8.3.2 : Correlations with Redshift and Intrinsic Luminosity

In order to compare the variability in our sample against various physical parameters we need to take out the effect of the range of calculated errors. As a measure of variability in our sample we use the maximum deviation divided by the median error. This is essentially a signal-to-noise ratio (S/N) and is similar to the *Q-statistic* used by Pica and Smith (1983) and others. The lower graphs of figure 8-2 show this quantity versus emission line redshift and the log of the luminosity in ergs s^{-1} Hz^{-1} at a rest wavelength of 2500Å. The luminosity was derived using V magnitudes and assuming $L_\nu \propto \nu^\alpha$ with $\alpha = -0.8$ as a typical continuum slope (*cf.* Francis et al. 1992). We have assumed H_o=50 and q_o=0.

The approximate variability cutoff line is shown at a level of 5.5. As before, radio selected QSOs are shown as triangles and optically selected QSOs as squares. QSOs which are classed as definite BALQSOs, marginal BALQSOs (MBAL), and possible BALQSOs (BAL?) (see definitions in table 8-1) are shown as filled symbols. The inhomogeneity of our sample is evident in the excess of BALQSO class objects with $z_e \gtrsim 1.3$ (the limit where the C IV BAL generally becomes readily observable with ground-based telescopes). The non-BALQSOs mostly come from the FOS target sample which mostly consists of bright objects with a wide range of redshifts.

Considering only the BALQSO class objects, our data show a possible excess of variable QSOs at high emission-line redshift ($z_e > 2.6$). For all redshifts, 33% (18/54) of the BALQSO class objects (filled symbols), lie above the variability cutoff line. For $z_e < 1.8$, 42% (5/12) of these QSOs show variability. For $1.8 < z_e < 2.6$, 19% (6/31) show variability. For $z_e > 2.6$, 64% (7/11) show variability. However, by choosing different cutoffs the differences in these percentages may become somewhat smaller. Also, the sample is small enough that this effect may be consistent with random fluctuations. The luminosity plot appears to show no significant change in variability with luminosity.

Note that since most QSO samples (including ours) consist of a relatively narrow range of apparent luminosities there is always strong correlation between redshift and