**Additional file 1**

**Table S1. Formulae and definitions of the selected JIP-test fluorescence parameters used in this study.**

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| **Fluorescence parameter** | **Definition** |
| **Original data extracted from the recorded fluorescence transient Ft** | |
| Ft | Fluorescence at time t after onset of actinic illumination |
| F0 ≌ F20µs | Minimal reliable recorded fluorescence at 20 µs with the Handy-PEA-fluorimeter, when all PSII RCs are open |
| FP = FM | Maximum fluorescence, when all PSII RCs are closed |
| FL ≡ F150µs | Fluorescence intensity at the L-step (about 150 µs) |
| Fk ≡ F300µs | Fluorescence intensity at the K-step (300 µs) |
| FJ ≡ F2ms | Fluorescence intensity at the J-step (2 ms) |
| FI ≡ F30ms | Fluorescence intensity at the I-step (30 ms) |
| Fp (=FM) | Maximal recorded fluorescence intensity at the peak P of OJIP, when all PSII RCs are closed |
| tFM | Time (in ms) to reach FM |
| Area | Total complementary area between the fluorescence induction curve and F = FM |
| **Fluorescence parameters derived from the original data** | |
| Selected OJIP parameters |  |
| Vt ≡ (Ft - F0)/(FM - F0) | Relative variable fluorescence at time t |
| VK = (FK - F0)/(FM - F0) | Relative variable fluorescence at the K-step |
| VJ = (FJ - F0)/(FM - F0) | Relative variable fluorescence at the J-step |
| VI = (FI - F0)/(FM - F0) | Relative variable fluorescence at the I-step |
| 1/VI = (FM - F0)/(FI - F0) | The maximal amplitude of IP phase reflecting the relative pool size of the final electron acceptors of PSI |
| Mo = 4(F300µs - F0)(FM - F0) | Approximated initial slope (in ms–1) of the fluorescence transient normalized on the maximal variable fluorescence FM - Fo |
| Sm = Area/(FM - F0) = EC0/RC | Normalized total complementary area above the OJIP transient (reflecting multiple turnover QA reduction events) or total electron carriers per RC |
| EC0/ABS = (EC0/RC)(RC/ABS) | Electron carriers per ABS at t = 0 |
| VK/VJ | A relative measure of inactivation of OEC |
| t1/2(I-P) | The time needed for half saturation of the final electron acceptors pools of PSI with electrons donated by intermediate carriers |
| Quantum yields or flux ratios | |
| φPo = TR0/ABS = 1 - F0/FM | Maximum quantum yield for primary photochemistry at t= 0 |
| φEo = ET0/ABS = (1 - F0/FM)(1 - VJ) | Quantum yield for electron transport at t= 0 |
| φRo = RE0/ABS = φPoψEoδRo | Quantum yield for reduction of end electron acceptors at the PSI acceptor side at t = 0 |
| φDo = DIO/ABS = 1 - φPo = F0/FM | Quantum yield for energy dissipation at t = 0 |
| ψEo = ET0/TR0 = 1 - VJ | Efficiency/probability with which a trapped excition can move an electron into the electron transport chain beyond QA- |
| δRo = RE0/ET0 = (1 - VI)(1 - VJ) | Efficiency/probability with which an electron can move from the reduced intersystem electron acceptors to the PSI end electron acceptors |
| ρRo = RE0/TR0 = ψE0δR0 | Efficiency/probability with which a trapped excition can move an electron into the electron transport chain from QA-to the PSI end electron acceptors |
| Specific energy fluxes (per QA-reducing PSII RC) | |
| ABS/RC = M0/VJ/φPo | Absorption flux per RC (reflecting an average antenna size) |
| TR0/RC = M0/VJ | Trapped energy flux (leading to QA reduction) per RC at t = 0 |
| ET0/RC = M0(1/VJ)(1 - VJ) | Electron transport flux (further than QA) per RC at t = 0 |
| RE0/RC = M0(1/VJ)ψEoδRo | Electron flux reducing end electron acceptors at the PSI acceptor side per RC at t = 0 |
| DI0/RC = (ABS/RC) - (TR0/RC) | Dissipated energy flux per RC at t = 0 |
| Density of RCs | |
| γRC = ChlRC/Chltotal = RC/(ABS + RC) = VJφPo/( M0 + VJφPo) | Probability that a PSII Chl molecule functions as RCs |
| Sm/tFM = [RCopen/(RCclose + RCopen)]av = [QA/QA(total)]av | Average fraction of open RCs (redox state of QA-/QA) of PSII in the time span between 0 and tFM |
| Performance indexes (products of terms expressing partial potentials at steps of energy bifurcations) | |
| PItotal = (RC/ABS)[φPo/(1-φPo)] [ψEo/(1-ψEo)][δRo/(1-δRo)] | Performance index (potential) for energy conservation from exciton to the reduction of PSI end acceptors |

Subscript “0” (or “o” when written after another subscript) indicates that the parameter refers to the onset of illumination, when all RCs are assumed to be open.