

The Winter Sky

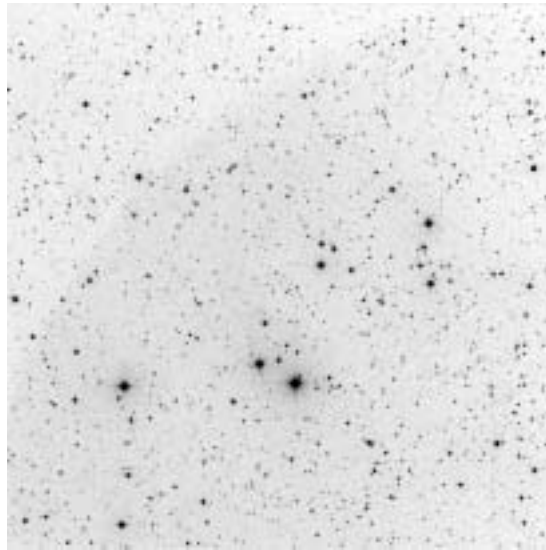
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Fixed Stars

Wherever we look at the winter sky (or any other sky, for that matter) we will see in the immediate neighborhood a region of particular astronomical importance. It will be one of the 206 Selected Areas which are distributed more or less uniformly over the whole sky. They are located in zones of declination separated by fifteen degrees, and in right ascension they are separated by some whole number of hours so chosen that the separation on the sky is no more than fifteen degrees. In this way, no point in the sky is more than eleven degrees from the center of some selected area. Actually, the distribution is slightly irregular because the centers were chosen to be close to cataloged stars, which were to act as markers. The sizes of the areas are undefined and will depend upon the kind of investigation undertaken and the instrument used. On account of the particular interest in the Milky Way, an additional Special Plan was added consisting of 46 areas near the galactic plane. These areas were not uniformly distributed but were centered on regions thought to be of special interest. The Special Plan has not turned out to be particularly useful.

The "Plan of Selected Areas," as it is called, was introduced in 1906 by Jacobus Kapteyn, who is generally recognized as the father of modern Dutch astronomy. Kapteyn's main interest was in the distribution of stars in the Milky Way, and he approached this through star counts, which revealed the density of stars in various directions. Making star counts to different limiting magnitudes gave information on the distribution in depth, or so it was supposed. The latter was a bit misleading because of the failure at the time to recognize the influence of interstellar extinction. Because of this and the absence of good distance calibrations the resulting picture of the Milky Way galaxy, which became known as the "Kapteyn Universe," looked quite unlike our current picture, but it was a great improvement over anything that had preceded it.

About this time, statistical studies of not only the apparent distribution of stars but also their radial velocities, proper motions and spectra were becoming important tools in attempts to understand the nature of the Milky Way system. The large number of observable stars put complete surveys of the sky or even of the Milky Way out of the reach of astronomers, so it was Kapteyn's proposal that surveys be concentrated in selected areas of the sky. In this way studies of different properties could be combined to get the most complete possible picture of a widely distributed sample of stars.



A MIRA research observation of a portion of Selected Area 110, containing a number of photometric standard stars.

During the first half of the twentieth century Kapteyn's plan formed the basis of many coordinated investigations of galactic structure and dynamics. In 1965 the astronomers A. Blaauw and T. Elvius were able to write: "The plan has contributed greatly to the researches which, first, revealed the proper nature of the Galaxy as a stellar system of finite dimensions, and, next, lead to our present knowledge of the detailed properties and space distribution and motions of different components of the galactic population. It continues to be of great significance for galactic research at the present time."

In the last fifty years astronomy has been changing rapidly. As more spectral regions have become accessible, particularly at radio wavelengths and in the infrared, whole new areas of galactic research have opened up, largely displacing the extensive statistical surveys for which the Selected Areas had served so well. Such surveys have also become unpopular because of the requirement by many academic and other employers that astronomers produce a steady stream of papers containing striking new results. This harmful policy makes it impossible for most astronomers to find the time required to collect the large body of data needed for the kind of statistical surveys which have proved so valuable in the past.

In one respect, however, the selected areas remain at the center of our attention. Accurate photometry of stars in

these areas was one aspect of the survey work referred to above. This photometry, which has recently been greatly refined and extended, provides us with accurate photometric sequences distributed over the sky. Anyone doing precision photometry now has access to an adequate number of conveniently located areas containing sequences of well-measured photometric standards. Not all of the 206 selected areas have as yet been measured, but each one in the equatorial zone is now available, and work is continuing in other zones. We are indebted to a number of astronomers for doing this ill-rewarded but very valuable work. Two, in particular, A. Landolt and P.B. Stetson, have devoted large portions of their careers to providing these data, and those of us who use the selected area sequences are particularly grateful to them.

The Plan of Selected Areas has not gone unnoticed at MIRA. Several photometric programs, devoted to young stars, gravitational lenses and, more recently, comets require sequences of standard stars, and for this purpose we have chosen the sequences in eight equatorial Selected Areas spaced at intervals of three hours. This gives us adequate coverage, so that at any time at least two areas are observable. We still have to make magnitude transfers over large distances in order to establish sequences in our observed fields. In an ideal world there would be photometric sequences in all of the Selected Areas, but it will be some time before this utopian situation can be achieved.

Planets

Mercury will be visible with difficulty in the southeastern sky during the morning hours of early January. A much better observing opportunity will be in the second half of February when it will be relatively high in the evening sky. It will be brightest toward the beginning of that period.

Venus will be seen briefly in the evening sky in early January before passing the Sun in inferior conjunction on January 14. Before the end of January it will reappear in the morning sky where it will remain until the end of the summer.

At the beginning of the quarter Mars will be visible during most of the night, but it becomes an evening object later on, as it moves from Aries into Taurus. It is far north of the equator during the whole quarter and thus well placed for northern observers. It is, however, becoming fainter.

Jupiter starts the quarter as a morning sky object, but it becomes visible during more of the night as it approaches opposition. It is stationary in Libra on March 5. It remains quite far south during the whole year.

Saturn is in opposition on January 27 when it will be in Cancer and quite close to Praesepe. It will be observable during the whole night until late in the quarter when it

becomes an evening object. It will be 20 degrees north of the equator and thus very accessible to northern observers.

Meteor Showers

By far the best of the winter showers in the Quadrants. This is a shower of short duration which should peak about noon on January 3. Although the very narrow peak will not be observable from our region, the fainter (mainly telescopic) meteors may peak a half day earlier. The best time to observe this shower will be in the early morning of January 3. The moon will not be a problem.

The delta-Leonids are a very sparse shower which should peak around February 24. The moon will be approaching new and will not interfere.

The Virginid complex, of which the delta-Leonids may be a part, will last from late January through mid April. There may be maxima toward the end of January and again during March.

Other showers are either too far south for northern observers (the alpha-Centaurids) or are spoiled by moonlight.

Comets

Probably the best comet in the winter sky will be C/2005 E2 (McNaught). This comet is still approaching perihelion, and it should reach about magnitude 10 before it disappears into the evening twilight at the end of March.

Comet C/2004 B1 (LINEAR) was expected to reach magnitude 9 in the spring, but it is brightening only slowly and will probably not become brighter than magnitude 11. Furthermore, it will not become visible from the northern hemisphere until the end of March, when it will already be fading.

Periodic comet 73P/Schwassmann-Wachmann 3 has divided into several components, of which component C was recovered in October. It is expected to pass very close to the Earth in May, when it may reach magnitude 2. It will be interesting to watch it brighten from an expected magnitude 14 in January.

Eclipses

There will be a penumbral eclipse of the moon (a rather unexciting event) on March 14, but the eclipse will be practically over when the moon rises in our neighborhood, so there will be nothing to see.

A total eclipse of the sun will take place during the night of March 28-29 (our time). Since we will be unable to see anything of this eclipse from our neighborhood, a select group of MIRA friends will be traveling to the eastern Mediterranean where they will view the eclipse from shipboard. The path of totality starts near the eastern point of Brazil and then crosses the Atlantic to central Africa and Egypt, crossing Turkey and southern Russia to reach its endpoint in central Asia.