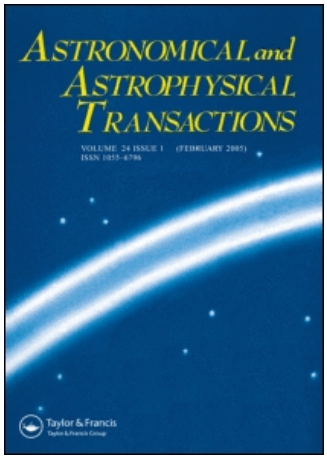

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H_α LOOPS IN SOLAR ACTIVE REGIONS

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About a dozen H_α loops events observed in flare active regions in period from 1975 to 1985 have been analyzed. On the base of own authors observations and data by other scientists loop morphology, temporal behaviour and physical conditions have been systematized.

KEY WORDS Sun-flares, chromosphere, corona

Active region loops are impressive features observed in H_α, EUV, X-ray lines and visible both in emission and absorption in projection on the solar disk. They are usually associated with flares. There is a definite relation between H_α and X-ray loops. Loops stretch to heights of 100.000 km, have noticeable plasma motions and are believed to trace out magnetic field lines. It is important to understand the loops' own nature, their role in the evolution of flares and energy transport in the upper layers of the solar atmosphere.

On the basis of our own observations and data from other authors we analyzed the morphology, behaviour and physical conditions in loops. H_α filtergrams taken at the centre and wings of the H_α line were used. Procedures for reconstructing true loop geometry were proposed by Loughhead *et al.* (1984).

We have considered 13 loop events in the period from 1979 to 1985. Loops have a fine structure, and widths of loop threads vary from 0".5 to 2–5". Separate loops are visible for 1–5^m, sometimes for 15–20^m. At the average separations P_1P_2 of loop footpoints are 3×10^4–9×10^4 km; distances H between the highest loop point and the line joining footpoints vary from 2×10^4 km to 7×10^4 km. The tilts of the loops symmetry axes from normals to P_1P_2 lines are less than 10–15°. The behaviour of long-lived loop systems differs. The H_α loops in the dynamic flare of 6 November 1980 increased their heights twice during 1.5 hours (Švestka *et al.*, 1987). A loop system observed by us associated with the proton flare of 9 July 1985 was stable for several hours. In this case a relative stability of the magnetic field possibly caused the loop stability.

The loop orientation is described by the inclination β of the loop plane to the solar vertical. Loops with $\beta < 30°$ occur more frequently than loops with $\beta \sim 70°$. A scatter of β values in a system is less than 30°. Loops appear to change their orientation. A definite low was revealed by Mogilevskii *et al.* (1989) in loop azimutal changes possibly connected with currents in loops. In events of July 1985 we have not found a noticeable azimutal variation; inclinations of loop planes relative to the solar surface gradually increased with time.

Loop footpoints are usually situated in penumbra of large spots, in little umbra, pores and emission mottles. Several loops can begin from one point, other legs

ending in different places. Emission and absorption loops are often visible simultaneously; their morphological parameters do not show differences.

Knowing the true loop geometry and line of sight velocities we can determine plasma motion velocities. Evaluated velocities change along loops and range from several $km\,s^{-1}$ to 100–200 $km\,s^{-1}$ and more. In some cases matter moves from one footpoint to the other, sometimes from the loop top along both legs.

Physical conditions define if a loop is visible in emission or in absorption in projecting on the solar disk, the gas pressure being the main parameter. Physical conditions can be determined by loop contrast relative the surrounding chromosphere. For loops observed in emission $T \cong 10^4$ K, $N_e \cong 10^{11}$–$10^{12}\,cm^{-3}$, $P_g \cong 1$–3 dn (Heinzel and Karlický, 1987).

In conclusion we should like to emphasize that further loop investigations are necessary and that because of poor statistics the results ought to be considered as preliminary.

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