



## NRC Publications Archive Archives des publications du CNRC

### **The winter triangle** Tapping, Ken

This publication could be one of several versions: author's original, accepted manuscript or the publisher's version. / La version de cette publication peut être l'une des suivantes : la version prépublication de l'auteur, la version acceptée du manuscrit ou la version de l'éditeur.

For the publisher's version, please access the DOI link below. / Pour consulter la version de l'éditeur, utilisez le lien DOI ci-dessous.

#### **Publisher's version / Version de l'éditeur:**

<https://doi.org/10.4224/23000202>

*Skygazing: Astronomy through the seasons, 2014-12-30*

#### **NRC Publications Record / Notice d'Archives des publications de CNRC:**

<https://nrc-publications.canada.ca/eng/view/object/?id=301bfd1b-d8cd-4170-9b7b-84ee4e95bb25>

<https://publications-cnrc.canada.ca/fra/voir/objet/?id=301bfd1b-d8cd-4170-9b7b-84ee4e95bb25>

Access and use of this website and the material on it are subject to the Terms and Conditions set forth at

<https://nrc-publications.canada.ca/eng/copyright>

READ THESE TERMS AND CONDITIONS CAREFULLY BEFORE USING THIS WEBSITE.

L'accès à ce site Web et l'utilisation de son contenu sont assujettis aux conditions présentées dans le site

<https://publications-cnrc.canada.ca/fra/droits>

LISEZ CES CONDITIONS ATTENTIVEMENT AVANT D'UTILISER CE SITE WEB.

**Questions?** Contact the NRC Publications Archive team at

PublicationsArchive-ArchivesPublications@nrc-cnrc.gc.ca. If you wish to email the authors directly, please see the first page of the publication for their contact information.

**Vous avez des questions?** Nous pouvons vous aider. Pour communiquer directement avec un auteur, consultez la première page de la revue dans laquelle son article a été publié afin de trouver ses coordonnées. Si vous n'arrivez pas à les repérer, communiquez avec nous à PublicationsArchive-ArchivesPublications@nrc-cnrc.gc.ca.



## THE WINTER TRIANGLE

Ken Tapping, 30<sup>th</sup> December, 2014

When we look into the sky on a dark, clear night, we get the impression of staring off into the vastness of space. Actually all the stars we see making up the constellations are in our cosmic backyard. Our galaxy, one of billions, is about 100,000 light years in diameter. That is, it is so large that light takes roughly 100,000 light years to get from one side to the other. In more familiar units, a light year is just under 10,000,000,000,000 km. The most distant galaxies we can see are more than ten billion light years away. The universe is huge. The stars making up our constellations are no more than a few hundred light years away, and most of the brighter stars are less than 50. Most of those stars stand out because they are close, not because they are particularly brilliant by stellar standards

The brightest star in our skies other than the Sun is Sirius, visible in the south-west in the evenings at this time of year. There is no mistaking it. It flashes like a blue-white diamond. Of course the star itself shines a steady bluish white; our turbulent atmosphere provides the light show. The view through binoculars is amazing.

Sirius is the brightest star in the constellation of Canis Major – the Big Dog. It has a mass of about twice that of the Sun and produces 25 times the Sun's energy output. Our Sun puts 1.4 kilowatts into every square metre of the Earth's surface facing the Sun. If we swapped it for Sirius we'd receive 35 kilowatts per square metre; we'd fry. There are stars far more luminous than Sirius. It stands out because it is close, a mere 8.6 light years away from us.

Sirius is one of the three stars known as the Winter Triangle. The other two stars are Procyon, in the constellation of Canis Minor – the Little Dog, and Betelgeux, a red star marking the left shoulder of Orion the Hunter.

If you spot the three stars in a row, marking Orion's belt, higher and to the right of Sirius, and

pointing roughly in its direction, you can easily locate Betelgeux. Then scan left to Procyon, which completes the triangle. There is a summer counterpart – the Summer Triangle, made up of the stars Vega, Capella and Altair.

Procyon looks dimmer than Sirius, and more yellow. It has 1.4 times the Sun's mass and radiates almost seven times as much energy. It too is close to us, about 11.5 light years – on our cosmic doorstep.

Betelgeux, that red star marking Orion's left shoulder, is a different kettle of fish altogether. It is one of a class of stars known as red supergiants. Its colour is even more clearly visible through binoculars. This star lies about 640 light years away, and has an energy output about 100,000 times that of the Sun. Our Sun is turning 4 million tonnes of itself into energy per second. Betelgeux is annihilating 400,000 million tonnes of itself per second. Even though it has about 10 times the mass of the Sun, it is easy to see that it cannot keep this up for long. The Sun has been burning for around 4.5 billion years. Betelgeux cannot be more than about 10 million years old and is unlikely to last another ten million. Our star, along with Sirius and Procyon will end its life by sneezing off its outer layers and cooling off. Betelgeux will end its life in a huge explosion known as a supernova. When this happens, even being 640 light years away will leave us a bit closer than we would like. That explosion could happen any time in the next few million years, so we should enjoy the Winter Triangle while it is still there.

Jupiter lies in the east after dark and by midnight is high in the south-east. The planet looks brighter than Sirius, is higher in the sky and looks more yellowish. It is worth getting out the binoculars to have a look. Mars lies low in the sunset glow. The Moon will be Full on the 4<sup>th</sup> January, 2015.

**Ken Tapping is an astronomer with the National Research Council's Dominion Radio Astrophysical Observatory, Penticton, BC, V2A 6J9.**

**Tel (250) 497-2300, Fax (250) 497-2355**

**E-mail: [ken.tapping@nrc-cnrc.gc.ca](mailto:ken.tapping@nrc-cnrc.gc.ca)**

