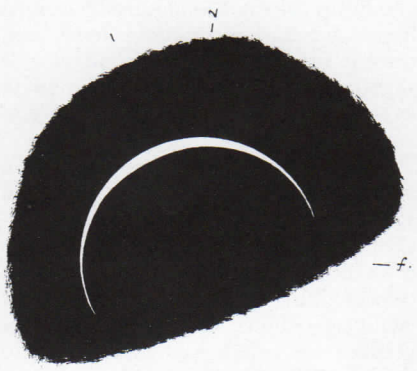
▶ 'central branch' of a SEB Revival. There is also a typical 'northern branch', i.e. a dark SEB(N) with p. end moving faster (−5.1 deg/day).

Typical Revivals also have a 'southern branch', of dark spots retrograding on the SEBs jetstream, but this has not appeared – presumably because it is obstructed by the GRS, which is still a dark red oval. However, the GRS has shifted up about 3 degrees (from λ_2 43 to λ_2 46) and has become somewhat streaky, and the Red Spot Hollow has become disturbed. It will be interesting to see whether the GRS changes and whether the SEB(S) manages to revive f. it, and whether this reveals more about the putative circulations in the STropZ. By the time you read this, the face of the planet will probably have undergone yet more striking changes.

John Rogers, *Jupiter Section Director*



Venus 1993 March 22, 11.30 UT. Narrowing crescent as planet approaches inferior conjunction. Apparent angular diameter 56″.1. Drawing by Harold Hill using 8.25-inch Schmidt–Cass.

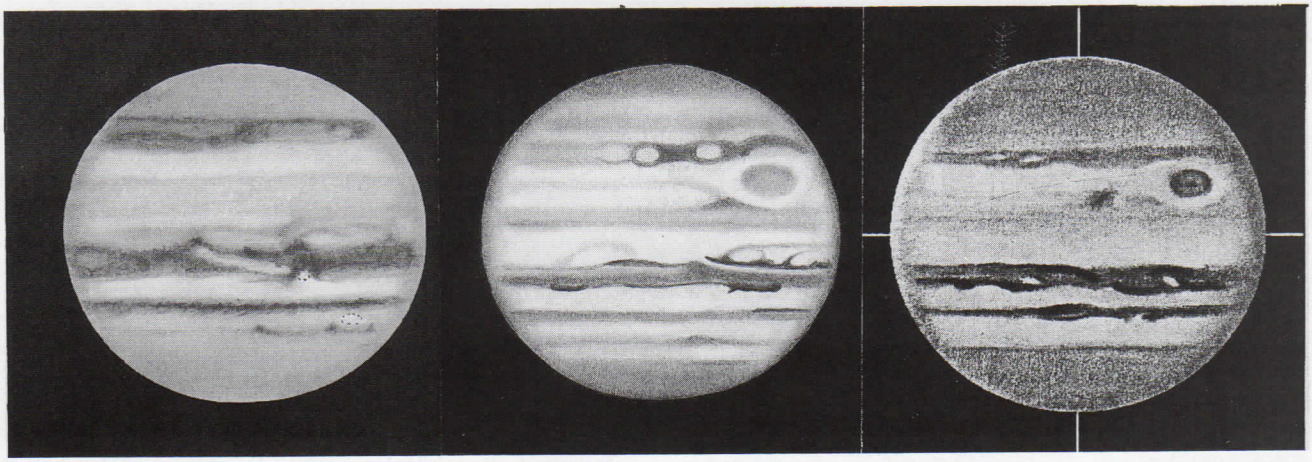
Exciting events on Jupiter

The remarkable disturbances on Jupiter, in 1993 April, could not have come at a better time. The biggest event, the SEB Revival, began on April 6–7 with the planet more favourably placed than it will be for several years hereafter, and just at the start of an International Jupiter Watch planned for April 15–30. The Jupiter Watch was organised by Dr Glenn Orton of the Jet Propulsion Laboratory to coordinate professional observations of the planet and its magnetosphere, and the BAA was invited to contribute observations. Many visual observers have done their bit, not only from the UK but also from Spain, Italy, Belgium, Germany, and Japan. Photographs have been produced by Jean Dragesco and Isao Miyazaki, and CCD images by Terry Platt. As it turned out, all these observations were valuable because events have developed so rapidly. This interim report summarises what happened up to early May.

Even before the SEB Revival, there was remarkable activity in three other regions of the planet: the STB, the STropZ, and the NEB/NTropZ.

The STB had been virtually absent for several years, but in late 1992 it was seen to be reviving, in three dark segments that also covered the STZ. One began at white ovals BC and DE, and extended past the GRS; the second was following white oval FA; and the third was new, and has grown rapidly longer at both ends, extending past light ovals in the STZ. Although the STB is still uneven and some dark sectors have transiently faded again, overall the belt has continued to revive and is now almost continuous around the planet. Longitudes (λ_2) at opposition on March 30 were as follows: oval BC, 350; DE, 14; FA, 106; third dark sector, 190–244 (extending to 165–260). These features were moving with the S. Temperate Current at about −12 deg/mth, as usual.

The STropZ has several bright sectors which approximately coincide with the reviving dark sectors of STB. Photographs show that the p. ends of the bright sectors are bounded by dusky features that resemble the f. ends of S Tropical Disturbances, near System II longitudes 80, 150, and 335. Their shape suggests that they may be sites of ▶



Figs. 1–3. Fig. 1 shows the eruption in the NEB/NTropZ. Figs. 2–6 show how the SEB Revival developed; each shows the GRS on the f. side, and ovals BC and DE in the STB. **Fig. 1 (left):** 1993 March 22d 23h 42m, ω_1 100, ω_2 245; *R. Bullen* (216-mm reflector). Shows the NEB eruption and NNTBs jetstream spots. **Fig. 2 (centre):** March 6d 23h 55m, ω_1 99, ω_2 6; *D. Gray* (415-mm reflector). Before the SEB Revival, there was a grey streak in the SEB Np. the GRS (as in 1990). **Fig. 3 (right):** 1993 April 9d 22h 04m, ω_1 5, ω_2 13; *A. Nikolai* (Berlin). Shows the start of the SEB Revival.

▶ anti-cyclonic circulation across the zone. The first of these developed from a faint streak on SEBs at the f. edge of a white oval; the second developed from a faint spot on STBn. Both have prograding drifts typical of S Tropical Disturbances (−5, −6 deg/mth), and the second one is linked to p. ends of darker STB and SEB (even before the classical SEB Revival began). Thus the sector from λ_2 170–250, with dark STB and brilliant STropZ and bluish-grey SEB, contrasts strikingly with the dull, low-contrast sectors p. and f. it.

Conversely the third feature resembled a S Tropical Disturbance only transiently, and has a slight positive drift (λ_2 330 at opposition, +4.5 deg/mth), but there is good evidence for a circulating current in its vicinity. The first sign of it was a faint dusky streak in the STropZ at λ_2 324 in early February, which may have been the successor to a long-lived white spot that was tracked from 1987 to 1992. A small dark spot in northern STropZ (spot X) seems to have retrograded past it at +87 deg/mth, then halted and swung south around February 4 at λ_2 344, then come back along STBn in mid-February, and merged with the pre-existing dusky streak in early March, to form a feature that resembled the f. end of a S Tropical Disturbance, complete with a white oval f. it, which marked the path of circulation of spot X. But since then, this dusky feature has rounded up to become a dark oval (in photos), which appears red in large reflectors (Zac Pujic in Australia, and suspected by the author), maintaining exactly the same course as the original long-lived white spot. So it seems to have become an anticyclonic Little Red Spot!

The EZ(N) has become rather shaded, and some sectors appear slightly ochre to the author; this colour remains unconfirmed. The NEBs edge was rather quiet and diffuse at some longitudes, but some impressive dark projections have been present in April. The NTropZ is also slightly shaded and distinctly yellowish at some longitudes, according to several visual observers.

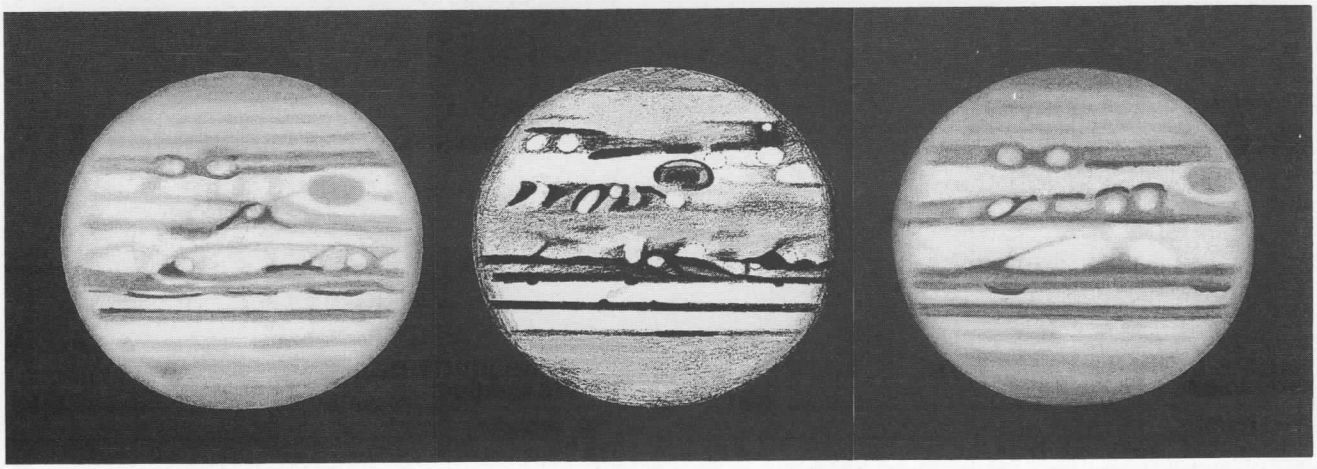
There was an unprecedented eruption in the NEB/NTropZ at λ_2 250 on March 19–22. This arose at the f. end of a pre-existing bright 'rift' in the NEB. The most obvious product of the eruption (reported first by Terry Broadbank, and beautifully shown in Miyazaki's photographs) was a dark spot expanding into the NTropZ at λ_2 257 on March 19–22. This dark spot faded somewhat in early April as it rapidly overtook a bright oval in NTropZ, but remained faintly visible and moving at −14 deg/mth thereafter. The eruption simultaneously produced a spectacularly bright 'rift' expanding p. in the NEB. This soon broke up into several oddly-shaped white spots, and its Nf. end has persisted as a very bright spot in northern NEB moving at −35 deg/mth, at least until April 22. The eruption also produced a third, retrograding branch: a chain of small dark spots expanding in the f. direction on the NEBn edge. The individual spots had only slow drifts but the chain as a whole lengthened at roughly +63 deg/mth. In conclusion, this eruption is similar both to SEB outbreaks and to the more continuous activity that was observed in the NEB by Voyager, with a modestly prograding source region producing both prograding bright rifts and disturbance on the retrograding NEBn jetstream.

The SEB was very faint in late 1992, and the GRS became a vividly red oval. Now it has begun to recover, in a classical Revival starting from a single energetic source.

The SEB Revival began on April 6–7, immediately p. the GRS. The earliest report was by Franco Balella on April 7d 20h, when the source appeared as a dark streak across the SEB at λ_2 = 21 with a white spot p. it. There were several independent discoveries of the source on April 7–10, plus several other observations at the same time which were not recognised nor reported until later. Spanish observers report it visible on a CCD image on April 6d 23h, when it just consisted of a dark spot at latitude 10°S (A. Sanchez-Lavega, report to International Jupiter Watch).

The initial longitude was interesting for two reasons. Firstly, it was only a few degrees f. the track of a tiny dark spot at 17°S, which was drifting at +9.5 deg/mth in March; the Voyager spacecraft had observed a SEB white spot outbreak starting in the centre of a similar spot. Secondly, the longitude confirmed a theory of permanent subsurface 'sources' proposed by E. J. Reese in 1972; the outbreak started only 7° f. Reese's hypothetical locus B. The 1990 outbreak also started close to Reese locus B. This is the first SEB Revival to have appeared imnmediately p. the GRS (though the 1975 one started immediately f. the GRS). As this region is so perturbed by the GRS circulation on the surface, a source appearing here is striking evidence for the deep-seated focal nature of these sources.

Over the first week the initial streak, very dark and bluish, decreased in longitude at −1.6 deg/day, with a bright spot p. it. Further bright spots with dark streaks appeared near the original site over the next two weeks, moving at −2.5 deg/day. By the end of April, the SEB had revived for 70 degrees p. the Red Spot Hollow and was quite disturbed. On May 3–6, several observers remarked on an impressive chain of 6 white spots that had appeared throughout the revived SEB; they moved at −1.7 deg/day. All this is quite typical of the ▶



Figs. 4–6. The SEB Revival. **Fig. 4 (left):** 1993 April 14d 21h 15m, ω_1 45, ω_2 15; *D. Gray*. **Fig. 5 (centre):** May 6d 19h 54m, ω_1 231, ω_2 33; *J. Rogers* (320-mm refractor). **Fig. 6 (right):** 1993 May 8d 20h 50m, ω_1 221, ω_2 8; *D. Gray*.