

# The Objective View

Newsletter of the Northern Colorado Astronomical Society

February 2004

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**Next Meeting: February 5 7:30 PM**

## A Brief History of Astronomy in Boulder and Sommers-Bausch Observatory

### Mr. Keith Gleason

### NCAS Business at 7 PM

**Meeting directions Discovery Science Center**  
703 East Prospect Rd, Fort Collins  
<http://www.dcsm.org/index.html>

In Fort Collins, from the intersection of College Ave and Prospect Rd, head East about 1/2 mile. See the Discovery Center sign to the South. Enter the West Wing at the NE corner. From I-25, take Exit 268, West to Lemay Ave, continue West 1/2 mile, see Discovery Center on the left.

### Starwatch at Discovery Science Center

February 27 6:30 pm  
March 26 6:30 pm

### NCAS Dark Sky Star Party Dates

**February 13, 14, 20, 21**

Cactus Flats site is on undeveloped parcel of prairie about 6 miles West of Briggsdale. Take Colo Hwy 14 East from I-25 (Exit 269). Go 19 miles East to Ault. Continue 18 miles East of Ault. At County Rd 65 (Milepost 170), turn North, go one mile. Site is through the wire gate on the right, no road, close gate and set up. Beware of the cactus. Our standard nights are the weekend of the New Moon, sometimes a weekend before and after. The site is now officially wheelchair accessible, but there are no facilities so bring essentials. Call **Tom Teters**, [tomt@starmon.com](mailto:tomt@starmon.com), with questions about star party status or dates, 482-5702.

### Other Events

Little Thompson Observatory Star Night, Berthoud  
February 20 Star Night 7 – 10 pm  
Dennis Ebbets, James Webb Space Telescope  
<http://www.starkids.org>

Cheyenne Astronomical Society, Cheyenne Botanical Garden  
February 20 7 pm  
<http://home.bresnan.net/~curranm/>

Open House, Chamberlain Observatory, dusk to 10 pm  
Feb 28, Mar 27, Apr 24, May 29, Jun 26 303 871 5172  
<http://www.du.edu/~rstencel/Chamberlain/>

Longmont Astronomical Society  
Feb 19 7 pm Longmont Christian School, 550 Coffman St  
<http://laps.fsl.noaa.gov/cgi/las.cgi>

### Global Net of Astronomical Telescopes Needs You

Dr. Culver has short-period variable star candidates which need monitoring. If you can contribute CCD images of selected 15<sup>th</sup> to 18<sup>th</sup> magnitude stars, please call Dr. Culver in the Physics Dept, CSU, 491-6206 for more information.

### About Our Feb 5 Speaker

Keith Gleason is the manager of Sommers-Bausch Observatory at the University of Colorado in Boulder, where he has been devising equipment and laboratory exercises to torture astronomy students for the past 20 years. Prior to that, he spent 10 years in the "real world" as an engineer, where he made a whole lot more money, but enjoyed it less. Keith holds a master's degree in astro-geophysics from CU, but when he escapes home in the evening to the foothills above Lyons, he's the hired hand working for his wife Joanna, helping her tend the flock of about five dozen sheep.

In 2003, Sommers-Bausch Observatory celebrated its 50th anniversary. We'll trace the early origins of SBO, dating back to a telescope built nearly a century ago, and a last will and testament written 30 years later. These events, coupled with the founding of the Harvard College High Altitude Observatory on an 11,000 foot mountain pass, and the new realization that the Sun could be used to predict radio communications interference during World War II, eventually led to the founding of the CU Observatory and the establishment of virtually every astronomical, geophysical, and space science facility that now exists in Boulder.

### January 8 Program

#### Apollo 13 Incident: Failure is Not an Option Jess Huguley

President John F. Kennedy was out of options. The USSR had successfully launched Sputnik I in October 1957, followed with the dog Laika in orbit. Yuri Gagarin had orbited the Earth, then Svetlana. The US had conspicuous launch failures. But in his speech at Rice University in 1961, JFK announced that the Americans would place a man on the Moon, and return him, by the end of the decade. In a current Smithsonian exhibit, JFK is quoted not as promoting space or engineering, but a challenge to the Soviets about our way of life. The roots of the Apollo 13 incident date to 1965. Connections were made with copper wire. Higher voltage meant a smaller wire could be used. A 65

volt supply was chosen for ground operations. Mercury and Gemini had used 24 to 32 VDC. Apollo was still conducted at 28 VDC onboard, but subcontractors were required to qualify their equipment at 65 VDC operating voltage. In 1967, a short circuit ignited an inferno in the Apollo I capsule. It showed how little we knew about space medicine. It was presumed that if a little oxygen was good, more was better. The command module was full of nylon and other flammable plastics. It took 22 seconds of combustion for the pressure to reach 45 PSI, then the relief valve blew, a fatal scenario. In 1968, the first low Earth orbit mission was conducted with Apollo 7, commanded by Wally Schirra. We were on our way to the Moon. In July 1969, the first words from the Moon were "Houston, Tranquility Base here. The Eagle has landed." Capitalism had triumphed over Communism. The decade closed with euphoria, but complacency soon set in about space. Television's "All In The Family" reflected a loss of innocence. The news brought home the tragedy of the Vietnam War, Kent State, and Watergate. Timothy Leary called students to "turn on, tune in, and drop out." In a surreal world of high technology, NASA forged on. Apollo 12 was uneventful in the Fall of 1969. On April 11, Apollo 13 lifted off at 13:13 Houston time. The crew filmed a life in space vignette on their second day, but the TV networks declined to air it. On April 13, the Environmental Systems Engineer responded to a low pressure caution on Hydrogen Tank #2. He also had trouble monitoring the quantities in oxygen tank #2. He requested a cryogenic stir. Jack Swigert switched on the stirring fans, and a shudder went through the craft. At first, astronauts thought Fred Haise was playing a trick by securing the Lunar Module Hatch. His expression quickly denied that. The Main Bus B Under Volt Alarm sounded on the overhead panel in the craft. Pressure was rapidly decaying in Oxygen Tank #2. Fuel Cells #1 and #3 currents dropped to zero. The spacecraft yawed and pitched erratically, and Commander Lovell struggled to compensate manually, and barely avoided a non-recoverable spin. Fuel cell #2 was in current load stress. Main Bus B were rapidly decaying. The Command Module was dying. The crew began their scramble to the Lunar Module. Gene Kranz was made lead of the newly created Gold Team, whose sole task was to develop life-saving procedures for the crew. His first words to his team were: "Gentlemen, failure is not an option." The events that followed demonstrated the dedication, skill, genius and brilliance that the human race is capable of exercising. Mr Huguley was one of the "ground rats" who had to answer all the questions and get the program flying again. Their work began on April 19. He next summarized for us the structure of the Apollo Command Module, Service Module, and Lunar Module. The Service Module was the home of two cryogenic oxygen tanks. Flight telemetry pointed to an initial failure of Oxygen Tank #2. The oxygen is maintained at the triple point, minus 197 degrees F, to allow the maximum transfer rate. The tank is a very effective thermos bottle. Stirring is needed to maintain a homogeneous fluid state. As oxygen leaves and expands, the tank cools. It contains a heater element with a thermostat. A capacitance probe determines the fluid quantity. There are fill and drain ports, and electrical conduit. The team developed nominal testing conditions, and researched the history of Oxygen Tank #2. Among 67 tests were determining fuel cell loads, igniting "flame proof" Teflon insulation in 900 PSI oxygen, pressure

drop measurements in Iconel tubing, flammability of fan motors, stratification of supercritical oxygen, and heater thermostat switch study. Test of the thermostat switch was successful at 28 VDC, but at 65 VDC, the thermostat welded closed. Heater voltage was on, regardless of environmental temperature. The history of Oxygen Tank # 2 was coming to light. Tank #2 had been assigned to Apollo 10. To allow modification of a nearby RF system, the tank had to be removed. One last mounting nut was partially removed when lunch break came. After lunch, the nut was forgotten. The tank was dropped 2 inches when a crane's fitting snapped, due to the nut's interference. Contractors felt the tank would not be damaged by this, and the tank was assigned to Apollo 13. In retrospect, dynamicist Stan Baretta has cautioned, "You cannot analyze shock impact." A countdown demonstration test was performed in March 1970. This rehearsal went fine to its planned hold. But, Oxygen Tank #2 would not empty. Its internal vent tube had been misaligned in the drop. It was decided to boil off the oxygen with the tank heater. It was run for 10 hours. The 65 VDC system on the ground welded the thermostat immediately, so the tank received uncontrolled heat. The temp sensor range did not allow reading above 80 degrees F. Subsequent ground testing showed the internal tank temperature reached 1000 degrees F. The Teflon wire insulation melted at 450 degrees F. Fan wiring which carries 115 VAC at 400 Hz had been damaged, but no further exercise of the tank was required before launch. At the time of the third tank stir performed by Swigert, a spark occurred in the partially full tank which ignited remaining Teflon insulation. The rapid expansion in the 950 PSI tank overcame the pressure relief valve, and it failed in a dramatic manner. Apollo 14 was redesigned, the fans were encapsulated, a third oxygen tank was installed, and the oxygen tanks were isolated from each other. Apollo 14, 15, 16, and 17 flew without incident. Mr. Huguley has continued to follow the space program closely, and looks forward to a return to the Moon.

### **NCAS Business, January 8 2003**

President Dan Laszlo called the meeting to order. Officers elected for 2004 were: Dan Laszlo, President; Max Moe, Vice President, Kimon Berlin, Secretary; Nate Perkins, Treasurer. Max Moe announced upcoming NCAS programs. Ray Moe mentioned Max's recent bio in the February Sky and Telescope magazine, and his Soapbox column in the Fort Collins Coloradoan this week. Corey Radman recruited NCAS members for the Putnam Elementary starwatch on January 23.

### **If HST Could Image the Earth**

Date: Tuesday, January 20, 2004 9:03:10 PM  
From: molczan@rogers.com  
To: Columbia-L@satobs.org

Tom W wrote:

- > I wish they would take at least
- > one picture of something on the ground before the end. I'd
- > like to see what kind of resolution that can be obtained
- > from orbit.

It's been done, but Hubble does not have the ability to track terrestrial objects; therefore, the images are too blurry to reveal much. Four such images appear on pg. 208 of *The Hubble Wars*, by Eric Chaisson. However, Hubble was derived from the KH-11 imaging reconnaissance satellite, which had only a slightly smaller mirror. So these leaked July 1984 KH-11 images of a Soviet aircraft carrier under construction, give a pretty good idea of

Hubble's potential:

[http://www.fas.org/irp/imint/kh11m\\_1.htm](http://www.fas.org/irp/imint/kh11m_1.htm)

[http://www.fas.org/irp/imint/kh11m\\_2.htm](http://www.fas.org/irp/imint/kh11m_2.htm)

[http://www.fas.org/irp/imint/kh11m\\_3.htm](http://www.fas.org/irp/imint/kh11m_3.htm)

Ted Molczan

**Subj: [FRAC] Bush's space plan**

Date: Wednesday, January 14, 2004 1:59:58 PM

From: schweitz@frii.com

Here are the key points from the White House budget below.

So, we're going to

- return the shuttle to flight
- finish assembly of the ISS
- develop a new Crew Exploration Vehicle to replace the shuttle and
- return to the moon

all with an annual budget increase, on average, of \$200 million per year. Good ideas, but probably can't all be done with the given budget, even with NASA cutting \$11 billion from other projects. Andrea

Key Points on the President's FY 2005 Budget

The funding added for exploration will total \$12 billion over the next five years. Most of this added funding for new exploration will come from reallocation of \$11 billion that is currently within the five-year total NASA budget of \$86 billion. In the Fiscal Year (FY) 2005 budget, the President will request an additional \$1 billion to NASA's existing five-year plan, or an average of \$200 million per year. From 1992 to 2000, NASA's budget decreased by a total of 5 percent. Since the year 2000, NASA's budget has increased by approximately 3 percent per year.  
>From the current 2004 level of \$15.4 billion, the President's proposal will increase NASA's budget by an average of 5 percent per year over the next three years, and at approximately 1 percent or less per year for the two years after those.

Date: Saturday, January 17, 2004 8:30:28 AM

From: [nobler@att.net](mailto:nobler@att.net)

Kimon wrote: For that money, we might as well spend it on a space elevator, and recoup many many times the cost in economic benefits.

>

John wrote: I'd like to see the space elevator too. People are working on the details, but I think the longest carbon nanotubes to this point are only ~10 to 100  $\mu\text{m}$  in length. In the long term it sounds very efficient. If a society really wants to "do space" it's probably the way to go.

Bob, LAS:

At the NSS conference three years ago, a scientist from LANL (Los Alamos) gave a talk on beanstalks and showed that present bucky-tube composites were strong enough. He went on to show how you would build the cable with automated fiber laying machines (spiders).

You could have heard a pin drop in the room.

Just about every technology that we "wish we had..." we do, from beanstalks to nuclear torch-ships.

**Hubble Servicing Mission cancelled**

Date: Friday, January 16, 2004 9:33:17 PM

From: gmarino2@mindspring.com

This is a tragedy. It will most likely cost us years of Hubble observations, and will definitely cost us all observations with the new cameras that will now never get installed. I understand their reasons, but I still think that this is a huge price to pay and a huge overreaction to the Columbia accident. If we are unwilling to take any risks at all, we should just stay at home on our own planet and hide under the covers. Or, come to think of it, fund a new exploration initiative so poorly that it will probably never come to pass. Now I feel \*slightly\* better since I've gotten that off of my chest...

Greg

**Does Anybody Want to Support the Hubble?**

Go to <http://www.savethehubble.org> it takes about 3 minutes!!!  
Think cosmic,  
TT

>From: "SLOOH Astronomy. Live." <mike@slooh.com>

>To: "Michael Paolucci" <mike@slooh.com>

>Subject: SaveTheHubble.org

>Date: Sun, 25 Jan 2004 20:51:15 -0500

>

>Dear Fellow Petitioner,

>

>Our movement continues to gain momentum. Since NASA's announcement canceling the shuttle servicing mission to Hubble, the daily signature count has increased to 300 per day, which puts us at ~3000 strong and counting. So keep doing what you are doing--emailing, linking, blogging, etc. To start bringing pressure to bear on the government, I believe we will need a base of 100,000 signatures. At that point, we will have the credibility to deliver our message to the powers that be.

>

>

>Michael Paolucci

>president

>[www.slooh.com](http://www.slooh.com)

>www.savethehubble.org

### Mars Rover in The Onion

Date: Friday, January 16, 2004 3:16:40 PM  
From: schweitz@frii.com

Now for something more lighthearted:  
<http://www.theonion.com/4002/infograph.html>

### Cactus Flats Observing Jan 17 2004

It was good to see a crowd already set up as I crested the hill above CFN after being the only observer out the last few times. The only time the temperature really bothered me was when the wind picked up. I really prefer frost over dew anytime, really! Mike here is the link to those Andromeda charts I have...

[http://nedwww.ipac.caltech.edu/level5/ANDROMEDA\\_Atlas/frames.html](http://nedwww.ipac.caltech.edu/level5/ANDROMEDA_Atlas/frames.html)

I don't recall where I found the chart I used for G1 as it is not on these charts. Saturn was just magnificent at times, though things had softened up by the time Jupiter was up high enough for observing. Bill, we will have to check out that UGC (3697) Galaxy hopefully under more transparent skies next time along with "The Box" G group. They both do show up better than last night. It's always fun to see a new Comet (C2002/C T7) and watch it move against the background sky. Surprising to wake up to heavy fog here in Greeley. I was hoping to get out tonight in the driveway but the fog has moved back in again. Lets hope for a repeat for next weekend.

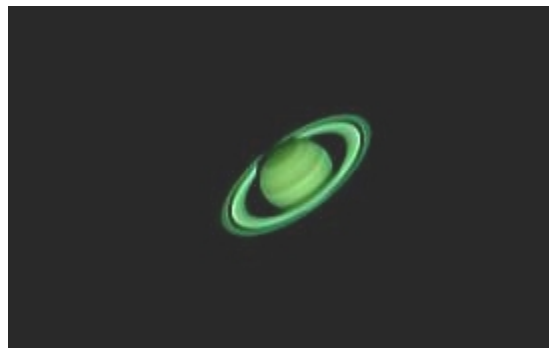
Dave D

From: gary30views@earthlink.net

We had 12 people show up at Pawnee for another great clear and dark night, Seeing was best in long time, Saturn everybody had at highest powers, Jeff White was at 3 mm on 3000mm focal length which means over 1000x on Saturn before it started to look bad. He took lots of Saturn shots and we should be getting some pictures back from him soon I hope. It was very cold, about 20 degrees, but we all were dressed for it and stayed up till almost 2 am before cold did mirrors in with frost build up. Comet was easy to find and pretty bright with short tail, should be able to find in yard, about 8th mag. I think Jupiter was pretty good along with NGC4565, edge on favorite, and so many more to name. I hope some of my digital Saturn and Jupiter pictures come out. bye, gary

Subj: [FRAC] Pawnee Saturn image  
Date: Monday, January 19, 2004 11:29:31 PM  
From: sodflyer@peakpeak.com

For all of those that did not make it last night you missed some incredible seeing! Here is one of a few pictures I took of Saturn.  
Jeff White



### From Dave Larison: Grand Mesa Star Party July 15-18

Aaron Reid from the Grand Junction club sends news that plans are progressing for a regional star party on top of Grand Mesa scheduled for July 15-18, 2004.

A weblink for the event is now up:  
<http://www.coloradowestastronomy.org/SP04.html>

Although it's a long drive for Front Range folks, the site and event sounds very appealing... (Dave L.)

In a message dated 1/8/2004 4:04:34 PM Mountain Standard Time, somestarguy@acsol.net writes:

>Dave,  
>...Our strategies are to have primitive camping, plenty of space for that, on the RMSS size scale, and we are providing a >bunch of porta-potties, as well as talks, a single catered >meal is possible, and on the Mesa are some >campgrounds/fishing depending on a person's picking. Several members have camp trailers, myself included, and we will, set up a Gazebo, type deal for the programs. Mainly, it's >where the stars are! Our board meeting is a week from now >on the 15th and we will update the website then as well.  
>Aaron

### Choosing a Video camera for a Scope

Date: Sunday, January 18, 2004 2:02:18 PM  
From: rickbaldridge@msn.com

International Occultation Timing Association (I.O.T.A.) has several papers on the accuracy and sensitivity of video methods.  
<http://www.lunar-occultations.com/iota/iotandx.htm>

A good article about the differences in the Supercircuits PC23C and PC164 is at:  
<http://www.lunar-occultations.com/iota/supercomparison.htm>

Both the PC-cameras are quite good and low light, however one big drawback is they do not have exposure or gain control built in, which makes exposing planets and close-ups of satellites difficult. (However, one I.O.T.A. member has written a paper on how to add a gain control to the PC-23C and offers to retrofit a PC-164 for a small fee.) If you just want to track satellites and use the camera to video sat-star passage timings, etc., they are both quite good. The PC-23C has a built-in microphone -

the PC-164 does not, but Supercircuits sells a 9V battery powered microphone. See:

PC-164C (approx &130 US)

<http://www.supercircuits.com/STORE/prodinfo.asp?number=PC164C&variation=&aitem=5&mitem=13>

PC-23C (approx \$90 US)

<http://www.supercircuits.com/STORE/prodinfo.asp?number=PC23C-AC&variation=&aitem=7&mitem=13>

Pre-amp microphone (\$13 US)

<http://www.supercircuits.com/STORE/prodinfo.asp?number=PA3&variation=&aitem=14&mitem=23>

I highly recommend the PC-164 and the additional cost is well worth the extra sensitivity.

The AstroVid "StellaCam EX" is an EXCELLENT camera for all types of astro-imaging, planetary imaging and satellite tacking since the exposure can be controlled from 1/10,000 sec up to integrating 128 frames together, but it is much more expensive at about \$750 US. With it, I can image stars about 1 magnitude FAINTER than I can see through the telescope visually, and it does very well on nebula, galaxies, etc. Some examples including my tracking of the J002E3 rocket body (suspected Saturn S-IVB stage) can be seen at:

<http://www.astrovid.com/>

Click on "What's New - Customer Images!" on the left, then scroll down about half way.

What I found cool about the StellaCam is with frames integrating for several seconds, any moving object will appear as a streak, making them obvious on a monitor. When searching for geosync sats or sats with ill-defined or moved orbits, one can simply point the camera and start recording, and satellites show up as short lines!

Since I have some experience as a satellite tracker and occultation timer (similar requirements!), I'd be glad to answer specific questions off-line at [rickbaldridge@msn.com](mailto:rickbaldridge@msn.com)

Rick Baldridge  
Campbell, CA USA

### **Binoculars for Sale**

11x80 binoculars in excellent condition, with caps and case. \$145. Contact [REScline@aol.com](mailto:REScline@aol.com)

### **URL for Clear Sky Clocks for Colorado**

[http://cleardarksky.com/csk/prov/Colorado\\_clocks.shtml](http://cleardarksky.com/csk/prov/Colorado_clocks.shtml)

### **Best Looks**

Moon	By Saturn 2/2 By Jupiter 2/7,8 By Venus 2/23 By Mars 2/25
Mercury	Low in SE at dawn, midmonth
Venus	SW at sunset
Mars	Bright in SW after sunset
Jupiter	High in S midnight
Saturn	Overhead in evening

From: Dan Laszlo  
2001 S Shields St Building H  
Fort Collins CO 80526

**TO:**

## International Space Station Passes for Loveland-Fort Collins

February 2004

Date	Mag	Starts			Max. Altitude			Ends		
		Time	Alt	Az	Time	Alt	Az	Time	Alt	Az
30 Jan	1.9	17:57:19	10	NNW	17:57:56	10	N	17:58:33	10	NNE
31 Jan	1.7	18:28:59	10	NNW	18:30:25	13	NNE	18:30:38	13	NNE
01 Feb	1.6	19:00:18	10	NNW	19:01:25	17	NNW	19:01:25	17	NNW
02 Feb	1.5	17:56:49	10	NNW	17:58:33	14	NNE	18:00:17	10	NE
02 Feb	2.2	19:31:45	10	NW	19:32:16	14	NW	19:32:16	14	NW
03 Feb	0.5	18:28:06	10	NW	18:30:44	26	NNE	18:31:15	25	NE
<b>04 Feb</b>	<b>-0.6</b>	<b>18:59:34</b>	<b>10</b>	<b>NW</b>	<b>19:02:17</b>	<b>69</b>	<b>NW</b>	<b>19:02:17</b>	<b>69</b>	<b>NW</b>
<b>05 Feb</b>	<b>0.1</b>	<b>17:55:46</b>	<b>10</b>	<b>NW</b>	<b>17:58:34</b>	<b>34</b>	<b>NNE</b>	<b>18:01:23</b>	<b>10</b>	<b>E</b>
05 Feb	1.8	19:31:40	10	W	19:33:29	21	WSW	19:33:29	21	WSW
<b>06 Feb</b>	<b>-0.4</b>	<b>18:27:19</b>	<b>10</b>	<b>WNW</b>	<b>18:30:19</b>	<b>65</b>	<b>SW</b>	<b>18:32:56</b>	<b>13</b>	<b>SE</b>
07 Feb	2.2	18:59:43	10	W	19:01:42	16	SW	19:03:40	10	S
<b>08 Feb</b>	<b>0.6</b>	<b>17:54:58</b>	<b>10</b>	<b>WNW</b>	<b>17:57:51</b>	<b>43</b>	<b>SW</b>	<b>18:00:44</b>	<b>10</b>	<b>SSE</b>
09 Feb	3.0	18:28:06	10	WSW	18:29:06	11	SW	18:30:06	10	SSW
19 Feb	1.4	06:06:14	10	SSW	06:08:55	29	SE	06:11:37	10	ENE

## A Few Iridium Flares for Lemay and Trilby, Fort Collins

Date	LocalTime	Mag	Alt	Azimuth	Distance to flare centre	Mag at flare centre
31 Jan	18:32:26	-1	38°	175° (S )	24.6 km (W)	-8
01 Feb	18:26:21	-4	39°	175° (S )	9.8 km (E)	-8
03 Feb	17:40:20	-5	12°	272° (W )	3.2 km (W)	-5
04 Feb	06:41:51	-1	61°	351° (N )	21.9 km (W)	-8
05 Feb	06:35:53	-3	60°	353° (N )	12.3 km (W)	-8
05 Feb	18:11:12	-0	39°	187° (S )	31.2 km (W)	-8
06 Feb	06:29:53	-6	58°	354° (N )	6.1 km (W)	-8
06 Feb	18:05:07	-5	40°	186° (S )	6.6 km (E)	-8
07 Feb	06:23:51	-2	57°	357° (N )	16.2 km (E)	-8
08 Feb	06:17:54	-2	55°	358° (N )	20.5 km (E)	-8
09 Feb	06:11:53	-1	53°	359° (N )	26.4 km (E)	-8
10 Feb	19:26:01	-3	39°	147° (SSE)	18.0 km (W)	-8
11 Feb	17:43:49	-7	39°	197° (SSW)	1.8 km (E)	-7
11 Feb	19:18:56	-0	38°	146° (SE )	42.9 km (E)	-8
11 Feb	19:19:56	-2	39°	147° (SSE)	24.7 km (E)	-8