

## SPECTROSCOPIC OBSERVATION OF THE SOLAR ACTIVE REGIONS IN HeI 10830 Å LINE

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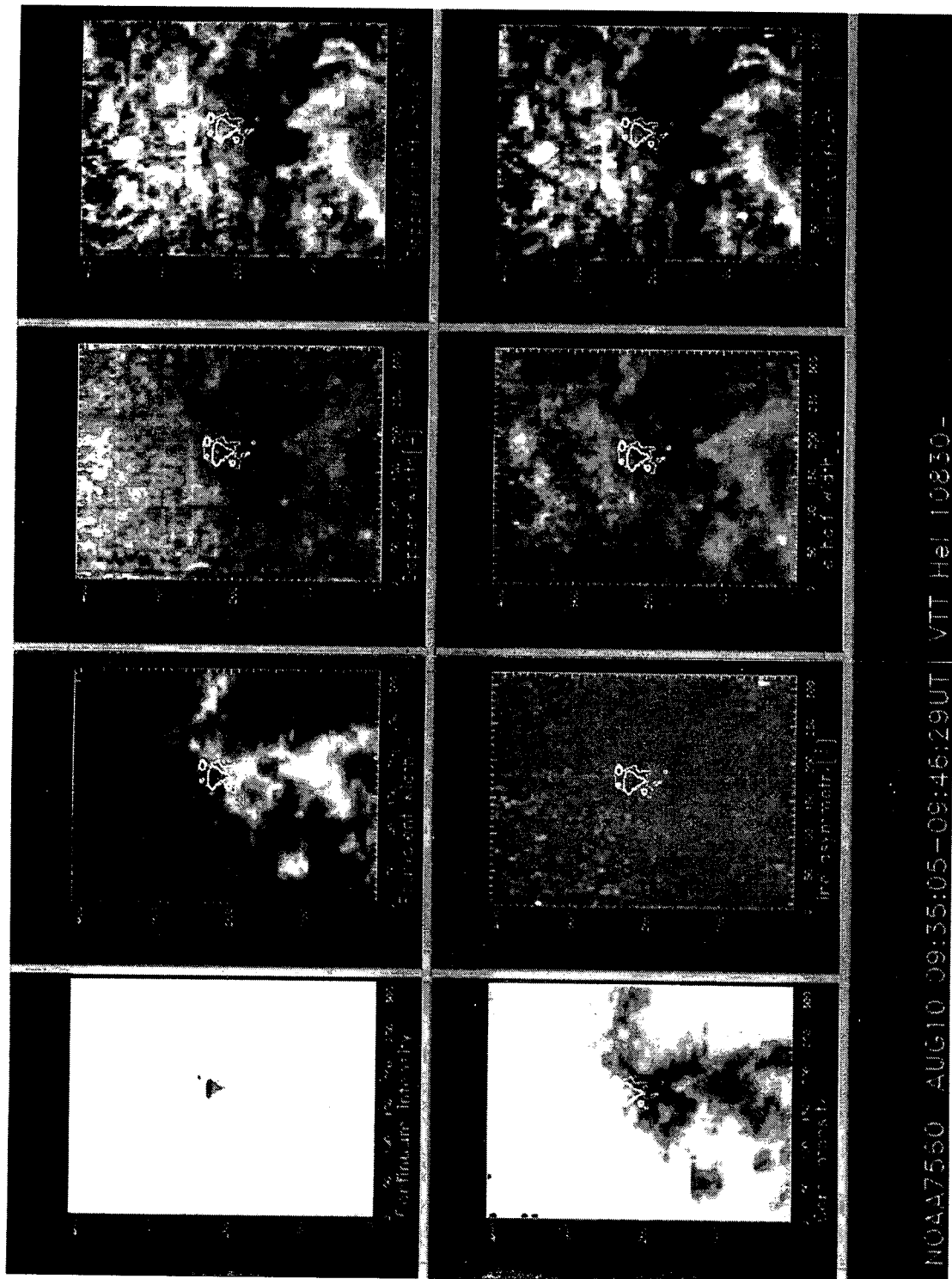
### ABSTRACT

Here we report the results from spectroscopic observations of solar active regions in the HeI 10830 Å line at the German Vacuum Tower Telescope(VTT) in Tenerife during the August 1993 International EFR(Emerging Flux Region) Campaign. Four active regions in various stages of their evolution, i.e., NOAA7558, 7560, 7561, and 7562, were observed on 10 August 1993. From the observed HeI 10830 Å spectra in these active regions, spectroscopic quantities such as equivalent width(EW), doppler shift, doppler width, etc., were derived(see Figure 1(a)) and the correlation between them were studied(see Figure 1(b)). Our main results are as follows: (1)In NOAA7562, which is a young and evolving EFR, the EW is large, while it is small around a simple and roundish spot of NOAA7558. (2)In these active regions, redshift in the 10830 line is dominant when the EW is larger. (3)As the doppler width increases, the line tends to shift redward. (4)When the EW is smaller, it seems to exist another component which have dynamic characteristics different from the redshifting component. In NOAA7560 and NOAA7561, regions which have several small spots, the values of the EW are intermediate. Results (2) and (3) may suggest the possible existence of downflow above active regions, if the HeI 10830 Å line is formed in the upper chromosphere, and it is consistent with the earlier result from the SMM extreme-ultraviolet observation by Klimchuk(1987, *Astrophys. J.*, 323, 368) (to be submitted to *Astronomy and Astrophysics*; an extended abstract)

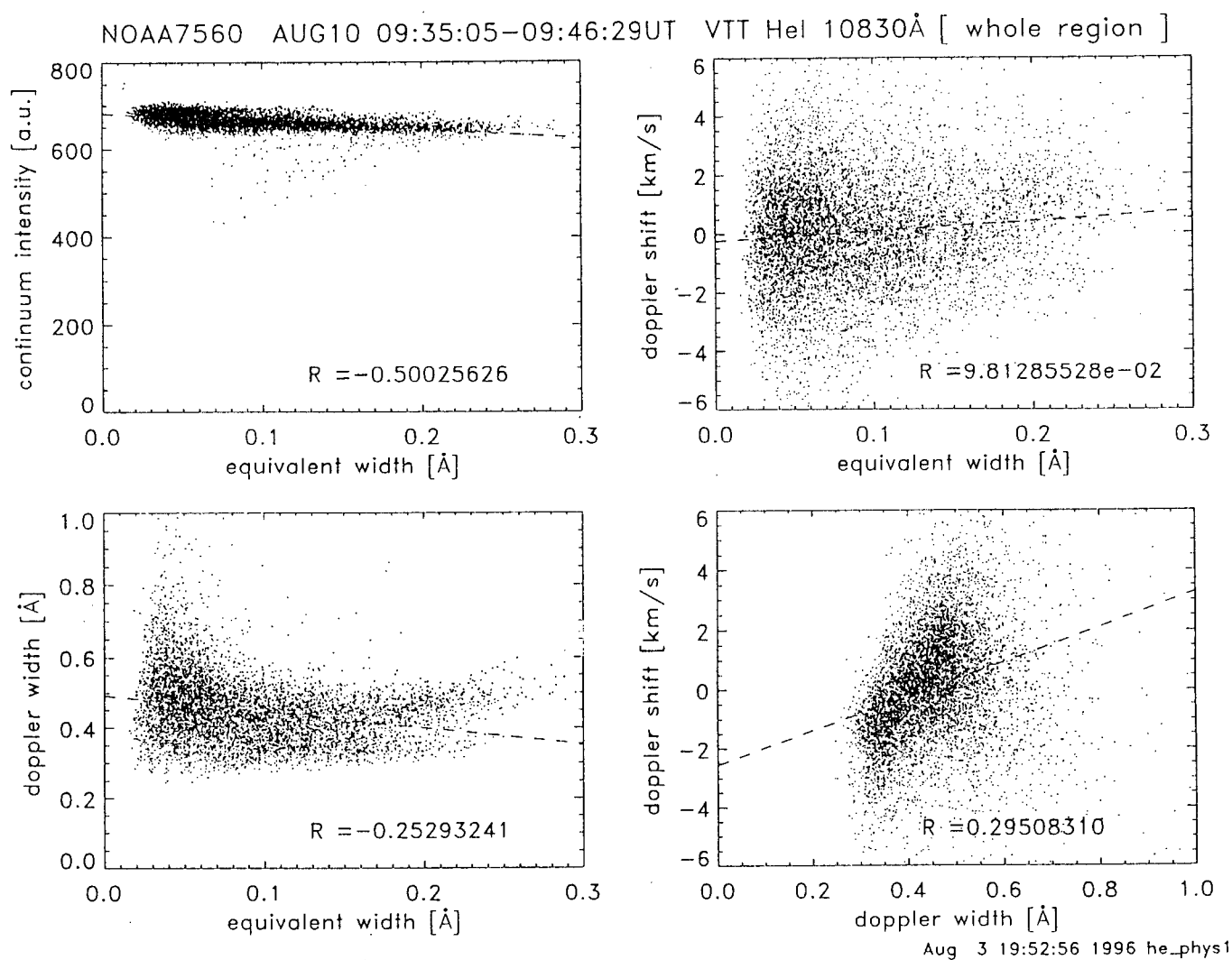
*Key Words* : Sun:chromosphere, Sun:active regions, Sun:HeI  $\lambda$  10830 Å spectra

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**Fig. 1.**— Maps of the physical quantities derived from the 10830 Å line profile of the active region NOAA7560. The horizontal scale of each figure is 90 arcsec. In these figures, for those of the doppler shift and the 1/e line shift, brighter area means redshift, and darker area, blueshift. For the line asymmetry, brighter area means positive asymmetry, and darker area, negative. For other physical quantities, brighter area means larger value, and darker area, smaller. For comparison, the contours of umbra(thick line) and penumbra(thin line) are superimposed in each figure.



**Fig. 2.**— Scattergrams between the physical quantities shown in Figure 1(a). The vertical and horizontal axes of the figures are as follows: continuum intensity vs equivalent width(EW)(upper left), doppler shift vs EW(upper right), doppler width vs EW(lower left), and, doppler shift vs doppler width(lower right).