

# Wadhurst Astronomical Society Newsletter January 2014

*A Very Happy New Year to all  
Wadhurst Astronomical Society members  
and welcome to the Society's  
18<sup>th</sup> year*

## MEETINGS

### DATES OF THE 2014 MEETINGS

Wednesday 15<sup>th</sup> January  
Wednesday 19<sup>th</sup> February  
Wednesday 19<sup>th</sup> March  
Wednesday 16<sup>th</sup> April  
Wednesday 21<sup>st</sup> May  
Wednesday 18<sup>th</sup> June  
Wednesday 16<sup>th</sup> July

There is no August meeting although there are plans to have an astro-barbecue

Wednesday 17<sup>th</sup> September  
Wednesday 15<sup>th</sup> October  
Wednesday 19<sup>th</sup> November  
Wednesday 17<sup>th</sup> December (3<sup>rd</sup> Wednesday this year)

Meetings start promptly at 1930

## DECEMBER MEETING

The meeting was opened by Phil Berry giving a warm welcome to members and visitors at our December session and announced that there would be Stollen cake and homemade mince pies provided by members and their wives during our tea and coffee break.

On December the 4<sup>th</sup> Brian Mills and Phil attended a WAS outreach at Uplands College across the road from our venue, to introduce students taking their GCSE Astronomy course to stars and constellation recognition. The sky was clear and the evening turned out to be a great success and as we said last month it is good that the Society is being recognised in this way, thanks to members like Phil and Brian and to Uplands College for the invitation.

Mention was made of the proposed DSLR group and Brian Mills said that enough members have now shown sufficient interest for planning to go ahead. In the meantime, there is certainly time left if any other members would be interested. Just let Brian know.

We were reminded that this is the start of the 2014 session and that regrettably the subscriptions are now £16 for an adult, two family members at the same address is now £23. Visitors will be asked for £3 to help cover costs. Students and members under 17 will still have free membership.

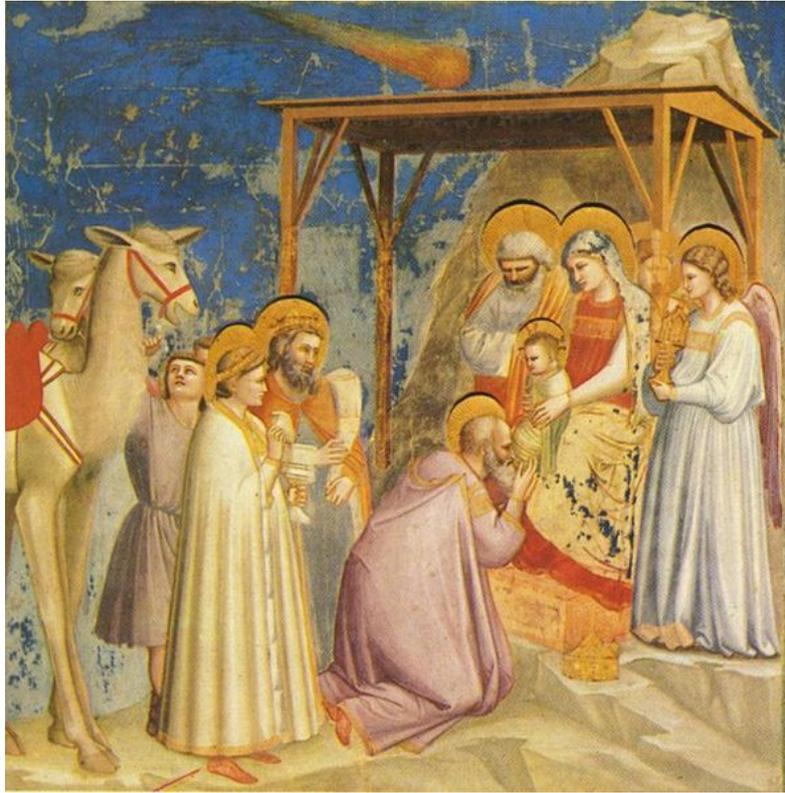
Phil then introduced tonight's speaker; our Director of Observations, Brian Mills.

### **The Star of Bethlehem MkII**

*Brian Mills FRAS*

About three years ago, Brian gave a similar talk which captured the attention of members' interest; since then he has been able to add even more through further research and thought to develop a new and enlightening presentation at this rather appropriate season.

The Star of Bethlehem is so well known for its association with the birth of Jesus and of Christmas that it is seen everywhere at Christmas; on Christmas cards, in paintings, on the top of Christmas Trees and it is seen in street decorations.



A Fresco by Giotto di Bondone

Brian said that if we take the Star of Bethlehem literally as only a miracle as written in the Bible then that's it; there is no discussion – and no talk!

Kepler in the sixteenth century wondered if it might have been a supernova and there is evidence that this was being considered even before then. Patrick Moore believed that it could be the effect of two meteors.

One problem is that what had been written about the star was written from word-of-mouth many years after the event and not by the person it was subscribed to. Also, the Star of Bethlehem is mentioned only in the book of Matthew. The book of Luke is the only other book to write about the nativity but doesn't mention a star although in the book of Numbers in the Old Testament, a star is mentioned as foretelling of the coming.

During his research, Brian has collected a huge amount of information relating to the star, the time Jesus was born and the movement of the wise men who would most likely have been astrologers.

One precise translation of the writings about the star says that it had been seen at its *heliacal* rising which occurs after a star has been behind the Sun for a season and is briefly visible in the east just before the Sun rises. Brian said these were seen as important events as they were used as a calendar, for example, the heliacal rising of Sirius was seen as a sign that the Nile was about to flood.

We next looked at the most likely time that Jesus was born. It is known that there was a census at the time although there were a number of different kinds of censuses in use. It is believed that this one was to show the existence of the people and is recorded as taking place a year or so before the death of King Herod the Great in 5 BC, also it had been written in the book of Micah that the Messiah would be born in Bethlehem. From other evidence, Jesus had to have been born before 4 BC and after 6 BC.

Another difficulty arises over which calendar was being used at that time. Under the influence of Rome it was probably the Roman Calendar which marked the founding of Rome and a year had only 10 months. Caesar added two extra months making a twelve month year beginning on the 25<sup>th</sup> of March. In the 17<sup>th</sup> century the calendar was adjusted because the year was not precisely 365 days and errors had accumulated, so it was shortened by 10 days and interestingly this is why our financial year begins on the 5<sup>th</sup> of April. Later, the year was made to start on January the 1<sup>st</sup> and for other reasons the birth of Jesus was made 25<sup>th</sup> of December, partly for convenience. It was also noted that the shepherds were in the fields at the time which could suggest that it was really March or April by our calendar.

Next Brian looked at the journey the wise men or Magi would have made once they had seen the star. The star was seen in the east and was taken as a sign that the Messiah was coming so they made their way to Jerusalem, a few miles north of Bethlehem. It was not clear whether they came from Babylonia at about 650 miles distance or Persia about 1000 miles away and Brian said that with all the preparation and the journey across desert travelling in the coolest part of the day, the journey could have taken two or three months.

The Magi had an audience with Herod who said he wished to pay homage to the new born.

But over the months since first seeing the star in the east, it would have moved to the south and Bethlehem is almost due south of Jerusalem, although there was some discussion as to how high the star reached towards the zenith.

Brian now turned to the question of what the star was. It had to have been something that was visible for several months. Could it have been Venus? Venus is very bright but the planet's position had been known for several centuries so it was unlikely. It was unlikely to have been Uranus because it is on the limit of naked eye visibility. Also it was unlikely to have been an occultation which would have been an important event to the Magi. There were two occultations of Venus around that time but they didn't fit the criterion.

Could it have been a comet? Comets were regarded as harbingers of doom, not of good and no comet had been recorded at that time. It has been suggested that it might have been Halley's comet but that would have appeared well outside the time period.

Could it have been a supernova? These are very bright results of the death of a star lasting a short time. Certainly the Magi would have regarded this as a very important sign, but there is no record of a supernova appearing during the time we are looking at.

A nova is a smaller event and quite different and can recur. Two were observed but it is thought they could have been the same event with problems in recording the dates.

Meteors could be another possible source of the sighting and as said earlier; Patrick Moore believed it could have been the effect of two meteor sightings or even two fire balls but Brian thought this unlikely.

In 6 BC there was a very close grouping of Jupiter, Saturn and Mars and then in 5 BC a nova was recorded and would have appeared in the east, but there is some dispute about the actual timing yet remains a strong candidate. Brian said that Mark Kidger had written a book, "The Star of Bethlehem, An Astronomer's View", in which he disusses the possibilities together.

The talk was presented in Brian's unique style leaving members entertained but well informed as usual.

## **Comet ISON**

*John Wayte*



ISON imaged by Waldemar Skorupa, a German amateur astronomer on November 16<sup>th</sup> 2013

NASA and the European Space Agency have started their search for the remnants of Comet ISON, the so-called "Comet of the Century" which combusted just 750,000 miles above the surface of the Sun last week (Late November). It had been hoped that ISON might survive the encounter and shine brightly in the night skies into December. But it became clear on Thursday that the icy ball of dust and rock had not been able to withstand the intense heat and radiation and had mostly broken up by Monday morning.

Fortunately, there is still much that scientists can learn from the comet. Huge amounts of data were gathered before its destruction and can be used to provide insights into everything from the origins of the Solar System to the nature of comets themselves.

And now scientists at the European Space Agency say there is a 10% chance that pieces of the comet larger than 100m have survived – and may yet be large enough to continue to be studied, even as they fly at 828,000 mph away from the Sun.

Let's just remind ourselves what comet ISON was all about.

The comet was discovered last year by two amateur astronomers using Russia's International Scientific Optical Network (ISON). It was born in the Oort cloud, a shell of scattered icy objects right at the outermost edge of the Solar System. The cloud is nearly a light-year from the Sun, a quarter of the distance to our nearest neighbouring star, Proxima Centauri.

Sometimes a comet is nudged out of the cloud by the gravitational tug of a passing star and sent on a journey taking millions of years and eventually bringing it into the inner Solar System. Computer models show that ISON was one such comet. However, it was unusual in being a first-time visitor and also in a Sun-grazing orbit.

The comet's apparent destruction ended a three-million year journey from the Oort Cloud at the edge of our Solar System.

## **JANUARY MEETING**

**Wednesday 15<sup>th</sup> January 2014** – We begin with a brief AGM and this will be followed by our own Phil Berry talking about "Totality" of a solar eclipses.

Meetings begin at 1930 although members are invited to arrive anytime after 1900 as this is a good time to exchange ideas and discuss problems and also relax before the meeting starts.

The venue as always is the Upper Room of the Methodist Church at the east end of Wadhurst Lower High Street, almost opposite the entrance to Uplands College. (For those with SatNav – the post code is TN5 6AT)

Anyone is welcome but non-members are asked if they wouldn't mind contributing £3 towards costs.

## **FUTURE MEETINGS**

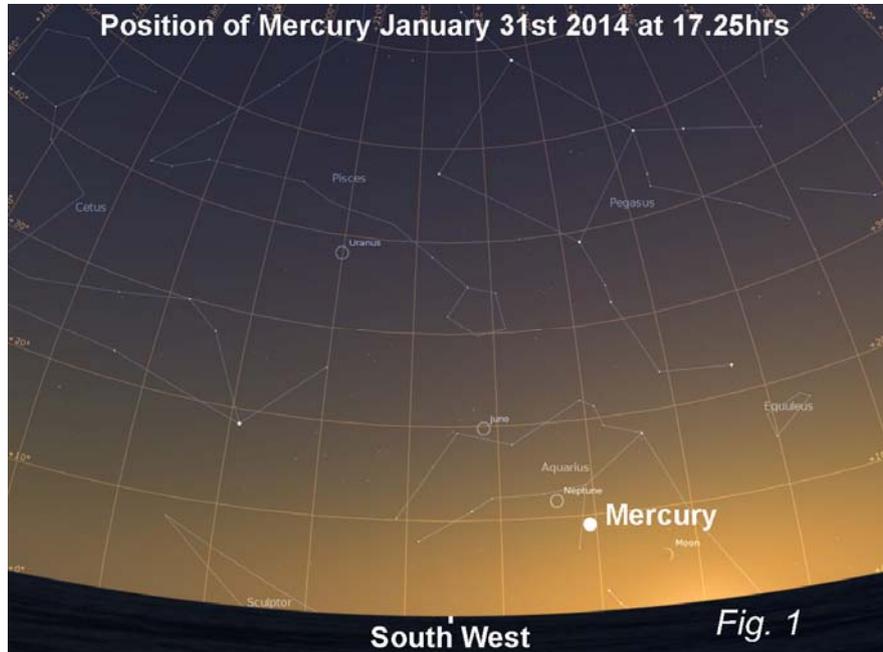
**Wednesday 19<sup>th</sup> February 2014** – Jan Drozd gives another of his thought provoking presentations. This time he calls his talk "Life, the Earth and the Universe".

**Wednesday 19<sup>th</sup> March 2014** – Dr. David Whitehouse talks about the future of Space Travel.

## SKY NOTES FOR JANUARY 2014

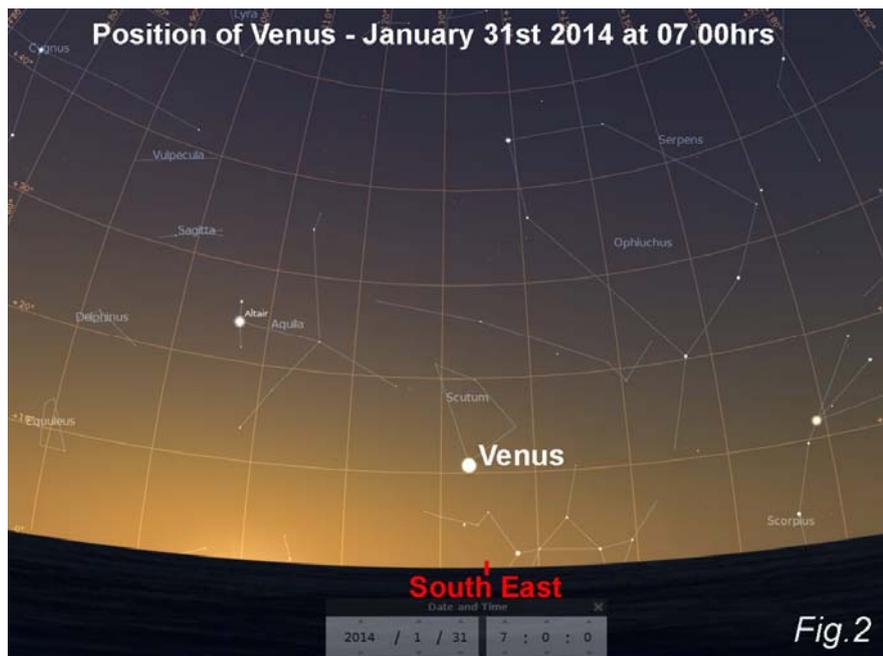
### Planets

Mercury suffered a superior conjunction on December 29<sup>th</sup> and is now moving east of the Sun to become an evening object with a maximum magnitude of -1.0. It will reach greatest eastern elongation on January 31<sup>st</sup> when, in angular terms, it will be 18° from the Sun. The map shows the planet's position on the last day of January with the Sun 6° below the horizon (end of civil twilight).



As you can see, it is just under 10° in altitude at that time and is close to an extremely young crescent Moon, being just twenty hours old. This evening's apparition of Mercury is one of the best for 2014 although on May 25<sup>th</sup> it will also be well placed at a similar elevation above the horizon.

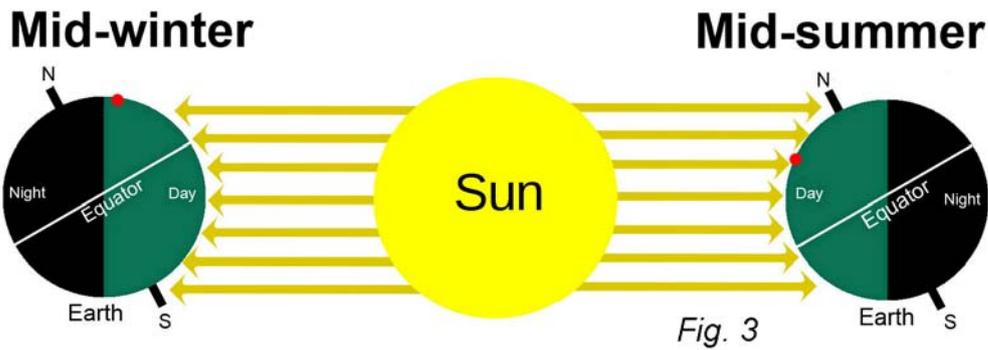
Venus is still an evening object setting just 1¼ hours after the Sun as the month begins. Viewing will be difficult and short lived in the twilight as the planet moves swiftly to an inferior conjunction on January 11<sup>th</sup> after which it moves west of the Sun and quickly becomes a brilliant morning object at a magnitude of -4.3.



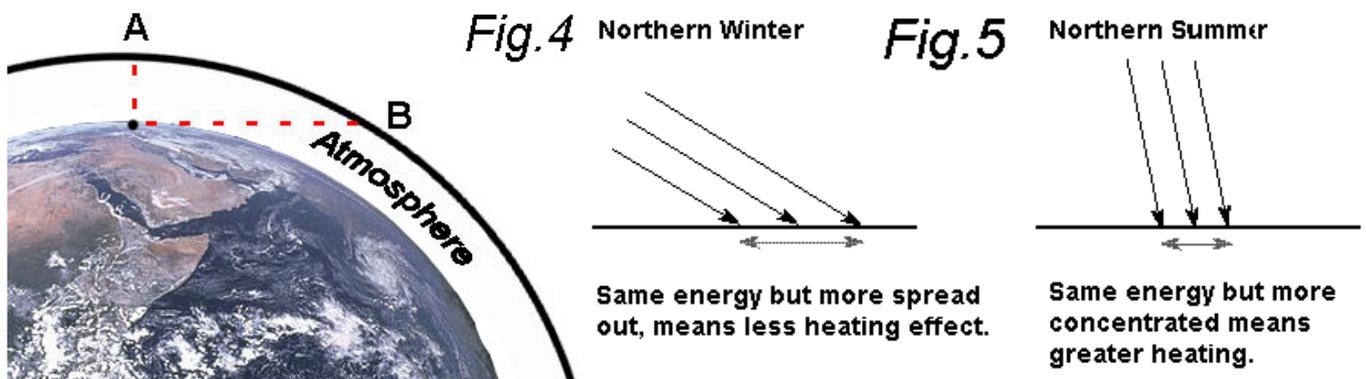
By the last day of January it rises two hours ahead of the Sun, becoming a conspicuous object low down in the south east at dawn. The diagram illustrates this at 07.00 hrs with the Sun 6° below the horizon.

Earth reaches perihelion (closest to the Sun) on January 4<sup>th</sup> when we will be 91.3 million miles from our parent star. On the face of it this may seem rather strange as we are at our closest but also paradoxically at our coldest when surely we should be at our warmest.

This may well be the case in the southern hemisphere but it is certainly not so for our latitudes. The discrepancy is caused by the tilt of the Earth's axis with relation to its plane of rotation about the Sun, and it is this tilt of 23.5° that gives rise to the seasons.



In the diagram Fig.3, the position of the UK, at a latitude of approximately 52° is shown by the red dot. As you can see, in mid-winter the north pole points away from the Sun and the solar rays strike our part of the globe at an acute angle. Six months later when the Earth has moved round to mid-summer, the north pole is now facing the Sun. Although it is never overhead, the Sun is much higher in the sky and has more of a warming effect on us for a variety of reasons. Firstly, during the summer, it is above the horizon for much longer.



Secondly, figure 4 demonstrates that because it is higher, it shines through a thinner layer of the atmosphere (A) than when it is lower down (B), and thirdly it is due to each unit of heat being more concentrated as shown in Fig. 5.

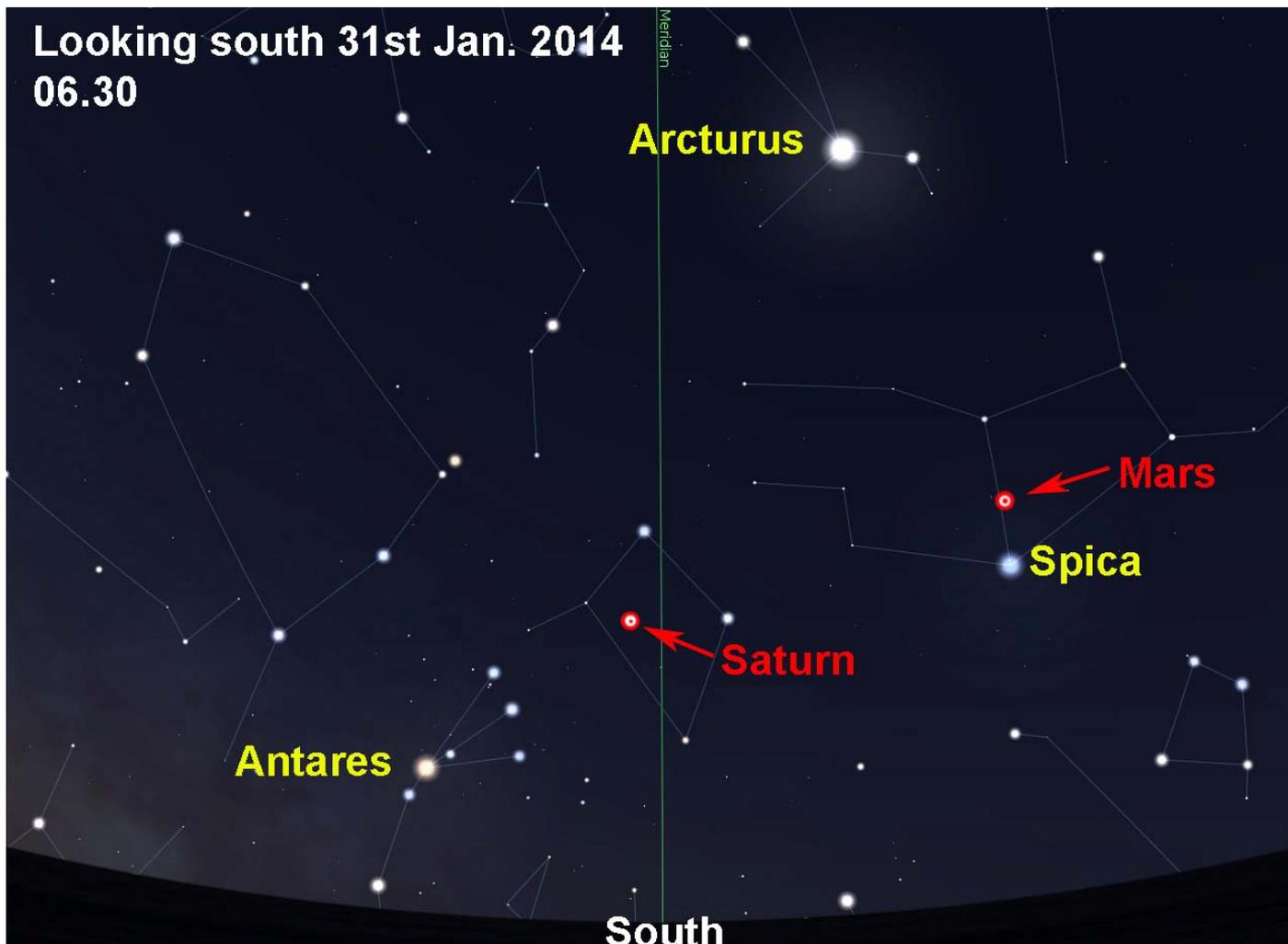
Mars is still a morning object rising only fifteen minutes after midnight at the start of the month and at 23.15 hrs by the end. It might be expected that the planet's migration to being an evening object would be brisker than this but at present it is moving eastwards (direct motion) and continues to do so until March 1<sup>st</sup> when it reaches its first stationary point. After this it moves westwards (retrograde motion) until mid-May. The planet's brightness increases from +0.9 to +0.2 whilst its apparent size also rises from 6.8" to 8.9" as it heads towards opposition in April. Mars spends all of the month in the constellation of Virgo. Its position is shown on the Saturn map.

Jupiter comes to opposition on January 5<sup>th</sup> when it has an apparent size of 44.8", five times that of Mars currently, and is considerably brighter at magnitude -2.6. When a planet is at opposition it is "opposite" the Sun in the sky and therefore rises as the Sun sets and vice versa so it is visible all night. When Jupiter culminates (crosses the meridian) on the 5<sup>th</sup> it will be at an altitude of just over 61° making it superbly placed for observation and imaging. Tripod mounted binoculars will show the four largest moons that were discovered, but not named, by Galileo. They will however not show detail in the cloud belts; a moderately sized telescope is needed for this. A programme such as Stellarium which can be downloaded for free will show you which moon is which if you zoom in close as in the example in Fig.6.



You will notice that Io is missing from the diagram because at that time it is hidden behind the body of Jupiter. The planet remains in the constellation of Gemini for the entire month and only moves into neighbouring Cancer early in July. The position of Jupiter is shown in the sky map later in this newsletter.

Saturn at magnitude +0.6 is a morning object in the constellation of Libra. At the beginning of the month it rises at 04.00 hrs but by the end this has become 02.00 hrs. However, it will be mid-March before it rises early enough to be an evening object. If you are an early riser, Saturn will be on the meridian at 06.30 hrs at the end of January and will form a pleasing group with Mars and the bright stars Antares, Arcturus and Spica.



**Lunar Occultations**

In the table below I've listed events for stars down to magnitude 7.0 that occur before midnight although there are many others that are either of fainter stars or occur at more unsociable hours. DD = disappearance at the dark limb whilst RD = reappearance at the dark limb. The column headed "mm" (millimetres) shows the minimum aperture telescope required for each event. **Times are in GMT.** Please remember that the Society has telescopes that members can borrow, all of which are suitable for the following events.

Jan.	Time	Star	Mag	Ph	Alt °	% illum.	mm
5 <sup>th</sup>	17.26	ZC3366	6.6	DD	32	24	40
6 <sup>th</sup>	19.43	25 Piscium	6.3	DD	29	35	40
11 <sup>th</sup>	16.59	ZC600	6.6	DD	35	83	80
17 <sup>th</sup>	20.50	Kappa Cancri	5.2	RD	23	97	60

**Phases of the Moon for January**

New	First ¼	Full	Last ¼
1 <sup>st</sup>	8 <sup>th</sup>	16 <sup>th</sup>	24 <sup>th</sup>
30 <sup>th</sup>			

## ISS

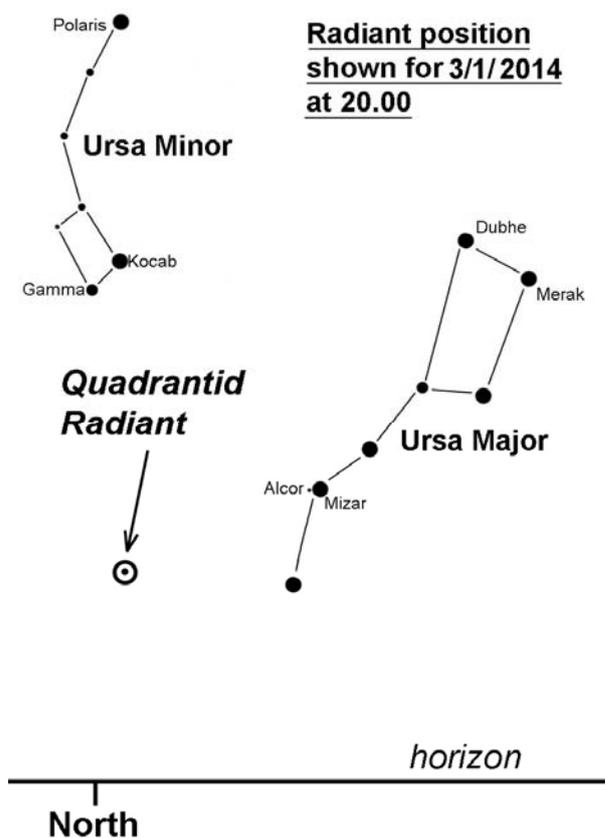
There are no evening passes of the ISS this month. There are a number of early morning passes that are visible, the details of which can be found at [www.heavens-above.com](http://www.heavens-above.com)

## Iridium Flares

The flares that I've listed are magnitude -3 or brighter although there are a lot more that are fainter or occur after midnight. If you wish to see a complete list, or obtain timings for somewhere other than Wadhurst, go to [www.heavens-above.com](http://www.heavens-above.com). Remember that when one of these events is due it is sometimes possible to see the satellite before and after the "flare", although of course it will be much fainter at those times. There are several this month that are extremely bright, namely on the 10<sup>th</sup>, 11<sup>th</sup> and 25<sup>th</sup>. **Times are in GMT.**

Jan.	Time	Mag.	Alt°	Az.°		Dec.	Time	Mag.	Alt°	Az.°
1 <sup>st</sup>	16.32	-4.1	28	281 (W)		17 <sup>th</sup>	17.43	-5.6	15	290 (WNW)
2 <sup>nd</sup>	17.38	-7.0	29	185 (S)		19 <sup>th</sup>	16.59	-4.9	12	223 (SW)
4 <sup>th</sup>	16.05	-5.3	33	276 (W)		19 <sup>th</sup>	17.14	-4.5	21	283 (WNW)
10 <sup>th</sup>	18.28	-7.9	45	32 (NNE)		19 <sup>th</sup>	17.41	-3.1	59	43 (NE)
11 <sup>th</sup>	18.21	-8.0	47	34 (NE)		20 <sup>th</sup>	17.08	-5.8	22	282 (WNW)
14 <sup>th</sup>	17.02	-5.8	19	211 (SSW)		25 <sup>th</sup>	19.09	-7.5	34	23 (NNE)
16 <sup>th</sup>	16.59	-5.4	17	215 (SW)		26 <sup>th</sup>	19.04	-4.8	37	24 (NNE)
16 <sup>th</sup>	17.59	-3.2	12	293 (WNW)		27 <sup>th</sup>	17.01	-3.6	71	59 (ENE)
16 <sup>th</sup>	18.07	-4.6	11	295 (WNW)						

## Meteors



The Quadrantids are active from January 1<sup>st</sup> until the 6<sup>th</sup> with maximum occurring during the evening of the 3<sup>rd</sup>. The zenithal hourly rate (ZHR) is predicted to be 50 to 80 at peak activity but the radiant is low down so this average will be reduced. However, perhaps we should expect to see one meteor every two or three minutes if skies are clear. The Moon is a very young crescent at the time and should cause very little interference if any, besides which it will set just after 19.00 hrs in the west-south-west.

Quadrantid meteors are often described as being comparatively slow (when compared to Perseids) and coloured either blue or yellow although only a small percentage of them leave a persistent train behind.

Meteors from this shower have been tentatively linked to the asteroid (196256) 3003 EH1 (though this has still to be confirmed) which may be an extinct comet with a period of 5½ years which coincidentally comes to perihelion this March. Because the peak is comparatively short-lived (possibly 4 hours) the trail of debris left behind by the parent body must still be quite compact.

## Comet ISON

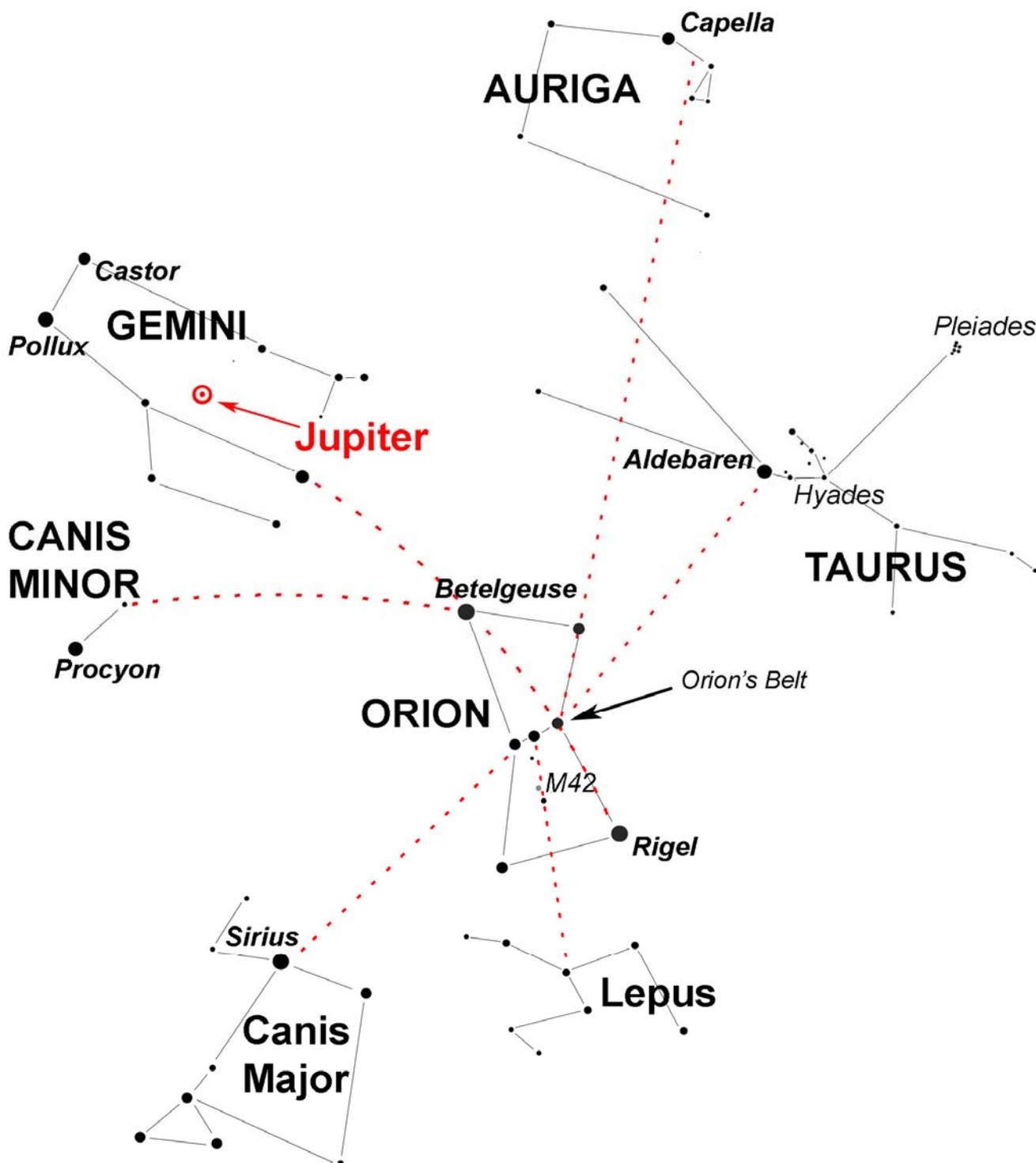
Sadly, as was rather expected, ISON became a victim of the intense forces exerted on it by the Sun as it passed through perihelion. It was observed by spacecraft whose mission is to observe the outer reaches of the Sun's atmosphere by means of using an occulting disk to hide the bright body of our star. The comet was seen to brighten as it passed around the Sun but very quickly

faded, possibly due to the nucleus disintegrating. It did brighten significantly but briefly as it passed through some coronal particles that had been ejected by the Sun.

**The Night Sky in January** (Written for 22.00hrs GMT mid month)

In the west the autumn constellation are slipping out of sight. The square of Pegasus is still just visible standing on one of its corners and Andromeda with its famous galaxy is 40° in altitude. Perseus with the lovely double cluster is high in the sky as are the smaller constellations of Aries and Triangulum. The area between Pegasus and Orion in the south is filled with the mostly large and indistinct groups Pisces, Cetus and Eridanus.

Looking north the Great Bear is standing on its tail whilst his smaller namesake points generally to the east. The head of Draco is at its lowest and on the meridian, although its tail stretches between the two bears and towards the head of the larger of the pair. Cassiopeia and Cepheus lie to the west of the pole and beneath them you should be able to find the bright star Deneb in the constellation of Cygnus.



To the east Leo and Cancer and fully risen with the head of Hydra (the Water Snake) visible below the latter. If you have binoculars, take a look at M44, the Beehive cluster, in the centre of Cancer. It is visible to the naked eye as a misty patch but optical aid will show it much better and reveal the individual stars in the group.

In the south the sky is dominated by the brilliant winter constellations. Orion, of course, takes centre stage as he lies on the meridian with his retinue cast around him. Above Orion are Taurus, Auriga and Gemini, whilst to his east lie Canis Major and Canis Minor. Below his feet is Lepus (the Hare) which is presumably being chased by his hunting dogs. The map shows the area and how to use Orion as a signpost to the other constellations.

### **Advance warning for February**

**February 12<sup>th</sup>** - Venus reaches greatest brilliance at magnitude -4.5

Brian Mills

## **NASA SPACE PLACE**

### **The Big Picture: GOES-R and the Advanced Baseline Imager**

By Kieran Mulvaney

The ability to watch the development of storm systems – ideally in real time, or as close as possible – has been an invaluable benefit of the Geostationary Operational Environmental Satellites (GOES) system, now entering its fortieth year in service. But it has sometimes come with a trade-off: when the equipment on the satellite is focused on such storms, it isn't always able to monitor weather elsewhere.

"Right now, we have this kind of conflict," explains Tim Schmit of NOAA's National Environmental Satellite, Data, and Information Service (NESDIS). "Should we look at the broad scale, or look at the storm scale?" That should change with the upcoming launch of the first of the latest generation of GOES satellites, dubbed the GOES-R series, which will carry aloft a piece of equipment called the Advanced Baseline Imager (ABI).

According to Schmit, who has been working on its development since 1999, the ABI will provide images more frequently, at greater resolution and across more spectral bands (16, compared to five on existing GOES satellites). Perhaps most excitingly, it will also allow simultaneous scanning of both the broader view and not one but two concurrent storm systems or other small-scale patterns, such as wildfires, over areas of 1000 km x 1000 km.

Although the *spatial* resolution will not be any greater in the smaller areas than in the wider field of view, the significantly greater *temporal* resolution on the smaller scale (providing one image a minute) will allow meteorologists to see weather events unfold almost as if they were watching a movie.

So, for example, the ABI could be pointed at an area of Oklahoma where conditions seem primed for the formation of tornadoes. "And now you start getting one-minute data, so you can see small-scale clouds form, the convergence and growth," says Schmit.

In August, Schmit and colleagues enjoyed a brief taste of how that might look when they turned on the GOES-14 satellite, which serves as an orbiting backup for the existing generation of satellites.

"We were allowed to do some experimental imaging with this one-minute imagery," Schmit explains. "So we were able to simulate the temporal component of what we will get with ABI when it's launched."

The result was some imagery of cloud formation that, while not of the same resolution as the upcoming ABI images, unfolded on the same time scale. You can compare the difference between it and the existing GOES-13 imagery here: [http://cimss.ssec.wisc.edu/goes/blog/wp-content/uploads/2013/08/GOES1314\\_VIS\\_21AUG2013loop.gif](http://cimss.ssec.wisc.edu/goes/blog/wp-content/uploads/2013/08/GOES1314_VIS_21AUG2013loop.gif)

Learn more about the GOES-R series of satellites here: <http://www.goes-r.gov>

Kids should be sure to check out a new online game that's all about ABI! It's as exciting as it is educational. Check it out at <http://scijinks.gov/abi>



*The Advanced Baseline Imager. Credit: NOAA/NASA.*

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**SAGAS** web-site [www.sagasonline.org.uk](http://www.sagasonline.org.uk)

**Any material for inclusion in the February 2014 Newsletter should be with the Editor by January 28<sup>th</sup> 2014**