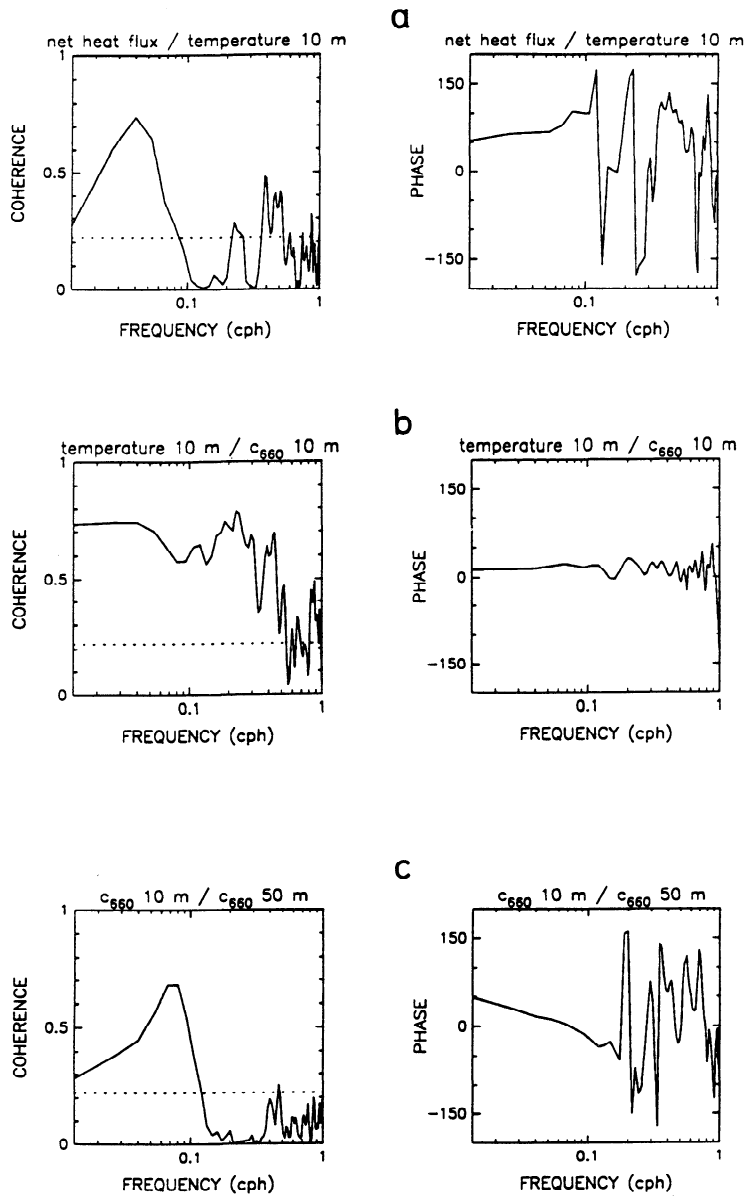

Figure 11. Squared coherence and phase function between (a) net heat flux and 10-m water temperature, (b) water temperature and c_{660} at 10-m depth, (c) c_{660} at 10- and 50-m depths. These are estimates for the 10-day subset of the MLML data shown in Figure 8. Dashed line is a 95% cutoff value.

during the night. The optimum conditions for high phytoplankton production also required that the overnight decrease of phytoplankton concentration in surface waters was not too large, because total production is proportional to the product of the growth rate and chlorophyll concentration.

We can view the above scenario as a special equilibrium between physical and biological conditions which lead to extremely favorable conditions for phytoplankton growth. Note, that the probability of occurrence of such a balanced situation may partially explain large inter-annual variation of phytoplankton biomass in the North Atlantic waters. In general, if the daily heating of the surface waters starts to prevail over the nighttime cooling, then the trend of increasing thermal stratification should be observed. This in turn must result in a separation of the surface and deep waters similar to this described for our period 3 (Figure 9). The "moderate" diel cycle associated with such a situation has been reproduced before for data from the spring of 1989 by *Taylor and Stephens* [1993] and *Stramska and Dickey* [1994], although different modeling approaches were used. The important observation now is that the conditions of a "moderate" diel cycle lead to a somewhat smaller total biomass in the water column compared to the "intense thermal diel variability" period. On the other hand, if the overnight cooling is not compensated by the diurnal warming, then the deepening of the ML should be observed. This may lead to a significant dilution of the biomass in the water column which will not be replaced by a newly produced phytoplankton. An example of such conditions is the decrease of phytoplankton concentration in response to stormy weather around day 140 (Figure 7). Similar examples for the 1989 data are discussed by *Stramska and Dickey* [1994].

High coherence between net heat flux and 10-m water temperature (Figure 11) supports our interpretation of the data primarily in terms of the local variability. Importantly, we