

## Radio and Infrared Study of the Active Star-forming Region W31

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We present radio continuum, radio recombination line, and various molecular line observations of the W31 HII region/molecular cloud complex, which contains two UC HII regions with extended envelopes, G10.15-0.34 and G10.30-0.15. By analyzing these data, in conjunction with the *IRAS* HIREs data, we investigate the physical properties and kinematics of ionized and molecular gases in the region, and find compelling observational evidence of two champagne flows. In the vicinity of G10.30-0.15, the CO J=2-1/J=1-0 line intensity ratio is measured to be greater than the Galactic average of 0.5-0.8, as in other active star-forming regions, and a prominent molecular gas hole is observed. These results support that molecular cloud and HII regions are strongly interacting with each other in the W31 complex.

## An ASCA Study of the W51 Complex

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We present the analysis of archival data from the ASCA of the W51 complex, which is a radio complex located at the tangential point of the Sagittarius arm. W51 is composed of two complex HII regions, W51A and W51B, and the supernova remnant (SNR) W51C. According to the ASCA GIS image in soft (0.7-3.0 keV) energy band, which is consistent with our previous ROSAT image, there is a bright, central region composed of two maxima separated by  $\sim 10'$ . This central region is taken as emission associated with the SNR W51C. The average spectrum can be fitted well by a single-temperature ( $k_B T \approx 0.37$  keV) thermal plasma model. The ASCA hard (3-10 keV) X-ray map reveals features not present in the soft X-ray map. First, there are two unidentified point-like sources located close to the two bright, soft X-ray emission features, respectively. Secondly, there is a bright, extended structure which coincides with the W51B molecular clouds. The positional coincidence strongly suggests that the X-ray emission might be from star-forming regions. We will present the results of a detailed spectral analysis.