MARKIS: The Dutch marine database and its quality control system

J. B. Wijngaard

De Bilt, February 2006

Contents

Introduction

The Royal Netherlands Meteorological Institute (KNMI) has a long history of collecting and archiving marine data. In 1854 Dutch merchant ships started to transfer their collected observations regularly to the just-founded KNMI. The data came to the KNMI in the logbook form as agreed at the Brussels conference in 1853 (Quetelet, 1854). Once the KNMI received the data, they were processed and archived. Nowadays, the KNMI is still active in the field of collecting, processing and archiving marine data. The data collecting routine was subject to many changes during the past one and a half century. These changes include differences in logbook models, SHIP codes, archive formats, storing devices (media) and processing. Around 1980 a first step was undertaken to digitally archive all marine observations in one format. Due to changing WMO coding standards, later observations got another format. Until recently the marine data were available digitally, but had different formats for different periods and a plain file structure only. Recently, the new Dutch marine database has been developed (MARKIS). All marine data are stored in this relational database for archiving, processing and retrieval. This database contains the Dutch marine ship data from 1854 until now, as well as the marine data from the other Voluntary Observing Ships (VOS) that are exchanged internationally under WMO regulations (CMM-XI, Rec. 11).

Often data quality appear to be problematic, especially when data sources, processes or human interference change over time. With respect to the quality controlled historical data, an additional problem arises as the procedure followed is not readily available anymore; e.g. adjustments were often made without archiving why and how it was done. To overcome this kind of problems in future and to provide information about the different steps in the quality control procedures, a quality control module has been developed. This quality control module is incorporated in the marine database and enables the monitoring of the quality control process in its different stages. Moreover, metadata concerning former types of archiving are preserved. This appears valuable in the quality control and homogenising procedures because different types of archiving introduce their own type of errors.

This report starts with a short review of the history of the marine-data collection and archiving during one and a half century. It continues with a description how the archive is structured nowadays in the new designed ‘MARKIS’ database. Furthermore, its quality control structure is highlighted in more detail. Finally, the operational procedures to keep the database up-to-date are described.

History

Data transfer

Since the regular collecting of marine data started in 1854, the ship observations were recorded in meteorological logbooks according to the format specified at the Brussels conference. The logbooks from the Dutch ships were sent to the KNMI. Although the invention of wireless communication brought an effective way of transmitting observations in near real time mode to the different national weather services, the meteorological logbooks still kept their position on board the ships until the introduction of the computer. Nowadays most Dutch ships record their observations on the on-board pc. For climatological purposes, the data – covering several months of observations – are sent regularly to the KNMI.

Storing devices at KNMI

First, the paper logbooks were processed manually and the data extracted were kept in a paper archive at the KNMI. Given the growing amount of data at the beginning of the twentieth century this procedure became too time consuming and inconvenient. Therefore in 1923, following the example of the UK Meteorological Office, punch cards were introduced to store the data. They were in use until 1982. Over the years KNMI applied different punch codes and punch cards with widths of 45 and 80 columns. Also different logbook models and SHIP codes were employed during this time. Appendix A gives an overview of these different ship logbook models and KNMI punch codes. From 1968 until 1989 magnetic tapes were in use for data storage. Afterwards the data were transferred and stored on computer hard disk and backed-up on CD-Rom.

Digital data formats

In 1981 all the marine data up to and including 1980 were checked, corrected and archived in a so called '120-character' format on magnetic tapes (Broersma, 1981). The number of characters was confined to 120 by the fact that the magnetic tape lines were limited to this size. This resulted in a very condensed, but also complicated way of archiving. Next, the format of the data observed after 1980 was changed to the '130-character' format. Changing and lengthening of the format was necessary given the new code standards specified by the World Meteorological Organisation (WMO, 1982a). The introduction of the International Maritime Meteorological Tape (IMMT) code in 1982 (WMO, 1982b) made it again necessary to adopt a new format. Table 1 summarises the different formats used at the KNMI before introduction of the database. The data until 1936 are from Dutch origin for 95 percent, afterwards a large part of the data is from other nationalities.

Format	**Start year**	**End year**
120-character	1854	1980
130-character	1981	2000
IMMT	1982	

Table 1: Different archiving formats used at the KNMI at the end of the 20th century. Within the KNMI the IMMT format is sometimes called the '131 character format'. This is because the main core of the used format consists of 131 characters.

To a relational database

At the end of the twentieth century basically three different formats were in use at the KNMI for different observational periods (Table 1). Collate these data in an uniform database structure with a well-defined quality control module improves:

1) The access to the marine data; Until recently, only experienced users were able to extract the data and process them. By making use of a structured and well-defined data-archive more people can directly benefit from the data.
This will facilitate future research on the data. For example, it could support work like the research on the gravity correction of the surface level pressure records as described by Wallbrink et al. (2003). These revised data led to an up-date of ICOADS (International Comprehensive Ocean-Atmosphere Data Set. ICOADS contains observations provided by archives all over the world including the Dutch archive of marine data (Woodruff et al., 1987).

2) The quality control structure; This structure makes it easier for users to examine the data quality. Not only one 'overall' quality flag is available, but also information about the different stages in the quality control procedure is provided.

3) The removal of duplicates; It appeared that in the plain file archive several records exist with the same primary keys.

To prevent non-reversible conversion errors, the original values of observations are preserved as much as possible. Only reversible conversions were – if necessary – applied and documented. E.g. unit conversions improve the standardized presentation and therefore the practical usefulness of the data.

MARKIS database

The database used is a relational Oracle database. The main structure is straightforward and shown in Figure 1. Different element groups are defined for a convenient arrangement and to facilitate (meta) data administration. The elements are divided into 7 main groups, the 'mo-tables', as presented in the lower part of Figure 1:
- mow: wind and wave elements
- mor: rain elements
- mot: temperature elements
- moi: ice elements
- moc: cloud elements
- moa: general weather elements
- moe: the 'extra' table contains metadata information (mainly originating from the ship code)

In Appendix B a description of the elements in the mo-tables is given. The other group of tables (upper part of Figure 1) contains metadata providing information about the start and end of the measurements, descriptions of the different elements, ship characteristics, units, etc.

Every record in de mo-tables contains a primary key (identifier) with a unique value, The primary key contains the following elements in succession:
-udate: date (yyyymmdd UTC)
-utime time (hhmi UTC)
-cs: call sign (identification) of the ship
-la: latitude
-lo: longitude

The data has been entered in the database in ascending order from the year 1854 onward.
By processing the data a check on these primary keys is applied: the primary key should always be available otherwise the record will be kept in error files outside the database until further processing is applied. An exception is made for the call sign. If the call sign is not present, an artificial one is constructed of the form SHIP-<n>, where n is an unique number starting at 1, and is increased by one, every time a missing call sign has to be constructed and the other four key elements (la, lo, udate and utime) have the same value. A similar procedure is followed for any double primary key; the key last found is made unique by adding a number to cs. Records with duplicate keys (cs = <name x>, and cs = <name x>-<n>, where n < maxnumber) are not kept in the main database, but are transferred to supplementary tables. The last entered record (cs = <name x>-<n>, where n = maxnumber) is the one remaining in the main database; this is the record originating from the most recent input file.

If other elements than the primary key elements are incorrect, missing or contain values that are outside its expected range, they are flagged. To monitor data quality every observed element is accompanied by a quality indicator (q_<element abbreviation>) which contains several flagging possibilities (see for more details section about the quality control module). In addition, to the information derived directly from the ship-codes and the quality control flags, the original historical formats (as far as known) are archived in the database.

In Appendix B an overview of the elements and how they are related to each other in the three different former formats (120-, 130-character and IMMT) is given. The program 'cin_mar' that actually transfers the data to the database has a clear structure along with extensive remarks, allowing easy changes in the future. Appendix C provides a detailed overview of the program comments (partly in Dutch).

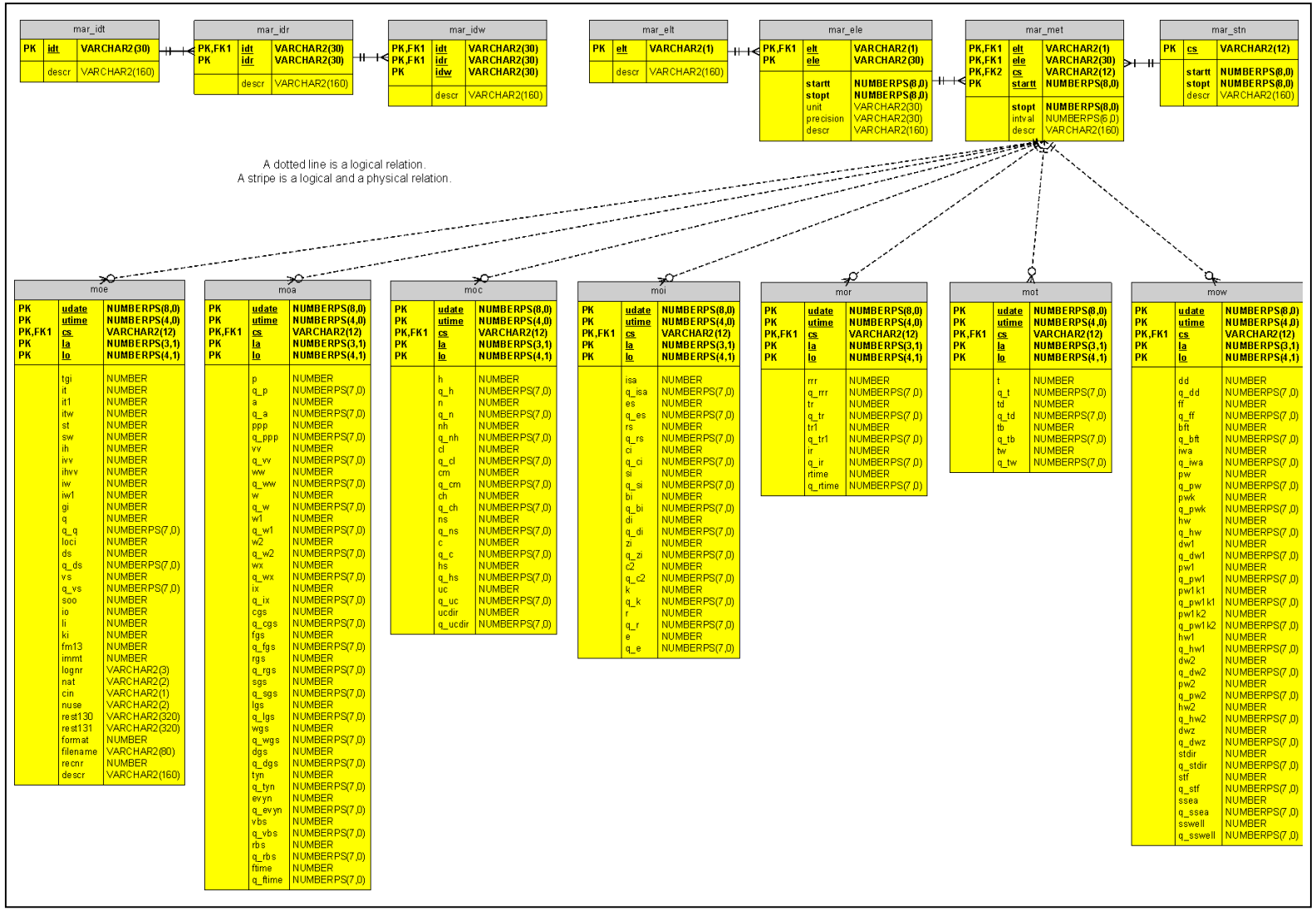

Figure 1: Structure MARKIS database (for explanation of the abbreviations see text and appendix B)

Quality control module

Applying quality control procedures is one of the important issues when archiving weather data. For the current ship data, quality parameters are already supplied within the ship code according to the WMO standards (WMO, 1995). Although this is a good first indication for the usefulness of the data, it is desirable to refine this quality control procedure. The historical data (in this case the 120-character format) do not include any quality control indicators at all. For both the current and historical data a quality control module is developed. To achieve this a quality indicator for every observed element is introduced. These indicators are intended to point at suspicious or erroneous observations, or values changed by human intervention.

The quality control indicators monitor the different stages of the quality control process. Therefore for every (weather) element a quality control indicator is given containing 7 different quality flags: Qc, Qg, Qs, Qt, Qa, Qh and Qf (see Table 2).

The different quality flags present:
Qc: Conversion and precision flag. Indicates if he element is presented in its original unit or converted numerically. Also the precision of the element is given. The description of the Qc for the different elements is part of the database (see also Appendix C). The value 1 means for every element that the element is in its original unit and with current precision.
Qg: General quality control as given in the original code. This flag is only available from the 130-character and IMMT format.
Qs: Quality of the element as given in the ship code, available in the IMMT and (for most elements) also in the 130-character format. Qs = 7 means that originally this quality was not given.
Qt: Technical control, applied during the transfer of the data into the database. The code (Table 3) is based on the quality control code in the IMMT format, but only the 0 and 6 are used. The Qt-flags are gathered in an error-log, which can be used for interactive checking.
Qa: Automatic quality control provided in the post-processing phase. This includes very simple controls (e.g. no negative numbers for wind speed and not exceeding a certain limit) but also more sophisticated ones (e.g. comparison between different elements as wave height and wind speed). The automatic checks included so far are given in Appendix D. More control procedures can be developed and inc1uded easily.
Qh: Optional human control, performed during the post-processing phase on basis of the error-logs and outcomes of the automatic control. Human involvement can lead to corrections/interpolations of certain values. If the value of an element is adjusted during this half-automatic process, it is indicated here. Moreover, the original value is always easily traced back while kept in logs within the database.
Qf: The final overall quality depending on the Qt, Qa and the Qh. If the Qh is present this final quality flag is based on the Qh, otherwise on the Qa and Qt. Qf gives the user a simple tool to support the decision whether or not to use a certain element. Still, the different stages of the quality control procedure remain available by means of the other quality flags.

Qc	Possible conversions and precision (data entry)
Qg	General quality control as given in the ship code (if present)
Qs	Quality control as given in the ship code (if present)
Qt	Technical control (data entry)
Qa	Automatic quality control (post-processing)
Qh	Human quality control (second stage of post-processing)
Qf	Overall quality (determined by the previous flags)

Table 2: The quality flags as provided at different stages in the data-processing.

0	No quality control (QC) has been performed on this element
1	QC has been performed; element appears to be correct
2	QC has been performed; element appears to be inconsistent with other elements
3	QC has been performed; element appears to be doubtful
4	QC has been performed; element appears to be erroneous
5	The value of the element has been changed as a result of QC
6	Unit/sign missing for the value of the element
7	Originally quality not given
8	Reserve
9	The value of the element is missing

Table 3: Quality values used for the Qt, Qa, Qh and Qf are based on the IMMT format. (6 and 7 in IMMT reserved values). Not all values are used for each flag.

Operational procedure

The successive steps to undertake the updating of the MARKIS database with new marine data are:

- Dutch marine data are collected and pre-validated (mainly checking the format) at the department of the Port Meteorological Officer.
- This Dutch data are sent to the GCC (Global Collecting Centre) in Hamburg by the marine representative of the KNMI on a quarterly basis.
- Data of different nations are gathered, processed and afterwards disseminated to the participants by the GCC.
- Every 3 months the database manager of MARKIS collects the data by ftp from the GCC.
- The database manager is in charge of entering this newly received data into the database and runs the control programs (database entry control and quality control module). At this point, the data are inserted to the non-validated part of the database (mo-tables)
- As the process of data entry and quality control are successful completed, the data are migrated to the validated part of the database (ma-tables). Afterwards duplicates are migrated to the so-called mu-tables.
- A back-up copy of the entire database (snapshot) is made following the operational procedure of the Climatological Service data administration.

Recommendations

Desirable developments in future are:

- Expand automatic quality control procedures.
- Develop interactive procedures to improve the quality of the data. Human interference can lead to a rational filling of gaps or adjusting of data. Note that the original value will always be preserved in the MARKIS database.
- Add other marine data archived at the KNMI, e.g. the historical data available through the CLIWOC project (Können and Koek, 2005) or the North Sea wave measurements archive, maintained by Frits Koek (KNMI).
- Develop derived products such as climatologies for the North Sea, which for example could be used in safety analyses by the offshore industry.

References

Broersma R. (1981). Verwerken waarn. Code 28 v.w.b. controle, correctie en omzetting in het standaard 120-character format. KNMI, The Netherlands (in Dutch, handwritten).

JCOMM (2000). Final report from the Subgroup on Marine Climatology – eighths session, Asheville, NC, USA, 10-14 April 2000, JCOMM meeting report No. 2.

Können, G.P. and F.B. Koek (2005). Description of the CLIWOC database. Climatic Change 73: 117-130.

Quetelet, A. (1854). Rapport de la Conférence, tenue à Bruxelles, sur l'invitation du gouvernement des Etats-Unis d'Amérique, à l'effet de s'entendre sur un système uniform d'observations météorologiques à la mer, Annuaire de l'Observatoire Royal de Belgique, 21: 155 - 167.

Wallbrink H., F.B. Koek, G.P. Können and T. Brandsma (2003). Sea level pressure observations from Dutch ships 1854-1938 incorporated in COADS Release 1C climatology. Int. J. of Climatol, 23: 471-475.

Woodruff S.D., R.J. Slutz, R.L. Jenne and P.M. Steurer (1987). A Comprehensive Ocean Atmosphere Data Set. Bull. Amer. Meteor. Soc., 68:1239-1250.

WMO (1982a). Guide to Marine Meteorological Services, 2nd ed. WMO No. 471, Geneva, Switzerland.

WMO (1982b). Thirty-fourth session of the executive committee. WMO No. 599, Geneva, Switzerland.

WMO (1995). Manual on Codes. WMO No. 306, Geneva, Switzerland.

Appendix A

This overview is kindly supplied by H. Wallbrink (KNMI).

Compilation of Dutch marine meteorological observations 1854 – 1982

Pre WW II ship logs				
Year	**Compilation**	**Ship log, Model**	**KNMI Code**	**Remarks**
1854	Handwritten registers (Collection books).	'Universeel Extract-Journaal'		6 times daily at the end of each watch. Local time. The new day starts at midnight (watch 6 = 00 hours of the day beginning).
1898	Handwritten registers. (Collection books).	Model 704		Idem
1923	Handwritten registers. First test at KNMI with a Hollerith key punch machine	Model 704	Code 1	Idem
1924	45-column punch card. Key punching at KNMI with borrowed Hollerith machines.	Model 704	Code 1	Idem
1925	45-column punch card. KNMI Powers key punch, sorting and tabulating machines.	Model 704	Code 2	Idem
1931	45-column punch card. All Hollerith Code 1 cards reproduced to Powers Code 2 cards. Code 2 was in use until the first of January 1931.	Model 704	Code 2	Idem
1931	45-column punch card. Code 7 was in use from the first of January 1931 until 1937.	Model 704	Code 7	Idem
1935	Introduction of card verification by 'check-punching'.		Code 2 and Code 7	Idem
1935 - 1943	1 November 1941: all the ship's observations of the period 1854 – 1938 are now punched and check-punched on 45 columns punch cards.	Model 704	Code 2 and Code 7	6 times daily at the end of each watch. Local time. The new day starts at midnight (watch 6 = 00 hours of the day beginning).
1940 - 1945	During the second World War all Dutch marine meteorological observations were cancelled.			

Post WW II ship logs: November 1945 – 1950				
Year	**Compilation**	**Ship log**	**KNMI Code**	**Remarks**
1946	80-column punch card.	Model 704, issued 1938 and in 1939	Code 01	6 times daily. GMT 01-24. The new day starts after midnight at watch 1 = 04 hours. Air pressure in tenth of millibars. Corrected for gravity.
	80-column punch card. Reproduction Code 01 cards on 80 columns German punch cards. Code 07: Indian Ocean only. Code 17: All other cards.		Code 07 Code 17	Day and Watch similar to Code 01. Punched on behalf of German 'Monatskarten' of the North Atlantic ocean.
	80-column punch card. In use for observations which were not yet punched. Meteo observations were punched conform Code 01. Current observations rounded to whole hours ship's time were punched conform Code 03.	Model 704, issued 1938 and in 1939	Code 14 Code 03	6 times daily. GMT 01-24. The new day starts after midnight at watch 1 = 04 hours (Code 14). Air pressure in tenth of millibars. Corrected for gravity.
1947	80-column punch card. Adjustment Paris code observations to the international Code 08.	Model 753, issued 1947	Code 15 Code 03	4 times daily at 00, 06, 12 and 18 GMT. GMT 00-23. The new day starts at midnight GMT. Air pressure in tenth of millibars. Corrected for gravity. All current observations, until ship logbook issue 1962, in local time.
1948	80-column punch card. Adjustment Copenhagen code observations to the international Code 08.	Model 754, issued 1948. Model 755, issued 1948	Code 16 Code 03	4 times daily at 00, 08, 12 and 18 GMT. GMT 00-23. The new day starts at midnight GMT. Air pressure in tenth of millibars. Corrected for gravity. Loose-leaf ship logbook, model 754 conform GMT. Current logbooks, model 755, until 1962 conform ship's time.
1949	80-column punch card. International 'Washington code', Code 08. In use from 1 January 1949.	Model 756, issued 1949.	Code 08 until 1968	4 times daily at 00, 08, 12 and 18 GMT. GMT 00-23. Air pressure in tenth of millibars. Corrected for gravity.

Post WW II ship logs: 1951-1982				
Year	**Compilation**	**Ship log**	**KNMI Code**	**Remarks**
1951 - 1953	COADS deck 193. Ship's observations punched on 45 column punch cards from the period 1854-1938 were reproduced to 80 column punch cards in behalf of the 'US Weather Bureau' from 1951 until1953.		IBM card No. A11831	6 times daily GMT. The new day starts at watch 6 or 00 hours of the day beginning. GMT 00-23. Air pressure in tenth of millimetres omitting initial 7. Not corrected for gravity.
1953	80-column punch card.	Model 777 issued 1953.	Code 08 until 1968	4 times daily at 00, 08, 12, en 18 GMT. The new day starts at midnight GMT. GMT 00-23. Air pressure in tenth of millibars. Corrected for gravity.
1955	80-column punch card.	Model 784, 792.	Code 08 until 1968	1st respectively 2nd edition 1955.
1957	80-column punch card.	Model 800 issued 1957.	Code 08 until 1968	Idem
1958	80-column punch card.	Model 802 issued 1958.	Code 08 until 1968	Idem
1959	80-column punch card.	Model 802 issued 1959, 1960	Code 08 until 1968	Idem
1961	80-column punch card.	Model 805 issued 1961.	Code 08 until 1968	Idem
1962	80-column punch card. Current log issued in 1962.	Model 807	Code 03	Conform local time.
1961 - 1963	80-column punch card. All 45-column punch cards 1854-1938 reproduced to 80 column punch card.		Code 28	Local time. Watch conform 45 column Code 2. Marsden square transferred to Q, LA, LO. Air pressure in tenth of millibars.
1965	80-column punch card. Current log issued in 1964.	Model 808	Code 03	Rounded to whole hours GMT.
1968	80-column punch card. 'Selected Ships'	Model 815 issued 1968	Code 08	Starts at 1 January 1968. GMT.
1968	Magnetic Tape. Reproducing 80 columns punch cards to KNMI standard 120-character tape format.		120 character	Codes 07, 14, 15, 16 en 17 are reproduced to magnetic tape. Code 01 was rejected.
1981	Magnetic Tape. Checking, correcting and cleaning of the Code 28 data tapes 1854-1938.		120 character	Translation errors were introduced.
1982	The keypunching at KNMI ended.			

Appendix B

Relation of the elements in the different formats

Element name	Description	Format 120	120 char. nr.	Format 130	130 char. nr.	IMMT	IMMT char. nr.
aaaa	year	(2 characters)	2-3	idem	2-3	(4 characters)	2-5
mm	month	value:1-12	4-5	idem	4-5	idem	6-7
yy	day	value:1-31	6-7	idem	6-7	idem	8-9
gg	hour	value:00-23	15-16	idem	8-9	idem	10-11
Q	octant/quadrant	octant /different → LOCI	8	octant, value:0-3,5-8	11	quadrant (before july 1996 octant) value:1,3,5,7	12
LOCI	location indicator	value:00,10,20,21,30,31,40,50,60,70,80	75-76	--	--	--	--
LA	latitude	in 0.1 degrees/different → LOCI,Q	9-11	in 0.1 degrees →Q	12-14	idem	13-15
LO	longitude	in 0.1 degrees/different → LOCI,Q	12-14	(3 characters) in 0.1 degrees →Q	15-17	(4 characters) in 0.1 degrees →Q	16-19
IT1	temperature indicator (T,TD,TW, TB,TDS); Fmt120: unit and precision of the measurement.	value:1-7	1	--	--	--	--
IT	temperature.indicator (T,TD,TW,TB,TDS); Fmt130 and131: precision of the measurement	--	--	value:3-5 on tapes and disks	1	idem	1
T	air temperature	in 0.1 deg. Celsius/Fahrenheit →IT1,sn	36-38	in deg. Celsius →sn	28-30	idem	31-33
sn	sign air temperature	value:blank/- (blank=+,-=-)	35	value:0-1 (0=+,1=-)	27	idem	30
TD	dew-point temperature	in 0.1 deg. Celsius/Fahrenheit→IT1,ST	91-93	in deg. Celsius →ST	87-89	idem	35-37
ST	sign/ice dew-point temperature	value:blank/- (blank=+,-=-)	90	value:0-1 (0=+,1=-)	86	value:0-2, 5-7 (0,5=+; 1,2,6,7=-)	34
ITW	indicator for sea-surface temperature measurement	value:0-7	54	Idem	51	idem	54
TW	sea-surface temperature	in deg. Celsius/Fahrenheit →IT1,sn2	51-53	in deg. Celsius →sn2	48-50	idem	51-53
sn2	sign sea-surface temperature	value:blank/- (blank=+,-=-)	50	value:0-1 (0=+,1=-)	47	idem	50
TB	wet-bulb temperature	in deg. Celsius/Fahrenheit →IT1,SW	40-42	in deg. Celsius→SW	32-34	idem	90-92

Element name	Description	Format 120	120 char. nr.	Format 130	130 char. nr.	IMMT	IMMT char. nr.
SW	sign/ice wet-bulb temperature	value:blank/-(39); 0/1 (43)	39,43	value:0-1, 5-7 (0,5=+; 1,6,7=-)	31	value:0-2, 5-7 (0,5=+; 1,2,6,7=-)	89
tds	difference dry- and wet-bulb temperature	in deg. Celsius/Fahrenheit →IT	56-58	--	--	--	--
stds	sign of difference of dry- and wet-bulb temperature	value:blank /- (blank=+,-=-)	55	--	--	--	--
IW1	wind indicator (DD, FF); Fmt120: precision of the measurement and estimated or measured	value:0-9	77	--	--	--	--
IW	wind indicator (FF); Fmt130 en 131: unit and estimated or measured	--	--	value:0,1,3,4	10	idem	27
DD	wind direction	tenths of degrees (00,99,01-36)	18-19	idem	23-24	idem	25-26
FF	wind speed	(3 characters) in knots	20-22	(2 characters) in knots or m/s →CIN (value:0,1,9), IW (according WMO-code 1855)	25-26	(2 characters) in knots or m/s →IW (according WMO-code 1855)	28-29
P	air pressure	(5 characters) in 0.1 hPa	30-34	(4 characters) in 0.1 hPa	35-38	Idem	38-41
GI	wave indicator	value:0-5	79	--	--	--	--
IWA	indicator for wave measurement	--	--	value:0-9	52	Idem	55
PW	period of wind waves or of measured waves	seconds →TGI (not 4), characters 61 and 62 filled	61-62	in seconds	53-54	Idem	56-57
PWK	code period wind waves	class (characters 62 blank) → TGI (not 4), value:0-9/blank	61	--	--	--	--
HW	height of wind waves or of measured waves	in 0.5m →TGI (not 4)	63-64	in 0.5 m	55-56	idem	58-59
DW1	direction of predominant swell waves	in tenths of degrees (00, 01-36, 45,99)	65-66	idem	57-58	idem	60-61
PW1	period of predominant swell waves	--	--	in seconds	59-60	idem	62-63
PW1K1	code 1 period predominant swell waves	class1(character 68) →TGI (not 4), value:0-9/blank	68	--	--	--	--
PW1K2	code 2 period predominant swell waves	class2(character 67) →TGI (not 4), value:0-9/blank	67	--	--	--	--

Element name	Description	Format 120	120 char. nr.	Format 130	130 char. nr.	IMMT	IMMT char. nr.
HW1	height of predominant swell waves	in 0.5m →TGI (not 4)	69-70	in 0.5 m	61-62	idem	64-65
DW2	direction of secondary swell waves	--	--	in tenths of degrees (00.01-36,99)	96-97	idem	99-100
PW2	period of secondary swell waves	--	--	in seconds	98-99	idem	101-102
HW2	height of secondary swell waves	--	--	in 0.5 m	100-101	idem	103-104
IH	cloud height indicator	value:0-1, blank	47	--	--	--	--
IVV	visibility indicator	(25) value:0,1, (26) value:0,1	25-26	--	--	--	--
IHVV	cloud height and visibility indicator	--	--	value:0-3	18	idem	20
H	height of clouds	value:0-9,/	46	idem	19	idem	21
VV	visibility	value:90-99,// (klassen)	23-24	idem	20-21	idem	22-23
N	cloud amount	Octas	17	idem	22	idem	24
DWZ	direction wind waves	tenths of degrees (=dd)	59-60	--	--	--	--
WW	present weather	value:00-99	27-28	idem	39-40	idem	42-43
W	past weather	value:0-9	29	--	--	--	--
W1	past weather 1	--	--	value:0-9	41	idem	44
W2	past weather 2	--	--	value:0-9	42	idem	45
WX	weather during measurement	value:0-9	107	--	--	--	--
NH	amount of lowest clouds	value:0-9	44	idem	43	idem	46
CL	genus of low clouds	value:0-9	45	idem	44	idem	47
CM	genus of middle clouds	value:0-9	48	idem	45	idem	48
CH	genus of high clouds	value:0-9	49	idem	46	idem	49
ISA	ice accretion on ships	--	--	value:1-5	63	idem	66
ES	thickness of ice accretion	--	--	in centimeters	64-65	idem	67-68
RS	rate of ice accretion	--	--	value:0-4	66	idem	69
TGI	appended group indicator	value:0-9	80	--	--	--	--
SOO	source of observation	--	--	value:0-6	67	idem	70
IO	observation platform	--	--	value:0-9	68	idem	71
NAT	nationality	value:0-99,<letters>	71-72	idem	76-77	idem	79-80
CIN	format indication (historical formats)	value:0-9,<space>,+,-,L,B →NAT	73	value:0,1,9; (→NAT)	79	--	--
IX	weather data indicator (manual/automatic)	--	--	value:1-6; →NAT	80	value:1,4,7	83
NUSE	national use (characters)	--	--	(2 characters)	79-80	(1 character)	81
LI	light vessel indicator	value:1-9	78	--	--	--	--
KI	card indicator	value:0-7	74	--	--	--	--

Element name	Description	Format 120	120 char. nr.	Format 130	130 char. nr.	IMMT	IMMT char. nr.
journr	logbook number	(3-7 characters) notation system→CIN	103-106	idem	69-75		
CS	call sign of ship	--	--	(3-7 characters)	69-75	idem	72-78
IR	precipitation indicator	--	--	value:1-4	81	idem	84
RRR	amount of precipitation (during TR/TR1)	value:00-99(code 3577)→TGI(=7) /as112-115 in 0.1mm/9999	81-82 / 112-115	value:000-999	82-84	idem	85-87
TR1	duration of period of reference for amount of precipitation ending at the time of report	value:00-92(code 4080) →TGI(=7)	83-84	--	--	--	--
TR	duration of period of reference for amount of precipitation ending at the time of report	--	--	value:1-9	85	idem	88
A	charactersaracteristic of pressure tendency during the three hours preceding the time of observation	value:0-8 →TGI(=6)	83	value:0-8	90	idem	93
PPP	pressure tendency past 3 hours	(2 characters and characters 88,89) in 0.1 hPa→TGI (=6)	84-85, 88,89	in 0.1 hPa	91-93	idem	94-96
DS	true direction of ship (past 3 hours)	value:0-9,/ →TGI(=6)	81	value:0-9,/	94	idem	97
VS	ship's average speed (past 3 hours)	value:0-9→TGI(=6)	82	value:0-9	95	idem	98
CI	concentration sea ice	--	--	value:0-9,/	102	idem	105
SI	stage of development	--	--	value:0-9,/	103	idem	106
BI	ice of land origin	--	--	value:0-9,/	104	idem	107
DI	true bearing of principal ice edge	value:0-9,/ →TGI(=2)	83	value:0-9,/	105	idem	108
ZI	present ice situation ant trend (past 3 hours)	--	--	value:0-9,/	106	idem	109
C2	ice type	value:0-9 (code 0663)→TGI (=2)	81	--	--	--	--
K	influence ice on navigation	value:0-9 (WMO-code 3600) →TGI (=2)	82	--	--	--	--
R	distant ship to ice edge	value:0-9→TGI (=2)	84	--	--	--	--
E	direction of ice edge	value:0-9(code 1000)→TGI (=2)	85	--	--	--	--
CGS	cloud (german system)	value:0-9 →TGI (=4)	62	--	--	--	--
FGS	fog (german system)	value:0-9 →TGI (=4)	64	--	--	--	--
RGS	rain/shower (german system)	value:0-9 →TGI (=4)	68	--	--	--	--
SGS	snow/hail (german system)	value:0-9 →TGI (=4)	70	--	--	--	--

Element name	Description	Format 120	120 char. nr.	Format 130	130 char. nr.	IMMT	IMMT char. nr.
LGS	thunder/rain/shower (german system)	value:0-9 →TGI (=4)	81	--	--	--	--
WGS	weather (german system)	value:0-9 →TGI (=4)	82	--	--	--	--
DGS	dew etc (german system)	value:0-9 →TGI (=4)	83	--	--	--	--
TYN	tornado	value:0-1	86	--	--	--	--
EVYN	st Elmus fire	value:0-2	87	--	--	--	--
VBS	visibility (british system)	value:0-9 →TGI (=5)	81	--	--	--	--
RBS	rain (british system)	value:000, 1-8, 999 →TGI (=5)	82-84	--	--	--	--
NS	cloud amount (c, cc)	value:0-9,/ →TGI (=8 as 81), CIN	81/108	--	--	--	--
C	genus of cloud	value:0-9,/ →TGI (=8 als 82), CIN	82/109	--	--	--	--
HS	height cloud/vertical visibility	value:00-99 →TGI (=8 als 83-84), CIN	83-84 / 110-111	--	--	--	--
BFT	wind speed in Beaufort	value:00-12	94-95	--	--	--	--
LOGNR	logbook number (charactersar)	sometimes a value	96-98	--	--	--	--
FTIME	fog duration (german system)	in quaters for 6/4 hours →CIN	99-100	--	--	--	--
RTIME	rain duration (british system)	in quaters for 6/4 hours →CIN	101-102	--	--	--	--
STDIR	direction of current	in tenths of degrees, 99 →CIN	108-109	--	--	--	--
STF	strength of current	in nautical miles/day →CIN	110-111	--	--	--	--
SSEA	scale number wind waves	value:0-9	116	--	--	--	--
SSWELL	scale number swell waves	value:0-9	117	--	--	--	--
UC	genus cloud upper air	value:1-5	118	--	--	--	--
UCDIR	direction of clouds upper air	in tenths of degrees, 99	119-120	--	--	--	--
FM13	FM13code version	--	--	--	--	value:0-8	110
IMMT	IMMT version	--	--	--	--	value:0-….	111
QCI	quality control indicator	--	--	value:0-9	78	idem	82
Q1	quality indicator for (H)	--	--	value:0-9	107	idem	112
Q2	quality indicator for (VV)	--	--	value:0-9	108	idem	113
Q3	quality indicator for (N,NH,CL,CM,CH)	--	--	value:0-9	109	idem	114
Q4	quality indicator for (DD)	--	--	value:0-9	110	idem	115
Q5	quality indicator for (FF)	--	--	value:0-9	111	idem	116
Q6	quality indicator for (T)	--	--	value:0-9	112	idem	117
Q7	quality indicator for (TD) and in 130 format also for (TB)	--	--	value:0-9	113	idem	118
Q8	quality indicator for (P)	--	--	value:0-9	114	idem	119
Q9	quality indicator for (WW,W1,W2)	--	--	value:0-9	115	idem	120
Q10	quality indicator for (TW)	--	--	value:0-9	116	idem	121
Q11	quality indicator for (PW)	--	--	value:0-9	117	idem	122

Element name	Description	Format 120	120 char. nr.	Format 130	130 char. nr.	IMMT	IMMT char. nr.
Q12	quality indicator for (HW)	--	--	value:0-9	118	idem	123
Q13	quality indicator for (DW1,PW1,HW1,DW2,PW2,HW2)	--	--	value:0-9	119	Idem	124
Q14	quality indicator for (IR, RRR, TR)	--	--	value:0-9	120	Idem	125
Q15	quality indicator for (A)	--	--	value:0-9	121	Idem	126
Q16	quality indicator for (PPP)	--	--	value:0-9	122	Idem	127
Q17	quality indicator for (DS)	--	--	value:0-9	123	Idem	128
Q18	quality indicator for (VS)	--	--	value:0-9	124	Idem	129
Q19	quality indicator for (TB)	--	--	--	--	value:0-9	130
Q20	quality indicator ship's position	--	--	--	--	value:0-9	131

name in capitals = element in database

name in red = element not in database

→ dependent on given element

with code is mentioned the WMO-code

Appendix C

Program comments cin_mar

```
Coded by: F. Duin
-------------------------------------------------------------------------------

2 juli 2004

File cin_mar.pc__docu_algemeen.txt geëxtraheerd uit programmatekst cin_mar.pc

Inlezen van maritieme waarnemingen in de KIS MO-tabellen

-------------------------------------------------------------------------------

/*
**
**                              SAMENVATTING
**                              ============
**
**
**
** Overzicht alle routines binnen dit programma :
**
**    main --------------------------- (becommentarieerd)
**    open_database
**    close_database
**    sql_error
**    sql_warning
**    ci_error
**    check_param --------------------- (becommentarieerd)
**    process_wrnm -------------------- (becommentarieerd)
**    convert_datetime ---------------- (becommentarieerd)
**    write_to_errorfile -------------- (becommentarieerd)
**    str_notpbrk --------------------- (becommentarieerd)
**
**
**
** Overzicht gelinkte routines :
**
**    geen gelinkte routines
**
**
**
** Aanroep van routines binnen dit programma :
**
**          |- open_database
**          |
**          |- check_param
**          |
**    main -|- process_wrnm
**          |
**          |- ci_error
**          |
**          |- close_database
**
**                  |- convert_datetime
**                  |
**    process_wrnm -|- str_notpbrk
**                  |
**                  |- write_to_errorfile
```

```
**
**    Bij Oracle-error:    sql_error
**    Bij Oracle-warning:  sql_warning
**    Bij Oracle-notfound: geen aanroep (continue)
**
**
**
** Herdraaien van dit programma :
**
**    Herdraaien van cin_mar op dezelfde inputfile is toegestaan.
**    Voorbereidende maatregelen bij herdraaien zijn niet nodig,
**    die worden door cin_mar zelf uitgevoerd.
**    Om corrumperen van MO-tabellen door herdraaien te voorkomen,
**    moet aan de volgende voorwaarden worden voldaan:
**    1) naam van inputfile niet wijzigen
**    2) niet switchen van octanten naar quadranten of omgekeerd
**    3) inhoud van inputfile niet wijzigen
**    4) inhoud van inputfile wel wijzigen, maar op de volgende wijze:
**       A) MAAK EEN COPIE VAN DE INPUTFILE MET DEZELFDE FILENAAM ONDER
**          EEN ANDERE DIRECTORY
**       B) CORRIGEER DIE INPUTFILE, MAAR WIJZIG NIET DE SLEUTELVELDEN
**       C) VOEG GEEN RECORDS TOE AAN DE INPUTFILE
**       D) VERPLAATS GEEN RECORDS IN DE INPUTFILE
**       E) VERWIJDER GEEN RECORDS UIT DE INPUTFILE
**       Reden:
**       veld mo?.cs, in het geval dat die een kunstmatig uniek
**       gemaakte waarde heeft (b.v. 'SHIP_<volgnr>'),
**       veld moe.recnr en veld moe.filename
**    Als de naam en/of inhoud van een inputfile zodanig is gecorrigeerd
**    dat die bij herdraaien wel corruptie veroorzaken, dan moeten om
**    corruptie te voorkomen eerst de reeds ingevoerde records afkomstig
**    uit die inputfile uit alle mo*-tabellen worden verwijderd (criterium
**    moe.format+moe.filename gekoppeld aan de mo*-sleutel).
**    Je kunt natuurlijk ook rechtstreeks op de mo*-tabellen corrigeren
**    zonder herdraai van cin_mar.
**
*/

-------------------------------------------------------------------------------

Startwijze:
cin_mar <inputfile> [<inputdirectory>]
Voorbeelden:
cin_mar gcc2002q1
cin_mar gcc2002q1 /users/kisdba/kis/dat/markis

-------------------------------------------------------------------------------

Filenamen scheepswaarnemingen 1854-2003

120 character format (waarnemingen 1854-1980) :
- <beginjaar><eindjaar>.<volgnummer>.[<codenummer>]
  eindjaar maximaal 1980

130 character format (waarnemingen 1981-2000) :
- <beginjaar><eindjaar>.<volgnummer>.[<codenummer>]
  19811990.<volgnummer>.[<codenummer>]
  19912000.<volgnummer>.[<codenummer>]

131 character format ");
(waarnemingen vanaf 1 januari 1982 mogelijk) :
- gcc<jaar>q<kwartaalnummer>[.dat]   (excl. ned. schepen)
  gcc1995q1.dat t/m gcc2003q1
```

```
- gcc<jaar>q<kwartaalnummer>[mix]    (incl. ned. schepen)
  gcc2003q2 t/m ...
- ned_obs.<volgnummer>               (ned. schepen)
  ned_obs.02 t/m ned_obs.20
- oth_nlra.<volgnummer>              (overig)
  oth_nlra.03

--------------------------------------------------------------------------------

/*
 * Recordlengte Format :
 * - Format 120 :
 *   Recordlengte 120 characters.
 * - Format 130 :
 *   Recordlengte 130 characters.
 * - Format 131-V1 (IMMT-1) :
 *   Recordlengte 131 characters.
 * - Format 131-V2 (IMMT-2) :
 *   Recordlengte 151 (en in sommige gevallen 131?) characters.
 */

--------------------------------------------------------------------------------

/*
 *
 *           In het programmacommentaar is onderscheid gemaakt tussen
 *           1) nauwkeurigheid in de meting
 *              Dit wordt bedoeld in de Format 120/130/131 layoutbeschrijvingen,
 *              en met het commentaar achter de declaratie van de indicator-
 *              variabelen i_fl__IT1, i_fl__IT en i_fl__iw (fl_ is de afkorting
 *              voor Format-inputfile).
 *           2) nauwkeurigheid in de notatie
 *              Dit wordt bedoeld met de nauwkeurigheidbeschrijving boven elk
 *              op te halen element en in het bijzonder met de
 *              nauwkeurigheidbeschrijving over variabele
 *              i_db__q_elem_1e_pos__oorspr_presentatie.
 *
 *           Bijzonderheden over Format 120 :
 *
 *           Temperatuurteken :
 *           - Bij sn(SPATIE,-), St(SPATIE,-) en sn2(SPATIE,-)
 *             alleen checken op SPATIE (== +) en MINUS_TEKEN (== -); ontbrekend
 *             is in dat geval alleen SLASH; rest is illegaal (voor errorfile).
 *             Bij Sw ingewikkelder (SPATIE,- of 0,1).
 *
 *           De Format120-beschrijving is niet helder, niet correct en niet
 *           compleet omtrent de onderstaande punten.
 *           Na raadpleging Frits Koek, Hendrik Wallbrink en Janet Wijngaard
 *           is het volgende aangenomen over de inhoud van de inputfiles in
 *           Format 120 (best guess) :
 *           - Alle temperaturen zijn aangegeven in eenheid [tienden graden Celsius]
 *             (bij IT==1,3,5) of [tienden graden Fahrenheit] (bij IT==2,4,6,7).
 *             Het onderscheid dat in IT gemaakt wordt in tienden, halve en hele
 *             heeft betrekking op de nauwkeurigheid in de meting, en niet op
 *             de eenheid.
 *           - Elem dd (pos 18-19) is altijd gegeven in eenheid [tientallen graden].
 *             Raadpleeg voor dd dus niet de waarde van IW.
 *           - Elem ff (pos 20-22) is altijd gegeven in eenheid [knopen].
 *             Raadpleeg voor ff dus niet de waarde van IW.
 *           - Elem Bft (pos 94-95) is altijd gegeven in eenheid [Beaufort].
 *             Raadpleeg voor Bft dus niet de waarde van IW.
 *
 */
```

```
-------------------------------------------------------------------------------

       /*
        * ENIGE VELDEN IN DE FORMAT 120, 130 EN 131 INPUTFILE :
        */

       int          i_fl__LOCI;     /* Format 120 :                                  */
                                    /* i_fl__LOCI==0,1,20,21,40 ->                   */
                                    /*   positie in format 120 was oorspronkelijk    */
                                    /*   weergegeven in standaard presentatie van    */
                                    /*   Q,La,Lo                                     */
                                    /* i_fl__LOCI==70 ->                             */
                                    /*   positie in format 120 was oorspronkelijk    */
                                    /*   weergegeven in afwijkende presentatie van   */
                                    /*   Q,La,Lo                                     */
                                    /* i_fl__LOCI==10,30,31,50 ->                    */
                                    /*   positie in format 120 was oorspronkelijk    */
                                    /*   weergegeven in standaard presentatie van    */
                                    /*   Marsden tiengraadsvak                       */
                                    /* i_fl__LOCI==60 ->                             */
                                    /*   positie in format 120 was oorspronkelijk    */
                                    /*   weergegeven in afwijkende presentatie van   */
                                    /*   Marsden tiengraadsvak                       */

                                                 /* Format 120 :              */
       int          i_fl__Marsdenvak;                  /* Nummer van Marsdenvak     */
       int          i_fl__een_GrBr_in_Marsdenvak;      /* 1-Graads Breedte          */
                                                 /* binnen het Marsdenvak     */
       int          i_fl__een_GrLn_in_Marsdenvak;      /* 1-Graads Lengte           */
                                                 /* binnen het Marsdenvak     */
       int          i_fl__eentiende_GrBr_in_Marsdenvak; /* 1/10-Graads Breedte      */
                                                 /* binnen het Marsdenvak     */
       int          i_fl__eentiende_GrLn_in_Marsdenvak; /* 1/10-Graads Lengte       */
                                                 /* binnen het Marsdenvak     */

                                    /* Format 120, 130 en 131 :                      */
       int          i_fl__Q;        /* Octant of Quadrant waarde                     */
       int          i_fl__LaLaLa;   /* Breedtegraad (horizontale aardcirkel)         */
       int          i_fl__LoLoLoLo; /* Lengtegraad (verticale aardcirkel)            */

                                    /* Format 120, 130 en 131 :                      */
       int          i_fl__AAAA;     /* Jaar (omgezet) in 4 cijfers [UTC]             */
       int          i_fl__MM;       /* Maand in 2 cijfers [UTC]                      */
       int          i_fl__YY;       /* Dag in 2 cijfers [UTC]                        */
       int          i_fl__GG;       /* Uur in 2 cijfers [UTC]                        */
                                    /* (presentatie middernacht: 00 volgende dag)    */

       int          i_fl__TGI;      /* Format 120 :                                  */
                                       /* Toegevoegde Groepen Indicator                 */
                                        /* Geeft aan of, en zo ja wat er staat op       */
                                       /* index_inrec==80t/m84 en index_inrec==87t/m88  */

       int          i_fl__IT1;      /* Format 120 :                                  */
                                    /* Geeft de nauwkeurigheid en eenheid aan        */
                                    /* waarin alle temperaturen gemeten zijn         */
                                    /* i_fl__IT1==1 -> nauwkeurigheid in meting is   */
                                    /*                   hele                        */
                                    /*                   [tienden graden celsius]    */
                                    /* i_fl__IT1==5 -> nauwkeurigheid in meting is   */
                                    /*                   vijftallen                  */
                                    /*                   [tienden graden celsius]    */
                                    /* i_fl__IT1==3 -> nauwkeurigheid in meting is   */
```

```
                                /*                  tientallen                    */
                                /*                  [tienden graden celsius]      */
                                /* i_fl__IT1==2 -> nauwkeurigheid in meting is    */
                                /*                  hele                          */
                                /*                  [tienden graden fahrenheit]   */
                                /* i_fl__IT1==6 -> nauwkeurigheid in meting is    */
                                /*                  vijftallen                    */
                                /*                  [tienden graden fahrenheit]   */
                                /* i_fl__IT1==4 -> nauwkeurigheid in meting is    */
                                /*                  tientallen                    */
                                /*                  [tienden graden fahrenheit]   */
                                /* i_fl__IT1==7 -> nauwkeurigheid in meting is    */
                                /*                  hele                          */
                                /*                  [tienden graden fahrenheit]   */
                                /*                  bij alle temperaturen,        */
                                /*                  behalve bij TdTdTd;           */
                                /*                  voor TdTdTd geldt:            */
                                /*                  nauwkeurigheid in meting is   */
                                /*                  tientallen                    */
                                /*                  [tienden graden fahrenheit]   */
/*      int           i_fl__IT;          Wordt in dit programma niet gebruikt.      */
                                /* Format 130 en 131 :                           */
                                /* Geeft de nauwkeurigheid aan waarin alle       */
                                /* temperaturen gemeten zijn                     */
                                /* i_fl__IT==3 -> nauwkeurigheid in meting is    */
                                /*                hele                           */
                                /*                [tienden graden celsius]       */
                                /* i_fl__IT==4 -> nauwkeurigheid in meting is    */
                                /*                vijftallen                     */
                                /*                [tienden graden celsius]       */
                                /* i_fl__IT==5 -> nauwkeurigheid in meting is    */
                                /*                tientallen                     */
                                /*                [tienden graden celsius]       */
                                /* Voor de duidelijkheid:                        */
                                /* in Format 131 is bij i_fl__IT == 3, 4 en 5    */
                                /* de nauwkeurigheid in weergave van getal       */
                                /* altijd: hele [tienden graden celsius]         */
        int           i_fl__sn;        /* Format 120 :                             */
                                /* Geeft op positie 35 het teken aan van de      */
                                /* temperatuur TTT, en                           */
                                /* geeft op positie 50 het teken aan van de      */
                                /* temperatuur TwTwTw                            */
                                /* Format 130 :                                  */
                                /* Geeft op positie 27 het teken aan van de      */
                                /* temperatuur TTT, en                           */
                                /* geeft op positie 47 het teken aan van de      */
                                /* temperatuur TwTwTw                            */
                                /* Format 131 :                                  */
                                /* Geeft op positie 30 het teken aan van de      */
                                /* temperatuur TTT, en                           */
                                /* geeft op positie 50 het teken aan van de      */
                                /* temperatuur TwTwTw                            */
                                /* Format 120, 130 en 131 :                      */
                                /* i_fl__sn==0 -> temperatuur is 0 of positief   */
                                /* i_fl__sn==1 -> temperatuur is negatief        */
        int           i_fl__St;        /* Geeft teken aan van de temperatuur TdTdTd    */
                                /* Format 120 en 130 :                           */
                                /* i_fl__St==0 -> temperatuur is 0 of positief   */
                                /* i_fl__St==1 -> temperatuur is negatief        */
                                /* Format 131 :                                  */
                                /* i_fl__St==0,5 -> temperatuur is 0 of positief */
                                /* i_fl__St==1,2,6,7 -> temperatuur is negatief  */
        int           i_fl__Sw;        /* Geeft teken aan van de temperatuur TbTbTb    */
```

```
                              /* Format 120 :                                    */
                              /* i_fl__Sw==0 -> temperatuur is 0 of positief      */
                              /* i_fl__Sw==1,2 -> temperatuur is negatief        */
                              /* Format 130 :                                    */
                              /* i_fl__Sw==0,5 -> temperatuur is 0 of positief   */
                              /* i_fl__Sw==1,6,7 -> temperatuur is negatief      */
                              /* Format 131 :                                    */
                              /* i_fl__Sw==0,5 -> temperatuur is 0 of positief   */
                              /* i_fl__Sw==1,2,6,7 -> temperatuur is negatief    */

       int           i_fl__iw;       /* Format 120 :                                  */
                              /* Geeft de nauwkeurigheid aan waarin de           */
                              /* windrichting dd gemeten is                      */
                              /* i_fl__iw==0,2,4,6,8 ->                          */
                              /*   nauwkeurigheid in meting is                   */
                              /*   hele [tientallen graden]                      */
                              /* i_fl__iw==1,3,5,7,9 ->                          */
                              /*   nauwkeurigheid in meting is                   */
                              /*   round((36/32)*streken) [tientallen graden]    */
                              /* Voor de duidelijkheid:                          */
                              /* in Format 120 is                                */
                              /* de nauwkeurigheid in weergave van getal dd      */
                              /* altijd: hele [tientallen graden]                */

                              /* Format 120 :                                    */
                              /* Geeft de nauwkeurigheid aan waarin de           */
                              /* windsnelheid ff gemeten is                      */
                              /* i_fl__iw==0,1,6,7 ->                            */
                              /*   nauwkeurigheid in meting is                   */
                              /*   hele [knopen]                                 */
                              /* i_fl__iw==4,5,8,9 ->                            */
                              /*   nauwkeurigheid in meting is                   */
                              /*   round((3600/1852.0)*(meter/sec)) [knopen]     */
                              /* i_fl__iw==2,3 ->                                */
                              /*   nauwkeurigheid in meting is                   */
                              /*   <arbitraire omzetting beaufort naar knopen>   */
                              /*   [knopen]                                      */
                              /* Voor de duidelijkheid:                          */
                              /* In Format 120 is                                */
                              /* de nauwkeurigheid in weergave van getal ff      */
                              /* altijd: hele [knopen]                           */

                              /* Format 130 en 131 :                             */
                              /* Geeft de eenheid aan waarin de                  */
                              /* windsnelheid ff gemeten is                      */
                              /* i_fl__iw==0,1 -> eenheid is [meter/seconde]     */
                              /* i_fl__iw==3,4 -> eenheid is [knopen]            */

       char   c_fl__CIN[LEN_SMALL];  /* Format 120 :                                */
                              /* 1-char symbool die verwijst naar de             */
                              /* oorspronkelijke code(file) identificatie waar   */
                              /* de format120-waarneming van afkomstig is.       */

       int           i_fl__NAT;      /* Format 120 en 130 :                           */
                              /* Geeft het land aan dat de waarneming heeft      */
                              /* doorgegeven                                     */
                              /* i_fl__NAT==0    -> Nederland                    */
                              /* i_fl__NAT==-999 -> Buitenland                   */

-------------------------------------------------------------------------------

       /*
        * Opbouw van i_db__q_elem_alle_pos van links (is 1e cijfer)
```

```
 * naar rechts (is laatste en 7e cijfer) :
 * - Kwaliteitsgedeelte afkomstig uit de inputfile :
 *   - 1e cijfer == symbool voor de oorspronkelijke meeteenheid in
 *                  de inputfile (0 == wrnm ontbreekt in inputfile)
 *                  (== i_db__q_elem_1e_pos__oorspr_presentatie)
 *   - 2e cijfer == QCI (pos 82) in de inputfile
 *                  (== i_db__q_elem_2e_pos__qci)
 *   - 3e cijfer == Q1, Q2, Q3, ..., Q19 of Q20 in de inputfile
 *                  (== i_db__q_<elem>_3e_pos__qcnr)
 * - Kwaliteitsgedeelte afkomstig van afdeling KD :
 *   - 4e cijfer == toegevoegde MARKIS KD-kwaliteit
 *   - 5e cijfer == toegevoegde MARKIS KD-kwaliteit
 *   - 6e cijfer == toegevoegde MARKIS KD-kwaliteit
 *   - 7e cijfer == toegevoegde MARKIS KD-kwaliteit
 */

/*
 * 3 VAN DE 7 ONDERDELEN IN DE MARKIS KWALITEIT, BETREFFENDE
 * HET VOLLEDIGE INPUTFILE-KWALITEITS GEDEELTE :
 */

/* Format 120, 130 en 131                                                  */
/* Oorspronkelijke presentatie (code of soort eenheid) in inputfile :      */
/* (0 == waarneming ontbreekt in inputfile)                                */
int          i_db__q_elem_1e_pos__oorspr_presentatie;

/* Format 130 en 131                                                       */
/* QCI (Quality Control Indicator) in inputfile :                          */
/* Betreft algemene kwaliteit voor alle waarnemingen in 1 record.          */
int          i_db__q_elem_2e_pos__qci;

/* Format 130 en 131                                                       */
/* Q1, Q2, ..., Q19 of Q20 in inputfile :                                  */
/* Speciale kwaliteit voor 1 (groep) waarneming(en) in 1 record.           */
/*                                                                         */
/* i_db__q_<elem>_3e_pos__qcnr in de markis MO*-tabellen, die              */
/* bestaan in de layout van het inputfile-format 131 (alfabetisch) :       */
/* i_db__q_a_3e_pos__qcnr                                                  */
/* i_db__q_ch_3e_pos__qcnr                                                 */
/* i_db__q_cl_3e_pos__qcnr                                                 */
/* i_db__q_cm_3e_pos__qcnr                                                 */
/* i_db__q_dd_3e_pos__qcnr                                                 */
/* i_db__q_ds_3e_pos__qcnr                                                 */
/* i_db__q_dw1_3e_pos__qcnr                                                */
/* i_db__q_dw2_3e_pos__qcnr                                                */
/* i_db__q_ff_3e_pos__qcnr                                                 */
/* i_db__q_h_3e_pos__qcnr                                                  */
/* i_db__q_hw_3e_pos__qcnr                                                 */
/* i_db__q_hw1_3e_pos__qcnr                                                */
/* i_db__q_hw2_3e_pos__qcnr                                                */
/* i_db__q_ir_3e_pos__qcnr                                                 */
/* i_db__q_n_3e_pos__qcnr                                                  */
/* i_db__q_nh_3e_pos__qcnr                                                 */
/* i_db__q_p_3e_pos__qcnr                                                  */
/* i_db__q_ppp_3e_pos__qcnr                                                */
/* i_db__q_pw_3e_pos__qcnr                                                 */
/* i_db__q_pw1_3e_pos__qcnr                                                */
/* i_db__q_pw2_3e_pos__qcnr                                                */
/* i_db__q_q_3e_pos__qcnr   (alleen in Format 131)                         */
/* i_db__q_rrr_3e_pos__qcnr                                                */
/* i_db__q_t_3e_pos__qcnr                                                  */
/* i_db__q_tb_3e_pos__qcnr  (alleen in Format 131)                         */
/* i_db__q_td_3e_pos__qcnr                                                 */
```

```
/* i_db__q_tr_3e_pos__qcnr                                              */
/* i_db__q_tw_3e_pos__qcnr                                              */
/* i_db__q_vs_3e_pos__qcnr                                              */
/* i_db__q_vv_3e_pos__qcnr                                              */
/* i_db__q_ww_3e_pos__qcnr                                              */
/* i_db__q_w1_3e_pos__qcnr                                              */
/* i_db__q_w2_3e_pos__qcnr                                              */
/*                                                                      */
/* i_db__q_<elem>_3e_pos__qcnr in de markis MOE-tabel :                 */
int           i_db__q_ds_3e_pos__qcnr;
int           i_db__q_vs_3e_pos__qcnr;
int           i_db__q_q_3e_pos__qcnr;
/* i_db__q_<elem>_3e_pos__qcnr in de markis MOA-tabel :                 */
int           i_db__q_p_3e_pos__qcnr;
int           i_db__q_a_3e_pos__qcnr;
int           i_db__q_ppp_3e_pos__qcnr;
int           i_db__q_vv_3e_pos__qcnr;
int           i_db__q_ww_3e_pos__qcnr;
int           i_db__q_w1_3e_pos__qcnr;
int           i_db__q_w2_3e_pos__qcnr;
/* i_db__q_<elem>_3e_pos__qcnr in de markis MOC-tabel :                 */
int           i_db__q_h_3e_pos__qcnr;
int           i_db__q_n_3e_pos__qcnr;
int           i_db__q_nh_3e_pos__qcnr;
int           i_db__q_cl_3e_pos__qcnr;
int           i_db__q_cm_3e_pos__qcnr;
int           i_db__q_ch_3e_pos__qcnr;
/* i_db__q_<elem>_3e_pos__qcnr in de markis MOI-tabel :                 */
/* geen                                                                 */
/* i_db__q_<elem>_3e_pos__qcnr in de markis MOR-tabel :                 */
int           i_db__q_rrr_3e_pos__qcnr;
int           i_db__q_tr_3e_pos__qcnr;
int           i_db__q_ir_3e_pos__qcnr;
/* i_db__q_<elem>_3e_pos__qcnr in de markis MOT-tabel :                 */
int           i_db__q_t_3e_pos__qcnr;
int           i_db__q_td_3e_pos__qcnr;
int           i_db__q_tb_3e_pos__qcnr;
int           i_db__q_tw_3e_pos__qcnr;
/* i_db__q_<elem>_3e_pos__qcnr in de markis MOW-tabel :                 */
int           i_db__q_dd_3e_pos__qcnr;
int           i_db__q_ff_3e_pos__qcnr;
int           i_db__q_pw_3e_pos__qcnr;
int           i_db__q_hw_3e_pos__qcnr;
int           i_db__q_dw1_3e_pos__qcnr;
int           i_db__q_pw1_3e_pos__qcnr;
int           i_db__q_hw1_3e_pos__qcnr;
int           i_db__q_dw2_3e_pos__qcnr;
int           i_db__q_pw2_3e_pos__qcnr;
int           i_db__q_hw2_3e_pos__qcnr;

/*
 * 4E VAN DE 7 ONDERDELEN IN DE MARKIS KWALITEIT, BETREFFENDE UITZONDERING
 * OP OCT/QUADRANT (Q), TEMPERATUUR (T, TD, TB, TW) OF WINDSNELHEID (FF) :
 */

int           i_db__q_elem_4e_pos;

/*
 * HAAL DE Q1 T/M Q20 (DE ELEMENT-SPECIFIEKE QUALITY
 * CONTROL INDICATOR) OP UIT DE INPUTFILE :
 * ......................................................
 *
 * Format 131 inputfile: de Q1 t/m Q20 zijn aan de volgende
```

```
       * db-elementen gekoppeld:
       * - Q1 (QC indicator for (h)) :
       *   - moc.h
       * - Q2 (QC indicator for (VV)) :
       *   - moa.vv
       * - Q3 (QC indicator for (clouds: elements 12, 24-27)) :
       *   - moc.n
       *   - moc.nh
       *   - moc.cl
       *   - moc.cm
       *   - moc.ch
       * - Q4 (QC indicator for (dd)) :
       *   - mow.dd
       * - Q5 (QC indicator for (ff)) :
       *   - mow.ff
       * - Q6 (QC indicator for (TTT)) :
       *   - mot.t
       * - Q7 (QC indicator for (TdTdTd)) :
       *   - mot.td
       * - Q8 (QC indicator for (PPPP)) :
       *   - moa.p
       * - Q9 (QC indicator for (weather: elements 21-23)) :
       *   - moa.ww
       *   - moa.w1
       *   - moa.w2
       * - Q10 (QC indicator for (TwTwTw)) :
       *   - mot.tw
       * - Q11 (QC indicator for (PwPw)) :
       *   - mow.pw
       * - Q12 (QC indicator for (HwHw)) :
       *   - mow.hw
       * - Q13 (QC indicator for (swell: elements 34-36, 56-58)) :
       *   - mow.dw1
       *   - mow.pw1
       *   - mow.hw1
       *   - mow.dw2
       *   - mow.pw2
       *   - mow.hw2
       * - Q14 (QC indicator for (iRRRRtR)) :
       *   - mor.ir
       *   - mor.rrr
       *   - mor.tr
       * - Q15 (QC indicator for (a)) :
       *   - moa.a
       * - Q16 (QC indicator for (ppp)) :
       *   - moa.ppp
       * - Q17 (QC indicator for (Ds)) :
       *   - moe.ds
       * - Q18 (QC indicator for (Vs)) :
       *   - moe.vs
       * - Q19 (QC indicator for (TbTbTb)) :
       *   - mot.tb
       * - Q20 (QC indicator for (Q, LaLaLa and LoLoLoLo together)) :
       *   - moe.q
       *   - mo?.la
       *   - mo?.lo
       */

-------------------------------------------------------------------------------
```

```
--------------------------------------------------------------------------------

2 juli 2004

File cin_mar.pc__docu_sleutel.txt geëxtraheerd uit programmatekst cin_mar.pc

Inlezen van maritieme waarnemingen in de KIS MO-tabellen

--------------------------------------------------------------------------------

              /*
               * ALLE SLEUTELVELDEN IN ALLE MARKIS MO-TABELLEN
               * ........................................
               */

              unsigned long       i_db__udate;
              int                 i_db__utime;
              char                c_db__cs[LEN_SMALL];
              double              r_db__la;
              double              r_db__lo;

              /*
               * ALLE ALTERNATIEVE IDENTIFICATIEVELDEN IN DE MARKIS MOE-TABEL
               * ....................................................
               */

              char                c_db__filename[LEN_ALG];
              int                 i_db__recnr;

              /*
               * TOELICHTING OP VELDEN DIE GEBRUIKT WORDEN VOOR HET BEPALEN VAN DE SLEUTEL
               * ..................................................................
               */

              /*
               * UDATE, UTIME :
               *
               * <yyyymmdd> and <hhmi> [UTC].
               *
               * Presentatie: Code (gelijk aan de code in de inputfile)
               */

              /*
               * CS :
               *
               * Call sign (or journalnumber); ship's identifier.
               *
               * Presentatie: Code (gelijk aan de code in de inputfile, maar
               *   omgezet naar hoofdletters; leeg wordt vervangen door "SHIP")

              /*
               * LOCI :
               *
               * Indicator for location.
               *
               * Presentatie: Code (gelijk aan de code in de inputfile, maar
               *   leeg (uitsluitend spaties) wordt vervangen door getal 1)
               *
               * Voor gebruik in het Marsden- of LA/LO-gedeelte.
               */

              /*
```

```
             * LA, LO :
             *
             * Latitude and longitude.
             *
             * Presentatie: Eenheid
             *   Eenheid        = [graden]
             *   Nauwkeurigheid = tienden [graden]
             *
             * Toelichting op Format 120 :
             *
             *   Bij LOCI-waarde=='  ' is niet vermeld of de positie is
             *   uitgedrukt in Q-lalo of in marsdenvak.
             *   Neem in dat geval aan dat het Q-lalo betreft behorende bij
             *   LOCI-waarde=='00'.
             *
             *   If (LOCI-waarden==10,30,31,50,60) then
             *      marsdenvakken-type_A (LOCI-waarde==10) or
             *      marsdenvakken-type_B (LOCI-waarde==60)
             *
             *   Bij LOCI-waarden==30,31,50 is het type marsdenvakken
             *   (type_A (1/10) of type_B (1/6)) onbekend.
             *   Neem in dat geval aan dat het marsdenvakken-type_A betreft.
             *
             *   If (marsdenvakken) then
             *      zet die om naar lalo en laat Q leeg
             *   else
             *      pas Q-lalo omzetting toe die ook gebruikt wordt bij Format>=130
             */

            /*
             * +-LA en +-LO gedestilleerd uit het Marsden tiengraadsvak :
             *
```

```
Marsden 10-degree squares, WMO-Code 2590
----------------------------------------

Nummers Marsden tiengraadsvakken :

090'                                090'                                090'
   918   917   ...   ...   902   901   936   935   ...   ...   920   919
080'                                080'                                080'
   270   269   ...   ...   254   253   288   287   ...   ...   272   271
070'                                070'                                070'
   234   233   ...   ...   218   217   252   251   ...   ...   236   235
060'                                060'                                060'
   198   197   ...   ...   182   181   216   215   ...   ...   200   199
050'                                050'                                050'
   162   161   ...   ...   146   145   180   179   ...   ...   164   163
040'                                040'                                040'
   126   125   ...   ...   110   109   144   143   ...   ...   128   127
030'                                030'                                030'
   090   089   ...   ...   074   073   108   107   ...   ...   092   091
020'                                020'                                020'
   054   053   ...   ...   038   037   072   071   ...   ...   056   055
010'                                010'                                010'
   018   017   ...   ...   002   001   036   035   ...   ...   020   019
-180' -170' -160' -...' -020' -010'  000'  010'  020'  ...'  150'  170'  180'
   317   316   ...   ...   301   300   335   334   ...   ...   319   318
-010'                               -010'                               -010'
   353   352   ...   ...   337   336   371   370   ...   ...   355   354
-020'                               -020'                               -020'
   389   388   ...   ...   373   372   407   406   ...   ...   391   390
-030'                               -030'                               -030'
```

```
    425   424   ...   ...   409   408   443   442   ...   ...   427   426
-040'                               -040'                               -040'
    461   460   ...   ...   445   444   479   478   ...   ...   463   462
-050'                               -050'                               -050'
    497   496   ...   ...   481   480   515   514   ...   ...   499   498
-060'                               -060'                               -060'
    533   532   ...   ...   517   516   551   550   ...   ...   535   534
-070'                               -070'                               -070'
    569   568   ...   ...   553   552   587   586   ...   ...   571   570
-080'                               -080'                               -080'
    605   604   ...   ...   589   588   623   622   ...   ...   607   606
-090'                               -090'                               -090'
```

Onderverdeling van een Marsden tiengraadsvak in eengraadsvakken
voor elk van de 4 wereldhelften :

```
            N-WL :                                  N-EL :

 99 .. .. .. .. .. .. .. .. 90       90 .. .. .. .. .. .. .. .. 99
 ..                         80       80                         ..
 ..                         70       70                         ..
 ..                         60       60                         ..
 ..                         50       50                         ..
 ..                         40       40                         ..
 ..                         30       30                         ..
 ..                         20       20                         ..
 ..                         10       10                         ..
 09 08 07 06 05 04 03 02 01 00       00 01 02 03 04 05 06 07 08 09 90

            S-WL :                                  S-EL :

 09 08 07 06 05 04 03 02 01 00       00 01 02 03 04 05 06 07 08 09 90
 ..                         10       10                         ..
 ..                         20       20                         ..
 ..                         30       30                         ..
 ..                         40       40                         ..
 ..                         50       50                         ..
 ..                         60       60                         ..
 ..                         70       70                         ..
 ..                         80       80                         ..
 99 .. .. .. .. .. .. .. .. 90       90 .. .. .. .. .. .. .. .. 99

            */
```

```
      /*
       * CHECK OF LA-LO IS AANGEGEVEN IN OCTANTEN OF QUADRANTEN :
       * ......................................................
       *
       * Toelichting :
       * - Format-periodes :
       *   - Format 120    van 1854 t/m 1980.
       *     Format 130    van 1981 t/m heden.
       *     Format 131-V1 van na 1981 (welk jaar?) t/m heden (IMMT-1).
       *     Format 131-V2 van na 1981 (welk jaar?) t/m heden (IMMT-2).
       * - la-lo in octanten of quadranten :
       *   - Format 120 en Format 130 :
       *     la-lo in octanten
       *   - Buitenlandse inputfile in format 131 (IMMT-1 en IMMT-2) :
       *     Heet gcc<jaar in 4 cijfers>q<kwartaalnummer>[.dat]
       *     B.v. gcc1986q3, gcc2003q1, etc.
       *     kwartaalnummer == 1  -> jan t/m mrt
```

```
        *     kwartaalnummer == 2  -> apr t/m jun
        *     kwartaalnummer == 3  -> jul t/m sep
        *     kwartaalnummer == 4  -> okt t/m dec
        *     la-lo in octanten:   t/m  gcc1996q2
        *     la-lo in quadranten: v.a. gcc1996q3
        *   - Nederlandse inputfile in format 131 (IMMT-1 en IMMT-2) :
        *     Heet ned_obs.<oplopend volgnummer>
        *     B.v. ned_obs.01, ned_obs.17, etc.
        *     la-lo in octanten:   t/m  ned_obs.03
        *     la-lo in quadranten: v.a. ned_obs.04
        *   - Overige inputfile in format 131 (IMMT-1) :
        *     Heet oth_nlra.<volgnummer>\n");
        *     Alleen oth_nlra.03
        *     la-lo in octanten
        */
```

```
            /*
             * 1 NIEUW RECORD AANMAKEN IN ELKE MARKIS MO-TABEL :
             * ................................................
             *
             * # Noot:
             * # Er bestaat geen zelfde filename voor meer dan 1 file
             * # binnen eenzelfde format en binnen alle formats tezamen;
             * # dus filename+recnr is, moet en behoort een unieke
             * # identificatie van een MOE-tabelrow te zijn.
             * # M.a.w.
             * # udate+utime+cs+la+lo : filename+recnr == 1 : 1
             * #
             * select filename+recnr in moe
             * if (aanwezig) then
             *   # Deze tabelrow is van zijn eigen waarneemstation
             *   # (dus huidige cin_mar-run is een re-run)
             *   verwijder de row met deze filename+recnr identificatie
             *     uit de mo*-tabel
             * endif
             * #
             * select udate+utime+cs+la+lo in moe
             * if (aanwezig) then
             *   # Deze tabelrow is van een ander waarneemstation
             *   # (dus waarde in var c_db__cs is niet uniek)
             *   in loop cs zodanig uniek maken (door -<nr> toe te voegen)
             *     dat udate+utime+cs+la+lo uniek wordt voor de moe- mie-,
             *     mae- en mue-tabel
             *   schrijf error_double_key in de error_double_key-file
             * endif
             * #
             * aanmaken 1 row in de mo*-tabel
             */
```

Appendix D

Procedure for the automatic quality control flag Qa (wind and waves)

Coded by: J.W. Nellestijn and F. Duin

```
CREATE OR REPLACE PROCEDURE MO_Wind_Golven_Qa (p_filename IN VARCHAR2)
IS

-- 20 oktober 2005
--
-- Deze procedure vult kwaliteit Qa van de wind- en golfwaarnemingen.
--
-- De checks op kwaliteit zijn gebaseerd op de volgende rapporten:
-- - kd9201.doc   (check-nrs. 600 t/m 799)
-- - wigo_cor.SPS (check-nrs. 600 t/m 799)
--
-- Randvoorwaarde is dat deze procedure de waarde van Qa altijd op <> 0 zet.
-- Op die manier kun je ook zien of de Qa-verificatie heeft plaatsgevonden.
--
-- Uit kd9201.doc en wigo_cor.SPS worden alleen de checks overgenomen met
-- de volgende eenheden:
--
--                                                                  eenheid                eenheid
kwaliteit      kwaliteit
--                                                                  kd9201.doc             MARKIS:
kd9201.doc     MARKIS:
--                                                                  wigo_cor.SPS:
wigo_cor.SPS:
-- wind:
--                          dd (windrichting)                       [tientallen graden]    [graden]
Qc4            q_dd
--                          ff (windsnelheid)                       [meter/seconde]
[meter/seconde]   Qc5             q_ff
-- golven:
--    zeegang == sea   == pw  (golfperiode)                        [seconde]              [seconde]
Qc11           q_pw
--                          hw  (golfhoogte)                        [halve meter]          [meter]
Qc12           q_hw
--    deining == swell == dw1 (golfrichting van deining 1)          [tientallen graden]    [graden]
Qc13           q_dw1
--                          pw1 (golfperiode  van deining 1)        [seconde]              [seconde]
Qc13           q_pw1
--                          hw1 (golfhoogte   van deining 1)        [halve meter]          [meter]
Qc13           q_hw1
--                          dw2 (golfrichting van deining 2)        [tientallen graden]    [graden]
Qc13           q_dw2
--                          pw2 (golfperiode  van deining 2)        [seconde]              [seconde]
Qc13           q_pw2
--                          hw2 (golfhoogte   van deining 2)        [halve meter]          [meter]
Qc13           q_hw2
-- code in MARKIS:
--    dd  ==   0 == stil, geen windrichting
--    dw1 ==   0 == stil, geen golfrichting deining 1
--    dw2 ==   0 == stil, geen golfrichting deining 2
--    pw  ==   0 == stil, geen golfperiode zeegang
```

```
--    pw1 ==   0 == stil, geen golfperiode deining 1
--    pw2 ==   0 == stil, geen golfperiode deining 2
--    dd  == 999 == veranderlijk
--    dw1 == 999 == niet te bepalen door verwarde zee
--    dw2 == 999 == illegale waarde; deining 2 kan alleen bestaan als deining 1 bestaat, dus
--                  in dat geval is dw2 999 (verwarde zee) niet te onderscheiden van dw1
--    pw  ==  99 == niet te bepalen door verwarde zee
--    pw1 ==  99 == niet te bepalen door verwarde zee
--    pw2 ==  99 == illegale waarde; deining 2 kan alleen bestaan als deining 1 bestaat, dus
--                  in dat geval is pw2 99 (verwarde zee) niet te onderscheiden van pw1

-- Bijzonderheden PL/SQL:
-- NULL   == ongedefinieerd == ontbrekend (leeg)
-- NVL    == functie die een NULL-waarde omzet in een zelf gekozen gedefinieerde waarde
-- TRUNC  == functie die van een getal alles afkapt wat achter de komma staat (is dus iets
anders dan afronden)
-- ABS    == functie die de absolute waarde teruggeeft (resultaat is altijd een positief
getal)

   aantal_uitgevoerde_jaren NUMBER;

   aantal_uitgevoerde_updates NUMBER;

   l_udate NUMBER(8,0); l_utime NUMBER(4,0); l_cs VARCHAR2(12); l_la NUMBER(3,1); l_lo
NUMBER(4,1);
   l_iw NUMBER;

        l_dd NUMBER;            l_ff NUMBER;            l_pw NUMBER;            l_hw NUMBER;
      l_q_dd NUMBER(7,0);     l_q_ff NUMBER(7,0);     l_q_pw NUMBER(7,0);     l_q_hw
NUMBER(7,0);
     l_qa_dd NUMBER(1,0);    l_qa_ff NUMBER(1,0);    l_qa_pw NUMBER(1,0);    l_qa_hw
NUMBER(1,0);
                             l_qt_ff NUMBER(1,0);

       l_dw1 NUMBER;           l_pw1 NUMBER;           l_hw1 NUMBER;
     l_q_dw1 NUMBER(7,0);    l_q_pw1 NUMBER(7,0);    l_q_hw1 NUMBER(7,0);
    l_qa_dw1 NUMBER(1,0);   l_qa_pw1 NUMBER(1,0);   l_qa_hw1 NUMBER(1,0);

       l_dw2 NUMBER;           l_pw2 NUMBER;           l_hw2 NUMBER;
     l_q_dw2 NUMBER(7,0);    l_q_pw2 NUMBER(7,0);    l_q_hw2 NUMBER(7,0);
    l_qa_dw2 NUMBER(1,0);   l_qa_pw2 NUMBER(1,0);   l_qa_hw2 NUMBER(1,0);

BEGIN

aantal_uitgevoerde_jaren:=0;

WHILE (aantal_uitgevoerde_jaren<=300) LOOP

DECLARE

-- De transaction logfile is te klein voor 1 cursor-fetch, ondanks de veelvuldige
-- tussentijdse commits.
-- Daarom is 1 cursor-fetch over de gehele tabel opgeplitst in 300 cursor-fetchjes
-- vanaf het jaar 1800 tot het jaar 2100.
-- Hopelijk zijn die wel te verhapstukken voor de transaction logfile.

   CURSOR cursor_wg IS
```

```
      SELECT
         e.udate, e.utime, e.cs, e.la, e.lo,
         e.iw,
         w.dd, w.q_dd, w.ff, w.q_ff,
         w.pw, w.q_pw, w.hw, w.q_hw,
         w.dw1, w.q_dw1, w.pw1, w.q_pw1, w.hw1, w.q_hw1,
         w.dw2, w.q_dw2, w.pw2, w.q_pw2, w.hw2, w.q_hw2
      FROM
         MOE e, MOW w
      WHERE
         e.udate>=18000101+(aantal_uitgevoerde_jaren*10000) AND
         e.udate<=18001231+(aantal_uitgevoerde_jaren*10000) AND
         e.udate=w.udate AND e.utime=w.utime AND e.cs=w.cs AND e.la=w.la AND e.lo=w.lo AND
         e.filename LIKE p_filename
      ORDER BY
         e.udate ASC, e.utime ASC, e.cs ASC, e.la ASC, e.lo ASC;

BEGIN

   aantal_uitgevoerde_updates:=0;

-- haal de te controleren gegevens op :

   OPEN cursor_wg;

   FETCH cursor_wg INTO
      l_udate, l_utime, l_cs, l_la, l_lo,
      l_iw,
      l_dd,  l_q_dd,  l_ff,  l_q_ff,
      l_pw,  l_q_pw,  l_hw,  l_q_hw,
      l_dw1, l_q_dw1, l_pw1, l_q_pw1, l_hw1, l_q_hw1,
      l_dw2, l_q_dw2, l_pw2, l_q_pw2, l_hw2, l_q_hw2;

   WHILE (cursor_wg%FOUND) LOOP

   -- Van de kwaliteit Q het onderdeel Qt inlezen en het onderdeel Qa initializeren.
   --
   -- Betekenis:
   --
   -- Q-parts from the left:
   -- Position 1, Qcv: gives possible conversions/accuracy ( by entering the data)
   -- Position 2, Qgs: general quality control as given in the ship code (if present)
   -- Position 3, Qes: quality control as given in the ship code (if present)
   -- Position 4, Qt:  technical control (by entering the data)
   -- Position 5, Qa:  automatic quality control (post-processing)
   -- Position 6, Qh:  human quality control (second stage of post-processing)
   -- Position 7, Qf:  overall quality for the element (determined by the previous other
qualities)
   --
   -- Possible values of Qt:
   -- 0:   No quality control (QC) has been performed in this element
   -- 1-5: Reserve
   -- 6:   Unit/sign missing
   -- 7-9: Reserve
   --
   -- Possible values of Qa:
   -- 0:   No quality control (QC) bas been performed in this element
```

```
   -- 1:   QC bas been performed; element appears to be correct
   -- 2:   QC bas been performed; element appears to be inconsistent with other elements
   -- 3:   QC bas been performed; element appears to be doubtful
   -- 4:   QC bas been performed; element appears to be erroneous
   -- 5:   The value has been changed as a result of QC
   -- 6:   Unit/sign missing
   -- 7-8: Reserve
   -- 9:   The value of the element missing

      IF l_q_ff  IS NOT NULL THEN l_qt_ff  :=MOD(TRUNC(l_q_ff /1000) ,10); ELSE l_qt_ff
:=NULL; END IF;

   -- Standaard Qa op 'waarneming ontbrekend' (9) of 'waarneming correct' (1) zetten.
   -- Qa == 0                     -> kwaliteitscontrole is niet uitgevoerd
   -- Qa == 1, 2, 3, 4, 5, 6 of 9 -> kwaliteitscontrole is uitgevoerd
   --
   -- Het op deze plek Qa op 1 initializeren bij aanwezigheid van de waarneming van het
element voordat de eerste
   -- kwaliteitscontrole is uitgevoerd, is alleen toegestaan als vervolgens minstens 1
verificatie op die waarneming
   -- wordt gedaan zonder combinatie met waarnemingen van andere elementen.
   -- Dat blijkt dus het geval te zijn:
   -- element l_dd:  check 04, kd9201.doc nr. 625
   -- element l_ff:  check 02, kd9201.doc nr. 610, 620
   -- element l_pw:  check 06, kd9201.doc nr. 770
   -- element l_hw:  check 07, kd9201.doc nr. 771
   -- element l_dw1: check 14, kd9201.doc nr. 782
   -- element l_pw1: check 08, kd9201.doc nr. 772
   -- element l_hw1: check 09, kd9201.doc nr. 773
   -- element l_dw2: check 15, kd9201.doc nr. 783
   -- element l_pw2: check 10, kd9201.doc nr. 774
   -- element l_hw2: check 11, kd9201.doc nr. 775

      IF l_dd  IS NOT NULL THEN l_qa_dd :=1; ELSE l_qa_dd :=9; END IF;
      IF l_ff  IS NOT NULL THEN l_qa_ff :=1; ELSE l_qa_ff :=9; END IF;
      IF l_pw  IS NOT NULL THEN l_qa_pw :=1; ELSE l_qa_pw :=9; END IF;
      IF l_hw  IS NOT NULL THEN l_qa_hw :=1; ELSE l_qa_hw :=9; END IF;
      IF l_dw1 IS NOT NULL THEN l_qa_dw1:=1; ELSE l_qa_dw1:=9; END IF;
      IF l_pw1 IS NOT NULL THEN l_qa_pw1:=1; ELSE l_qa_pw1:=9; END IF;
      IF l_hw1 IS NOT NULL THEN l_qa_hw1:=1; ELSE l_qa_hw1:=9; END IF;
      IF l_dw2 IS NOT NULL THEN l_qa_dw2:=1; ELSE l_qa_dw2:=9; END IF;
      IF l_pw2 IS NOT NULL THEN l_qa_pw2:=1; ELSE l_qa_pw2:=9; END IF;
      IF l_hw2 IS NOT NULL THEN l_qa_hw2:=1; ELSE l_qa_hw2:=9; END IF;

   --
================================================================================================
========
   -- WIND: DD, FF
   --
   -- check 01, wind, kd9201.doc nr. 600, 601, 603
   -- check 02, wind, kd9201.doc nr. 610, 620
   -- check 03, wind, kd9201.doc nr. 621
   -- check 04, wind, kd9201.doc nr. 625
   -- check 05, wind, kd9201.doc nr. 626
   --
================================================================================================
========
```

```
   -- check 01, wind, kd9201.doc nr. 600, 601, 603
   -- verdacht-check :
   -- bij windstilte moeten windrichting l_dd en windsnelheid l_ff 0 zijn, en
   -- bij variabele windrichting l_dd moet windsnelheid l_ff minder zijn dan 5 m/s

      IF l_dd IS NOT NULL AND l_ff IS NOT NULL AND NVL(l_qt_ff,6)<>6 THEN
         IF (l_dd=0 AND l_ff<>0) OR (l_dd<>0 AND l_ff=0) OR (l_dd=999 AND l_ff>5) THEN
            IF l_qa_dd<2 THEN l_qa_dd:=2; END IF;
            IF l_qa_ff<2 THEN l_qa_ff:=2; END IF;
         END IF;
      END IF;

   -- check 02, wind, kd9201.doc nr. 610, 620
   -- verdacht- en fout-check :
   -- windsnelheid l_ff groter dan 40 m/s is twijfelachtig, en
   -- windsnelheid l_ff groter dan 80 m/s is onmogelijk

      IF l_ff IS NOT NULL AND NVL(l_qt_ff,6)<>6 THEN
         IF    l_ff>80 THEN
            IF l_qa_ff<4 THEN l_qa_ff:=4; END IF;
         ELSIF l_ff>40 THEN
            IF l_qa_ff<3 THEN l_qa_ff:=3; END IF;
         END IF;
      END IF;

   -- check 03, wind, kd9201.doc nr. 621
   -- fout-check :
   -- als in format 130 of format 131 windindicator l_iw ontbreekt, dan
   -- is het onbekend of windsnelheid l_ff gemeten is in m/s of in knopen;
   -- precies diezelfde check is ook al gedaan door het invoerprogramma cin_mar
   -- (die maakt in dat geval Qt van ff gelijk aan 6)

      IF l_ff IS NOT NULL AND NVL(l_qt_ff,-1)=6 THEN
         IF l_qa_ff<6 THEN l_qa_ff:=6; END IF; -- in kd9201.doc wordt die in dit geval op 4
gezet
      END IF;

   -- check 04, wind, kd9201.doc nr. 625
   -- fout-check :
   -- windrichting l_dd moet een gedefinieerde waarde hebben

      IF l_dd IS NOT NULL THEN
         IF (l_dd<0 OR l_dd>360) AND l_dd<>999 THEN
            IF l_qa_dd<4 THEN l_qa_dd:=4; END IF;
         END IF;
      END IF;

   -- check 05, wind, kd9201.doc nr. 626
   -- fout-check :
   -- windsnelheid l_ff moet een gedefinieerde (>=0) of een geloofwaardige (<=99) waarde
hebben

      IF l_ff IS NOT NULL AND NVL(l_qt_ff,6)<>6 THEN
         IF (l_ff<0 OR l_ff>99) THEN
            IF l_qa_ff<4 THEN l_qa_ff:=4; END IF;
         END IF;
```

```
      END IF;

   --
================================================================================================
========
   -- WIND:   DD, FF
   -- GOLVEN: PW, HW, DW1, PW1, HW1, DW2, PW2, HW2
   --
   -- check 06, wind en golven, kd9201.doc nr. 700
   -- check 07, wind en golven, kd9201.doc nr. 701
   -- check 08, wind en golven, kd9201.doc nr. 703
   -- check 09, golven,         kd9201.doc nr. 705 t/m 715
   -- check 10, wind en golven, kd9201.doc nr. 731 t/m 736
   -- check 11, golven,         kd9201.doc nr. 741
   -- check 12, golven,         kd9201.doc nr. 746a, 747a
   -- check 13, golven,         kd9201.doc nr. 746b, 747b
   -- check 14, golven,         kd9201.doc nr. 748 t/m 756
   -- check 15, golven,         kd9201.doc nr. 757 t/m 765
   -- check 16, golven,         kd9201.doc nr. 767a, 767b, 767c
   -- check 17, golven,         kd9201.doc nr. 770
   -- check 18, golven,         kd9201.doc nr. 771
   -- check 19, golven,         kd9201.doc nr. 772
   -- check 20, golven,         kd9201.doc nr. 773
   -- check 21, golven,         kd9201.doc nr. 774
   -- check 22, golven,         kd9201.doc nr. 775
   -- check 23, golven,         kd9201.doc nr. 780
   -- check 24, golven,         kd9201.doc nr. 781
   -- check 25, golven,         kd9201.doc nr. 782
   -- check 26, golven,         kd9201.doc nr. 783
   -- check 27, golven,         kd9201.doc nr. 784
   -- check 28, golven,         kd9201.doc nr. 785
   -- check 29, golven,         kd9201.doc nr. 786
   -- check 30, golven,         kd9201.doc nr. 787
   -- check 31, golven,         kd9201.doc nr. 768a
   -- check 32, wind en golven, kd9201.doc nr. 768b
   -- check 33, wind en golven, kd9201.doc nr. 769

   -- De checks in kd9201.doc nr. 737 t/m 740 en 742 t/m 745 worden niet uitgevoerd omdat in
MARKIS ook
   -- historische waarnemingen staan waarbij die aanwezigheidssituaties wel legitiem kunnen
zijn.

   --
================================================================================================
========

   -- check 06, wind en golven, kd9201.doc nr. 700
   -- verdacht-check :
   -- als windsnelheid l_ff 0 is, dan moet golfperiode l_pw ook 0 of niet te bepalen zijn

      IF l_ff IS NOT NULL AND NVL(l_qt_ff,6)<>6 AND l_pw IS NOT NULL THEN
         IF l_ff=0 AND l_qa_ff=1 AND l_pw<>0 AND l_pw<>99 THEN
            IF l_qa_ff<2 THEN l_qa_ff:=2; END IF;
            IF l_qa_pw<2 THEN l_qa_pw:=2; END IF;
         END IF;
      END IF;
```

```
-- check 07, wind en golven, kd9201.doc nr. 701
-- verdacht-check :
-- als windsnelheid l_ff 0 is, dan moet golfhoogte l_hw ook 0 zijn

   IF l_ff IS NOT NULL AND NVL(l_qt_ff,6)<>6 AND l_hw IS NOT NULL THEN
      IF l_ff=0 AND l_qa_ff=1 AND l_hw<>0 THEN
         IF l_qa_ff<2 THEN l_qa_ff:=2; END IF;
         IF l_qa_hw<2 THEN l_qa_hw:=2; END IF;
      END IF;
   END IF;

-- check 08, wind en golven, kd9201.doc nr. 703
-- verdacht-check :
-- als golfperiode l_pw 0 is, dan moet windsnelheid l_ff minder zijn dan 5 m/s

   IF l_ff IS NOT NULL AND NVL(l_qt_ff,6)<>6 AND l_pw IS NOT NULL THEN
      IF (l_ff<0 OR l_ff>5) AND l_qa_ff=1 AND l_pw=0 THEN
         IF l_qa_ff<2 THEN l_qa_ff:=2; END IF;
         IF l_qa_pw<2 THEN l_qa_pw:=2; END IF;
      END IF;
   END IF;

-- check 09, golven, kd9201.doc nr. 705 t/m 715
-- verdacht-check :
-- elke golfhoogte-klasse behoort bij een bepaalde golfperiode-klasse

   IF l_hw IS NOT NULL AND l_pw IS NOT NULL THEN
      IF (l_hw=0                    AND l_pw<>99 AND (l_pw<0  OR l_pw>3) ) OR
         (l_hw=0.5                  AND l_pw<>99 AND (l_pw<0  OR l_pw>6) ) OR
         (l_hw=1                    AND l_pw<>99 AND (l_pw<0  OR l_pw>8) ) OR
         (l_hw=1.5                  AND l_pw<>99 AND (l_pw<0  OR l_pw>10)) OR
         (l_hw=2                    AND l_pw<>99 AND (l_pw<0  OR l_pw>12)) OR
         (l_hw=2.5                  AND l_pw<>99 AND (l_pw<0  OR l_pw>13)) OR
         (l_hw>=3    AND l_hw<=6    AND l_pw<>99 AND (l_pw<3  OR l_pw>15)) OR
         (l_hw>=6.5  AND l_hw<=10   AND l_pw<>99 AND (l_pw<6  OR l_pw>17)) OR
         (l_hw>=10.5 AND l_hw<=14.5 AND l_pw<>99 AND (l_pw<8  OR l_pw>20)) OR
         (l_hw>=15   AND l_hw<=20   AND l_pw<>99 AND (l_pw<10 OR l_pw>24)) OR
         (l_hw>=20.5 AND l_hw<=25   AND l_pw<>99 AND (l_pw<12 OR l_pw>30))
      THEN
         IF l_qa_pw<2 THEN l_qa_pw:=2; END IF;
         IF l_qa_hw<2 THEN l_qa_hw:=2; END IF;
      END IF;
   END IF;

-- check 10, wind en golven, kd9201.doc nr. 731 t/m 736
-- verdacht-check :
-- elke windsnelheid-klasse behoort bij een bepaalde golfhoogte-klasse

   IF l_ff IS NOT NULL AND NVL(l_qt_ff,6)<>6 AND l_hw IS NOT NULL THEN
      IF (l_ff>=1  AND l_ff<=7  AND l_qa_ff=1 AND (l_hw<0   OR l_hw>2) ) OR
         (l_ff>=8  AND l_ff<=12 AND l_qa_ff=1 AND (l_hw<0.5 OR l_hw>5) ) OR
         (l_ff>=13 AND l_ff<=17 AND l_qa_ff=1 AND (l_hw<0.5 OR l_hw>8) ) OR
         (l_ff>=18 AND l_ff<=22 AND l_qa_ff=1 AND (l_hw<1   OR l_hw>12)) OR
         (l_ff>=23 AND l_ff<=30 AND l_qa_ff=1 AND (l_hw<1.5 OR l_hw>15)) OR
         (l_ff>=31 AND l_ff<=50 AND l_qa_ff=1 AND (l_hw<2   OR l_hw>25))
      THEN
         IF l_qa_ff<2 THEN l_qa_ff:=2; END IF;
```

```
            IF l_qa_hw<2 THEN l_qa_hw:=2; END IF;
         END IF;
      END IF;

   -- checks 11 t/m 13, golven, kd9201.doc nr. 741, 746a, 747a, 746b, 747b
   -- verdacht-check :
   -- van deining 1 golfrichting l_dw1 versus golfperiode l_pw1 en golfhoogte l_hw1
   -- van deining 2 golfrichting l_dw2 versus golfperiode l_pw2 en golfhoogte l_hw2

   -- check 11, golven, kd9201.doc nr. 741
   -- verdacht-check :
   -- als van deining 1 golfrichting l_dw1 niet te bepalen is dan is golfperiode l_pw1 ook
niet te bepalen

      IF l_dw1 IS NOT NULL AND l_pw1 IS NOT NULL THEN
         IF (l_dw1=999 AND l_pw1<>99) THEN
            IF l_qa_dw1<2 THEN l_qa_dw1:=2; END IF;
            IF l_qa_pw1<2 THEN l_qa_pw1:=2; END IF;
         END IF;
      END IF;

   -- check 12, golven, kd9201.doc nr. 746a, 747a
   -- verdacht-check :
   -- als van deining 1 golfrichting l_dw1 gelijk is aan 0 (stille zee), dan moeten
   -- golfperiode l_pw1 en golfhoogte l_hw1 ook gelijk zijn aan 0 (stille zee)

      IF l_dw1 IS NOT NULL THEN
         IF l_dw1=0 THEN
            IF l_pw1 IS NOT NULL THEN
               IF l_pw1<>0 THEN
                  IF l_qa_dw1<2 THEN l_qa_dw1:=2; END IF;
                  IF l_qa_pw1<2 THEN l_qa_pw1:=2; END IF;
                  IF l_qa_hw1<2 THEN l_qa_hw1:=2; END IF;
               END IF;
            END IF;
            IF l_hw1 IS NOT NULL THEN
               IF l_hw1<>0 THEN
                  IF l_qa_dw1<2 THEN l_qa_dw1:=2; END IF;
                  IF l_qa_pw1<2 THEN l_qa_pw1:=2; END IF;
                  IF l_qa_hw1<2 THEN l_qa_hw1:=2; END IF;
               END IF;
            END IF;
         END IF;
      END IF;

   -- check 13, golven, kd9201.doc nr. 746b, 747b
   -- verdacht-check :
   -- als van deining 2 golfrichting l_dw2 gelijk is aan 0 (stille zee), dan moeten
   -- golfperiode l_pw2 en golfhoogte l_hw2 ook gelijk zijn aan 0 (stille zee)

      IF l_dw2 IS NOT NULL THEN
         IF l_dw2=0 THEN
            IF l_pw2 IS NOT NULL THEN
               IF l_pw2<>0 THEN
                  IF l_qa_dw2<2 THEN l_qa_dw2:=2; END IF;
                  IF l_qa_pw2<2 THEN l_qa_pw2:=2; END IF;
                  IF l_qa_hw2<2 THEN l_qa_hw2:=2; END IF;
```

```
            END IF;
         END IF;
         IF l_hw2 IS NOT NULL THEN
            IF l_hw2<>0 THEN
               IF l_qa_dw2<2 THEN l_qa_dw2:=2; END IF;
               IF l_qa_pw2<2 THEN l_qa_pw2:=2; END IF;
               IF l_qa_hw2<2 THEN l_qa_hw2:=2; END IF;
            END IF;
         END IF;
      END IF;
   END IF;

   -- check 14, golven, kd9201.doc nr. 748 t/m 756
   -- verdacht-check :
   -- elke golfhoogte-klasse van deining 1 behoort bij een bepaalde golfperiode-klasse van
deining 1

      IF  l_pw1 IS NOT NULL AND l_hw1 IS NOT NULL THEN
         IF (l_hw1=0                    AND                (l_pw1<0 OR l_pw1>5) ) OR
            (l_hw1=0.5                  AND l_pw1<>99 AND (l_pw1<0 OR l_pw1>11)) OR
            (l_hw1=1                    AND l_pw1<>99 AND (l_pw1<0 OR l_pw1>13)) OR
            (l_hw1=1.5                  AND l_pw1<>99 AND (l_pw1<0 OR l_pw1>15)) OR
            (l_hw1=2                    AND l_pw1<>99 AND (l_pw1<0 OR l_pw1>17)) OR
            (l_hw1=2.5                  AND l_pw1<>99 AND (l_pw1<0 OR l_pw1>19)) OR
            (l_hw1>=3    AND l_hw1<=6   AND l_pw1<>99 AND (l_pw1<0 OR l_pw1>21)) OR
            (l_hw1>=6.5  AND l_hw1<=10  AND l_pw1<>99 AND (l_pw1<0 OR l_pw1>23)) OR
            (l_hw1>=10.5 AND l_hw1<=25  AND l_pw1<>99 AND (l_pw1<0 OR l_pw1>30))
         THEN
            IF l_qa_pw1<2 THEN l_qa_pw1:=2; END IF;
            IF l_qa_hw1<2 THEN l_qa_hw1:=2; END IF;
         END IF;
      END IF;

   -- check 15, golven, kd9201.doc nr. 757 t/m 765
   -- verdacht-check :
   -- elke golfhoogte-klasse van deining 2 behoort bij een bepaalde golfperiode-klasse van
deining 2

      IF  l_pw2 IS NOT NULL AND l_hw2 IS NOT NULL THEN
         IF (l_hw2=0                    AND                (l_pw2<0 OR l_pw2>5) ) OR
            (l_hw2=0.5                  AND l_pw2<>99 AND (l_pw2<0 OR l_pw2>11)) OR
            (l_hw2=1                    AND l_pw2<>99 AND (l_pw2<0 OR l_pw2>13)) OR
            (l_hw2=1.5                  AND l_pw2<>99 AND (l_pw2<0 OR l_pw2>15)) OR
            (l_hw2=2                    AND l_pw2<>99 AND (l_pw2<0 OR l_pw2>17)) OR
            (l_hw2=2.5                  AND l_pw2<>99 AND (l_pw2<0 OR l_pw2>19)) OR
            (l_hw2>=3    AND l_hw2<=6   AND l_pw2<>99 AND (l_pw2<0 OR l_pw2>21)) OR
            (l_hw2>=6.5  AND l_hw2<=10  AND l_pw2<>99 AND (l_pw2<0 OR l_pw2>23)) OR
            (l_hw2>=10.5 AND l_hw2<=25  AND l_pw2<>99 AND (l_pw2<0 OR l_pw2>30))
         THEN
            IF l_qa_pw2<2 THEN l_qa_pw2:=2; END IF;
            IF l_qa_hw2<2 THEN l_qa_hw2:=2; END IF;
         END IF;
      END IF;

   -- check 16, golven, kd9201.doc nr. 767a, 767b, 767c
   -- verdacht-check :
   -- - als van deining 1 golfrichting l_dw1 ontbreekt, dan
```

```
--   moet van deining 2 golfrichting l_dw2 ook ontbreken
-- - als van deining 1 golfperiode l_pw1 ontbreekt, dan
--   moet van deining 2 golfperiode l_pw2 ook ontbreken
-- - als van deining 1 golfhoogte l_hw1 ontbreekt, dan
--   moet van deining 2 golfhoogte l_hw2 ook ontbreken

   IF l_dw1 IS NULL THEN
      IF l_dw2 IS NOT NULL THEN
         IF l_qa_dw2<2 THEN l_qa_dw2:=2; END IF;
      END IF;
   END IF;

   IF l_pw1 IS NULL THEN
      IF l_pw2 IS NOT NULL THEN
         IF l_qa_pw2<2 THEN l_qa_pw2:=2; END IF;
      END IF;
   END IF;

   IF l_hw1 IS NULL THEN
      IF l_hw2 IS NOT NULL THEN
         IF l_qa_hw2<2 THEN l_qa_hw2:=2; END IF;
      END IF;
   END IF;

-- check 17, golven, kd9201.doc nr. 770
-- verdacht-check :
-- van zeegang is golfperiode l_pw tussen bepaalde waarden verdacht

   IF l_pw IS NOT NULL THEN
      IF l_pw>20 AND l_pw<=30 THEN
         IF l_qa_pw<3 THEN l_qa_pw:=3; END IF;
      END IF;
   END IF;

-- check 18, golven, kd9201.doc nr. 771
-- verdacht-check :
-- van zeegang is golfhoogte l_hw tussen bepaalde waarden verdacht

   IF l_hw IS NOT NULL THEN
      IF l_hw>17.5 AND l_hw<=25 THEN
         IF l_qa_hw<3 THEN l_qa_hw:=3; END IF;
      END IF;
   END IF;

-- check 19, golven, kd9201.doc nr. 772
-- verdacht-check :
-- van deining 1 is golfperiode l_pw1 tussen bepaalde waarden verdacht

   IF l_pw1 IS NOT NULL THEN
      IF l_pw1>25 AND l_pw1<=30 THEN
         IF l_qa_pw1<3 THEN l_qa_pw1:=3; END IF;
      END IF;
   END IF;

-- check 20, golven, kd9201.doc nr. 773
-- verdacht-check :
-- van deining 1 is golfhoogte l_hw1 tussen bepaalde waarden verdacht
```

```
   IF l_hw1 IS NOT NULL THEN
      IF l_hw1>17.5 AND l_hw1<=25 THEN
         IF l_qa_hw1<3 THEN l_qa_hw1:=3; END IF;
      END IF;
   END IF;

-- check 21, golven, kd9201.doc nr. 774
-- verdacht-check :
-- van deining 2 is golfperiode l_pw2 tussen bepaalde waarden verdacht

   IF l_pw2 IS NOT NULL THEN
      IF l_pw2>25 AND l_pw2<=30 THEN
         IF l_qa_pw2<3 THEN l_qa_pw2:=3; END IF;
      END IF;
   END IF;

-- check 22, golven, kd9201.doc nr. 775
-- verdacht-check :
-- van deining 2 is golfhoogte l_hw2 tussen bepaalde waarden verdacht

   IF l_hw2 IS NOT NULL THEN
      IF l_hw2>17.5 AND l_hw2<=25 THEN
         IF l_qa_hw2<3 THEN l_qa_hw2:=3; END IF;
      END IF;
   END IF;

-- check 23, golven, kd9201.doc nr. 780
-- fout-check :
-- van zeegang is golfperiode l_pw buiten bepaalde waarden foutief

   IF l_pw IS NOT NULL THEN
      IF (l_pw<0 OR l_pw>30) AND l_pw<>99 THEN
         IF l_qa_pw<4 THEN l_qa_pw:=4; END IF;
      END IF;
   END IF;

-- check 24, golven, kd9201.doc nr. 781
-- fout-check :
-- van zeegang is golfhoogte l_hw buiten bepaalde waarden foutief

   IF l_hw IS NOT NULL THEN
      IF (l_hw<0 OR l_hw>25) THEN
         IF l_qa_hw<4 THEN l_qa_hw:=4; END IF;
      END IF;
   END IF;

-- check 25, golven, kd9201.doc nr. 782
-- fout-check :
-- van deining 1 is golfrichting l_dw1 buiten bepaalde waarden foutief

   IF l_dw1 IS NOT NULL THEN
      IF (l_dw1<0 OR l_dw1>360) AND l_dw1<>999 THEN
         IF l_qa_dw1<4 THEN l_qa_dw1:=4; END IF;
      END IF;
   END IF;
```

```
   -- check 26, golven, kd9201.doc nr. 783
   -- fout-check :
   -- van deining 2 is golfrichting l_dw2 buiten bepaalde waarden foutief

      IF l_dw2 IS NOT NULL THEN
         IF (l_dw2<0 OR l_dw2>360) THEN
            IF l_qa_dw2<4 THEN l_qa_dw2:=4; END IF;
         END IF;
      END IF;

   -- check 27, golven, kd9201.doc nr. 784
   -- fout-check :
   -- van deining 1 is golfperiode l_pw1 buiten bepaalde waarden foutief

      IF l_pw1 IS NOT NULL THEN
         IF (l_pw1<0 OR l_pw1>30) AND l_pw1<>99 THEN
            IF l_qa_pw1<4 THEN l_qa_pw1:=4; END IF;
         END IF;
      END IF;

   -- check 28, golven, kd9201.doc nr. 785
   -- fout-check :
   -- van deining 2 is golfperiode l_pw2 buiten bepaalde waarden foutief

      IF l_pw2 IS NOT NULL THEN
         IF (l_pw2<0 OR l_pw2>30) THEN
            IF l_qa_pw2<4 THEN l_qa_pw2:=4; END IF;
         END IF;
      END IF;

   -- check 29, golven, kd9201.doc nr. 786
   -- fout-check :
   -- van deining 1 is golfhoogte l_hw1 buiten bepaalde waarden foutief

      IF l_hw1 IS NOT NULL THEN
         IF (l_hw1<0 OR l_hw1 >25) THEN
            IF l_qa_hw1<4 THEN l_qa_hw1:=4; END IF;
         END IF;
      END IF;

   -- check 30, golven, kd9201.doc nr. 787
   -- fout-check :
   -- van deining 2 is golfhoogte l_hw2 buiten bepaalde waarden foutief

      IF l_hw2 IS NOT NULL THEN
         IF (l_hw2<0 OR l_hw2 >25) THEN
            IF l_qa_hw2<4 THEN l_qa_hw2:=4; END IF;
         END IF;
      END IF;

   -- check 31, golven, kd9201.doc nr. 768a
   -- verdacht-check :
   -- tussen deining 1 en deining 2 mag verschil in richting, periode en hoogte niet te klein
zijn

      IF l_dw1 IS NOT NULL AND l_pw1 IS NOT NULL AND l_hw1 IS NOT NULL AND
         l_dw2 IS NOT NULL AND l_pw2 IS NOT NULL AND l_hw2 IS NOT NULL
```

```
      THEN
         IF l_dw1>=10 AND l_dw1<=360 AND l_dw2>=10 AND l_dw2<=360 AND
            ABS(l_hw1-l_hw2)<=1 AND ABS(l_pw1-l_pw2)<=2 AND
           (ABS(l_dw1-l_dw2)>330 OR ABS(l_dw1-l_dw2)<30)
         THEN
            IF l_qa_dw1<2 THEN l_qa_dw1:=2; END IF;
            IF l_qa_pw1<2 THEN l_qa_pw1:=2; END IF;
            IF l_qa_hw1<2 THEN l_qa_hw1:=2; END IF;
            IF l_qa_dw2<2 THEN l_qa_dw2:=2; END IF;
            IF l_qa_pw2<2 THEN l_qa_pw2:=2; END IF;
            IF l_qa_hw2<2 THEN l_qa_hw2:=2; END IF;
         END IF;
      END IF;

   -- check 32, wind en golven, kd9201.doc nr. 768b
   -- verdacht-check :
   -- tussen zeegang en deining 1 mag verschil in richting, periode en hoogte niet te klein
zijn

      IF l_dd  IS NOT NULL AND l_pw  IS NOT NULL AND l_hw  IS NOT NULL AND
         l_dw1 IS NOT NULL AND l_pw1 IS NOT NULL AND l_hw1 IS NOT NULL
      THEN
         IF l_dd>=10 AND l_dd<=360 AND l_dw1>=10 AND l_dw1<=360 AND
            ABS(l_hw-l_hw1)<=1 AND ABS(l_pw-l_pw1)<=2 AND
           (ABS(l_dd-l_dw1)>330 OR ABS(l_dd-l_dw1)<30)
         THEN
            IF l_qa_pw<2  THEN l_qa_pw:=2;  END IF;
            IF l_qa_hw<2  THEN l_qa_hw:=2;  END IF;
            IF l_qa_pw1<2 THEN l_qa_pw1:=2; END IF;
            IF l_qa_hw1<2 THEN l_qa_hw1:=2; END IF;
            IF l_qa_dw1<2 THEN l_qa_dw1:=2; END IF;
         END IF;
      END IF;

   -- check 33, wind en golven, kd9201.doc nr. 769
   -- verdacht-check :
   -- tussen zeegang en deining 2 mag verschil in richting, periode en hoogte niet te klein
zijn

      IF l_dd  IS NOT NULL AND l_pw  IS NOT NULL AND l_hw  IS NOT NULL AND
         l_dw2 IS NOT NULL AND l_pw2 IS NOT NULL AND l_hw2 IS NOT NULL
      THEN
         IF l_dd>=10 AND l_dd<=360 AND l_dw2>=10 AND l_dw2<=360 AND
            ABS(l_hw-l_hw2)<=1 AND ABS(l_pw-l_pw2)<=2 AND
           (ABS(l_dd-l_dw2)>330 OR ABS(l_dd-l_dw2)<30)
         THEN
            IF l_qa_pw<2  THEN l_qa_pw:=2;  END IF;
            IF l_qa_hw<2  THEN l_qa_hw:=2;  END IF;
            IF l_qa_pw2<2 THEN l_qa_pw2:=2; END IF;
            IF l_qa_hw2<2 THEN l_qa_hw2:=2; END IF;
            IF l_qa_dw2<2 THEN l_qa_dw2:=2; END IF;
         END IF;
      END IF;

   -- zet de nieuwe Qa kwaliteiten in de database :

      UPDATE MOW SET
```

```
         q_dd= TRUNC(q_dd /1000)*1000+(l_qa_dd *100),
         q_ff= TRUNC(q_ff /1000)*1000+(l_qa_ff *100),
         q_pw= TRUNC(q_pw /1000)*1000+(l_qa_pw *100),
         q_hw= TRUNC(q_hw /1000)*1000+(l_qa_hw *100),
         q_dw1=TRUNC(q_dw1/1000)*1000+(l_qa_dw1*100),
         q_pw1=TRUNC(q_pw1/1000)*1000+(l_qa_pw1*100),
         q_hw1=TRUNC(q_hw1/1000)*1000+(l_qa_hw1*100),
         q_dw2=TRUNC(q_dw2/1000)*1000+(l_qa_dw2*100),
         q_pw2=TRUNC(q_pw2/1000)*1000+(l_qa_pw2*100),
         q_hw2=TRUNC(q_hw2/1000)*1000+(l_qa_hw2*100)
      WHERE
         udate=l_udate AND utime=l_utime AND cs=l_cs AND la=l_la AND lo=l_lo;

      aantal_uitgevoerde_updates:=aantal_uitgevoerde_updates+1;

      IF (aantal_uitgevoerde_updates>1000) THEN
         COMMIT;
         aantal_uitgevoerde_updates:=0;
      END IF;

   -- Ga naar de volgende rij :

      FETCH cursor_wg INTO
         l_udate, l_utime, l_cs, l_la, l_lo,
         l_iw,
         l_dd,  l_q_dd,  l_ff,  l_q_ff,
         l_pw,  l_q_pw, l_hw, l_q_hw,
         l_dw1, l_q_dw1, l_pw1, l_q_pw1, l_hw1, l_q_hw1,
         l_dw2, l_q_dw2, l_pw2, l_q_pw2, l_hw2, l_q_hw2;

   END LOOP; -- einde loop van fetch cursor_wg over 1 jaar

   COMMIT;

   CLOSE cursor_wg;

END; -- einde compound van open-close cursor_wg over 1 jaar

aantal_uitgevoerde_jaren:=aantal_uitgevoerde_jaren+1;

END LOOP; -- einde loop van aantal_uitgevoerde_jaren = 300

END MO_Wind_Golven_Qa;
/
```