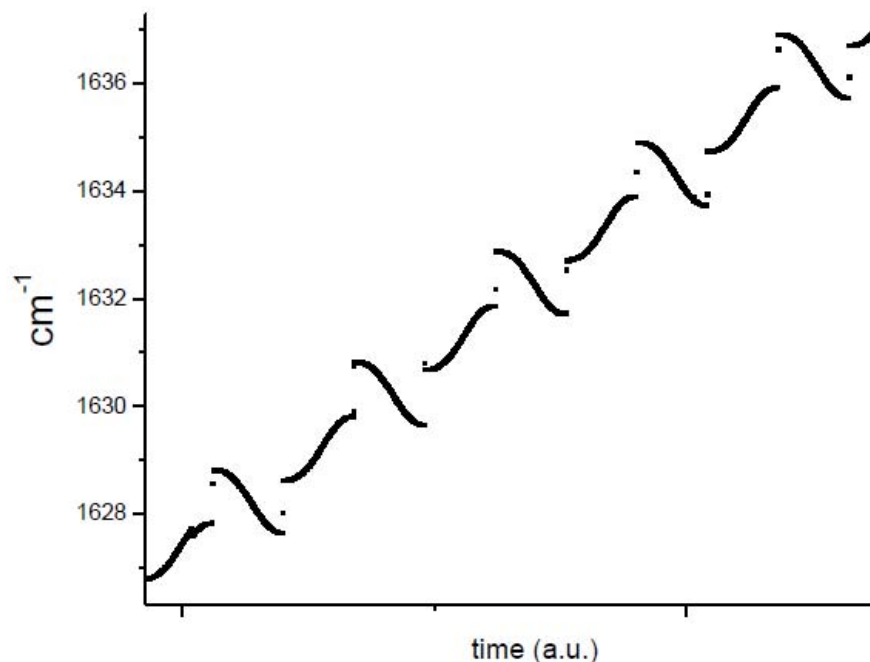




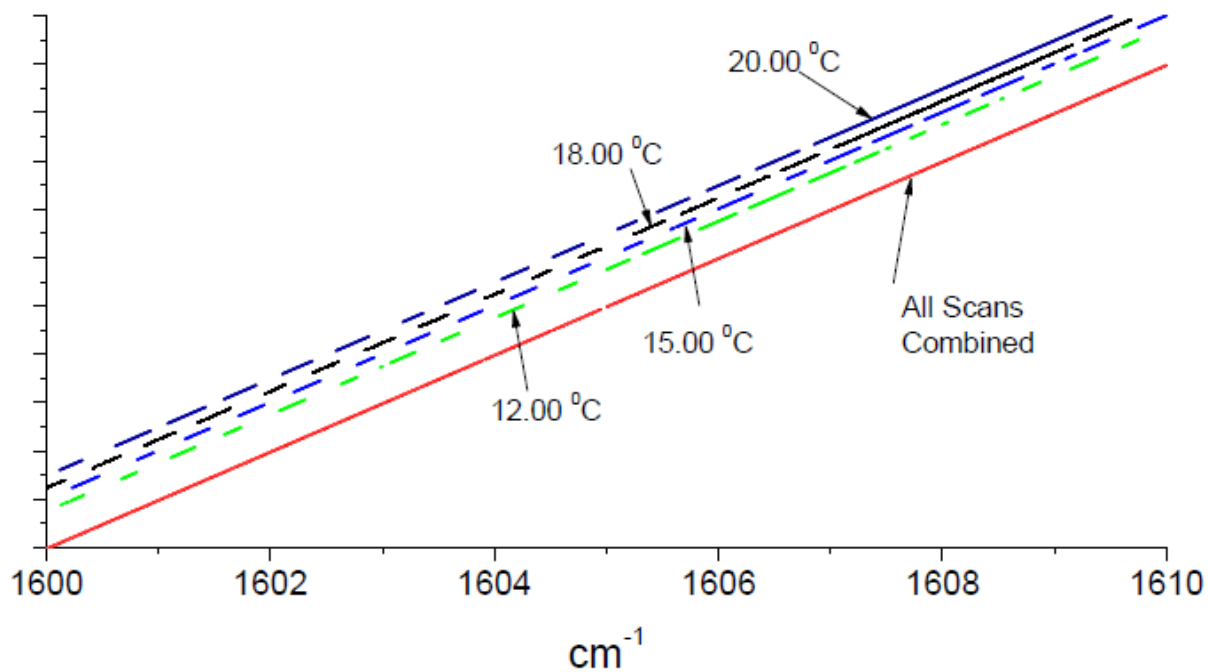
## Application Note: Continuous tuning of a Daylight Solutions 6.05 $\mu\text{m}$ cw ECqCL™ without loss of coverage due to mode hops via sequential scans at different laser head temperatures.

A Daylight Solutions cw-PLS laser operated in cw mode tunes discontinuously since the QC chip modes “pull” the gain. [Please click here for more details.](#) Continuous coverage from the ECqCL™ over its entire tuning range is achieved by combining sinusoidal piezo tuning (0-90 volts at 0.015 Hz) with computer-controlled step tuning of the grating. At each peak (or trough) of the sine wave, the piezo tuning is paused for ~2 seconds while the ECqCL™ controller is commanded to decrease the wavelength by 3.7 nm. The output of the ECqCL™ is split so that it can be continuously sampled by a Bristol Wavemeter. A section of the wavemeter reading as a function of time is shown below. This region of tuning corresponds to a region in which the ECqCL™ scans mode-hop free.



Complete wavelength coverage is achieved by combining multiple scans obtained at different laser head temperatures. Four separate scans are shown below. Also shown is a plot where the data has been sorted and linearized according to wavenumber. The y-axis is arbitrary. The scan region ( $1600\text{-}1610\text{ cm}^{-1}$ ) corresponds to a region in which the ECqCL™ *does not* scan mode hop-free. The top scan (dark blue) corresponds to a laser head temperature of 20.00 °C. The black, light blue and green curves correspond to laser head temperatures of 18.00, 15.00, and 12.00 °C, respectively. Changing the laser head temperature effectively moves the mode hops to different wavenumbers. For example, combining the 20.00 and 18.00 °C scans essentially results in mode-

hop free data; that is, data is recorded for all wavenumbers in this region. The bottom red curve is the combination of all four scans, showing only one narrow region near  $1605\text{ cm}^{-1}$  where there is no data.



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August 7, 2010