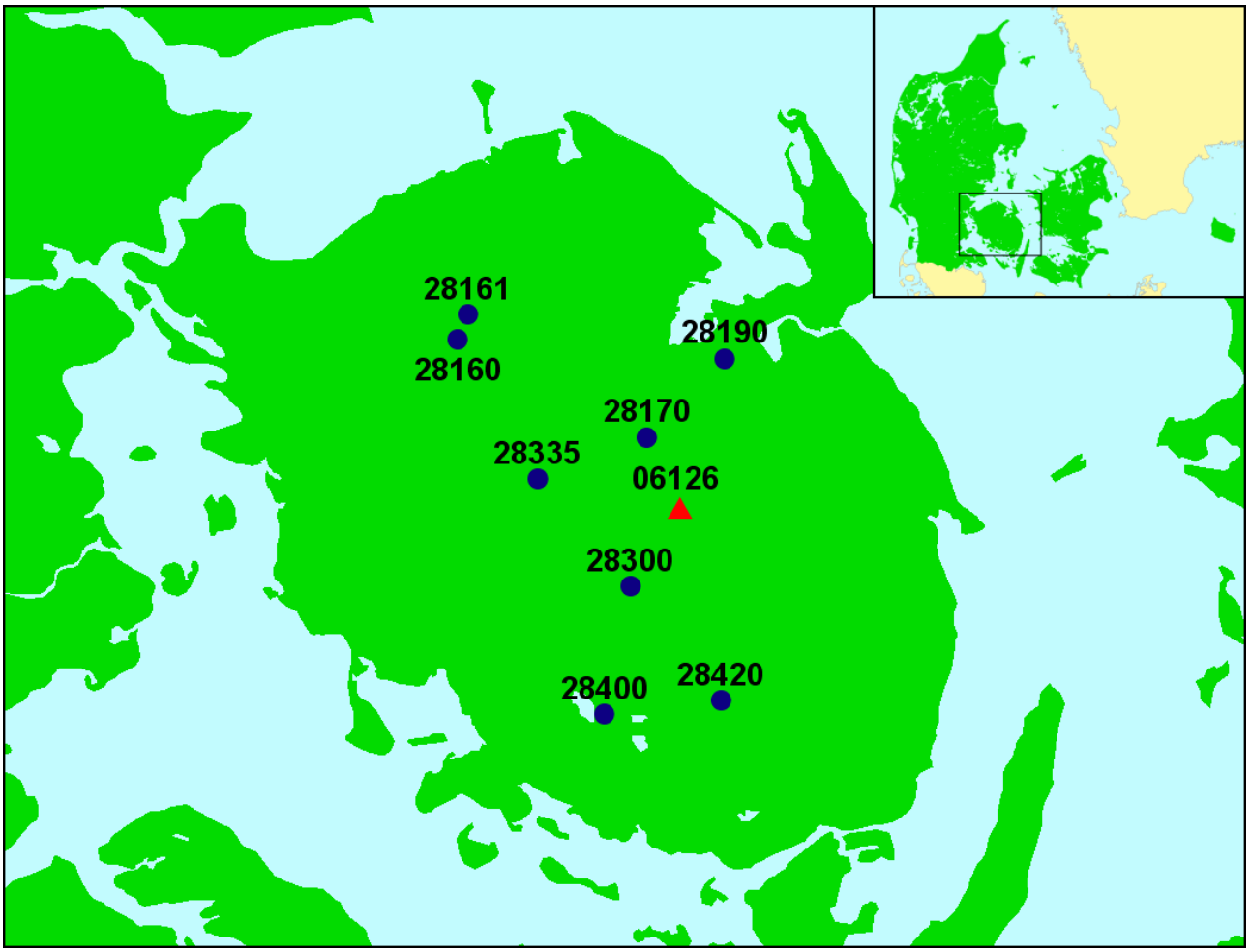
Danish Meteorological Institute
Ministry of Transport

Technical Report 04-24

Daily Climate Data to Odense Pilot River Basin, 1990-2003



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Content

1. Introduction

This report has been prepared in order to provide a climate data set relevant for studies on the danish test area Odense Pilot River Basin under the European Union (EU) Water Framework Directive (WFD) - integrated river basin management for Europe.

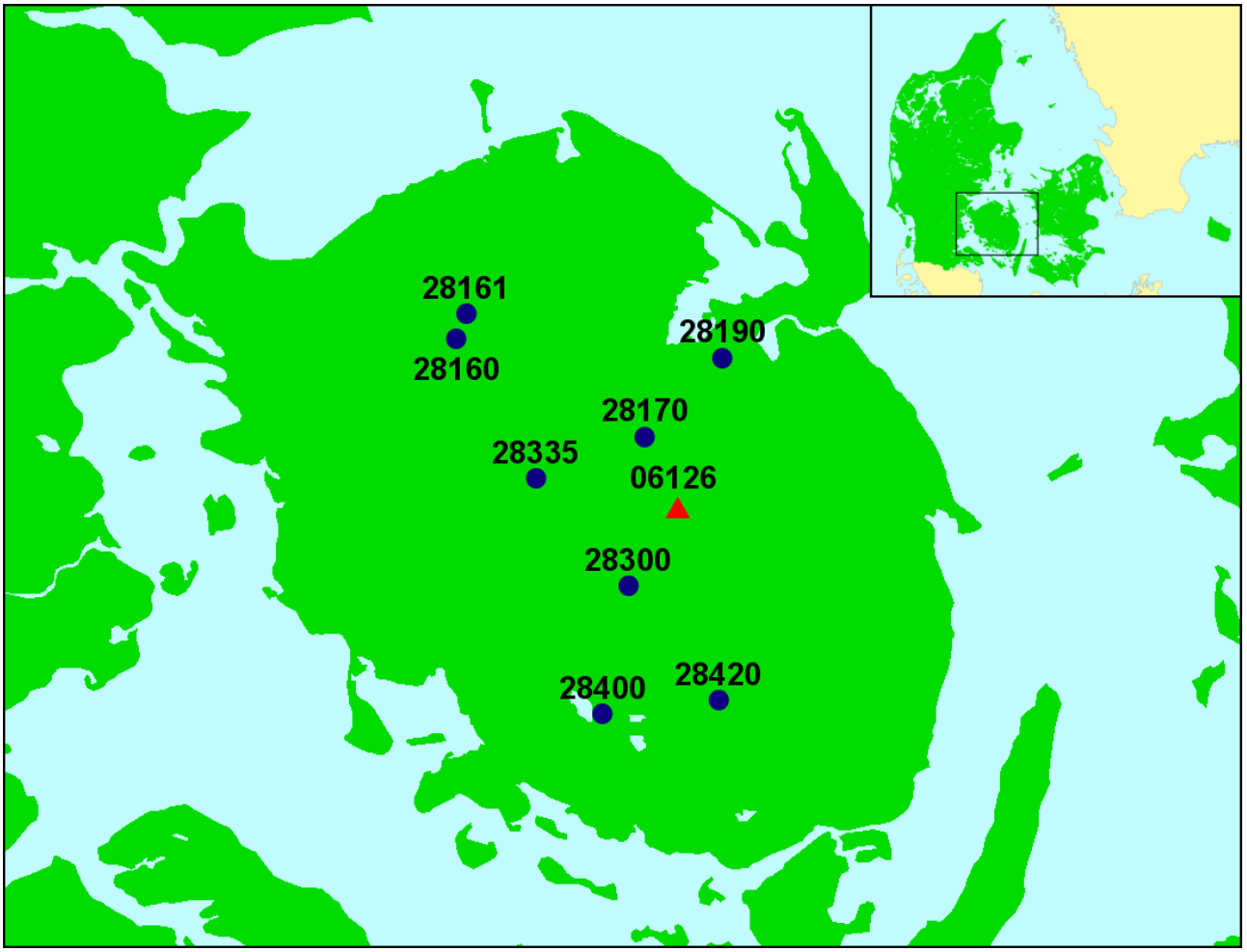
The *"Directive 2000/60/EC of the European Parliament and of the Council establishing a framework for the Community action in the field of water policy"* or short the EU Water Framework Directive (WFD) entered into force on December 22nd 2000. In order to test how the WFD should be implemented in the member states and to ease the general implementation of the directive, EU decided to carry out pilot projects in a number of selected river basins in Europe during the period 2002-2006 called Pilot River Basins, PRB. The catchment of Odense Fjord is – together with 13 other European catchments – selected to be a pilot area - test study - for implementation of a common strategy for the EU Water Framework Directory.

The present report present daily precipitation data from seven stations in the Odense Fjord catchment, and daily temperature, solar radiation, resulting wind vector speed, resulting wind direction vector, relative humidity and potential evaporation from one representative meteorological station for the period 1990-2003.

The report (pdf-format) and the matching data set can be downloaded from the DMI web pages (www.dmi.dk)

2. Station map

Seven precipitation stations are selected to represent the catchment of Odense Fjord and one meteorological station is selected to represent the catchment concerning temperature, relative humidity, wind speed, wind direction, potential evaporation and solar radiation. The locations are shown on figure 2.1 .



Figur 2.1 The stations representing each site are listed in the tables 3.1 and 3.2

3. Observations and methods

3.1 Temperature, relative humidity, resulting wind vector speed, resulting wind direction vector, accumulated potential evaporation and solar radiation.

The meteorological station 06126 Årslev was selected to represent the catchment in concern to temperature, relative humidity, resulting wind speed, resulting wind direction, accumulated potential evaporation and solar radiation.

During the period 1990 to June 2001 the station number for Årslev was 28281. In 2001 the station was modernized and the station number was changed to 06126, but the position is exactly the same as before. The entire series will therefore be reported as 06126 Årslev. The exact date for the change will appear in the following table.

Site and period	Station	Start	End
Årslev 1990-2003	28281 Årslev 06126 Årslev	01 January 1990 14 June 2001	06 June 2001 31 January 2003

Table 3.1

Methods to calculate the daily values

The daily averages are made for the meteorological day i.e. from the previous day at 06 UTC (but not including) until and including the actual day at 06 UTC. Thus the meteorological day 07.03.04 represents the period 06 UTC 06.03.04 – 06 UTC 07.03.04..

For the period 01 January to 06 June 2001 the calculations of daily values are based on 24 observations. For the period 14 June 2001 to 31 January 2003 the calculations of daily values for temperature and relative humidity, resulting wind vector speed, resulting wind direction vector are based on 8 observations, and the calculations of daily solar radiation and accumulated potential evaporation are based on 24 observations.

The daily solar radiation is calculated as a sum of the observations for the meteorological day.

The accumulated potential evaporation is calculated by means of a modified Makkink formula .(Mikael Scharling, 2001)

All daily data from the above mentioned parameters from Årslev are included in the data files shown in section 5.

3.2 Precipitation

Seven stations were selected to represent the catchment of Odense Fjord regarding daily observed precipitation in the period 1990-2003.

Site and period	Station	Start	End
Sasserod 1990-2003	28160 Sasserod 28161 Veflinge	01 January 1990 02 November 1999	01November 1999 31 December 2003
Dalum 1990-2003	28170 Dalum	01 January 1990	31 December 2003
Agedrup 1990- September 2003	28190 Agedrup	01 January 1990	30 September 2003
Heden 1990-2003	28300 Heden	01 January 1990	31 December 2003
Gundestrup 1990-2003	28335 Gundestrup	01 January 1990	31 December 2003
Korinth 1990-2003	28400 Korinth	01 January 1990	31 December 2003
Hundtofte Mark	28420 Hundtofte Mark	01 January 1990	31 December 2003

Table 3.2

Methods

Daily precipitation is observed every morning at 8 AM local time.

All daily observed precipitation data from the stations mentioned above are included in the data files shown in section 5.

4. Metadata

All available information on the station positions and rain gauge exposure is included in the data files St_pos and St_ang.dat. File description in section 5.

All precipitation observations have been made using a Hellmann gauge, the height of the gauge is in generally 150 cm above ground level.

The 06 June 2001 the automatic climate station 28281 Årslev was modernized to the Synop station 06126 Årslev which started on the 14th June 2001 and some instruments was replaced. In the following table the new instruments are listed.

Parameter	Instrument 28281	Instrument 06126
Solar radiation	CM11 Kipp and zonen	Star sensor
Temperature	PT500, Aanderaa	PT100, Vaisala
Wind	Malling 884	Waa151 and Wav151, Vaisala
Relative humidity	Lambrecht hair hygrometer	Humicap, Vaisala

Table 4.0

5. Contents of data files

5.1 Daily temperature, daily relative humidity, daily resulting wind vector speed, daily resulting wind direction vector, daily accumulated potential evaporation and daily solar radiation

Filenames: <Stations_no.>_<element no.>.dat
06126_101.dat
06126_201.dat
06126_216.dat
06126_381.dat
06126_382.dat
06126_550.dat

These files contain daily values of the following parameters from station 06126 Årslev for the period 1990-2003 on:

Element no.	Parameters	Unit of measurement
101	Temperaure	0,1°C
201	Relative humidity	%
216	Accumulated potential evaporation	0,1 mm
381	Resulting wind direction vector	Degrees
382	Resulting wind vector speed	0,1 m/s
550	Solar radiation	0,1 MJ/m^2

Table 5.1

There are no missing dates between the start and the end date. Missing observations are filled in by -9999.

ASCII format of all files:

Position	Format	Description
1-11	F11.0	Stations no.
12-17	F6.0	Year
18-21	F4.0	Month
22-25	F4.0	Day
26-31	F6.0	Element no.
32-42	F11.0	Element Value

5.2 Observed daily precipitation files

The observation files contain observed daily precipitation for the period 1990-2003. There are no missing dates between the start and the end date. Missing observations are filled in by -9999.

Filenames: P<Stations number>.dat

P28160.dat
P28170.dat
P28190.dat
P28300.dat
P28335.dat
P28400.dat
P28420.dat

ASCII format of all files

Position	Format	Description
1-11	F11.0	Stations no.
12-17	F6.0	Year
18-21	F4.0	Month
22-25	F4.0	Day
26-31	F6.0	Precipitation previous 24 hours (0,1 mm), -1 means more than 0 mm but less than 0,1 mm.

Be aware of that P28160.dat is compounded of data from station 28160 and 28161, as it also appears from part 3.2.

5.3 Stations angles file

The file contains information on the rain gauge exposure. The information is expressed as the angle to the horizon in eight directions, as the summarising angle index and the exposure class.

Filename: St_ang.dat (Fixed ASCII)

The file has the following format:

Position	Format	Description
1-5	F5.0	Stations no.
6-25	Datetime	Start date (DD-MMM-YYYY HH:MM:SS)
26-45	Datetime	End date (DD-MMM-YYYY HH:MM:SS)
46-51	F6.0	Angles towards N
52-57	F6.0	Angles towards NE
58-63	F6.0	Angles towards E
64-69	F6.0	Angles towards SE
70-75	F6.0	Angles towards S
76-81	F6.0	Angles towards SW
82-87	F6.0	Angles towards W
88-93	F6.0	Angles towards NW
94-100	F7.0	Angles index
101-105	A5	Exposure class

The following dependence of exposure class on angle index are used:

Exposure class	Description	Min. Index	Max Index
A	Well Sheltered	20	30
B	Moderately Sheltered	6	19
C	Freely Exposed, Unsheltered	0	5
D	Overprotected, Too well sheltered	31	127

5.4 Stations position file

This file contains information on the station position and thereby on any changes in locations of the stations during the period 1990-2003.

Filename: St_pos.dat

The file has the following ASCII formats:

Position	Format	Description
1-5	F11.0	Station no.
6-21	A15	Station name
22-22	A1	Station type (W= part of WMO synoptic net, N=automatic station and manual precipitation station)
23-42	Datetime	Start date (DD-MMM-YYYY HH:MM:SS)
43-62	Datetime	End date (DD-MMM-YYYY HH:MM:SS)
63-65	A3	UTM zone
66-76	F11.0	Easting
77-87	F11.0	Northing
88-95	F8.2	Elevation (metres above mean sea level)
96-106	F11.0	Latitude, degrees N (dd°mm'ss'')
107-117	F11.0	Longitude, degrees E (dd°mm'ss'')

6. References

Mikael Scharling. KLIMAGRID DANMARK - Sammenligning af potentiel fordampning beregnet ud fra Makkinks formel og den modificerede Penman formel. DMI Technical Report No. 01-19. Copenhagen 2001.

Previous reports

Previous reports from the Danish Meteorological Institute can be found on:
http://www.dmi.dk/dmi/dmi-publikationer.htm