INTRODUCTION

Water body monitoring
Phytoplankton monitoring is one of the key elements of water quality assessment and is essential in determining ecological status of lakes (Directive 2000/60/EC). Poor water quality and consequent cyanobacterial blooms represent a remarkable environmental risk with negative economic effects. With the implementation of the Bathing water directive cyanobacterial monitoring becomes compulsory in the European Union.

In vivo fluorometry
Faster and simple monitoring methods are needed, giving real-time results on a detailed spatial and temporal scale. One of such techniques is the use of in vivo fluorometry based on direct measurements of the fluorescence of photosynthetic and other accessory pigments of autotrophic planktonic organisms.

LIFE Stop Cyanobloom
With the aim to improve phytoplankton monitoring techniques and demonstrate an efficient control of harmful cyanobacterial blooms, a demonstration project “LIFE Stop Cyanobloom” has been supported by the European Commission. The aim of the project is to present autonomous remotely controlled vessel equipped with advanced on-line sensors and a device for suppressing the development of cyanobacterial blooms that is based on electrochemical principles.

First results
The goal of our first field trials was to validate the use of flow-through sensing chamber equipped with fluorescence sensors in the natural environment using the portable suitcase version of the sensing system.

RESULTS

Preliminary results from six months monitoring data on the fishpond Koseze show a very high correlation ($r^2=0.9678$) between Chl a extraction and in vivo Chl a fluorescence measurements. The correlation remained high in spite the phytoplankton seasonal succession. Because of the negligible presence of cyanobacteria the data from the PC sensor were very low and in the range of backscattering almost all the time of the field experiments.

Correlation between the amounts of extracted Chl a and Chl a fluorescence determined in vivo in water samples from the fishpond Koseze.

With the simultaneous application of Chl a and PC fluorescence sensors we were able to follow the succession of the phytoplankton community in subalpine Lake Bled during the autumn overturn.

Phyto- and bacterioplankton distribution during the stratified period (black and grey line) and during the transition to homogeneously mixed vertical water column (black dotted line). Panel A phycoerythrin sensor readings, panel B chlorophyll a sensor readings and panel C temperature.

CONCLUSIONS

The results obtained by using our fluorometric detection system showed high correlation with the data obtained by traditional methods with several advantages such as low costs of operation, high spatial and temporal resolution and real time information on the changes in plankton populations.