FIRe Fluorometer System

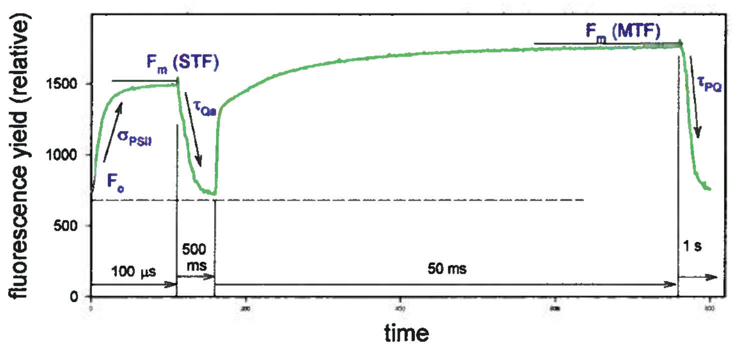
SATLANTIC

The Satlantic Fluorescence Induction and Relaxation (FIRe)

The Satlantic FIRe (**F**luorescence **I**nduction and **Re**laxation) System is the latest advance in bio-optical technology to measure variable fluorescence in photosynthetic organisms. Developed in collaboration with Dr. Maxim Gorbunov and Dr. Paul Falkowski from Rutgers University, the system is based on 15 years experience in basic and applied research and development in photosynthesis and oceanography.

FIRe Fluorometer System

The FIRe technique is based on active stimulation and highly resolved detection of the induction and subsequent relaxation of chlorophyll fluorescence yields on micro- and millisecond time scales. Analysis of fluorescence induction on microsecond time scales provides the minimum and maximum fluorescence yields, the quantum efficiency of photochemistry in Photosystem II (PSII), the functional absorption cross-section of PSII, and the energy transfer between PSII units. Following the saturation of PSII, the relaxation kinetics of fluorescence yields are recorded with high resolution that provides the rates of electron transport on the acceptor side of PSII and between PSII and PSI. The photosynthetic electron transport rates as a function of irradiance, together with coefficients of photochemical and non-photochemical quenching are measured using an incorporated source of background light.



Fluorescence Induction and Relaxation profile measured with the FIRe System

Measurements are conducted on discrete samples or in a flow-through cuvette. The user may optionally use a fiber-based extension to study variable fluorescence on macrophytes and leaves of higher plants.

Applications:

- Basic and applied photosynthesis research
- Environmental monitoring of phytoplankton and benthic organisms (macrophytes, coral, seagrass, algal turfs)
- Water quality monitoring
- Assessment of primary productivity in aquatic ecosystems
- Assessment of environmental stresses
- Ecophysiology

www.satlantic.com info@satlantic.com Tel: +1-902-492-4780 Fax: +1-902-492-4781

SATLANTIC

Features:

- System comes complete and ready for use with computer, monitor, and keyboard
- Dedicated software package for real time data analysis
- User-friendly and flexible protocols for measurements and data analysis
- Wide dynamic range of the fluorescence signals (four orders of magnitude)
- Comprehensive suite of fluorescent and photosynthetic parameters
- Extremely sensitive (down to 0.02 mg/m^3 of Chl-a)

FIRe System SPECIFICATIONS

- Excitation light source: blue LED (maximum emission 450 nm, 60 nm bandwidth). Other wavelengths optional (470, 500, 530 nm).
- Emission detection: 680 nm, 20 nm bandwidth. Other wavelengths 680-900 nm optional.
- Detector: Auto gain ranging, high sensitivity
- Chlorophyll Sensitivity: 0.02-100 mg/m^3
- Pulse control: Programmable 1 µsec – 50 msec
- Data acquisition: 14bit 1MHz
- Operating Platform: Pentium-based PC;
- Power Supply: 85-250 VAC, 43-63 Hz
- Operating Temperature: 0°C to + 40°C
- Dimensions: 45 x 14 x 49 cm ; 17.5 x 5 x 19 inches

Measured Parameters:

F_o, F_m	Minimum and maximum yields of chlorophyll-a fluorescence measured in a dark-adapted state
F_v	Variable fluorescence ($= F_m - F_o$)
F_v / F_m	Maximum quantum yield of photochemistry in PSII, measured in a dark-adapted state
σ_{PSII}	Functional absorption cross section of PSII
p	'Connectivity factor', defining the exciton energy transfer between individual photosynthetic units
F_o', F', F_m'	Minimum, steady-state, and maximum yields of chlorophyll-a fluorescence measured under ambient light
F' / F_m'	Quantum yield of photochemistry in PSII, measured under ambient light ($= (F_m' - F')/F_m'$)
F_v' / F_m'	Quantum efficiency of photochemistry in open reaction centers of PSII, measured in a light-adapted state ($= (F_m' - F_o')/F_m'$)
q_p	Coefficients of photochemical quenching ($= (F_m' - F')/(F_m' - F_o')$)
q_N	Coefficients of non-photochemical quenching ($= (F_m - F_m')/(F_m - F_o)$)
τ_{Qa}	Time constant for the electron transport on the acceptor side of PSII (the time of Q_a re-oxidation)
τ_{PQ}	Time constant for the electron transport between PSII and PSI (the time of the PQ pool re-oxidation)

www.satlantic.com info@satlantic.com Tel: +1-902-492-4780 Fax: +1-902-492-4781