Supporting Information

Reconstitution of 3-acetyl chlorophyll *a* into light-harvesting complex 2 from the purple photosynthetic bacterium *Phaeospirillum molischianum*

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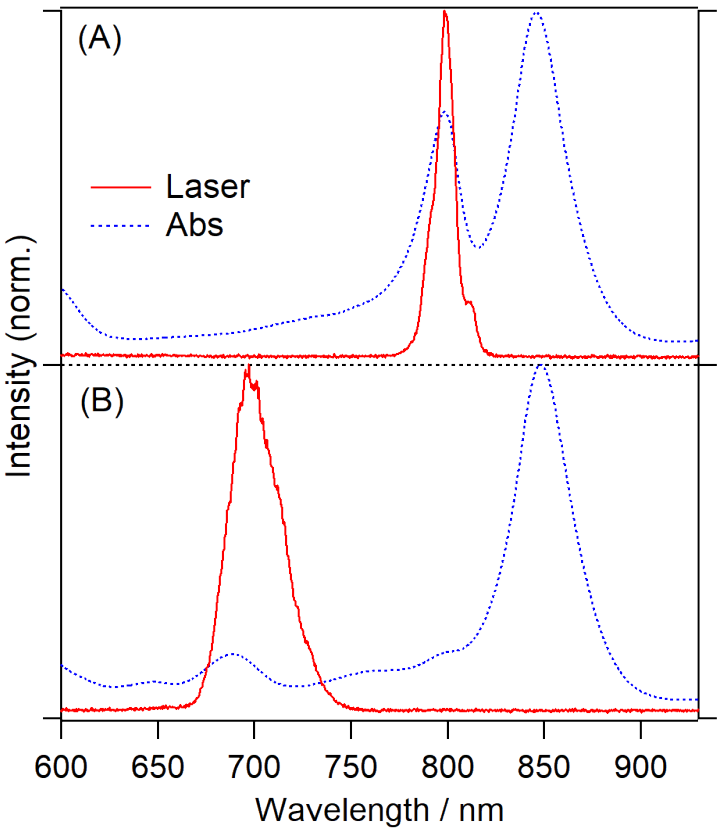

Figure S1. Overlap between the pump pulses (red solid curves) and the absorption spectra (blue broken curves) of native LH2 (A) and AcChl-reconstituted LH2 (B).

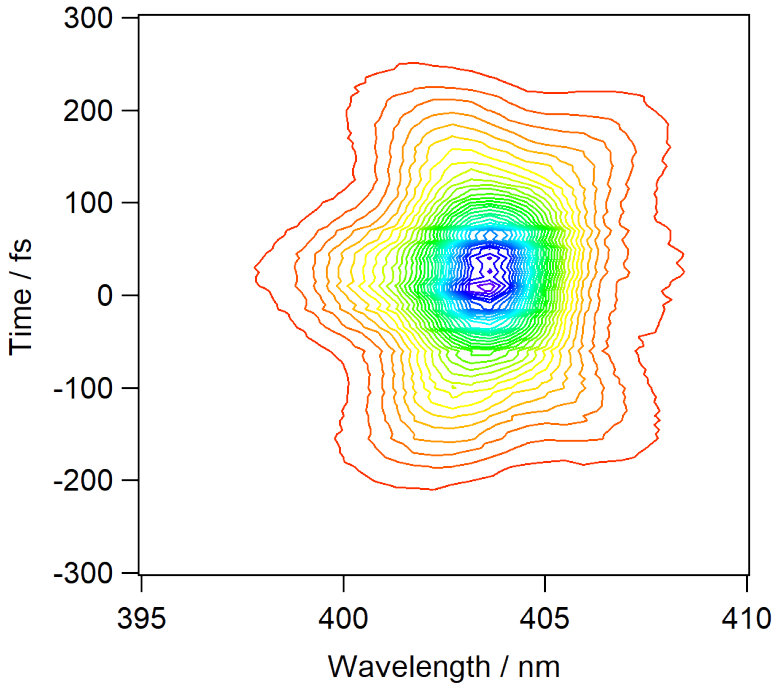

Figure S2. SHG-FROG signal for the pump pulse at 800 nm (fwhm: 130 ± 3.3 fs).

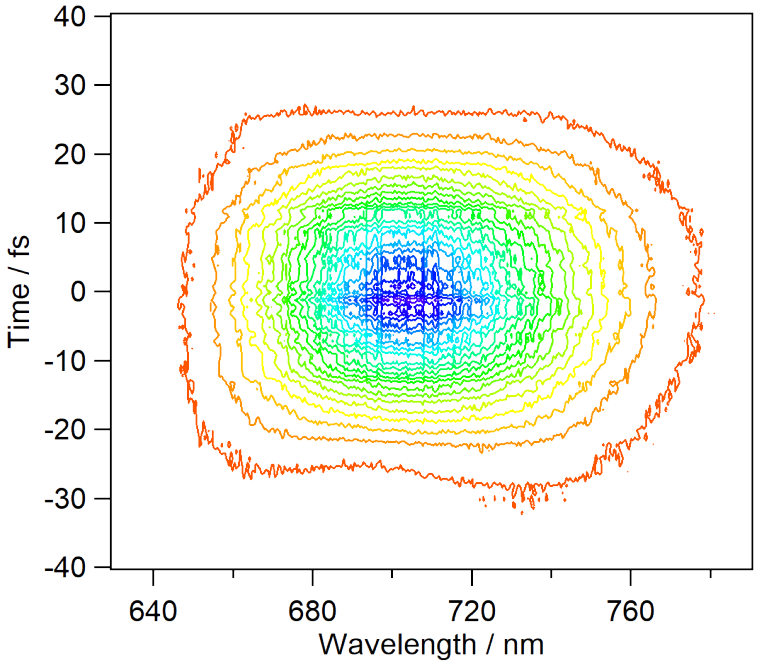

Figure S3. SD-FROG signal for the pump pulse at 695 nm (fwhm: 18.5 ± 0.38 fs).

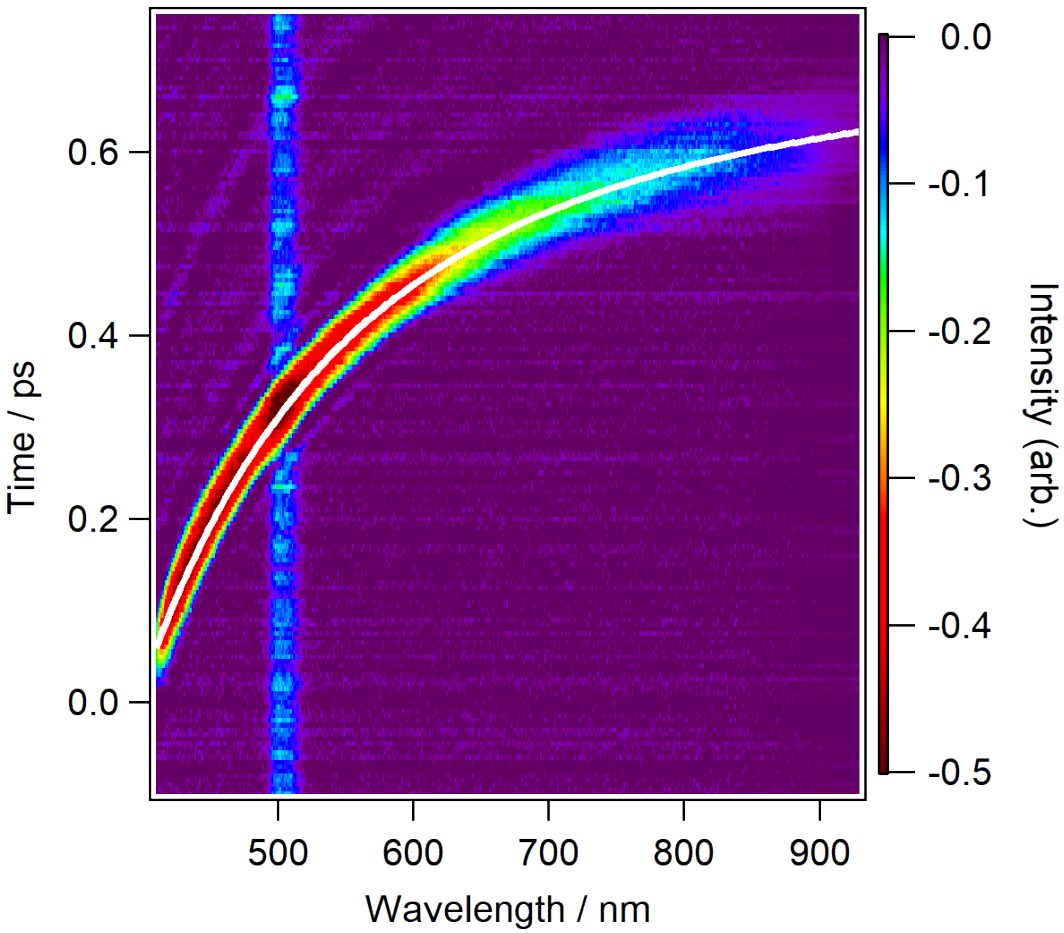

Figure S4. The HD-OKE signal between the pump and the probe pulses generated from neat carbon tetrachloride inside the sample cell. Wavelength dependence of the maximum of the electronic response was utilized to compensate the group velocity dispersion of the femtosecond time-resolved transient absorption spectra.

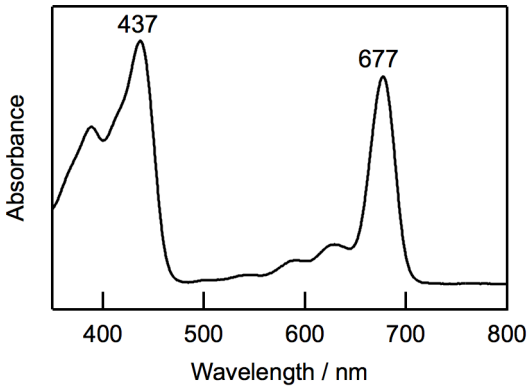

Figure S5. Electronic absorption spectrum of AcChl *a* in acetone.

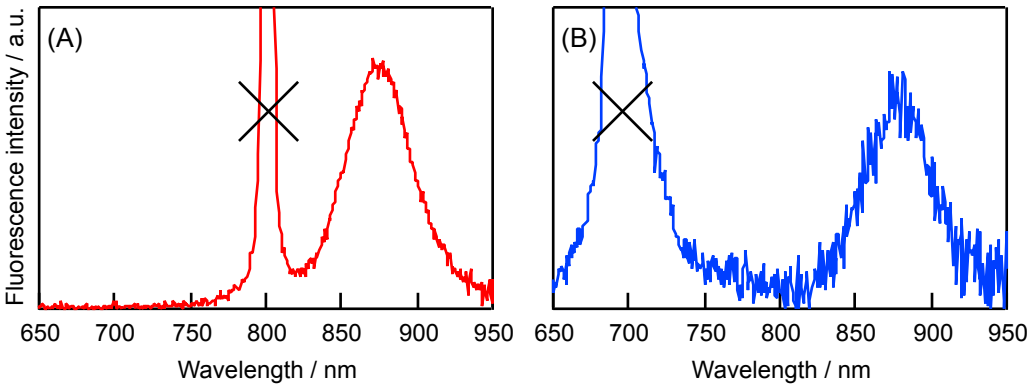

Figure S6. Fluorescence emission spectra of BChl-reconstituted LH2 (A) and AcChl-reconstituted LH2 (B) by excitation at 798 and 692 nm, respectively, in 20 mM Tris buffer containing 0.05% *n*-dodecyl-*β*-D-maltoside (pH=8.0). The signals denoted by × are due to excitation light.