Pier measuring station Müggelseedamm 260

1979

This year, we started with the continuously measurement of a few hydrological and meteorological parameters using an automatic measuring station on the pier at IGB grounds of Müggelseedamm 260. It was equipped with a so-called ESDM system made by Funkwerk Erfurt (Radio factory Erfurt) and consisted out of a digital voltmeter as AD converter, a serialisation unit and a paper tape puncher. The processing of the sensor signals was carried out with a self-made device system installed in a measuring wagon at the banks of lake Müggelsee. The water depth at the end of the pier was about 2 m. The following parameters were measured: wind direction and wind velocity, air temperature next to the water surface, water temperature at a depth of about 25 cm and at 1 m, global radiation and radiation in two different water depths. Additionally, for the determination of the extinction coefficient, oxygen measurements were carried out with Ardenne sensors which, however, turned out to be not worthwhile and even given up later on, because they lead to wrong values caused by frequent failure of the sensors due to plant overgrow and perforation of the membranes. These series of values were removed from the files, and the punched paper tapes were destroyed after the measured values had been transferred to magnetic media. The column "wd" indicates the wind direction corresponding to a 16-part wind rose: 0=north, 90=east, 180=south, 270=west and 337.5=north-north-west. Column "ws" contains the values for wind velocity in m/s. Column "a_temp" contains the air temperature in degree centigrade. Column "gr" shows the values for the global radiation. These values were measured with a selenium photo element, which covers for the most part the spectral range of the visible light, the maximum sensitivity of which is about 500...600 nm. The sensor was calibrated in Lux. But it has to be taken into account that these are instantaneous values only.
(J. Schmidt, February 1993)

1980

In the year 1980 the measuring station had more or less the same configuration as the year before. Only the selenium photo element used for the measurement of the global radiation was replaced by a device for the measurement of the radiation balance, which was in use until 2002. The method how these measured values are converted into the dimension of electrical work (Wh/m^2 or MJ/m^2) is explained in the parameter description.
The net global radiation was measured with the AdW radiation balance analyzer as difference radiation between the incident light from above and the reflex light from the water surface.
Thus it will be possible to receive the degree for the radiation energy which intrudes into the water.
It applies:

E=(M-10)*2,92 in Wh/m^2. (M:3-digit measuring value)

Two more photo elements were positioned at the depths of 0,75 m (UW1) and 1,25 m (UW2) and were measuring the incident radiation at these points. Thus, according to the established method it is possible to determine the extinction coefficient/m. Although the photo elements were also calibrated in Lux (measuring value X 10), the dimension, however, will be neglected during the determination of the quotient and can be left unconsidered. However, because of the spatial arrangement of the measuring device only daily values between 10 am and 3 pm should be used for the calculation.
(J. Schmidt, February 1993)

1981

In the year 1981 the measuring station had more or less the same configuration as the year before. The method how the measured values from the radiation balance analyzer are converted into the dimension of electrical work (Wh/m^2 or MJ/m^2) is explained in the parameter description.
Besides the measurement of the parameters: wind according to directions and speed, air temperature near the water surface, water temperature in ca. 25 cm and in 1 m depths, global radiation and radiation in two different water depths for the determination of the extinction coefficient temporarily two turbidity measuring sections in different depths were used. But they as well, were frequently out of order and the delivered values had no connection (supervisor: Dr. Kozerski). These data series were considered here neither; but they are available on the original discs for those, interested in them. Column (global radiation netto) shows the values for the global radiation. They were registered with the AdW-radiation balance analyzer as difference radiation between the incident light from above and the reflex light from the water surface. Thus we tried to receive the degree for the radiation energy which intrudes into the water.
It applies:

E=(M-50)*0,98 in Wh/m^2. (M:3-digit measured value).

Two more photo elements were positioned at the depths of 0,75 m (UW1) and 1,25 m (UW2) and were measuring the incident radiation at these points. Thus, according to the established method it is possible to determine the extinction coefficient/m. Although the photo elements were also calibrated in Lux (measuring value X 10), this dimension, however, will be neglected during the determination of the quotient and can be left unconsidered. But because of the spatial arrangement of the measuring device only daily values between 10 am and 3 pm should be used for the calculation.
(J. Schmidt, February 1993)

1982

For the year 1982 data from the pier measurements do not exist!!
In 1993 the data for the years between 1979 and 1989 were converted from the punched paper tapes onto magnetic media. Unfortunately, the paper tapes from the year 1982 got lost.

1983-1986

Between 1983 and 1986 the measuring station had more or less the same configuration as before. Parameters as wind direction, wind velocity, air temperature near the water surface, temperature in ca. 25 cm and the global radiation were measured.

The global radiation was registered with the AdW-radiation balance analyzer and was measured as difference radiation between the incident light from above and the reflex light from the water surface. Thus we tried to receive of the degree for the radiation energy which intrudes into the water.
It applies:
E=[(M-100)*10]/8,6 in Wh/m^2 (M:3digit measured value) or
E=[(M-100)*4,186]/1000 in MJ/m^2 (M wie vor).
(J. Schmidt, February 1993)

1987

In the year 1987 the measuring station had more or less the same configuration as the year before.
This year the station was additionally equipped with a precipitation sensor. The values are shown in litres/m^2 or mm.
(J. Schmidt, March 1994)

1988

This year, for the first time an air humidity sensor was installed. The paper tape puncher and the serialization unit were replaced by a small robotron KC87 computer.

1989

This year the precipitation sensor and the air humidity sensor were not used again. The reasons for that are not known.
After the transfer of the measured values from all punched paper tapes onto magnetic media the punched paper tapes were disposed of.

1990-1991

The configuration of the measuring station remained more or less the same.

1992

Since 1992 the data capturing has been carried out on a PC running with a self-made programme. It is based on the graphic programming system LabVIEW by National Instruments. This year on some days, additional measurements were carried out with the underwater spectrometer LI-1800 from the LiCor company. The device captures the radiation in the range between 350 and 850 nm with a resolution of 2 nm. One measurement each, at the water depths of 0 m, 0.5 m, 1 m and 1.5 m was carried out measuring in both upward and downward direction.

1993

Since 1993 additionally, the photosynthetic active radiation (PAR) is measured at two depths (0.75 m and 1.25 m). For this, we use spheric light sensors LI-193 from the LiCor company which make it possible to calculate the attenuation. A weekly cleaning of these sensors has been necessary until today. It mostly concerns the upper sensor which is strongly overgrown. This leads to an excessive attenuation value. This year the measurements were carried out for the last time with the underwater spectrometer LI-1800.

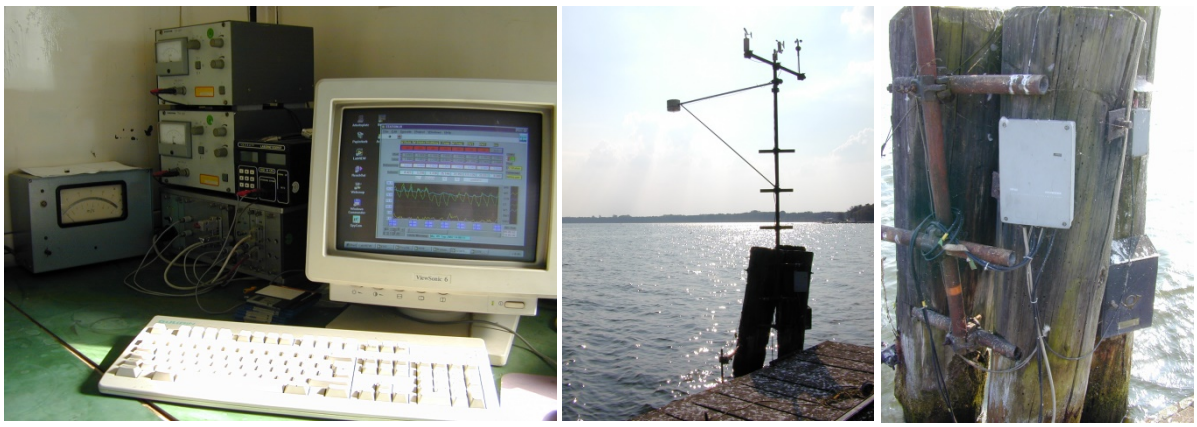
1994

This year we started with permanent measurements using a multi-parameter sensor DS3 respectively H20 from the Hydrolab company. The sensor is measuring the water temperature, the conductivity, the pH value as well as the dissolved oxygen absolute (mg/l) and also relative (%). The parameter pH and oxygen turned out to be very maintenance-intensive. The pH-sensor needed a reference electrode which had to be re-filled

approximately every second week. Incorrect values were showing a striking drift with increasing pH-value. Concerning the oxygen sensor the situation was similar. It was a Clark sensor, the electrolyte and membrane of which had to be replaced approximately every 2-4 weeks. Additionally, the sensors tended to be very much overgrown with plants, which as well lead to incorrect values. For the measuring of the fluorescence (chlorophyll_a and phycocyanine) this year a sensor from the Haardt company was installed. This sensor was placed approximately at the same depth as the multi-parameter sensor.
As of 1994 the sensors were not removed in winter, but the measurements were carried out permanently.

1995-2002

The measuring station had more or less the same configuration as in 1994.
Additionally, an air humidity sensor from the Lufft company was installed in May 1997.
September, 10th 2002 the measuring station at the pier of Müggelseedamm 260 was finally taken out of operation. The coordinates of the station are 52.4467°N and 13.6364°E (WGS84).



Pict.3: Measuring computer in the measuring wagon; Pict.4+5: Dolphins with meteorological sensors at the end of the pier

Pict.6: Boom with PAR sensors; Pict.7+8: typical plant growth on the PAR sensors and multi-parameter sensors

Parameter	unit	Sensor / company	Resolution (Sensor)	Accuracy (Sensor)	Interval [min]	Period	Hight / Depth [m]	Data bank Ser.-Nr.	Remarks
Air temperature	°C	Thermistor	0.1		60	1979-2002	2	186	
Wind direction	°	Windfahne	1		60	1979-2002	4	186	
Wind velocity	m/s	Schalenanemometer	0.1		60	1979-2002	4	186	
rel. air humidity	%	?	0.1		60	1988	2	186	
Precipitation	mm	?	0.1		60	1987-1988	2	186	
Global radiation	lux	Selen-Photoelement	100		60	1979	4	186	Maximum sensivity at 500...600 nm
Globals radiation (net)	MJ/m²/h	AdW-radiation balance analyzer	0.001		60	1980-2002	4	186	
PAR	lux	Selen-Photoelement	10		60	1979-1980	0.75 / 1.25	66, 67	max. 9520 lux!
	µmol/m²/sec	?	1			1980	0.75 / 1.25	68	
		LI-193SA, Li-Cor	0.1	±5 %		1993-2002	0.75 / 1.25	341	
Water temperature	°C	Thermistor	0.1		60	1979-2002	0.25	80	1979-1981 also at 1 m
		H20, Hydrolab	0.1	0.15	5	1994-2002	0.5	57	
pH value		H20, Hydrolab	0.01	0.2	5	1994-2002	0.5	57	
Sonductivity	µS/cm	H20, Hydrolab	1	10	5	1994-2002	0.5	57	
Oxygen rel.	%	H20, Hydrolab	0.1	2	5	1994-2002	0.5	57	Clark-Sensor
Oxygen abs.	mg/l	H20, Hydrolab	0.01	0.2	5	1994-2002	0.5	57	Clark-Sensor