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SN 1006 and other historical supernovae

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Abstract. The supernova which appeared in AD 1006 is unique in history for its brilliance, duration of visibility, and the interest it aroused. Almost thirty separate records of the star are preserved from various parts of the world. This paper briefly summarizes historical records of SN 1006 and discusses the prospects of uncovering further historical records of supernovae.

Among the many temporary stars observed over the past 1500 years, only five Galactic supernova can be confidently identified. These events occurred in the years AD 1006, 1054, 1181, 1572 and 1604. All five stars remained visible for many months. SN 1006 was by far the most brilliant of these objects. Several observers compared its brightness with that of the Moon (!), and the star continued to seen for more than three years after it was first sighted on 30 April in AD 1006. No other Galactic supernova attracted so much attention worldwide; almost thirty separate records are preserved from East Asia, the Arab dominions and Europe.

Chinese astronomers measured the RA of the supernova as 3 degrees east of the reference star α Lib, while in Egypt the longitude of the star was estimated as the 15th degree of Scorpio. As seen from St Gallen in Switzerland, the supernova appears to have skimmed the mountainous horizon, thus setting a southerly limit to its declination. Combining these various observations and adjusting for precession, the location of the supernova at the epoch J2000 may be estimated as within 1 or 2 degrees of a site with RA $15^{\rm h}15^{\rm m}$ and declination $-43°$. The galactic latitude is thus very high (approximately $+13°$) and only two known supernova remnants lie in this vicinity. These are G330.0+15.0 and G327.6+14.6. The former remnant (the Lupus Loop) is very large and faint and is much too old to be associated with SN 1006. However, in the case of the latter remnant (= PKS 1459−41), an age of a thousand years is quite acceptable.

The locations and changing brightness of the supernovae of AD 1572 and 1604 were carefully measured by European astronomers and some valuable Korean observations of the latter event are also preserved. There can be no doubt about the identity of their remnants (respectively G120.1+1.4 and G4.5+6.8). Both of the the supernovae occurring in AD 1054 and 1181 were almost exclusivly observed in China and Japan, but in each case a substantial number of records is preserved leading to confident identification of the remnants (G184.6−5.8 and G130.7+3.1). Studies of historical records of temporary stars of long duration which appeared in earlier centuries have revealed a few further supernova candidates, notably those of AD 185 and 393. Regrettably the reported positional information is poor and so far it has not proved possible to locate a unique remnant.

More than two hundred Galactic supernova remnants have been catalogued, based on their radio and X-ray properties. In recent years several attempts have been made to select a specific supernova remnant and search historical records for possible observations of the original outburst. However, this technique is of limited utility. Most early records of "new stars" give no indication of the duration of visibility, while positional descriptions are usually fairly vague. As a result, the probability of chance coincidences in position – leading to misidentification – is high.