plume, suggesting glowing material shed from the orbiter (or maybe structure in the plume?). I have tried to set the saturated pixels to white in this rendering, to get some idea of the outline of the orbiter. I am still working on algorithms to deconvolve our best estimate of the point spread function from this image (that may make the edges crisper), but this is proving difficult since the majority of the pixels are saturated, generating lots of artifacts.

There is, however, a group at the University of Arizona that has some specialized code that may be able to restore this image to some extent. Paul, Col Roberts described a process that (as I understand it) requires you to ask her for assistance from Air Force related groups and contractors-like the Arizona image processing group. Actually, I would guess they would be willing to do this on their own nickel (or dime) and in that case it wouldn't hurt to let them have a go at this. There is another group at ERIM, in Michigan, who is also very good and whom we have worked with in the past. Please let us know how to proceed.

Is there anyway we could get an estimate from telemetry of what the orientation of the orbiter

was at the time (current estimate is 13:57:14) this image was made? We would like to try to project a 3D orbiter model onto the outline in the image.

Bob Fugate



65712_256.txt



pow3.jpg

HILL, PAUL S. (JSC-DA8) (NASA), 09:13 AM 2/19/2003, ESAT status charts - 2-19

From: "HILL, PAUL S. (JSC-DA8) (NASA)" <paul.s.hill@nasa.gov>

To: MG Coordinators <mgcoor@ems.jsc.nasa.gov>,
DL ESAT

DL ESAT

<DL-ESAT@ems.jsc.nasa.gov>,
"MCCORMACK, DONALD L. (DON) (JSC-MV6) (NASA)"

<donald.l.mccormack@nasa.gov>,
"HARPOLD, JON C. (JSC-DA) (NASA)"

<jon.c.harbold@nasa.gov>,
"EPPS, RONALD C. (RON) (JSC-DM) (NASA)"

<ronald.c.epps@nasa.gov>,
"COLLINS, MICHAEL F. (MIKE) (JSC-DM) (NASA)"

<michael.f.collins@nasa.gov>,
"SHANNON, JOHN P. (JSC-DA8) (NASA)"

<john.p.shannon@nasa.gov>,
"BRISCOE, ALAN L. (LEE) (JSC-DA) (NASA)"

<alan.l.briscoe@nasa.gov>

Subject: ESAT status charts - 2-19

Date: Wed, 19 Feb 2003 07:13:16 -0600

X-Mailer: Internet Mail Service (5.5.2653.19)



MRT - ESAT 2-19.ppt

From: "HESS, DAVID C. (DAVE) (JSC-ZR) (NASA)" <david.c.hess@nasa.gov>
To: "Stephen Mark D Col AFRL/DE" <Mark.Stephen@kirtland.af.mil>
Cc: "CARD, MIKE (JSC-REMOTE)" <mcard@hq.nasa.gov>,
Good Earl Civ AFRL/DE
<earl.good@kirtland.af.mil>,
Bednarz Eugene J Civ AFRL/DEFP
<eugene.bednarz@kirtland.af.mil>,
Baker William L Civ AFRL/DE
<william.baker@kirtland.af.mil>,
Fugate Robert Q Civ AFRL/DES
<Bob.Fugate@kirtland.af.mil>,
Giuliano Concetto R Civ AFRL/DEB
<concetto.giuliano@kirtland.af.mil>,
Dinwiddie David L Civ AFRL/DEB
<david.dinwiddie@kirtland.af.mil>,
Skarupa Valerie B Civ AFRL/DEBI
<Valerie.Skarupa@kirtland.af.mil>,
Kress John C Lt Col AFSPC/DOOM
<John.C.Kress@PETERSON.af.mil>,
"White Richard W Jr. Col SMC Det 12/ST"
<Richard.White@kirtland.af.mil>,
"McCann, Lt Col Jeffrey"
<jeffrey.mccann@maui.afmc.af.mil>,
Good Earl Civ AFRL/DE
<earl.good@kirtland.af.mil>

Subject: RE: AMOS data sent via Fed-Ex to NASA

Date: Mon, 10 Feb 2003 16:42:15 -0600

Importance: high

X-Mailer: Internet Mail Service (5.5.2653.19)

It wouldn't surprise me that NASA may ask for high res imagery in the future. That may be something your folks could offer after this investigation is over and we get ready for return-to-flight...which we will! When that day gets closer, I'll point you in the right direction so the offer can get into the right hands.

As for the direction from SecAF...I had mentioned that to the folks at AFSPC, and Col Katherine Robert's (STRATCOM) direction back to me via Lt Col Kress was as you saw below. Like I said; I'm between a rock and a hard spot right now so someone needs to give me clear direction on what to do with the data coming in to me. I would assume Maj Gen Hamel (14AF/CC) who has been appointed as the lead for the DCIST could make the call, but if you have direction from SecAF, then maybe the folks at STRATCOM and AFSPC involved with the DCIST should be notified.

Like everyone else close to this (and we were very close to this) we are all trying to get the data to the right people and do it expeditiously. I sure don't want to get caught in the middle of "misunderstandings" between the

powers. Bad place to be.

Let me know what I can do!! When the Maui data comes in on Wednesday, I'll either turn it over to the NASA team or Re-FedEx it up to AFSPC; whichever is the direction I get.

David C. Hess.
David C. Hess, DAF
Director, DoD Human Space Flight Payloads
DoD Space Test Program
NASA JSC Houston, TX
Voice: 281.483.3498
Fax: 281.483.4651

-----Original Message-----

From: Stephen Mark D Col AFRL/DE [<mailto:Mark.Stephen@kirtland.af.mil>]
Sent: Monday, February 10, 2003 4:25 PM
To: HESS, DAVID C. (DAVE) (JSC-ZR) (NASA)
Cc: CARD, MIKE (JSC-REMOTE); Good Earl Civ AFRL/DE; Bednarz Eugene J Civ AFRL/DEFP; Baker William L Civ AFRL/DE; Fugate Robert Q Civ AFRL/DES; Giuliano Concetto R Civ AFRL/DEB; Dinwiddie David L Civ AFRL/DEB; Skarupa Valerie B Civ AFRL/DEBI; Kress John C Lt Col AFSPC/DOOM; White Richard W Jr. Col SMC Det 12/ST; 'McCann, Lt Col Jeffrey'; Good Earl Civ AFRL/DE
Subject: RE: AMOS data sent via Fed-Ex to NASA

Mr. Hess,

We have orders directly from the Secretary of the Air Force to release data directly to NASA.

We are also providing copies of everything we have to STRATCOM.

Do you think NASA will want us to take higher quality pictures for future shuttle launches?

As you know, we can do much better than we did this time if NASA wants us to.

Mark

Mark D. Stephen, Colonel, USAF

-----Original Message-----

From: HESS, DAVID C. (DAVE) (JSC-ZR) (NASA) [<mailto:david.c.hess@nasa.gov>]
Sent: Monday, February 10, 2003 3:19 PM
To: 'White Richard W Jr. Col SMC Det 12/ST'; 'McCann, Lt Col Jeffrey'
Cc: CARD, MIKE (JSC-REMOTE); Good Earl Civ AFRL/DE; Bednarz Eugene J Civ

AFRL/DEFP; Baker William L Civ AFRL/DE; Fugate Robert Q Civ AFRL/DES;
Stephen Mark D Col AFRL/DE; Giuliano Concetto R Civ AFRL/DEB; Dinwiddie
David L Civ AFRL/DEB; Skarupa Valerie B Civ AFRL/DEBI; Kress John C Lt Col
AFSPC/DOOM (E-mail)

Subject: RE: AMOS data sent via Fed-Ex to NASA

Importance: High

Gentlemen,

I have been directed by the folks at US Strategic Command and Air Force
Space Command (email from Lt Col John Kress, AFSPC/DOO excerpted below) to
forward ALL data to them for distribution and release. This is in
conjunction with the DoD Columbia Investigation Support Team (DCIST). Here
is the email excerpt that directs this:

Mr Hess - Per our discussion, I telephoned Col Roberts and asked for
direction with regards to where you should send data. She reiterated her
direction yesterday and directed me to inform you to send the data here.
The DoD Columbia Investigation Support Team (DCIST) is the official
collector of any data from DoD sources; it will release information as
quickly as possible in assisting in the recovery of debris and will work
closely with NASA for the analysis required of DoD data for the on-going
investigation. There is no effort to withhold or slow down the release of
information, but we have quick access to expert analysis that might reveal
crucial information from the data itself, or can be effectively merged with
other DoD data to produce something of use, so we need to get the data here.
In addition, it is important to observe proper management of any classified
data.

Should you be contacted by DoD agencies that feel they have relevant
information, data, or analysis, please direct them to the DCIST. The DCIST
includes Maj Gen Hamel, Col Roberts, Lt Col Cindy Visel (USSTRATCOM-West,
Maj Paul Pease (USSTRATCOM-West, Maj Eric
Olson (HQ AFSPC, some folks at Vandenberg AFB, and myself

I have given you the phone numbers of those here in Colo
Sprgs since the official collection and storage will be here. Also, if you
have questions or need to direct someone to the DCIST, these numbers may
expedite the process.

Based on this hardcore direction I am obligated, until directed otherwise,
to forward the AMOS data up to them at AFSPC so they can review and
determine where it should go from there. If this direction should change
before I get the FedEx on Wednesday, then naturally I will get the data to
the right folks here at JSC.

For Jeff McCann: Jeff, I noticed the FTP AMOS data showed up on the logs

briefed to Mr Dittmore, so obviously they got to the folks here at JSC

I truly apologize if this causes any delays. I had thought the Maui data was sent last Friday (before I got this direction) and had I know it wasn't going out till today, I would have had it redirected. I'm starting to feel caught between several rocks and even sharper rocks (the "hard spot" went by the wayside a long time ago).

Salutin' and steppin' off smartly here!

David C. Hess
David C. Hess, DAF
Director, DoD Human Space Flight Payloads
DoD Space Test Program
NASA JSC Houston, TX
Voice: 281.483.3498
Fax: 281.483.4651

-----Original Message-----

From: White Richard W Jr. Col SMC Det 12/ST
[<mailto:Richard.White@kirtland.af.mil>
<<mailto:Richard.White@kirtland.af.mil>>]
Sent: Monday, February 10, 2003 3:13 PM
To: 'McCann, Lt Col Jeffrey'; HESS, DAVID C. (DAVE) (JSC-ZR) (NASA)
Cc: CARD, MIKE (JSC-REMOTE); Good Earl Civ AFRL/DE; Bednarz Eugene J Civ AFRL/DEFP; Baker William L Civ AFRL/DE; Fugate Robert Q Civ AFRL/DES; Stephen Mark D Col AFRL/DE; Giuliano Concetto R Civ AFRL/DEB; Dinwiddie David L Civ AFRL/DEB; Skarupa Valerie B Civ AFRL/DEBI
Subject: RE: AMOS data sent via Fed-Ex to NASA

Jeff,

Many thanks for this. In view of the fact that Eglin AFB radar tracked an object moving away from the Shuttle on 17 Jan, photos of Columbia taken before re-entry take on increased importance.

<http://www.cnn.com/2003/TECH/space/02/10/sprj.colu.investigation/index.html>
<<http://www.cnn.com/2003/TECH/space/02/10/sprj.colu.investigation/index.html>>

Rich

Richard W. White Jr., Col, USAF

-----Original Message-----

From: McCann, Lt Col Jeffrey

Sent: Monday, February 10, 2003 1:42 PM

To: David Hess(NASA) (E-mail)

Cc: Mike Card (HQ NASA) (E-mail); Good (E-mail); Gene Bednarz (E-mail); Baker (E-mail); Bob Fugate (E-mail); Col Rich White (E-mail); Col Stephen (E-mail); Connie Giuliano (E-mail); Dinwiddie (E-mail); Skarupa, Valerie

Subject: AMOS data sent via Fed-Ex to NASA

Dave,

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On Friday afternoon (Hawaii time) we FTP'd two of the movies since they were too large over normal e-mail...did you receive them?

Please let me know if you have any questions,
Jeff

Jeffrey McCann, Lt Col, USAF

-----Original Message-----

Sent: Monday, February 10, 2003 9:40 AM

Subject: FedEx shipment 792188638869

L. A. MARTIN of BOEING LTS, INC sent David Hess of NASA Johnson Space Center