percentage of it really survives and is ejected into the interstellar medium? What is the characteristic life-time for AGB stars' Li production scenario? These and others are some of the questions we would like to answer with our observational and theoretical studies of Li in AGB stars.

Acknowledgements

It is a pleasure to thank B. Gustafsson and K. Ericksson for providing us the stellar models of C stars. HB is Boursier I.R.S.I.A. and CA is partially supported by an FPI of the MEC of Spain.

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Saturn's Bright Spot

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A very large, white spot has recently appeared on the giant planet Saturn. It is probably a great storm in the planet's atmosphere, which has been initiated by upwelling of clouds from the lower layers into the uppermost regions. The spot began as a small, white feature in Saturn's northern hemisphere and has since developed rapidly so that it now appears to completely encircle the planet's equatorial regions. "Great White Spots" have been seen on Saturn in 1876, 1903, 1933 and 1960 (see below), but the present one seems to be the biggest of them all.

At this moment Saturn is situated in the southern constellation of Sagittarius and is therefore best observed with southern telescopes. It has been monitored at the ESO La Silla Observatory since early October. Most of the observations have been made with the ESO NTT (both EFOSC 2 and EMMI) and later, with the ESO/MPI 2.2-m telescope.

As Saturn is a very bright object, the main problem was to avoid saturation of the CCD. This was solved by using very short exposure times and/or narrow-band filters. Table 1 gives the observational data. Isophotal contours have been plotted, and transferred to the coordinates system of Saturn (using a perspective scale grid as described in [1]). As this planet has a strong differential rotation (the period varies from 10 hrs 10 min to 10 hrs 50 min, depending on the latitude), the longitude definition is not an easy problem. The "System I" [2] was chosen; it is fixed to the equatorial belt, and its period of rotation is 10 hrs 14 min. As the spot is located in that region, this system is rather well suited. The longitudes were taken from the Astronomical Almanac 1990 [3].

For each image, the isophotes of the region of latitude between −30° and +30° are plotted in Figure 1. The limbs of the planet and the position of the rings are also indicated. Saturn presents an important limb darkening, which affects of course also the spot's isophotes. This effect has not been corrected. The visual observations reported in the IAU telegrams (# 5109, 5111 and 5115) are also plotted.

Development of the Spot

The new phenomenon was first reported on September 25, 1990 by astronomers at the Las Cruces Observatory in New Mexico, USA, as a white spot at northern latitude +12°. It was watched by many amateur astronomers in various countries as it slowly grew in size to about 20,000 km on October 2. Further observations determined the spot's rotation period to about 10 hrs 17 min, that is somewhat slower than the surrounding atmosphere.

During the next days the spot became longer and longer and by October 10, its length was approximately half of Saturn's visible diameter. After that it continued to expand and on exposures made at ESO from October 23 onwards it encircles the entire planet as a bright equatorial band. At the same time, several new intensively bright spots have been sighted inside the larger feature; they are now being followed with great interest. There is no indication yet that the phenomenon has started to fade away.

Earlier Spots

New spots on Saturn are not so common: only a few dozens have been observed from the Earth during the past 200 years and only about ten of them were enough contrasted and lasted long enough to give good positional measurements [4]. Most of them were quite small (5000 to 15,000 km), brown,

TABLE 1: *Selected Observations*

Date	Hour (UT)	Telescope	Instrument	Filter	Exp. time
10 01	22:49	*			
10 02	19:36	*			
10 03	05:44	*			
10 04	02:18	*			
10 08	00:00	NTT	EFOSC2	U	0.5s
10 10	02:40	NTT	EFOSC2	U	0.5s
10 16	00:00	NTT	EMMI-B	HeII	1s
10 17	00:04	NTT	EMMI-B	HeII	1s
10 19	02:47	NTT	EMMI-R	SII	1s
10 21	00:00	2.2-m	Adapt.	NU	15s
10 21	23:45	2.2-m	Adapt.	NU	10s
10 23	00:01	2.2-m	Adapt.	NU	10s

Comments: * Visual observation reported in IAU Circulars. – U: Johnson filter. – HeII: Narrow band around 4686 Å. – SII: Narrow band centred around 6732 Å. – NU: Narrow band centred around 3875 Å.

yellow or white, and they lasted for only a few rotations of the planet. Sometimes a spot may last several weeks or even more [5] [6]. The largest ovals are much smaller than those of Jupiter [7]. Most of the oval spots of Saturn are anticyclonic regions, only a few are cyclonic [7].

Four of the earlier spots are referred to as "Great White Spots", but none appears to have approached the enormous size of the present spot. We are therefore witnessing a very rare event.

The first known Great White Spot was detected in December 1876 by American astronomer Asaph Hall in Washington D.C. and the next one was found in June 1903 by E.E. Barnard with the 40-inch refractor at Yerkes Observatory, near Williams Bay, Wisconsin. The third and fourth were both found by eagle-eyed amateurs; in August 1933 by Will Hay in England, and in March 1960 by J.H. Botham in South Africa. All of these spots were seen in the northern hemisphere of Saturn: those in 1876 and 1933 at about the same latitude as the present one, while the two others were further north at +40° (1903) and +58° (1960).

What is a "Great White Spot"?

Detailed observations of the giant planets Jupiter and Saturn have been made since the invention of the astronomical telescope in the early 17th century. The "meteorological" studies of their atmospheres took a great stride forward during the flybys of the Pioneer and Voyager spacecraft, from which accurate measurements were made at close distance.

It has long been known that the "surface" of Jupiter shows many more bands and whirls than that of Saturn; this is now explained by the presence in the Saturnian atmosphere of a high layer of aerosols (small solid particles) and haze (liquid drops) which hide the view of the patterns of streams and turbulence below.

The five Great White Spots have appeared with amazing regularity, about once every thirty years, that is with the same period as the orbital revolution around the Sun. Moreover, these spots have all developed near the moment of Saturnian "mid-summer" in the northern hemisphere, when the insolation (amount of solar energy received) is the greatest possible here. It is therefore obvious that the emergence of large spots in the north must be triggered by some mechanism that is related to heating of the atmosphere.

Most planetary astronomers agree that the Great White Spots are upwellings from the lower atmosphere, where-

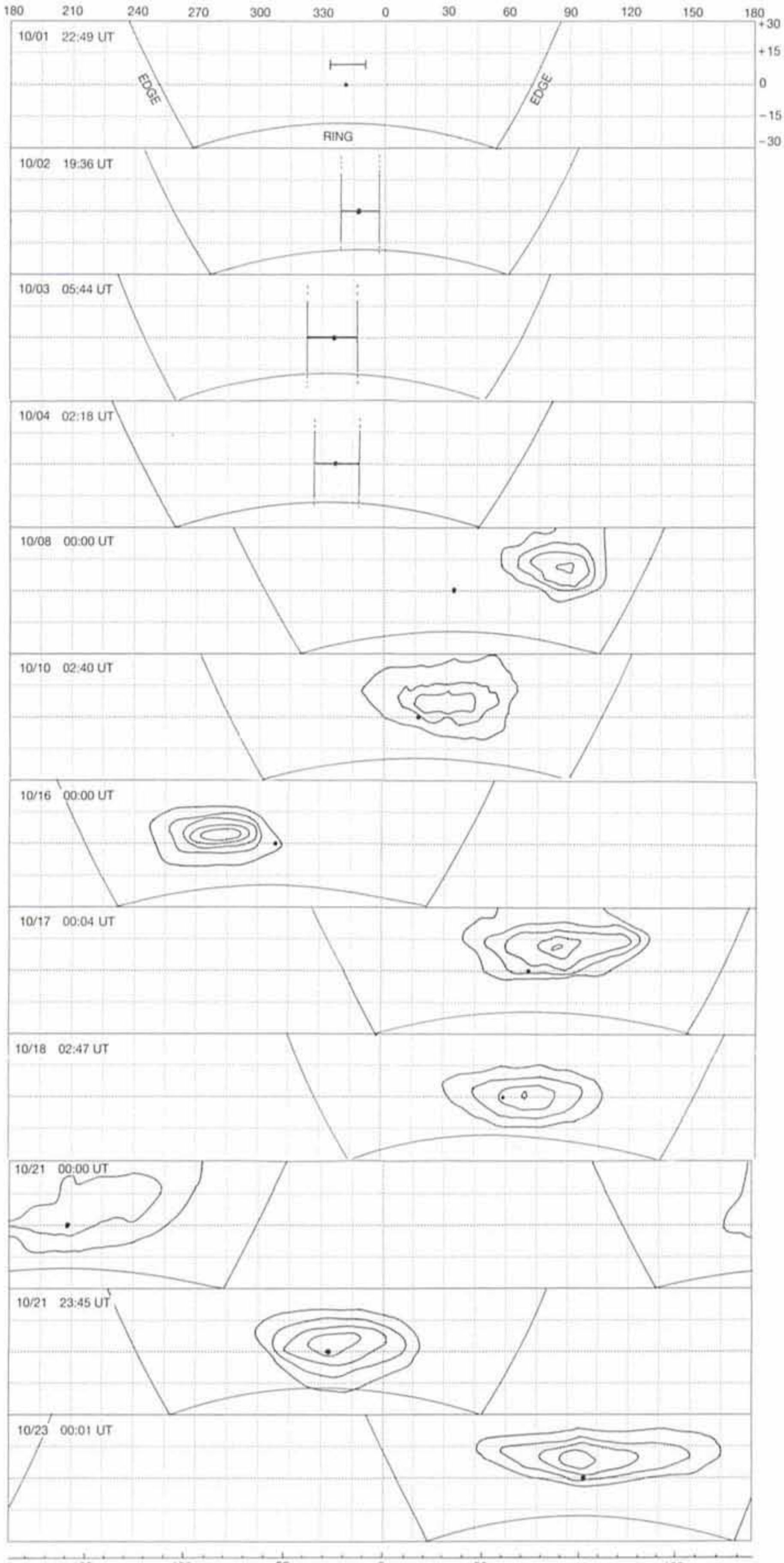

Figure 1: *Isophotal contours of the equatorial region of Saturn. The isophotes have been transferred to the System I of coordinates (top and right scales). The bottom scale is graduated in kilometres for the equator. The big dot indicates the central meridian position. The limbs of the planet and the position of the rings have been indicated. The typical seeing was around 1", or 7500 km close to the sub Earth point.*

by large clouds move upwards and become visible when they penetrate the uppermost, hazy layers. They resemble the towering cumulonimbus clouds often seen in the Earth's atmosphere. However, the lifting mechanism is not yet known; one possibility is that their upward motion is due to the release of heat by water condensation, perhaps in combination with strong updrafts from sublimating ammonia grains.

The spots become longer as the clouds are carried along by strong winds in the upper atmosphere. Eddies and whirl patterns undoubtedly develop because ot the different wind velocities at different latitudes, but due to their smaller size they are very difficult to observe from the Earth. This may imply that the spots, perhaps in particular those which have emerged more recently, are actually gigantic storm centres, just like the Giant Red Spot on Jupiter, that has now been visible for almost 400 years.

Since the Great White Spots on Saturn last much shorter, in the past cases at the most a few months, it will now be very interesting to follow the new one during some time to learn exactly how it disappears. Observations are therefore continuing at ESO as well as at other observatories.

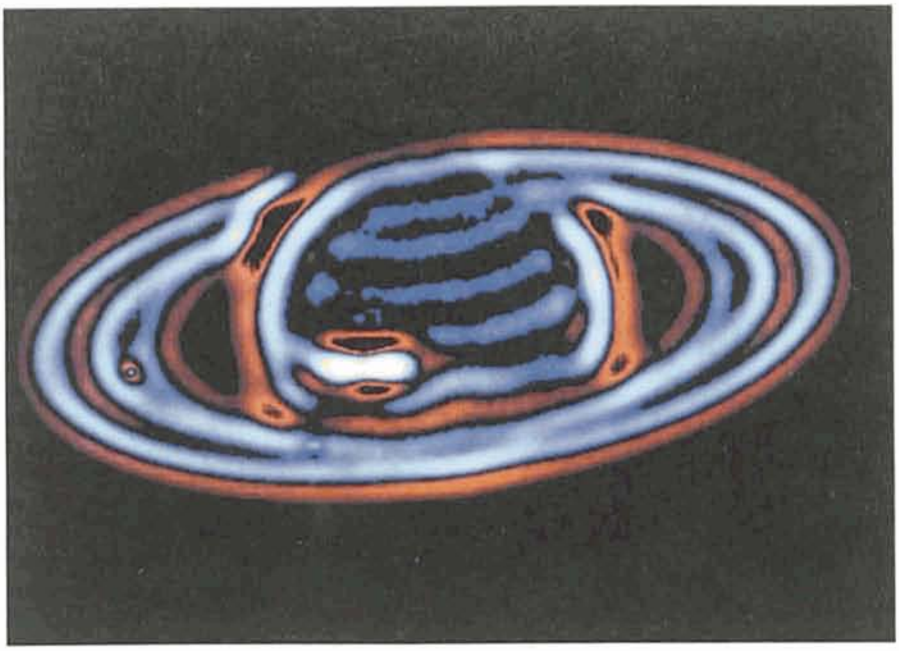

Figure 2: *This picture of Saturn and the Giant White Spot was obtained with the ESO New Technology Telescope on October 16, 1990 at UT 0 hrs 0 min. It is a 1-sec exposure through a 6-nm-wide filter, centred in the blue spectral region at 468 nm. North is approximately up and East is to the left. The seeing conditions were mediocre (~ 1.1 arcsecond), and the false-colour reproduction shown here has been subjected to computer processing by D. Baade at the ESO Headquarters, according to an advanced algorithm, developed by L. Lucy; this has resulted in a sharpening to about 0.4 arcseconds. To "flatten" the image, the original image was subtracted from the "sharpened", so that even small details become well visible. On this date the spot had a double structure, it extended to the equator and had already grown significantly in length. The various atmospheric bands are also well visible.*

Acknowledgements

I'm very grateful to S. D'Odorico, who took the EMMI images, and to A. Gemmo and A. Iovino, who kindly agreed to give me some of their observing time at the 2.2-m telescope.

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NEWS ON ESO INSTRUMENTATION

EMMI Through the Last Tests Before Entering Regular Use

At the end of September 1990, a new HP A900 computer dedicated to the control of instruments and to data acquisition was installed at the NTT. It is linked to the existing A900 which continues to take care of the telescope and the adaptor operation. Following this installation, the EMMI control software was further debugged and tested. The user interface was installed for the first time: it is based on a new concept and makes use of different menus and forms displayed on the RAMTEK and selected via a mouse. The overall control system performed in a reliable way but a number of improvements to make the system more robust and easier to use were suggested by the first observers and will be implemented early in 1991. Some 14 nights and days were intensively used for technical and astronomical tests and for training of the technical and astronomy staff of La Silla.

In addition to the observing modes described in the September issue of the *Messenger* (No. 61, p. 51) two new ones were successfully tested: the high-resolution echelle in the red arm (resolving power 28,000 with 1 arcsec slit) and the on-line slit punching device. The installation of the echelle requires the dismounting of the standard grating unit, an operation which takes a few hours and has to be planned in advance. The slit punching machine (PUMA3) is mounted on a x-y table in the instrument itself. Thin plates can be inserted in the different positions of the aperture wheel (up to 4 available) and slits of 7.5 × 1.2 arsec can be punched on the plates at positions measured on a direct image taken earlier with the same instrument.