

Wadhurst Astronomical Society Newsletter September 2014

ASTROPHOTOGRAPHY EVENINGS

Brian Mills has included a note at the end of the Sky Notes, saying that there are now a number of members interested in taking part in some Astrophotography evenings when members will be introduced to the subject and will be helped to take their own images and learn how to process them using free computer software that is available.

Brian suggests that if there are any other members who would like to show their interest and find out more about the evenings, they should contact him. Contact details are at the end of the Newsletter.

MEETINGS

There was no WAS meeting in August and the Astro-barbecue is not until Saturday evening. Details of times and how to get there are in the August Newsletter and if not too late, it is well worth trying to come along. There will be telescopes and clear skies (ever the optimist...!) The barbecue is a great way of meeting members other than at our meetings and we are grateful to Jim Cooper for being our host.

Don't forget, it is the end of August and it can get a bit cold so warm clothing is a good idea.

FUTURE MEETINGS

Wednesday 17th September – John Lutkin gives a talk he calls “Infinity and Beyond - some random thoughts on mathematics in astronomy”

Wednesday 15th October – Jan Drozd is giving a talk on “My First Steps in Planetary Imaging”.

Wednesday 19th November – Members of the Society will be giving short talks about astronomically related subjects.

Wednesday 11th December 2014 – Our Director of Observations will be giving another of his popular talks. He call the December talk “The Story of Longitude”.

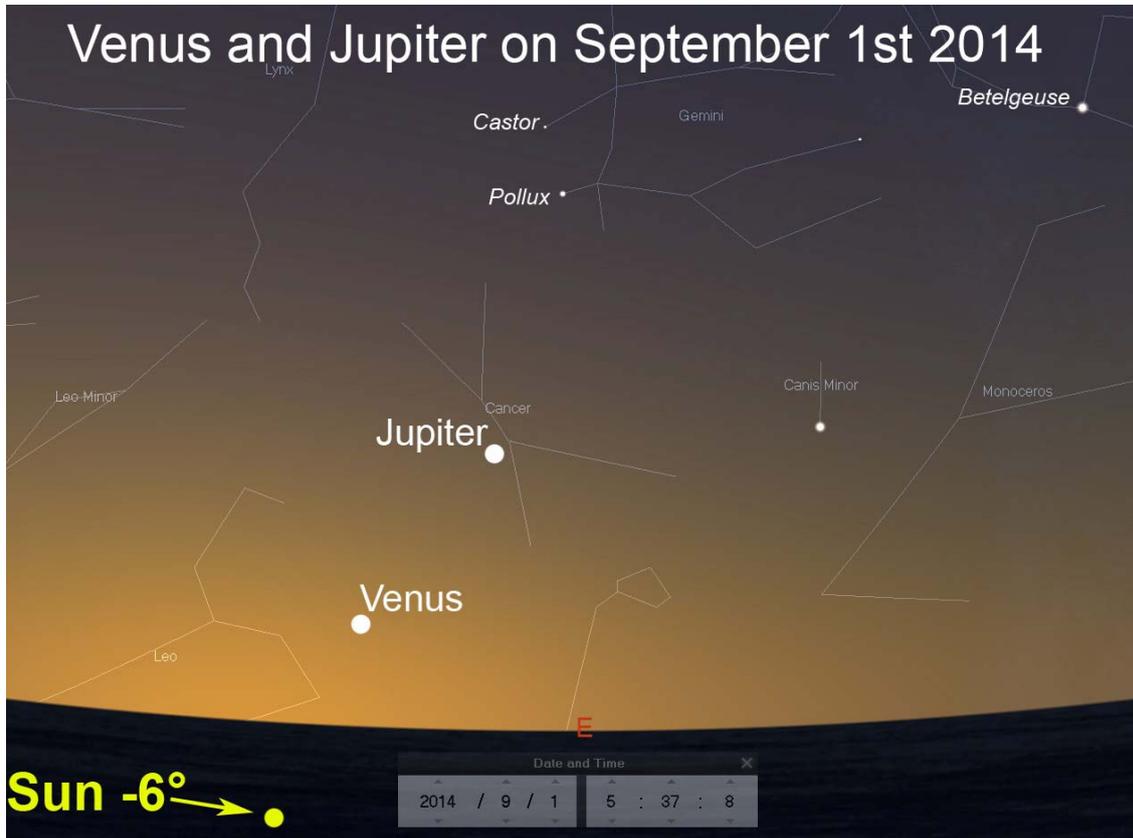
SKY NOTES FOR AUGUST 2014

Planets

Mercury is an evening object, reaching greatest eastern elongation on the 21st of the month. Unfortunately the planet is very poorly placed for observers in the UK given that the ecliptic makes a very shallow angle with the horizon and also that Mercury is located almost 3° south of the ecliptic. At sunset on the 21st the planet is just 4° above the horizon, whilst at the end of civil twilight, Mercury has already set.

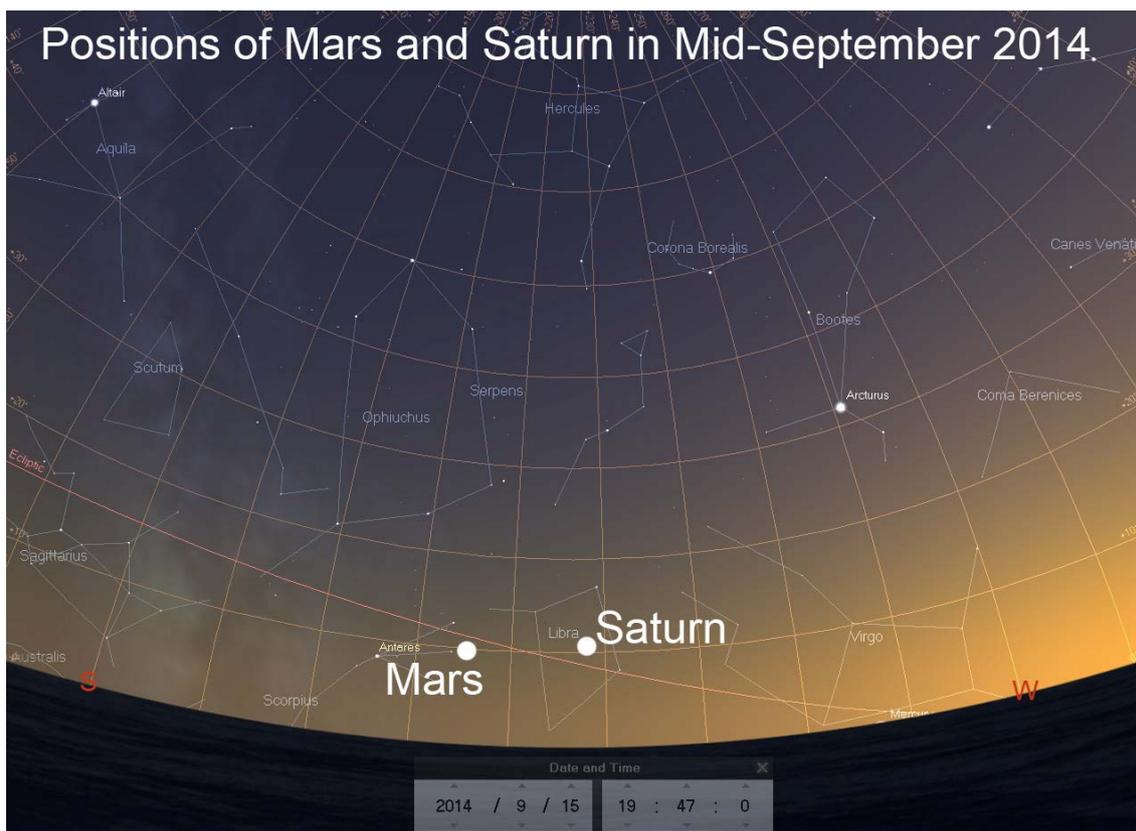
Venus is still visible as a morning object at magnitude -3.9, rising around 1½ hours before the Sun as the month begins. With the Sun 6° below the horizon, Venus will be just over 6° above it, whilst by the time of sunrise the planet will be nearly 13° above the eastern horizon. Its angular distance from the Sun decreases swiftly during September making this your last chance to see Venus before it passes through a superior conjunction in October.

Following its encounter with the Sun, Venus becomes an evening object although it will be next year before we see it well.



Earth reaches the autumnal equinox on September 23rd at 03.09 BST. This marks the moment when the Earth's axis points neither towards, nor away from, the Sun which means, that theoretically, everywhere on Earth has equal amounts of day and night. It may also be described as the time when the Sun, moving along the ecliptic, crosses the celestial equator.

Mars is an evening object rather low down in the south west. The map is drawn for the middle of the month and shows the position of the red planet when the Sun is 6° below the horizon which occurs that night at 19.47 BST. Opposition, as you may recall, occurred in early April, since when Mars has been decreasing in both brightness and apparent size (which will continue) whilst conversely its position is set to gradually improve over time. As the map shows the altitude of Mars is 10° around the middle of September, but as the months pass this actually increases due to the change in the angle that the ecliptic makes with the horizon. So by November it is almost 13° and in mid January next year it has reached 20° with the Sun 6° below the horizon. It will take until June 2015 for Mars and the Sun to meet once again for a solar conjunction.



Jupiter is currently a morning object rising at 03.30 BST, which is 2¼ hours before the Sun, as the month begins. At magnitude -1.9 it spends all of September in the constellation of Cancer before moving eastwards into neighbouring Leo in mid-October. Both the apparent size and brightness of Jupiter have been decreasing since opposition at the beginning of January, however during September this trend reverses and both see a slight increase. By the end of October Jupiter's apparent distance from the Sun will be large enough for it to appear as an evening object ahead of its next opposition which takes place on February 6th 2015. The planet's current position is shown on the map for Venus.

Saturn, at magnitude +0.6, currently lies in the constellation of Libra making it an evening object visible low in the south west immediately after sunset. It is drawing gradually closer to the Sun with the angular distance between the two bodies decreasing from 69° to 42° during September. Saturn is finally in conjunction with the Sun on November 18th, so make the most of this last chance to see the planet with its rings beautifully displayed. It emerges into the morning skies in December and moves briskly westwards from the Sun although it will be mid April before it becomes an evening object again. Its position for mid September is shown on the map for Mars.

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. The column headed "mm" (millimetres) shows the minimum aperture telescope required for each event. Please remember that the Society has telescopes that members can borrow, all of which are suitable for the such events.

Times are in BST.

Sept	Time	Star	Mag	Ph	Alt °	% illum.	mm
4 th	20.21	ZC 2745	6.8	DD	20	75	80
4 th	22.09	ZC 2755	6.6	DD	19	76	70
4 th	23.50	ZC 2764	6.4	DD	11	76	80
6 th	23.13	ZC 3070	6.6	DD	26	93	90
29 th	19.49	ZC 2391	7.0	DD	11	28	60

Phases of the Moon for September

First ¼	Full	Last ¼	New
2 nd	9 th	16 th	24 th

ISS

Unfortunately there are no evening passes of the International Space Station (ISS) this month, although there are some that occur in the period between midnight and dawn. For details of these passes please go to www.heavens-above.com

Iridium Flares

The flares that I've listed are magnitude -1.0 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. 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. **Times are in BST.**

Sept	Time	Mag.	Alt°	Az.°	Sept	Time	Mag.	Alt°	Az.°
9 th	21.32	-2.2	14	358 (N)	13 th	20.57	-1.6	24	359 (N)
12 th	21.04	-1.2	22	359 (N)	14 th	20.51	-4.0	26	359 (N)

The Night Sky in September (Written for 22.00hrs BST mid month)

In the south Deneb, the brightest star in Cygnus is on the meridian just a few degrees from the zenith. Part way along the body of the swan lies NGC 6871, an open cluster 20 arc minutes across at magnitude 5.2. Below the swan is a string of small constellations that reach from the double star, Albireo, across the meridian to the head of the winged horse. They are, from north to south, Vulpecula, Sagitta, Delphinus and Equuleus of which the middle two are the most obvious. What items of interest can these star groups claim? See the map in last months Newsletter to see the positions of all these constellations.

Vulpecula (the fox) contains the well known "coathanger" asterism more correctly referred to as Collinder 399 that lies close to the southern border with Sagitta. It is an easy object in binoculars and can be located by using Altair and Tarazed (γ Aquilae) as pointers. Sagitta (the arrow) is a tiny constellation, in fact it is the third smallest out of a total of 88. It contains three faint planetary nebulae plus a globular (M71 at magnitude 8.3) and one open cluster, H20, at magnitude 7.7.

Delphinus (the dolphin) is one of Ptolemy's original constellations and though small it has a very distinct shape. Gamma Delphini is a long period binary whose components are yellow (mag. 5.1) and orange (mag. 4.2).

Lastly Equuleus (the little horse) is the second smallest constellation in the entire sky covering just 71 square degrees, with only Crux being more diminutive at 68 square degrees. It has nothing of particular note save for several double stars.

Below this collection of small star groups lie Capricornus and Aquarius, and further south still we see the bright star Fomalhaut in Piscis Austrinis just 5° above the southern horizon.

Looking towards the west Arcturus is now only 10° high and will set at midnight BST. Above it are Corona Borealis and Hercules who are all outshone by the brilliant Vega (in Lyra) that is one third of the Summer triangle. Hercules is of course home to the brightest globular cluster in the northern hemisphere, M13, which I mentioned last month and is just visible to the naked eye, as well as M92 which is a little fainter being only magnitude 6.5. Alpha Herculis, which indicates the strong man's head, is a binary whose primary component is not only a red giant but also an irregular variable.

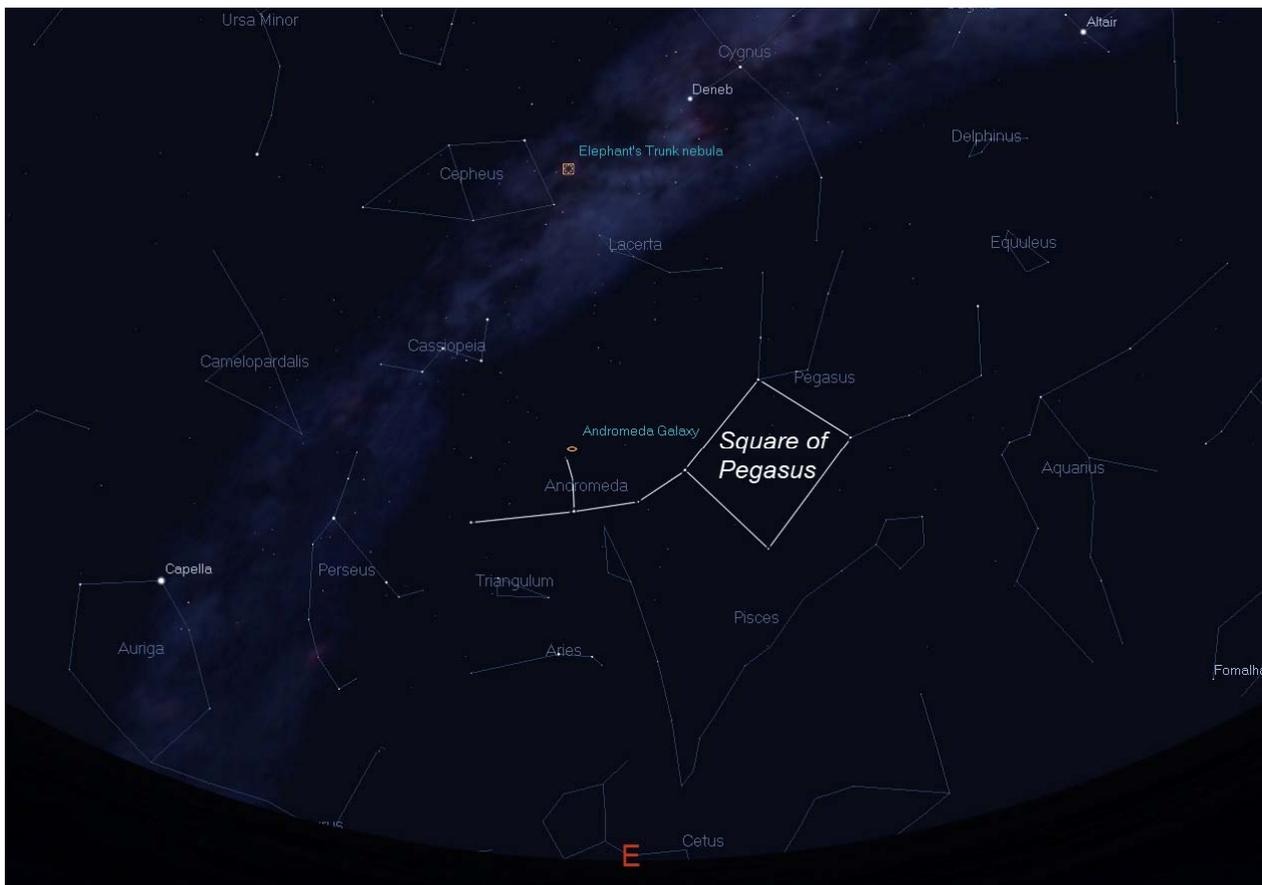
If we turn our attention to the north we find the plough has almost completed its journey towards the horizon. Cepheus conversely is near the meridian and close to its maximum altitude. Within it lies the magnitude 6.1 open cluster NGC 7160 with a diameter of 7 arc minutes. Between Cepheus and the outstretched lower limbs of the winged horse lies the small and rather shapeless group of stars that form Lacerta (the lizard) that was created by Hevelius in 1687.

To the east the sky has a distinctly autumnal feel to it with the prominence of Pegasus, Andromeda and Pisces although the one thing that reminds me that the balmy summer nights are over is the first glimpse of the Pleiades in the late evening. Below the extremities of Andromeda are the small but obvious constellations of Triangulum (one group at least that resembles its name) and Aries. The most obvious object of note in the former is the binocular M33, or NGC 598, a spiral galaxy of magnitude 5.7. Only 15° away lies the most distant object visible from the latitudes of the UK and the largest member of the local group, M31, the Andromeda galaxy. A giant spiral, its overall magnitude is 3.5 so it is comparatively easy from a dark site, though I find averted vision always helps. M32 and M110 are the most prominent of its attendant galaxies. Of course it was Edwin Hubble in 1925 who used images of Cepheid variables, taken with the 100" Hooker telescope at Mount Wilson, to prove that M31 was in fact an "island universe".

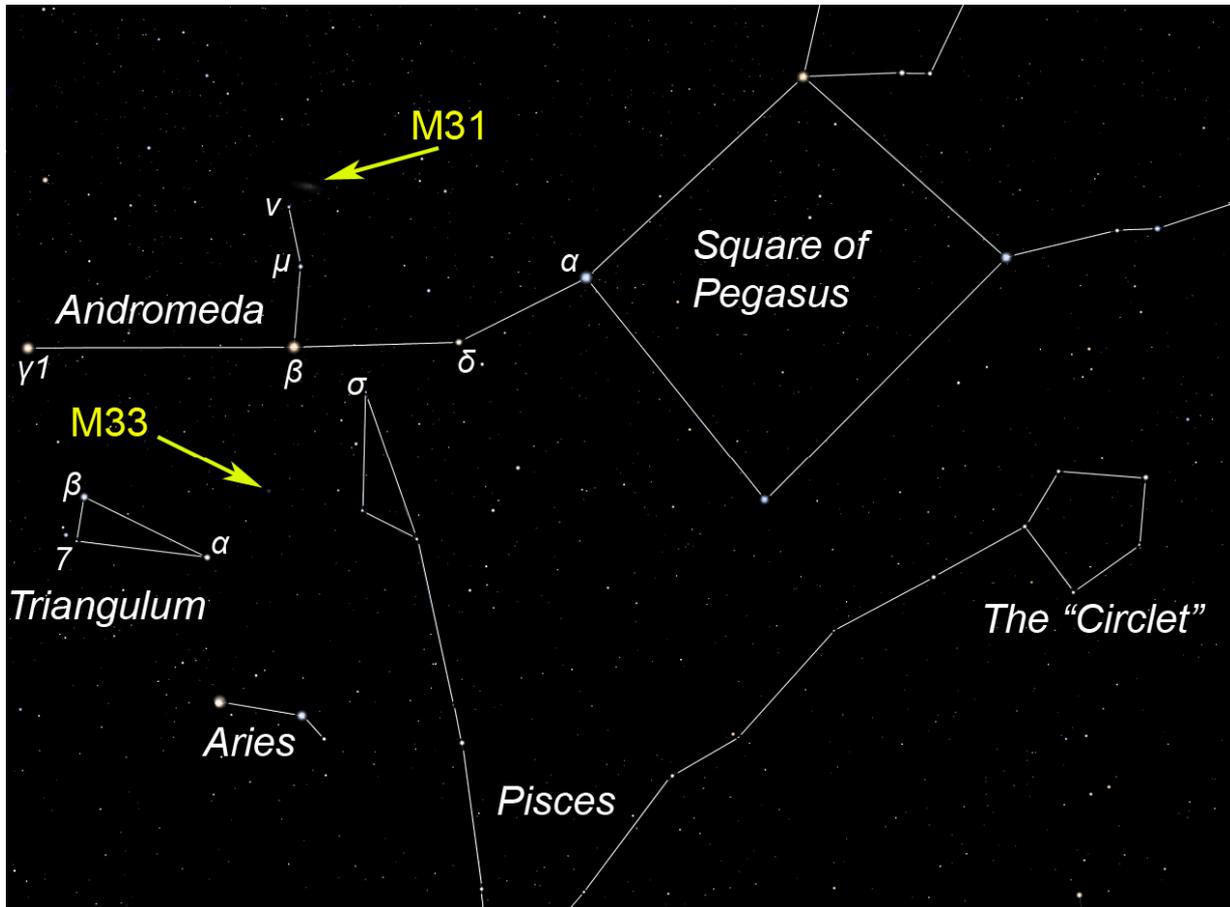
What Objects Can I Look For This Month?

1. M31

As I mentioned above, this is the Great Spiral Galaxy in Andromeda. By 22.00 BST around the middle of the month it is nearly 50° high in the east.



The first map above, shows the general area of sky looking towards the east, which you should use to locate the "Square of Pegasus". Having done this move on to the second map below which shows the area in more detail. From the top left star in the square, which actually belongs to Andromeda, count along the line two stars which brings you to beta (β) Andromedae. Then count two stars again, but this time northwards, and you will arrive at nu (ν) Andromedae. M31 can then be found a little to the north and west of that star.



2. M33 is also known as the Triangulum Galaxy because it lies in that constellation close to the boundary with Pisces. It can be found by drawing an imaginary line between alpha (α) Trianguli and sigma (σ) Piscium. M33 can be found about one third of the way along the line from Triangulum. It is often called the "Pinwheel" galaxy because it presents itself to us as a face-on spiral. It is best seen in binoculars because it appears rather large at 62 x 39 arc minutes.

Astrophotography Evenings

We now have seven names on the list for the astrophotography evenings. If you want to attend but haven't told me yet, please e-mail me your name as soon as possible using the address at the end of this newsletter.

Advanced warning for October

October 25th - Moon occults Saturn

Brian Mills

NASA SPACE PLACE

Droughts, Floods and the Earth's Gravity, by the GRACE of NASA

By Dr. Ethan Siegel

When you think about gravitation here on Earth, you very likely think about how constant it is, at 9.8 m/s² (32 ft/s²). Only, that's not quite right. Depending on how thick the Earth's crust is, whether you're slightly closer to or farther from the Earth's centre, or what the density of the material beneath you is, you'll experience slight variations in Earth's gravity as large as 0.2%, something you'd need to account for if you were a pendulum-clock-maker.

But surprisingly, the amount of water content stored on land in the Earth actually changes the gravity field of where you are by a significant, measurable amount. Over land, water is stored in lakes, rivers, aquifers, soil moisture, snow and glaciers. Even a change of just a few centimetres in the water table of an area can be clearly discerned by our best space-borne mission: NASA's twin Gravity Recovery and Climate Experiment (GRACE) satellites.

Since its 2002 launch, GRACE has seen the water-table-equivalent of the United States (and the rest of the world) change significantly over that time. Groundwater supplies are vital for agriculture and provide half of the world's drinking water. Yet GRACE has seen California's central valley and the southern high plains rapidly deplete their groundwater reserves, endangering a significant portion of the nation's food supply. Meanwhile, the upper Missouri River Basin—recently home to severe flooding—continues to see its water table rise.

NASA's GRACE satellites are the only pieces of equipment currently capable of making these global, precision measurements, providing our best knowledge for mitigating these terrestrial changes. Thanks to GRACE, we've been able to quantify the water loss of the Colorado River Basin (65 cubic kilometres), add months to the lead-time water managers have for flood prediction, and better predict the impacts of droughts worldwide. As NASA scientist Matthew Rodell says, "[W]ithout GRACE we would have no routine,

global measurements of changes in groundwater availability. Other satellites can't do it, and ground-based monitoring is inadequate." Even though the GRACE satellites are nearing the end of their lives, the GRACE Follow-On satellites will be launched in 2017, providing us with this valuable data far into the future. Although the climate is surely changing, it's water availability, not sea level rise, that's the largest near-term danger, and the most important aspect we can work to understand!

Learn more about NASA's GRACE mission here: http://www.nasa.gov/mission_pages/Grace/

Kids can learn all about launching objects into Earth's orbit by shooting a (digital) cannonball on NASA's Space Place website. Check it out at: <http://spaceplace.nasa.gov/how-orbits-work/>

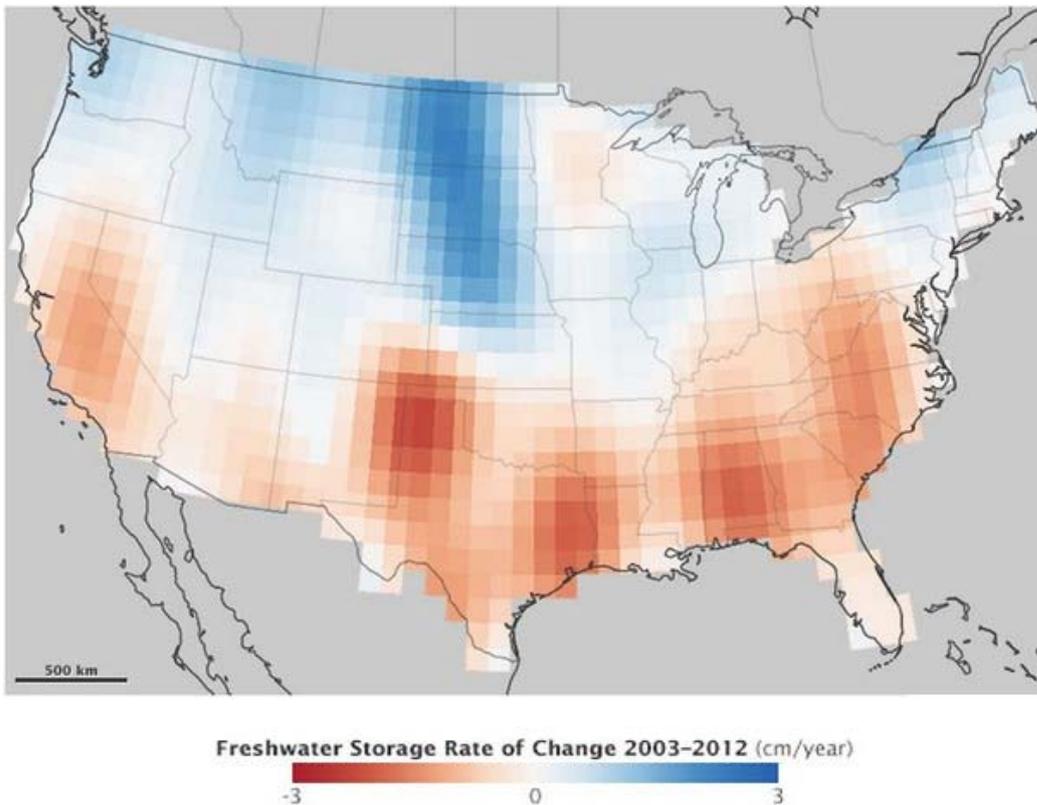


Image credit: NASA Earth Observatory image by Jesse Allen, using GRACE data provide courtesy of Jay Famigleitti, University of California Irvine and Matthew Rodell, NASA Goddard Space Flight Centre. Caption by Holli Riebeck.

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Wadhurst Astronomical Society website:
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Any material for inclusion in the October 2014 Newsletter should be with the Editor by September 28th 2014