Figure 2: *The disk of Jupiter on July 23, 1994, 23:17 UT. Impact site A was almost on the sub-solar meridian and can still be seen more than 7 days after the initial impact.*

changes in the brightness of the impact sites are also of considerable interest. The observations through different filters will allow an estimate of the scattering properties of the aerosols produced by the impacts. Models currently being used by us to determine the effects of aerosols on Martian surface photometry will be useful in this study.

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The Distribution of Near-IR Emissions in the Jovian Stratosphere Caused by the SL-9 Impact

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Between July 16 and 31, Jupiter was monitored spectroscopically in the near-IR with the IRSPEC spectrometer at the 3.5-m New Technology Telescope (see Encrenaz et al., this issue). During the week of impacts, the 4.″4 slit was aligned along the parallel of the impact sites (lat.: –44°) allowing a spatial analysis in this direction. Starting on July 23, we also observed the counterpart of the impact region in the northern hemisphere (lat.: +44°) and proceeded with a mapping of the entire planet. Data were recorded in several spectral regions between 2 μm and 5 μm with preference to the regions around the the H_3^+ multiplet at 3.5 μm and the H_2 S(1) quadrupole line at 2.12 μm attributed to the Jovian stratosphere.

1. Observations During the Impact Week (July 16–22, 1994)

On July 16, 23:13 UT, we started observing the phenomena in the Jovian stratosphere resulting from the impacts. The impact regions of fragments A to H were monitored in the ranges 2.107 μm–2.135 μm and 3.501 μm–3.566 μm. Due to bad weather we had to interrupt our observations and could resume only on July 22 after the final impact had taken place. Our last useful observation during the week of impact was taken on July 18, 20:24 UT. However, we were able to obtain spectra at the impact times of fragments B, F, and H. The impact of B was observed at 2.12 μm and H was watched in the 3.5 μm region. For impact F we recorded data in three spectral regions (3.3 μm, 3.5 μm, 2.1 μm) until three hours after impact. No H_3^+ was detected in the 3.5 μm observations of impact regions H and F within about an hour after the event, whereas it was clearly present in more evolved impact regions. For more details on impact H see Encrenaz et al., this issue. Figure 1 shows a spatially resolved spectrum obtained at 2.1 μm about 2 hours after impact F. Since fragment F almost fell on impact site E, both sites lie side by side very close together and can only be distinguished by their distinctly different spectra in the 2.1 μm region. As demonstrated in Figure 2 the spectrum of F is characterized by a strong featureless continuum, whereas the already evolved site E

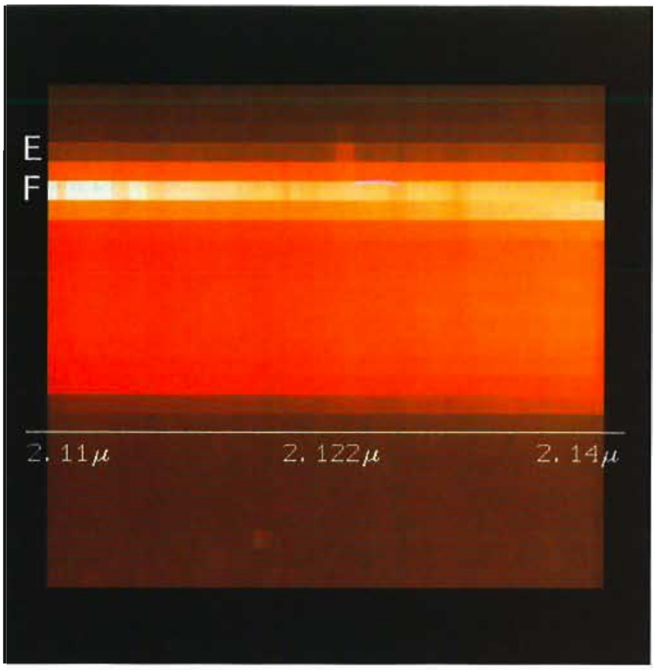

Figure 1: *A spatially resolved spectrum showing impact sites E and F in the 2.1 μm range about 2 hours after impact F (July 18, 2:34 UT).*

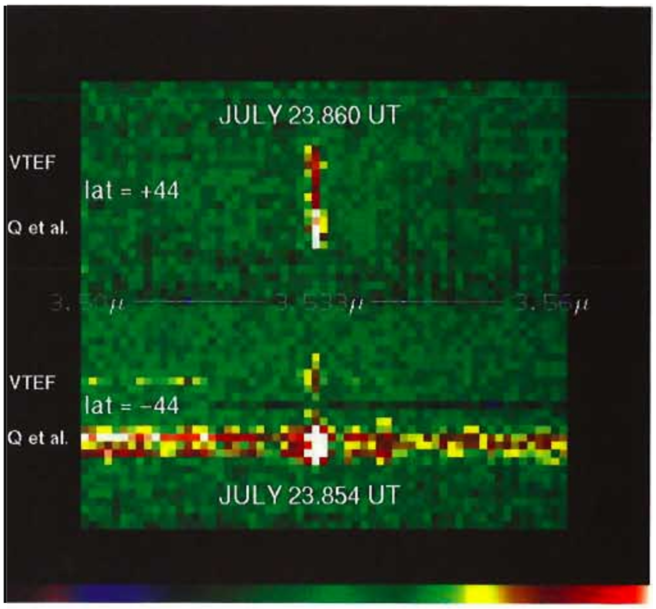

Figure 3: Emissions in the 3.5 μm range at the impact sites (lat. = −44°) and their northern counterparts (lat. = +44°). The intensity of the emissions is enhanced at the longitudes of impact sites of fragments Q_1, Q_2, N, R, S, D, G, B and V, T, E, F. See text for details.

showed little continuum, but a strong H_2 line.

2. Emissions in the Northern Hemisphere

After July 22, emissions clearly associated to the impacts were detected in the 2.1 μm and 3.5 μm regions also in the northern hemisphere (lat.: +44°). Figure 3 shows one example for the emissions detected in the northern hemisphere (upper half) in comparison to those present at −44° latitude (lower half). Both latitudes on the Jovian disk shown in Figure 3 are spatially resolved in longitude (y-axis). The H_3^+ emission line at 3.533 μm in the northern hemisphere is clearly enhanced at the longitudes of the impact sites visible in the southern half of Jupiter. The main difference between the spectra of the impact regions and their northern counterparts is the lack of continuum in the latter. However, the comparison of the longitudal distribution of the 3.533 μm H_3^+ emission at the latitude of the impacts and its northern counterpart clearly indicates a connection between the emissions at +44° and the impact sites. They could result from the transfer of charged particles along the Jovian magnetic field lines. For a more detailed study the entire planet was mapped in the 2.1 μm and 3.5 μm regions simply by scanning the planet along its rotational axis from pole to pole. The evaluation of the data in the 2.1 μm region and the construction of the maps is still in progess. However, the preliminary analysis showed that the H_3^+ emission was, as expected, strongest in the auroral regions where its was uniformly distributed. It was also strong at the impact sites and their northern counterparts. Apart from these regions it was extremely weak, although the strongest H_3^+ line at 3.533 μm could be detected at all latitudes. In the equatorial region the spectra around 3.5 μm exhibit two additional lines, which are still to be identified.

The mapping of the planet continued until July 31, 1994, when the impact sites and their northern counterparts were still observable. Thus, the maps of the Jovian disk provide information on the spatial and temporal evolution not only of the impact sites and their counterparts in the northern hemisphere, but on the entire planet in two different spectral regions.

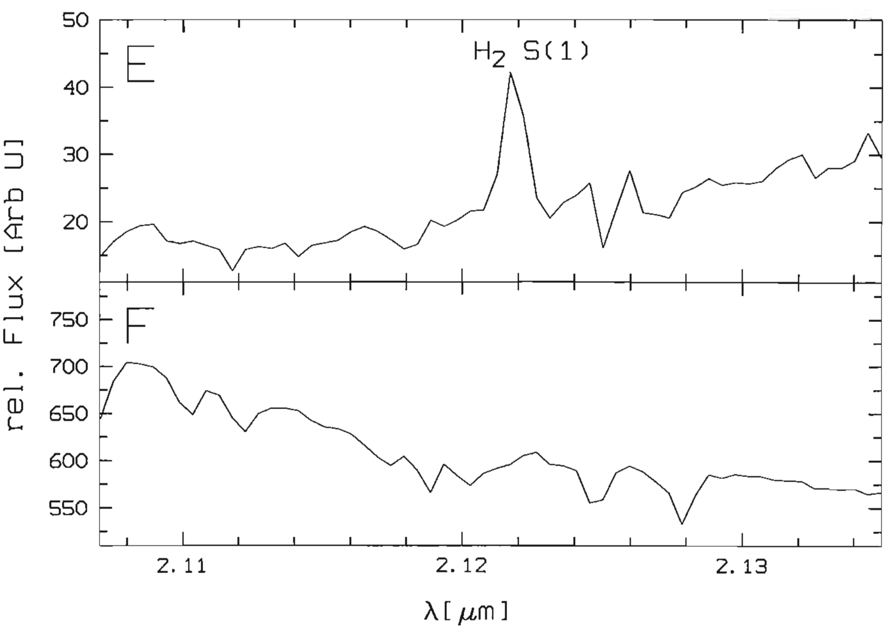

Figure 2: *One-dimensional scans through the spectrum of impact regions E and F shown in Figure 1.*

References

Encrenaz et al., *The Messenger*, this issue.