European Severe Storms Laboratory

TECHNICAL REPORT

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ESWD data format specification

Version 1.50 and 1.50-csv

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1. Introduction

This report describes a new version of the ESWD data format, which has been developed for the documentation of severe weather occurrences. The ESWD data format is used operationally in the European Severe Weather Database (ESWD) that is managed and maintained by the European Severe Storms Laboratory (e.g. Dotzek et al, 2009).

This document describes Version 1.50, which is an extension of version 1.40 (ESSL Techical Report 2006-01), and Version 1.50-csv, which is an extension of version 1.40-csv (ESSL Techical Report 2009-01).

The current version extends the database with various types of winter weather as well as lightning, and can be expanded further in future to accommodate the storage of additional types of severe weather.

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Several people have advised the Data Comittee and we express our thanks for this here. In particular we thank Alexander Keul (Universität Salzburg), Patrick Nairz (Lawinenwarndienst Tirol), Kristin Anthony-Malone (Canadian Avalanche Association), and Gerhard Diendorfer (EUCLID) for their input. Finally, posthumously, credit is due to Nikolai Dotzek for his many contributions to and support of the development of the ESWD during his time as ESSL Director.

2. Basic principles

2.1 Point data

The ESWD data formats are designed to record georeferenced 0-dimensional data (i.e. point data) as opposed to higher-dimensional geographical objects. An exception to this rule is the possibility to store 1 dimensional tornado damage paths. Other 1-dimensional or higher dimensional objects cannot be stored in the current data format.

2.2 Text data

The ESWD data format is a text-based format, that uses the UTF-8 encoding. Within a database system that used the ESWD data. data may be stored in an SQL, XML or any other format. These formats are not part of the official data format specification described in this document. Pending the availability of resources for this purpose, such specifications may be developed in future in compliance with international standards such as those of the Open Geospatial Consortium, http://www.opengeospatial.org.

2.3 *csv* and *conventional* formats

The ESWD data format comes in two types: the *csv format* and the *traditional* or *conventional format*. The traditional format was developed first (Groenemeijer et al., 2004). The primary distinction between the two types is the way data of a single report is structured.

In the *conventional* format this data is stored in 3 or 4 *groups*, or lines of data. The *csv* format stores al data in on one line, i.e. the data of one report consitutes one single string. Another difference is that the *conventional* format makes extensive use of keywords to indicate particular properties of the event that is reported. In contrast, the csv format uses numbers to store such data. More details can be found in the respective sections below.

Both data formats have their benefits. The csv data is the most easily used for transfer to other database systems, and for importing into spreadsheet programs. The conventional format is more human-readable and easier to encode, for example by organizations wishing to transmit data to ESSL's database. In this document both data formats are described.

2.4 Recording events vs. recording observations

The ESWD stores severe weather data in two different ways: For some event types, the data is recorded *per observation* and for others *per event*. The criterion that determines how an event is

stored is whether the events are countable without having to introduce some definition of what constitutes a single event.

Countable events, that are recorded on a *per event* basis, are:

- lesser whirlwinds
- funnel clouds
- gust front vortices
- tornadoes or waterspouts
- avalanches
- damaging lightning strikes

Uncountable events, that are recorded *per observation*, are:

- severe hailfall
- severe wind gust
- heavy rain
- heavy snowfall
- icing hazards

2.5 Merging of multiple reports of multiple events

When multiple events of the same countable event type occur in close spatial and temporral proximity (for example, 3 waterspouts) these may be merged into one report. This should be done only when no specific information about each of the waterspouts is known. The following conditions must be satisfied for multiple events to be combined into one record:

- the events are less than 30 minutes separated in time,
- the events are less than 5 kilometres away from each other
- there is no information available about each individual event, but only for the set of events.

3. Event types and definitions

The types of severe weather covered by this version of the data format are listed below.

Some types do not use fixed thresholds, because these differ from region to region. Some mountainous areas used to see accumulations of, for example, 80 mm in 12 hours, but in flatter areas where suchs amounts are uncommon, they may cause major problems. Similarly, 10 cm of snow in Rome has a very different effect than 10 cm of snow in Helsinki.

The criterion of whether a report qualifies to be included is whether important disruptions of daily life and/or considerable material damage or economical damage occurred, or could easily have occurred given the general level of resilience of the region to the events, for example, if it had happened at a slightly different time or location.

AVALANCHE – avalanche

Definition: A rapid flow of snow down a slope.

DEVIL – lesser whirlwind

Definition: A vortex not associated with a convective storm, typically between a few metres to a few tens of metres in diameter, extending upward from the earth's surface but not reaching any cloud, visible by material that is lifted off the earth's surface or by water droplets.

Remarks:

This category includes only those lesser whirlwinds that result from temperature differences between the surface and the air above. Whirls in the lee of objects, i.e. wake vortices which otherwise may meet the criteria above, should not be reported in this category.

Lesser whirlwinds have been reported not only over hot land surface, but also, albeit seldomly, over surfaces like water and and even snow surfaces. Whirls over such surfaces qualify as long as they are not wake vortices

FUNNEL - funnel cloud

Definition: A vortex, typically between a few metres to a few tens of metres in diameter, extending downward from a convective cloud but not reaching the earth's surface, that is visible by condensation of water vapour, normally having a cone or tube shape.

***Remark**:*

Funnel clouds and weak tornadoes can be confused easily if the tornado funnel does not fully extend to the ground, e.g. due to lack of moisture. If there is any evidence that the vortex had ground contact, the event should be reported as a tornado.

GUSTNADO - gust front vortex (gustnado)

Definition: A vortex occurring along the gust front of a convective storm and being visible by material that is lifted off the earth's surface, typically between a few metres to a few tens of metres in diameter, extending from the earth's surface upward but not extending to a cloud.

HAIL - severe hailfall

Definition: Hailstones having a diameter (in the longest direction) of 2.0 centimetres or more, or smaller hailstones that form a layer of 2.0 centimetres thickness or more on flat parts of the earth's surface.

***Remark**: The hailstones of a hail layer should not have accumulated because of transport by water, wind or by any other means.*

ICE – icing hazards

Definition: Accumulations of ice on the earth's surface and/or objects (such as power lines) in an amount that causes - or is capable of causing - important disruptions of daily life and/or considerable material damage or economical damage, not including ice accumulations resulting primarily from snowfall. Ice accumulations may result from freezing rain, freezing drizzle, freezing fog or from direct deposition of water vapour, resulting in glaze, frost or rime.

***Remarks**:*

Glaze is a coating of ice, generally clear and smooth, formed by the freezing of a film of supercooled water. Also known as clear ice or black ice.

Frost is a fuzzy layer of ice crystals on a cold object, forming by direct deposition of water vapor to solid ice

Rime is a white or milky and opaque granular deposit of ice formed by the rapid freezing of supercooled water drops as they impinge upon an exposed object

LIGHTNING – damaging lightning

Definition: A lightning strike causing important damage to aircraft, vehicles, ships, or injuries casualties to people or animals.

PRECIP - heavy precipitation

Definition: Precipitation in an amount that causes - or is capable of causing - important disruptions of daily life and/or considerable material or economical damage.

SNOW – heavy snowfall

Definition: Snow (or snow grains) and/or snowstorm in an amount that causes - or is capable of causing - important disruptions of daily life and/or considerable material or economical damage.

TORNADO - tornado, waterspout

Definition: A vortex, typically between a few metres to a few kilometres in diameter, extending between a convective cloud and the earth's surface, which may be visible by condensation of water vapour or by material (e.g. dust or water) being lifted off the earth's surface.

WIND - severe wind gust

Definition: Measured 3-second averaged wind speeds of 25 m/s or higher at 10 m above the surface, or wind damage inflicted by winds that were likely stronger than 25 m/s.

4. The *conventional* data format

4.1 *conventional* structure

The structure of the *conventional* data format can be summarized by the following hierarchy:

FILES *contain* ***RECORDS*** *that contain* ***GROUPS*** *that contain* ***FIELDS***

Any data file consists of a number of records. Each record contains information about one event (or various events occurring in close spatiotemporal proximity, *see Section 2.5*).

Records are separated by two newline characters. A record consists of several groups, each marked by a group code. Each group starts on a new line. Every record contains three or four groups: INFO (record information), TIME&PLACE (general time and location), the event group and, possibly a PATH group.

A group consists of a number of fields. Every first field of a group is the group identifier and the second contains the group length. Fields are separated by the character "|". A field contains one physical quantity or one type of information.

4.2 *conventional* field types

Fields can contain data of the following types. It is important to comply with this in order to be able to decode the data automatically:

format type	description
char	*alphabetic characters, spaces, numbers, all punctuation symbols except |*
paragr.	*a combination of n times char, with n <= 1024*
word	*a combination of n times char, with n <= 64*
integer	*1 to 5 numerical characters constituting a positive integer number (max. 32767)*
numb.	*a numerical character*
x numb.	*x times a numerical character (this differs from integer because its length is not variable and leading zeroes are therefore retained, but can be read by a program as an integer).*
float	*numbers that may contain a decimal point.*

4.3 *conventional* field status

Fields can be *required* (req.), *optional* (opt.) or *deprecated* (dep).

Required means that if the field is left empty, the data does not comply with the data format, which may cause errors in decoding. Events of which *required* information is not available may not be added to the database.

Optional fields may be left empty. This information should be given when available. Entering the number 0 indicates that the value of a\the field is zero, not that no information is available.

Deprecated fields are fields that are retained to ensure backward compatibility, but their usage is discouraged for new data.

4.4 conventional group and field descriptions

4.4.1 Group INFO – record information, source, revisions (req.)

#	field name	type	status	possible value(s) *and description*
1	group identifier	word	req	**INFO**
2	group length	integer	req	**14**
3	record version	word	req	**V01.50**
4	record length	integer	req	number of groups of the entire record
5	QC level	word	req	*quality level of the report, see Appendix B one of the following keywords:*
				QC0 *as received*
				QC0+ *plausibility checked*
				QC1 *confirmed by reliable source*
				QC2 *fully verified*
6	information sources	word	opt	*one or more of the following keywords, separated by a comma*
				NWSP *a newspaper*
				WWW *a web site*
				EMAIL *a report received by e-mail*
				TV *a television or radio broadcast*
				WXSVC *a weather service*
				SPTR *a storm spotter*
				LIT *scientific literature*
				OLIT *other literature*
				EYEWTN *an eyewitness*
				DMGEYEWTN *an eyewitness of the damage*
				EVTPHOTO *a photo or videoof the event*
				DMGPHOTO *a photo or video of the damage*
				DMGSVY *a damage survey by a severe weather expert*

7	external URL(s)	paragr.	opt	URL(s) of internet resources that complement the report, separated by a space. *Only URL(s) of ESSL and selected partners are allowed, e.g. http://www.meteopics.eu*
8	source name(s)	paragr.	req	name of the person who submitted the report
9	source e-mail	word	opt	e-mail address of this person
10	organization name	word	opt	name of this person's organization
11	spotter id	word	opt	identification code of the person making the report within his organization
12	no. of revisions	integer	req	number of revisions of the report the initial submission ot the ESWD is 1.
13	name and organization of revisor	word	opt	last name and organization of person doing the last revision
14	date of last revision	numb.	req	*given in format* yyyymmdd

4.4.2 Group TIME&PLACE - time and place of initial event occurrence (req.)

Remark:

1. All times must be given in UTC time.

#	**field name**	**type**	**status**	**possible value(s)** *and description*
1	group identifier	word	req	**TIME&PLACE**
2	group length	integer	req	**21**
3	year	4 numb.	req	*year, formatted as* yyyy
4	month	2 numb	req	*month (January = 01), formatted as* mm
5	day	2 numb.	req	*day in month (first day = 01), formatted as* dd
6	weekday	word	dep	*one of the following keywords:*
				MON *Monday* **TUE** *Tuesday* **WED** *Wednesday* **THU** *Thursday* **FRI** *Friday* **SAT** *Saturday* **SUN** *Sunday*
7	hours	2 numb.	req	hh
8	minutes	2 numb.	req	mm
9	time accuracy	word	opt	*one of the following keywords:*
				keyword / *the event has occurred...* **5M** *up to 2.5 minutes earlier or later...* **15M** *up to 7.5 minutes earlier or later...* **30M** *up to 15 minutes earlier or later...* **1H** *up to 30 minutesearlier or later...* **3H** *up to 1.5 hours earlier or later...* **6H** *up to 3 hours earlier or later...* **12H** *up to 6 hours earlier or later...* **1D** *up to 12 hours earlier or later...*

				GT1D *more than 12 hours earlier or later...* *...than specified in fields 3-8.*
10	country	word	req	two-character country code as specified in Appendix A.
11	adminsitrative division	word	opt	first sub-national administrative division such as province, department, land, autonomous region etc.
12	place name	word	req	name of nearest town, settlement or observing station
13	place name in local language	word	opt	name of nearest town, settlement or observing station in local language, if different from field 12
14	detailed location description	paragr.	opt	description
15	nearest larger city	word	dep	location in words expressed with respect to the nearest larger city, *e.g. 5 km S of Amsterdam, 10 km SSE of Stuttgart, near Basel*.
16	latitude	float	req	*decimal degrees north latitude (south is negative), e.g. 50.5000 is* 50º30'00"
17	longitude	float	req	*decimal degrees east longitude (west is negative*
18	place accuracy	word	opt	*one of the following keywords:*

keyword	*the event has occurred...*
1KM	*within 1km of the reported location...*
3KM	*within 3 km of the reported location.....*
10KM	*within 10 km of the reported location...*
20KM	*within 30 km of the reported location...*
100KM	*up to 100 km of the reported location...*
GT100KM	*possibly more than 100 km away from the reported location...*

19	orography	word	dep	*one or more of the following keywords*

FLAT	*flat, definition: local terrain height variation <= 50 m <= 50 m*
HILLS	*hilly, definition: local terrain height variation > 50 m and <= 500 m*

				MTS *mountainous, definition:local terrain height variation > 500 m*
20	character of earth's surface at the initial event location	word	opt (dep)	*one of the following keywords:* **LAND** *land surface <= 50 m* **WATER** *a water surface* *This field and the following make it possible to distinguish tornadoes over land from waterspouts.* *The following keywords, or combinations thereof, separated by a comma, are deprecated:* **RURAL** *rural (crops, grassland, both or unknown)* **CROPS** *rural, crops.* **GRASS** *rural, grassland (pastures)* **SAND** *sand,semi-)desert, beach, soil covered with very little vegetation)* **WILD** *wilderness (steppe, dunes, soil covered with some vegetation)* **SWAMP** *swamp* **ROCKS** *rocks* **URBAN** *urban, built-up zone* **FOREST** *forest* **ICE** *ice (glacier or ice-covered water)* **RIVER** *river, canal* **SEA** *sea, ocean* **LAKE** *lake*
21	*all types of earth's surface crossed by the event*	word	opt	*one or both of the following keywords, separated by a comma:* **LAND** *land surface <= 50 m* **WATER** *a water surface* *Additionally, the deprecated keywords of field 19 or combinations thereof (separated by a comma, may occur).*

4.4.3 Group AVALANCHE

Definition: An avalanche is a rapid flow of snow down a slope.

Remarks:

1. In accordance with the definition of the European Avalanche Warning Services (www.avalanches.org), only avalanches that have a volume greater than 100 m^3 or a minimum length of 50 m (level 2 on the EAWS scale) are to be recorded.

#	field name	type	status	possible value(s) *and description*
1	group identifier	word	req	**AVALANCHE**
2	group length	integer	req	**19**
3	type of avalanche	word	opt	*either of these keywords:*
				SLAB *a slab avalanche: the simultaneous release of a cohesive snow layer (slab) characterized by a distinct fracture line (or crown fracture) at the top of the avalanche.*
				LOOSE *a loose snow avalanche: an avalanche of dry or wet snow with no or low cohesion starting from a point fanning out downhill and leaving an inverted V-shaped scar.*
4	avalanche flow type	word	opt	*either of these keywords:*
				DENSE *a dense flow avalanche: an avalanche with a primarily flowing, sliding, slipping motion.*
				POWDER *a powder cloud avalanche: an avalanche in which a large fraction of the snow is suspended by turbulence*
5	snow mass characteristics	word	opt	*either of these keywords:*
				WETSNOW *a wet snow avalanche: an avalanche of wet snow; typically a slower avalanche of higher density*
				DRYSNOW *a dry snow avalanche:*

				an avalanche of dry snow; typically faster but of lower density than a wet snow avalanche
6	avalanche size	integer	opt	avalanche size expressed on the scale of the European Avalanche Warning Services (www.avalanches.org) **2** *small avalanche* — *50 - 100 m* — *10^2 - 10^3 m^3* **3** *medium avalanche* — *100 m - 1 km* — *10^3 - 10^4 m^3* **4** *large avalanche* — *1 - 2 km* — *10^4 – 10^5 m^3* **5** *very large avalanche* — *~ 3 km* — *> 10^5 m^3*
7	avalanche trigger	word	opt	*either of these keywords:* **NATURAL** *release of an avalanche without being triggered by a person, explosives, etc.* **ARTIFICIAL** *release of an avalanche by an external force (e.g. explosives, snow machines or machinery, people, wildlife).*
8	path length	float	opt	*in kilometres*
9	mean path width	float	opt	*in metres*
10	max. path width	float	opt	*in metres*
11	direction of movement	word	opt	direction of movement indicated as follows (from-to): **N-S NNE-SSW**, **NE-SW**, *etc.*
12	elevation of starting point	float	opt	*in metres*
13	elevation difference	float	opt	height difference between starting point and ending point of the avalanche *in metres*
14	property damage	word	opt	damage expressed in EUR (default unit) or in a specified other currency or quantity
15	crop/forest damage	word	opt	damage expressed in EUR (default unit) or in a

				specified other currency or quantity, such as m^3 of wood
16	total damage	word	opt	damage expressed in EUR (default unit) or in a specified other currency or quantity
17	number of people injured	integer	opt	
18	number of people killed	integer	opt	
19	event description / types of damage / other remarks	paragr.	opt	

4.4.4 Group DEVIL – lesser whirlwind

Definition: A vortex not associated with a convective storm, typically between a few metres to a few tens of metres in diameter, extending upward from the earth's surface but not reaching any cloud, visible by material that is lifted off the earth's surface or by water droplets.

Remarks:

1. This category includes only those lesser whirlwinds that result from temperature differences between the surface and the air above. Whirls in the lee of objects, i.e. wake vortices which otherwise may meet the criteria above, should not be reported in this category.
2. Lesser whirlwinds have been reported not only over hot land surface, but also, albeit seldomly, over surfaces like water and and even snow surfaces. Whirls over such surfaces qualify as long as they are not wake vortices
3. An F- or T-scale rating shall be provided only when a reasonably accurate estimate can be given.

#	**field name**	**type**	**status**	**possible value(s)** *and description*
1	group identifier	word	req	**DEVIL**
2	group length	integer	req	**18**
3	number of whirlwinds	integer	opt	*blank implies 1*
4	F-scale	integer	opt	*max. intensity on the Fujita-scale*
5	T-scale	integer	opt	*max. intensity on the T-scale*
6	F/T rating basis	word	opt	*the basis for the rating indicated by one or more of the following keywords, separated by a comma:*

DMGEYEWTN	*an eye-witness report of the inflicted damage*
DMGSVY	*a damage survey by a severe weather expert*
DMGPHOTO	*photographs / video footage of the inflicted damage*
DMGTEXT	*a written account of the damage (e.g. in a newspaper)*
WIND	*a measured wind speed*

7	wind speed	float	opt	*in m/s.* *only measured wind speeds should be given here, no estimates*
8	total event duration	float	opt	*in minutes*
9	path length	float	opt	*in kilometres*
10	mean path width	float	opt	*in metres*
11	max. path width	float	opt	*in metres*
12	direction of movement	word	opt	direction indicated as follows (from-to): **N-S NNE-SSW**, **NE-SW***, etc.*
13	property damage	word	opt	damage expressed in EUR (default unit) or in a specified other currency or quantity
14	crop/forest damage	word	opt	damage expressed in EUR (default unit) or in a specified other currency or quantity, such as m^3 of wood
15	total damage	word	opt	damage expressed in EUR (default unit) or in a specified other currency or quantity
16	number of people injured	integer	opt	
17	number of people killed	integer	opt	
18	event description / types of damage / other remarks	paragr.	opt	

4.4.5 Group FUNNEL - funnel cloud

Definition: A vortex, typically between a few metres to a few tens of metres in diameter, extending downward from a convective cloud but not reaching the earth's surface, that is visible by condensation of water vapour, normally having a cone or tube shape.

Remark:

1. Funnel clouds and weak tornadoes can be easily confused if the tornado funnel does not fully extend to the ground. If any evidence exists that the vortex associated with the funnel cloud had ground contact, the event should be reported as a TORNADO.

#	**field name**	**type**	**status**	**possible value(s)** *and description*
1	group identifier	word	req	**FUNNEL**
2	group length	integer	req	**7**
3	number of funnel clouds	integer	opt	*blank implies 1*
4	total event duration	float	opt	*in minutes*
5	max. vertical development	integer	opt	*in percentage of the distance cloud-ground. (e.g. 25% is one quarter of the distance from the cloud to the ground)*
6	direction of movement	word	opt	direction indicated as follows (from-to): **N-S NNE-SSW**, **NE-SW***, etc.*
7	event description / types of damage / other remarks	paragr.	opt	

4.4.6 Group GUSTNADO - gust front vortex (gustnado)

Definition: A vortex occurring along the gust front of a convective storm and being visible by material that is lifted off the earth's surface, typically between a few metres to a few tens of metres in diameter, extending from the earth's surface upward but not extending to a cloud.

Remarks:

1. In case of uncertainty whether a gustnado really has occurred, do not use this group. If it is certain that either a tornado or a gustnado occurred, use the TORNADO group. If a straight-line wind gust could have occurred instead, choose the WIND group.

2. Provide an F- or T-scale rating only when a reasonably accurate estimate can be given.

#	**field name**	**type**	**status**	**possible value(s)** *and description*
1	group identifier	word	req	**GUSTNADO**
2	group length	integer	req	**20**
3	number of gustnadoes	integer	opt	*blank implies 1*
4	F-scale	integer	opt	*max. intensity on the Fujita-scale*
5	T-scale	integer	opt	*max. intensity on the T-scale*
6	F/T rating basis	word	opt	*the basis of the rating should be indicated by one or more of the following keywords, separated by a comma:* **DMGEYEWTN** *an eye-witness report of the inflicted damage* **DMGSVY** *a damage survey by a severe weather expert* **DMGPHOTO** *photographs / video footage of the inflicted damage* **DMGTEXT** *a written account of the damage (e.g. in a newspaper)* **WIND** *a measured wind speed*
7	wind speed	float	opt	*in m/s* *only measured wind speeds should be given in the field, no estimates.*
8	total event duration	float	opt	*in minutes*
9	type of precipitation	word	opt	*all types of precipitation that are known to have occurred within 5 minutes of the event time and*

within 3 kilometres distance of the event, i.e. one or more of the following values separated by a comma:

HRAIN	*heavy rain*
LRAIN	*light or moderate rain*
LGHAIL	*large hail (2.0 cm in diameter or larger)*
MEDHAIL	*hail (0.5 – 1.9 mm in diameter)*
GRAINS	*graupel, small hail or snow grains (<0.5 mm in diameter)*
HAILUNK	*hail (unknown diameter)*
HSNOW	*heavy snowfall*
LSNOW	*light or moderate snowfall*
DUST	*dust or sand raised by the wind, thereby limiting visibility*
DRY	*no precipitation, dust or sand*

10	size of accompanying hail	float	opt	*in centimetres. the hail should have occurred within 5 minutes of the event time and within 3 kilometres distance of the event*
11	path length	float	opt	*in kilometres*
12	mean path width	float	opt	*in metres*
13	max. path width	float	opt	*in metres*
14	direction of movement	word	opt	direction of movement indicated as follows (from-to): **N-S NNE-SSW**, **NE-SW***, etc.*
15	property damage	word	opt	damage expressed in EUR (default unit) or in a specified other currency or quantity
16	crop/forest damage	word	opt	damage expressed in EUR (default unit) or in a specified other currency or quantity, such as m^3 of wood
17	total damage	word	opt	damage expressed in EUR (default unit) or in a specified other currency or quantity
18	number of people injured	integer	opt	
19	number of people	integer	opt	

	killed		
20	event description / types of damage / other remarks	paragr.	opt

4.4.7 Group HAIL - severe hailfall

Definition: Hailstones observed having a diameter (in the longest direction) of 2.0 centimetres or more, or smaller hailstones that form a layer of 2.0 centimetres thickness or more on flat parts of the earth's surface.

Remark:

1. The hail layer thickness should be measured where effects of local accumulation by transport of hail stones by water, wind or by any other means are negligible.

#	**field name**	**type**	**status**	**possible value(s)** *and description*
1	group identifier	word	req	**HAIL**
2	group length	integer	req	**14**
3	max. hail diameter	float	opt	*in centimetres*
4	max. hailstone weight	float	opt	*in grams*
5	average hailstone diameter	float	opt	*in centimetres*
6	thickness of accumulated hail layer	float	opt	*in centimetres (see Remark 1)*
7	hail stone characteristics	word	opt	*all of the following hailstone characteristics that apply, i.e. one or more of the following values separated by a comma:*

AGGR	*aggregates formed while in air*
CLEAR	*hailstones of clear ice*
CONE	*photographs / video footage of the inflicted damage*
OBLATE	*hailstones with oblate shape ("squeezed ball")*
POROUS	*porous (white ice) hailstones*
RINGS	*hailstones contain rings of white and clear ice*
SPIKES	*spiky stones*

#				
8	local event duration	float	opt	*the time a particular place was affected by hailfall, in minutes*
9	property damage	word	opt	damage expressed in EUR (default unit) or in a

				specified other currency or quantity
10	crop/forest damage	word	opt	damage expressed in EUR (default unit) or in a specified other currency or quantity
11	total damage	word	opt	damage expressed in EUR (default unit) or in a specified other currency or quantity
12	number of people injured	integer	opt	
13	number of people killed	integer	opt	
14	event description / types of damage / other remarks	paragr.	opt	

4.4.8 Group ICE – Icing hazards

Definition: Accumulations of ice on the earth's surface and/or objects (such as power lines) in an amount that causes - or is capable of causing - important disruptions of daily life and/or considerable material or economical damage, not including ice accumulations resulting primarily from snowfall. Ice accumulations may result from freezing rain, freezing drizzle, freezing fog or from direct deposition of water vapour, resulting in *glaze*, *frost* or *rime.*

#	**field name**	**type**	**status**	**possible value(s)** *and description*
1	group identifier	word	req	**ICE**
2	group length	integer	req	**14**
3	ice hazards	word	opt	*all of the following that apply, i.e. one or more of the following keywords separated by a comma:*
				GLAZE *a coating of ice, generally clear and smooth, formed by the freezing of a film of supercooled water. Also known as clear ice or black ice.*
				FROST *fuzzy layer of ice crystals on a cold object, forming by direct deposition of water vapor to solid ice*
				RIME *a white or milky and opaque granular deposit of ice formed by the rapid freezing of supercooled water drops as they impinge upon an exposed object*
4	thickness of glaze cover	float	opt	*in millimetres*
5	thickness of rime or frost cover	float	opt	*in millimetres*
6	frozen precipitation amount	float	opt	measured amount of precipitation that has contributed to the ice layer *in millimetres water equivalent*
7	duration of precipitation	float	opt	duration of the precipitation *in hours*
8	convective nature	word	opt	*Did the precipitation fall in connection with deep moist convection? One of the following values:*

				CONV *convective* **PARTLYCONV** *partly convective* **NONCONV** *nonconvective* **UNCERTAIN** *uncertain*
9	property damage	word	opt	damage expressed in EUR (default unit) or in a specified other currency or quantity
10	crop/forest damage	word	opt	damage expressed in EUR (default unit) or in a specified other currency or quantity
11	total damage	word	opt	damage expressed in EUR (default unit) or in a specified other currency or quantity
12	number of people injured	integer	opt	
13	number of people killed	integer	opt	
14	event description / types of damage / other remarks	paragr.	opt	

4.4.9 Group LIGHTNING – damaging lightning

Definition: Lightning strike causing important damage to aircraft, vehicles, ships, or injuries casualties to people or animals.

#	field name	type	status	possible value(s) *and description*
1	group identifier	word	req	**LIGHTNING**
2	group length	integer	req	**12**
3	objects struck	word	req	All objects directly struck by this lightning strike. *One or more of the following keywords, separated by a comma:* **AIRCRAFT** *e.g. an aeroplane or helicopter* **ANIMAL** *cattle or other large animals* **BUILDING** *build-up structures* **OVERHEAD** *overhead lines of transport infrastructure (catenary)* **PERSON** *persons or groups of persons* **POWERLINE** *powerline* **SHIP** *any vessels in water* **VEGITATION** *vegitation (i.e. causing wildfires)* **VEHICLE** *any vehicles on land, such as cars, lorries, etc.*
4	peak current	float	opt	peak current measured by lightning detection network *in kA (kiloampere)*
5	polarity	word	opt	polarity of the lightning strike as determined by a lightning detection network *either of the following keywords:* **POS** *a discharge between a cloud and the ground that lowers positive charge to the ground* **NEG** *a discharge between a cloud and the ground that lowers negative charge to the ground*
6	exceptional electrical phenomenon	float	opt	*One or more of the following keywords:*

				BALL *ball lightning* **OELP** *other expectionallightning phenomenon, explained in field 12*
7	property damage	word	opt	damage expressed in EUR (default unit) or in a specified other currency or quantity
8	crop/forest damage	word	opt	damage expressed in EUR (default unit) or in a specified other currency or quantit
9	total damage	word	opt	damage expressed in EUR (default unit) or in a specified other currency or quantity
10	number of people injured	integer	opt	
11	number of people killed	integer	opt	
12	event description / types of damage / other remarks	paragr.	opt	

4.4.10 Group PRECIP - heavy precipitation

Definition: Precipitation in an amount that causes - or is capable of causing - important disruptions of daily life and/or considerable material or economical damage.

#	**field name**	**type**	**status**	**possible value(s)** *and description*
1	group identifier	word	req	**PRECIP**
2	group length	integer	req	**16**
3	precipitation amount	float	opt	*in millimetres*
4	duration of accumulation	float	opt	*in hours* *required if field 3 is provided*
5	precipitation amount in peak period	float	opt	the accumulation within a time period during which the precipitation rate was exceptionally high (peak period) may be reported here*, in millimetres*
6	duration of peak period	float	opt	duration of the peak period, *in hours*
7	max. 6 hour accumulated precipitation	float	opt	*during the 0-6, 6-12, 12-18, or 18-00 UTC interval in which the time given falls. If the time given is exactly 00, 06, 12 or 18 UTC, the previous 6-hour period is meant.*
8	max. 12 hour accumulated precipitation	float	opt	*during the 00-12, 12-00 UTC interval in which the time given falls. If the time given is exactly 00, or 12 UTC, the previous 12-hour period is meant.*
9	max. 24 hour accumulated precipitation	float	opt	*during the 24 hour period in which the given time falls*
10	convective nature	word	opt	*Did the precipitation fall in connection with deep moist convection? One of the following values:* **CONV** *convective* **PARTLYCONV** *partly convective* **NONCONV** *nonconvective* **UNCERTAIN** *uncertain*
11	property damage	word	opt	damage expressed in EUR (default unit) or in a specified other currency or quantity
12	crop/forest damage	word	opt	damage expressed in EUR (default unit) or in a specified other currency or quantit

13	total damage	word	opt	damage expressed in EUR (default unit) or in a specified other currency or quantity
14	number of people injured	integer	opt	
15	number of people killed	integer	opt	
16	event description / types of damage / other remarks	paragr.	opt	

4.4.11 Group SNOW - heavy snowfall and/or snowstorm

Definition: Snow (or snow grains) and/or snowstorm in an amount that causes - or is capable of causing - important disruptions of daily life and/or considerable material or economical damage.

#	**field name**	**type**	**status**	**possible value(s)** *and description*
1	group identifier	word	req	**SNOW**
2	group length	integer	req	**24**
3	snowfall amount	float	opt	*in centimetres*
4	snow water equivalent	float	opt	the water equivalent of snow fall, *in millimeters*
5	duration of accumulation of the amount in field 3	float	opt	*in hours* *required if field 3 is provided*
6	snowfall amount in peak period	float	opt	the accumulation within a time period during which the snowfall rate was exceptionally high (peak period) may be reported here*, in centimetres*
7	snow water equivalent in peak period	float	opt	the snow water equivalent of snow accumulation within a time period during which the snowfall rate was exceptionally high (peak period) may be reported here*, in millimeters*
8	duration of peak period	float	opt	duration of peak period*,* *in hours* *required if field 5 is provided*
9	max. 6 hour accumulated snow	float	opt	*during the 0-6, 6-12, 12-18, or 18-00 UTC interval in which the time given falls. If the time given is exactly 00, 06, 12 or 18 UTC, the previous 6-hour period is meant, in centimeters*
10	max. 6 hour snow water equivalent	float	opt	*during the 0-6, 6-12, 12-18, or 18-00 UTC interval in which the time given falls. If the time given is exactly 00, 06, 12 or 18 UTC, the previous 6-hour period is meant, in millimeters*
11	max. 12 hour accumulated snow	float	opt	*during the 00-12, 12-00 UTC interval in which the time given falls. If the time given is exactly 00, or 12 UTC, the previous 12-hour period is meant, in centimeters*
12	max. 12 hour snow water equivalent	float	opt	*during the 00-12, 12-00 UTC interval in which the time given falls. If the time given is exactly 00, or 12 UTC, the previous 12-hour period is*

meant, in millimeters

13	max. 24 hour accumulated snow	float	opt	*during the 24 hour period in which the given time falls, in centimeters*
14	max. 24 hour snow water equivalent	float	opt	*during the 24 hour period in which the given time falls, in millimeters*
15	characteristics	word	opt	Applicable characteristics of the snowfall. *One or more of the following values should be given, separated by a comma:*

DRIFT	*drifting snow occurred (snow blowing below eye-height), but no blowing snow*
BLOW	*blowing snow occurred (snow blowing above eye-height)*
SNDRIFT	*a combination of falling and drifting snow, but no blowing snow*
SNBLOW	*a combination of falling and blowing snow*
WHITEOUT	*whiteout conditions occurred, i.e. a reduction of visibility reduces near zero and/or disappearance of horizon as well as reference points because of diffuse light conditions in cloudy snow cover environments or extreme blowing snow or extreme snowfall or dense fog in snow cover environments*

16	mean height of dunes or cornices	float	opt	mean height of fresh snow cornices or snow dunes in open areas *in centimetres*
17	max height of dunes or cornices	float	opt	maximum height of fresh snow cornices or snow dunes in open areas *in centimetres*
18	convective nature	word	opt	*Did the precipitation fall in connection with deep moist convection? One of the following values:*

CONV	*convective*
PARTLYCONV	*partly convective*
NONCONV	*nonconvective*
UNCERTAIN	*uncertain*

19	property damage	word	opt	damage expressed in EUR (default unit) or in a specified other currency or quantity
20	crop/forest damage	word	opt	damage expressed in EUR (default unit) or in a specified other currency or quantit
21	total damage	word	opt	damage expressed in EUR (default unit) or in a specified other currency or quantity
22	number of people injured	integer	opt	
23	number of people killed	integer	opt	
24	event description / types of damage / other remarks	paragr.	opt	

4.4.12 Group TORNADO - tornado, waterspout

Definition: A vortex, typically between a few metres to a few kilometres in diameter, extending between a convective cloud and the earth's surface, which may be visible by condensation of water vapour or by material (e.g. dust or water) being lifted off the earth's surface.

Remarks:

1. Use this group for events that have most likely been caused by tornadoes or by either tornadoes or gustnadoes. If a straight-line wind gust could have occurred instead, choose the WIND group. For events that clearly have not been tornadoes but gustnadoes, use the group GUSTNADO.
2. Provide an F- or T-scale rating only when a reasonably accurate estimate can be given.

#	**field name**	**type**	**status**	**possible value(s)** *and description*
1	group identifier	word	req	**TORNADO**
2	group length	integer	req	**23**
3	number of tornadoes	integer	opt	*if not given, 1 is implied*
4	F-scale	integer	opt	maximum intensity expressed on the Fujita scale
5	T-scale	integer	opt	maximum intensity expressed on the T-scale
6	rating basis	word	opt	*the basis of the rating should be indicated by one or more of the following keywords, separated by a comma:*
				DMGEYEWTN *an eye-witness report of the inflicted damage*
				DMGSVY *a damage survey by a severe weather expert*
				DMGPHOTO *photographs / video footage of the inflicted damage*
				DMGTEXT *a written account of the damage (e.g. in a newspaper)*
				WIND *a measured wind speed*
7	wind speed	float	opt	*the highest measured wind speed attributable to the tornado in m/s*
8	funnel sighted	word	req	*was the a funnel cloud of the tornado visually observed (not necessarily reaching the ground)?*

One of the following keywords:

FNLOBS	*funnel observed*
NOFNLOBS	*nofunnel observed*

9 suction vortices observed — word — opt

Have suction vortices been observed that were embedded in the larger tornadic parent circulation, indicating that this was a multi-vortex tornado?

One of the following keywords:

SVTCSOBS	*suction vortices observed*
NOSVTCSOBS	*nosuction vortices observed*

10 type of precipitation — word — opt

all types of precipitation that are known to have occurred within 5 minutes of the event time and within 3 kilometres distance of the event, i.e. one or more of the following values separated by a comma:

HRAIN	*heavy rain*
LRAIN	*light or moderate rain*
LGHAIL	*large hail (2.0 cm in diameter or larger)*
MEDHAIL	*hail (0.5 – 1.9 mm in diameter)*
GRAINS	*graupel, small hail or snow grains (<0.5 mm in diameter)*
HAILUNK	*hail (unknown diameter)*
HSNOW	*heavy snowfall*
LSNOW	*light or moderate snowfall*
DUST	*dust or sand raised by the wind, thereby limiting visibility*
DRY	*no precipitation, dust or sand*

11 size of accompanying hail — float — opt

in centimetres (the hail should have occurred within 5 minutes of the event time and within 3 kilometres distance of the event)

12 possibilities — word — opt

none, either or both of the following keywords:

POSSGUSTNADO	*It is possible that the wind damage is caused by a gustnado instead of a tornado,*

				but there is not enough evidence to confirm this. (please provide information in event description field 23)
				POSSDEVIL *It is possible that the wind damage is caused by a lesser whirlwind instead of a tornado, but there is not enough evidence to confirm this. (please provide information in event description field 23)*
13	total event duration	float	opt	*in minutes*
14	path length	float	opt	*in kilometres*
15	mean path width	float	opt	*in metres*
16	max. path width	float	opt	*in metres*
17	direction of movement	word	opt	direction indicated as follows (from-to): **N-S NNE-SSW**, **NE-SW**, *etc.*
18	property damage	word	opt	damage expressed in EUR (default unit) or in a specified other currency or quantity
19	crop/forest damage	word	opt	damage expressed in EUR (default unit) or in a specified other currency or quantity, such as m^3 of wood
20	total damage	word	opt	damage expressed in EUR (default unit) or in a specified other currency or quantity
21	number of people injured	integer	opt	
22	number of people killed	integer	opt	
23	event description / types of damage / other remarks	paragr.	opt	

4.4.13 Group WIND - severe wind gust

Definition: Measured wind speeds of 25 m/s or higher, or wind damage inflicted by winds that were likely stronger than 25 m/s.

Remark:

1. Provide an F- or T-scale rating only when a reasonably accurate estimate can be given.

#	**field name**	**type**	**status**	**possible value(s)** *and description*
1	group identifier	word	req	**WIND**
2	group length	integer	req	**22**
3	F-scale	integer	opt	maximum intensity expressed on the Fujita scale
4	T-scale	integer	opt	maximum intensity expressed on the T-scale
5	rating basis	word	opt	*the basis of the rating should be indicated by one or more of the following keywords, separated by a comma:*
				DMGEYEWTN *an eye-witness report of the inflicted damage*
				DMGSVY *a damage survey by a severe weather expert*
				DMGPHOTO *photographs / video footage of the inflicted damage*
				DMGTEXT *a written account of the damage (e.g. in a newspaper)*
				WIND *a measured wind speed*
6	wind speed	float	opt	*the highest measured wind gust attributable to the reported event in m/s*
7	10 min. average wind speed	float	opt	*the highest measured 10 minute-averaged wind speed*
8	local event duration	float	opt	*the duration of the event at a particular fixed location*
9	convective nature	word	opt	*Was the gust associated with deep moist convection? One of the following values:*
				CONV *convective*
				PARTLYCONV *partly convective*
				NONCONV *nonconvective*

				UNCERTAIN *uncertain*
10	type of precipitation	word	opt	*all types of precipitation that are known to have occurred within 5 minutes of the event time and within 3 kilometres distance of the event, i.e. one or more of the following values separated by a comma:* **HRAIN** *heavy rain* **LRAIN** *light or moderate rain* **LGHAIL** *large hail (2.0 cm in diameter or larger)* **MEDHAIL** *hail (0.5 – 1.9 mm in diameter)* **GRAINS** *graupel, small hail or snow grains (<0.5 mm in diameter)* **HAILUNK** *hail (unknown diameter)* **HSNOW** *heavy snowfall* **LSNOW** *light or moderate snowfall* **DUST** *dust or sand raised by the wind, thereby limiting visibility* **DRY** *no precipitation, dust or sand*
11	size of accompanying hail	float	opt	*in centimetres (the hail should have occurred within 5 minutes of the event time and within 3 kilometres distance of the event)*
12	possibilities	word	opt	*one or more of the following keywords, separated by a comma:* **POSSTORNADO** *It is possible that the wind damage is caused by a tornado, but there is not enough evidence to confirm this. (please provide information in event description field)* **POSSGUSTNADO** *It is possible that the wind damage is caused by a gustnado instead of a tornado, but there is not enough evidence to confirm this. (please provide information in event description field 23)* **POSSDEVIL** *It is possible that the wind*

				damage is caused by a lesser whirlwind instead of a tornado, but there is not enough evidence to confirm this. (please provide information in event description field 23)
13	path length	float	opt	*in kilometres (in case a damage path was observed)*
14	mean path width	float	opt	*in metres*
15	max. path width	float	opt	*in metres*
16	direction of movement	word	opt	direction indicated as follows (from-to): **N-S NNE-SSW**, **NE-SW***, etc.*
17	property damage	word	opt	damage expressed in EUR (default unit) or in a specified other currency or quantity
18	crop/forest damage	word	opt	damage expressed in EUR (default unit) or in a specified other currency or quantity, such as m^3 of wood
19	total damage	word	opt	damage expressed in EUR (default unit) or in a specified other currency or quantity
20	number of people injured	integer	opt	
21	number of people killed	integer	opt	
22	event description / types of damage / other remarks	paragr.	opt	

4.4.14 Group SIMPLEPATH - path of phenomenon (opt.)

To indicate paths of tornadoes or lesser whirwinds, this group simplepath can be used.

#	**field name**	**type**	**status**	**possible value(s)** *and description*
1	group identifier	word	req	**PATH**
2	group length	integer	req	**10**
3	start latitude	float	req	
4	start longitude	float	req	
5	start hour	2 numb.	opt	hh
6	start minutes	2 numb.	opt	mm
7	end latitude	float	req	
8	end longitude	float	req	
9	end hour	2 numb.	opt	hh
10	end minutes	2 numb.	opt	mm

5 The *csv* data format

5.1 *csv* structure

The structure of the *csv* data format is a hierarchy with one level less than the *conventional* format.

FILES *contain* ***RECORDS*** *that contain* ***FIELDS***

Any data file consists of a number of records. Each record contains information about one event (or various events occurring in close spatiotemporal proximity, *see Section 2.5*).

Records are separated by a newline character. A record consists of 90 fields separated by the character "|". A field contains one physical quantity or one type of information.

- Fields of a record are separated by the separation character comma (",") excluding the last element of the line.
- Fields may contain a comma, which in that case is enclosed in double quotation marks (",")
- An entry can not contain line break.
- Any white-spaces at the start of a line, just after a separating comma, just before a separating comma, or just before a newline character are ignored.
- An entry may contain a double quote. The double quote must be escaped by a double quote before it, i.e. ("") represents (").

The above rules ensure that the files comply with the *de facto* csv (comma separated value) standard, that can be imported into various data processing and spreadsheet programs.

5.2 *csv* field types

Fields can contain data in the following formats. It is important to comply with this to ensure that the decoding be carried out without errors.

type	description
varchar2(n)	*Variable length character string having maximum length n bytes.*
number	*Floating point number*
number(n)	*Number with precision n*
date	*Valid date range, represented as* **YYYY-MM-DD HH:mm:SS**

5.3 *csv* field status

Fields can be *optional (***opt***)* or *required (***req**) Some optional fields are *deprecated*.

Optional fields may be left empty without any consequence. The usage of *deprecated* optional fields is discouraged and for new events it is suggested that they be left empty.

Where *required* fields are left empty, essential information is missing and the report cannot be used for scientific analysis. Moreover, the violation of the data format specification may render software unable to parse the data.

5.3 *csv* fields

The table describes the entire conventional string representing one single report. In this table, the field names have sometimes been broken across two lines.

#	field name	type	status	possible value(s) *and description*
1	**ID**	number	req	the report's ID number in the ESWD database at ESSL. *Although this is a required field, when importing new data into the ESWD this field may be left empty, as the database will assign this number automatically.*
2	**QC_LEVEL**	varchar2(3)	req	**QC0/QC0+/QC1/QC2** *See Appendix B*
3	**INFO_SOURCE**	number	req	*the sum of all applicable options:*

1	NWSP	*a newspaper*
2	WWW	*a web site*
4	EMAIL	*a report received by e-mail*
8	TV	*a television or radio broadcast*
16	WXSVC	*a weather service*
32	SPTR	*a storm spotter*
64	LIT	*scientific literature*
128	OLIT	*other literature*
256	EYEWTN	*an eyewitness*
512	DMGEYEWTN	*an eyewitness of the damage*
1024	EVTPHOTO	*a photo or videoof the event*
2048	DMGPHOTO	*a photo or video of the damage*
4096	DMGSVY	*a damage survey by a severe weather expert*

4	**CONTACT**	varchar2(200)	req	name of the person who submitted the report
5	**E-MAIL**	varchar2(50)	req	e-mail address of this person

6	**ORGANISATION**	varchar2(255)	opt	name of this person's organization
7	**ORGANISATION_ID**	varchar2(255)	opt	identification code of the person making the report within his organization
8	**NO_REVISION**	number	req	an integer representing the number of revision of the entry, where 1 means the submission to the database
9	**PERSON_REVISION**	varchar2(255)	opt	last name and organization of person doing the last revision
10	**TIME_EVENT**	date	req	time (UTC) of the event, formatted as: YYYY-MM-DD HH:mm:SS
11	**TIME_CREATION**	date	req	time (UTC) the report was submitted to the database, formatted as: YYYY-MM-DD HH:mm:SS
12	**TIME_LAST_REVISION**	date	req	time (UTC) of the report's last revision, formatted as: YYYY-MM-DD HH:mm:SS
13	**TIME_ACCURACY**	varchar2(50)	opt	*one of the following keywords:*
14	**COUNTRY**	varchar2(2)	req	two-character country code according to Appendix A
15	**STATE**	varchar2(50)	opt	first sub-national administrative division such as province, department, land, autonomous region etc.

keyword	*the event has occurred...*
5M	*up to 2.5 minutes earlier or later...*
15M	*up to 7.5 minutes earlier or later...*
30M	*up to 15 minutes earlier or later...*
1H	*up to 30 minutesearlier or later...*
3H	*up to 1.5 hours earlier or later...*
6H	*up to 3 hours earlier or later...*
12H	*up to 6 hours earlier or later...*
1D	*up to 12 hours earlier or later...*
GT1D	*more than 12 hours earlier or later...*
	...than specified in fields 3-8.

16	**PLACE**	varchar2(255)	req	name of nearest town, settlement or observing station	
17	**PLACE_ LOCAL_ LANGUAGE**	varchar2(255)	opt	name of nearest town, settlement or observing station in local language, if different from field 16	
18	**DETAILED_ LOCATION**	varchar(4000)	opt	description	
19	**NEAREST_ CITY**	varchar(255)	opt/dep	location in words expressed with respect to the nearest larger city	
20	**LATITUDE**	number	req	decimal degrees north latitude (south is negative), e.g. 50.5000 is 50º30'00" N	
21	**LONGITUDE**	number	req	decimal degrees east longitude (west is negative), e.g. -12.5000 is 12º30'00" W	
22	**PLACE_ ACCURACY**	varchar2(50)	opt	*one of the following keywords:*	
				keyword	*the event has occurred...*
				1KM	*within 1km of the reported location...*
				3KM	*within 3 km of the reported location.....*
				10KM	*within 10 km of the reported location...*
				20KM	*within 30 km of the reported location...*
				100KM	*up to 100 km of the reported location...*
				GT100 KM	*possibly more than 100 km away from the reported location...*
23	**OROGRAPHY**	number	opt/dep	*the sum of all applicable options:*	
				1	*flat, definition: local terrain height variation <= 50 m <= 50 m*
				2	*hilly, definition: local terrain height variation > 50 m and <= 500 m*
				4	*mountainous, definition:local terrain height variation > 500 m*
24	**SURFACE_ INITIAL_ LOCATION**	varchar(255)	opt (dep)	*one of the following keywords:*	
				LAND	*land surface <= 50 m*

				WATER *a water surface*
				This field and the following make it possible to distinguish tornadoes over land from waterspouts.
				the following keywords are deprecated:
				RURAL *rural (crops, grassland, both or unknown)*
				CROPS *rural, crops.*
				GRASS *rural, grassland (pastures)*
				SAND *sand,semi-)desert, beach, soil covered with very little vegetation)*
				WILD *wilderness (steppe, dunes, soil covered with some vegetation)*
				SWAMP *swamp*
				ROCKS *rocks*
				URBAN *urban, built-up zone*
				FOREST *forest*
				ICE *ice (glacier or ice-covered water)*
				RIVER *river, canal*
				SEA *sea, ocean*
				LAKE *lake*
25	**SURFACE_CROSSED**	number	opt (dep)	*the sum of all applicable options:*
				1 LAND *land surface*
				2 WATER *a water surface*
				the following options are deprecated:
				4 RURAL *rural (crops, grassland, both or unknown)*
				8 CROPS *rural, crops.*
				16 GRASS *rural, grassland (pastures)*
				32 SAND *sand,semi-)desert, beach, soil covered with very little vegetation)*
				64 WILD *wilderness (steppe, dunes, soil covered with some vegetation)*

				128 SWAMP *swamp* **256** ROCKS *rocks* **512** URBAN *urban, built-up zone* **1024** FORES T *forest* **2048** ICE *ice (glacier or ice-covered water)* **4096** RIVER *river, canal* **8192** SEA *sea, ocean* **16384** LAKE *lake*
26	**TYPE_EVENT**	varchar2(255)	req	*any of the following keywords:* **AVALANCHE** avalanche **DEVIL** *lesser whirlwind* **FUNNEL** *funnel cloud* **GUSTNADO** *gust front vortex (gustnado)* **HAIL** *severe hailfall* **ICE** *icing hazards* **LIGHTNING** *damaging lightning* **PRECIP** *heavy rainfall* **SNOW** *heavy snowfall* **TORNADO** *tornado or waterspout* **WIND** *severe wind gust*
27	**NO_OBJECTS**	number	opt	*the number of events occurring within the vicinity constraints specified in section 2.5. When left empty, 1 is implied. CAn only be set for countable events.*
28	**MAX_HAIL_ DIAMETER**	number	opt	*in centimetres* *for event type HAIL only.*
29	**MAX_ HAILSTONE_ WEIGHT**	number	opt	*in grams* *for event type HAIL only.*
30	**AVERAGE_ HAIL_DIAMETER**	number	opt	*in centimetres*

for event type HAIL only.

31 **THICKNESS_HAIL_LAYER** number opt *in centimetres*
for event type HAIL only.

32 **HAILSTONE** number opt *the sum of all applicable options:*

1	AGGR	*aggregates formed while in air*
2	CLEAR	*hailstones of clear ice*
4	CONE	*photographs / video footage of the inflicted damage*
8	OBLATE	*hailstones with oblate shape ("squeezed ball")*
16	POROUS	*porous (white ice) hailstones*
32	RINGS	*hailstones contain rings of white and clear ice*
64	SPIKES	*spiky stones*

for event type HAIL only.

33 **F_SCALE** number opt *maximum intensity of the event on the Fujita-scale.*
for DEVIL, GUSTNADO, TORNADO, WIND only.

34 **T_SCALE** number opt *maximum intensity of the event on the T-scale*
for DEVIL, GUSTNADO, TORNADO, WIND only.

35 **RATING_BASIS** number opt All types of information used for establishing the F- or T-scale rating.
The sum of all applicable options:

1	DMGEYEWTN	*an eye-witness report of the inflicted damage*
2	DMGSVY	*a damage survey by a severe weather expert*
4	DMGPHOTO	*photographs / video footage of the inflicted damage*
8	DMGTEXT	*a written account of the damage (e.g. in a newspaper)*
1	WIND	*a measured wind speed*

				6 *for DEVIL, GUSTNADO, TORNADO, WIND only.*
36	**WIND_SPEED**	number	opt	the highest measured wind speed attributable to the reported event in m/s *for DEVIL, GUSTNADO, TORNADO, WIND only.*
37	**TEN_MIN_ WIND_SPEED**	number	opt	the highest measured 10 minute-averaged wind speed during the wind or snowstorm event. *for WIND, SNOW only.*
38	**FUNNEL_ SIGHTED**	varchar2(255)	opt	*one of the following keywords:* **FNLOBS** *funnel observed* **NOFNLOBS** *nofunnel observed* *for TORNADO only.*
39	**SUCTION_ VORTICES**	varchar2(255)	opt	*one of the following keywords:* **SVTCSOBS** *funnel observed* **NOSVTCSOBS** *nofunnel observed* *for TORNADO only.*
40	**PRECIPITATION_ AMOUNT**	number	opt	precipitation amount or snow water equivalent *in mm for PRECIP, ICE, SNOW only.*
41	**SNOW_FALL_AMOUNT**	number	opt	snow fall amount *in cm for event type SNOW only*
42	**PEAK_ PRECIPITATION_ AMOUNT**	number	opt	precipitation amount or snow water equivalent in peak period *in mm for event type PRECIP,SNOW only.*
43	**PEAK_SNOW_FALL_ AMOUNT**	number	opt	snow fall amount in peak period *in cm for event type SNOW only.*
44	**PEAK_ PRECIPITATION_ PERIOD**	number	opt	length of precipitation/snow fall peak period *in hours* *for PRECIP, SNOW only.*
45	**MAX_6_HOUR_ PRECIP**	number	opt	*during the 0-6, 6-12, 12-18, or 18-00 UTC interval in which the time given falls. If the time given is exactly 00, 06, 12 or 18 UTC, the previous 6-hour period is meant.*

				precipitation amount or snow water equivalent in mm. *for PRECIP, SNOW only.*
46	**MAX_6_HOUR_ SNOW_FALL**	number	opt	*during the 0-6, 6-12, 12-18, or 18-00 UTC interval in which the time given falls. If the time given is exactly 00, 06, 12 or 18 UTC, the previous 6-hour period is meant.* snow fall amount *in cm.* *for event type SNOW only.*
47	**MAX_12_HOUR_ PRECIP**	number	opt	*during the 00-12, 12-00 UTC interval in which the time given falls. If the time given is exactly 00, or 12 UTC, the previous 12-hour period is meant .* *precipitation amount or snow water equivalent in mm.* *for PRECIP, SNOW only.*
48	**MAX_12_HOUR_ SNOW_FALL**	number	opt	*during the 00-12, 12-00 UTC interval in which the time given falls. If the time given is exactly 00, or 12 UTC, the previous 12-hour period is meant .* snow fall amount *in cm.* *for event type SNOW only.*
49	**MAX_24_HOUR_ PRECIP**	number	opt	*during the 24 hour period in which the given time fall.* *precipitation amount or snow water equivalent in mm.* *for PRECIP, SNOW only.*
50	**MAX_24_HOUR_ SNOW_FALL**	number	opt	*during the 24 hour period in which the given time fall.* snow fall amount *in cm.* *for event type SNOW only.*
51	**CONVECTIVE**	varchar(255)	opt	*Did the precipitation fall in connection with deep moist convection? One of the following keywords:* **CONV** *convective* **PARTLYCONV** *partly convective* **NONCONV** *nonconvective* **UNCERTAIN** *uncertain*

for PRECIP, ICE, SNOW, WIND only.

52 **TOTAL_DURATION** number opt

total event duration

for event type PRECIP, SNOW, ICE in hours, representing the duration of accumulation of the amount mentioned in field 39.

for DEVIL, FUNNEL, GUSTNADO, TORNADO in minutes.

53 **TYPE_PRECIP** number opt

A accompanying weather phenomena known to have occurred within 5 minutes of the event time and within 3 kilometres distance of the event location.

The sum of all applicable options below. As a confirmation that none of those events occurred, the number 256 should be selected:

1	HRAIN	*heavy rain*
2	LRAIN	*light or moderate rain*
4	LGHAIL	*large hail (2.0 cm in diameter or larger)*
8	MEDHAIL	*hail (0.5 – 1.9 mm in diameter)*
16	GRAINS	*graupel, small hail or snow grains (<0.5 mm in diameter)*
32	HAILUNK	*hail (unknown diameter)*
64	HSNOW	*heavy snowfall*
128	LSNOW	*light or moderate snowfall*
256	DUST	*dust or sand raised by the wind, thereby limiting visibility*
512	DRY	*no precipitation, dust or sand*

for GUSTNADO, TORNADO, WIND only

54 **SIZE_ACCOMPANYING_** number opt

hail diameter in cm

	HAIL			*in case LGHAIL, MEDHAIL or GRAINS were reported in field 47. Otherwise this field should be left empty. In case LGHAIL was selected, the hail should be reported in an additional event report.*
				for GUSTNADO, TORNADO, WIND only
55	**POSSIBILITIES**	number	opt	*Indication of doubts regarding the nature of the event causing wind damage.*

The sum of all applicable options:

1	POSSGUSTNADO	*It is possible that the wind damage is caused by a gustnado instead of a tornado, but there is not enough evidence to confirm this.*
2	POSSDEVIL	*It is possible that the wind damage is caused by a lesser whirlwind instead of a tornado, but there is not enough evidence to confirm this.*
4	POSSTORNADO	*It is possible that the wind damage is caused by a tornado, but there is not enough evidence to confirm this. (please provide information in event description field)*

for WIND and for TORNADO only, with values >= 4 invalid in the case of TORNADO.

56	**PATH_LENGTH**	number	opt	path length *in km* *for AVALANCHE, DEVIL, GUSTNADO, TORNADO and WIND only.*
57	**MEAN_PATH_ WIDTH**	number	opt	mean path width *in m* *for AVALANCHE, DEVIL, GUSTNADO, TORNADO and WIND only.*
58	**MAX_PATH_ WIDTH**	number	opt	maximum path width *in m* *for AVALANCHE, DEVIL, GUSTNADO, TORNADO and WIND only.*

59	**MAX_ VERTICAL_ DEVELOP**	number	opt	*in percentage of the distance cloud-ground. (e.g. 25% is one quarter of the distance from the cloud to the ground)* *for FUNNEL only.*
60	**DIRECTION_ MOVEMENT**	varchar(255)	opt	*direction of movement or wind direction (for type WIND only) indicated as follows (from-to): N-S NNE-SSW, NE-SW, etc.* *for AVALANCHE, DEVIL, GUSTNADO, TORNADO, WIND*
61	**SNOW_HAZARDS**	number	opt	Snowfall characteristics *The sum of all applicable options:*

1	DRIFT	*drifting snow occurred (snow blowing below eye-height), but no blowing snow*
2	BLOW	*blowing snow occurred (snow blowing above eye-height)*
4	SNDRIFT	*a combination of falling and drifting snow, but no blowing snow*
8	SNBLOW	*a combination of falling and blowing snow*
16	WHITEOUT	*whiteout conditions occurred, i.e. a reduction of visibility reduces near zero and/or disappearance of horizon as well as reference points because of diffuse light conditions in cloudy snow cover environments or extreme blowing snow or extreme snowfall or dense fog in snow cover environments*

62	**MEAN_HEIGHT_ SNOW_CORNICES**	number	opt	mean height of fresh snow cornices or snow dunes in open areas *in centimetres* *for SNOW only.*
63	**MAX_HEIGHT_ SNOW_CORNICES**	number	opt	maximum height of fresh snow cornices or snow dunes in open areas *in centimetres* *for SNOW only*

64	**ICE_HAZARDS**	number	opt	*the sum of all applicable options:*

1	GLAZE	*a coating of ice, generally clear and smooth, formed by the freezing of a film of supercooled water. Also known as clear ice or black ice.*
2	FROST	*fuzzy layer of ice crystals on a cold object, forming by direct deposition of water vapor to solid ice*
4	RIME	*a white or milky and opaque granular deposit of ice formed by the rapid freezing of supercooled water drops as they impinge upon an exposed object*

for ICE only

65	**THICKNESS_ ICE_COVER**	number	opt	*in millimetres* *for ICE only*
66	**THICKNESS_ RIME_COVER**	number	opt	*in millimetres* *for ICE only*
67	**AVALANCHE_ TYPE**	varchar(255)	opt	*either of these keywords:*

SLAB	*a slab avalanche:* *the simultaneous release of a cohesive snow layer (slab) characterized by a distinct fracture line (or crown fracture) at the top of the avalanche.*
LOOSE	*a loose snow avalanche:* *an avalanche of dry or wet snow with no or low cohesion starting from a point fanning out downhill and leaving an inverted V-shaped scar.*

for AVALANCHE only

68	**AVALANCHE_ FLOW_TYPE**	varchar(255)	opt	*either of these keywords:*

DENSE	*a dense flow avalanche:* *an avalanche with a primarily flowing, sliding, slipping motion.*
POWDER	*a powder cloud avalanche:* *an avalanche in which a large fraction of the snow is suspended*

by turbulence

for AVALANCHE only

69 **SNOW_MASS_TYPE** varchar(255) opt *either of these keywords:*

DRYSNOW	*a wet snow avalanche: an avalanche of wet snow; typically a slower avalanche of higher density*
WETSNOW	*a dry snow avalanche: an avalanche of dry snow; typically faster but of lower density than a wet snow avalanche*

for AVALANCHE only

70 **AVALANCHE_SIZE** number opt avalanche size expressed on the scale of the European Avalanche Warning Services (www.avalanches.org)

	description	*path length*	*volume*
2	*small avalanche*	*50 - 100 m*	*10^2 - 10^3 m^3*
3	*medium avalanche*	*100 m - 1 km*	*10^3 - 10^4 m^3*
4	*large avalanche*	*1 - 2 km*	*10^4 – 10^5 m^3*
5	*very large avalanche*	*~ 3 km*	*> 10^5 m^3*

for AVALANCHE only

71 **AVALANCHE_TRIGGER** varchar(255) opt *either of these keywords:*

NATURAL	*release of an avalanche without being triggered by a person, explosives, etc.*
ARTIFICIAL	*release of an avalanche by an external force (e.g. explosives, snow machines or machinery, people, wildlife).*

for AVALANCHE only

72 **ELEVATION_START** number opt *in metres*

for AVALANCHE only

73 **ELEVATION_ DIFFERENCE** — number — opt

height difference between starting point and ending point of the avalanche *in metres*

for AVALANCHE only

74 **LIGHTNING_ DAMAGE_TO** — number(6) — opt

All objects directly struck by the lightning strike. *One or more of the following keywords, separated by a comma:*

1	AIRCRAFT	*e.g. an aeroplane or helicopter*
2	ANIMAL	*cattle or other large animals*
4	BUILDING	*built-up structures*
8	OVERHEAD	*overhead lines of transport infrastructure (catenary)*
16	PERSON	*persons or groups of persons*
32	POWERLINE	*powerline*
64	SHIP	*any vessels in water*
128	VEGITATION	*vegitation (i.e. causing wildfires)*
256	VEHICLE	*any vehicles on land, such as cars, lorries, etc.*

for LIGHTNING only

75 **PEAK_ CURRENT** — number — opt

in kA (kiloampere)

for LIGHTNING only

76 **POLARITY** — varchar(255) — opt

polarity of the lightning strike as determined by a lightning detection network

either of these keywords:

POS	*a discharge between a cloud and the ground that lowers positive charge to the ground*
NEG	*a discharge between a cloud and the ground that lowers negative charge to the ground*

for LIGHTNING only

77 **EXCEPT_ ELEC_ PHENOM** — varchar(255) — opt

One or more of the following keywords:

BALL	*ball lightning*
OELP	*other expectionallightning*

				phenomenon, explained in field 12
78	**PROPERTY_ DAMAGE**	varchar(255)	opt	*damage expressed in EUR (default unit) or in a specified other currency or quantity*
79	**CROP_ FOREST_ DAMAGE**	varchar(255)	opt	*damage expressed in EUR (default unit) or in a specified other currency or quantity*
80	**TOTAL_ DAMAGE**	varchar(255)	opt	*damage expressed in EUR (default unit) or in a specified other currency or quantity*
81	**NO_INJURED**	number(10)	opt	
82	**NO_KILLED**	number(10)	opt	
83	**EVENT_ DESCRIPTION**	varchar(4000)	opt	
84	**PATH_START_ LATITUDE**	number	opt	*for AVALANCHE, DEVIL, GUSTNADO, TORNADO, WIND*
85	**PATH_START_ LONGITUDE**	number	opt	*for AVALANCHE, DEVIL, GUSTNADO, TORNADO, WIND*
86	**PATH_START_ DATETIME**	time	opt	*for AVALANCHE, DEVIL, GUSTNADO, TORNADO, WIND*
87	**PATH_END_ LATITUDE**	number	opt	*for AVALANCHE, DEVIL, GUSTNADO, TORNADO, WIND*
88	**PATH_END_ LONGITUDE**	number	opt	*for AVALANCHE, DEVIL, GUSTNADO, TORNADO, WIND*
89	**PATH_END_ DATETIME**	time	opt	*for AVALANCHE, DEVIL, GUSTNADO, TORNADO, WIND*
90	**EXT_URL**	varchar(4000)	opt	*URL(s) of internet resources that complement the report, separated by a space. Only URL(s) of ESSL and selected partners are allowed*
91	**CREATOR_ID**	varchar(50)	opt	identifier of the creator of the report
92	**REVISOR_ID**	varchar(50)	opt	identifier of the revisor of the report
93	**LINK_ORG**	varchar(20)	opt	identifier of the linked (national) database
94	**LINK_ID**	varchar(20)	opt	field nummer of the associated report in a linked database
95	**DELETED**	varchar(1)	req	Character indicating whether the report isb deleted.

either of these options:

Y	*yes*
N	*no*

All retrieved data from the ESWD server not for synchronization purposes should have an "N" here.

Appendix A: Two-character country codes

The two-character codes of countries in WMO Region VI are given in this list. The list is similar to the ISO 3166-1 standard, but does not follow it completely with respect to smaller dependent territories.

AD	Andorra	GE	Georgia	ME	Montenegro
AL	Albania	GL	Greenland	MK	Macedonia[ii]
AR	Armenia	GR	Greece	MT	Malta
AT	Austria	HR	Croatia	NL	Netherlands
AZ	Azerbaijan	HU	Hungary	NO	Norway
BA	Bosnia and Herzegovina	IE	Ireland	PL	Poland
BE	Belgium	IL	Israel	PT	Portugal
BG	Bulgaria	IS	Iceland	RO	Romania
BY	Belarus	IT	Italy	RS	Serbia and/incl. Kosovo
CH	Switzerland	JO	Jordan	RU	Russian Federation
CY	Cyprus	KZ	Kazakhstan	SE	Sweden
CZ	Czech Republic	LB	Lebanon	SI	Slovenia
DE	Germany	LI	Liechtenstein	SK	Slovakia
DK	Denmark	LT	Lithuania	SY	Syria
DZ	Algeria	LU	Luxembourg	TN	Tunisia
EE	Estonia	LV	Latvia	TR	Turkey
EG	Egypt	LY	Lybia	UA	Ukraine
ES	Spain[i]	MA	Morocco	UK	United Kingdom[iii]
FI	Finland	MC	Monaco	VA	Holy See
FR	France	MD	Moldova		

i) including its North African dependencies

ii) the Former Yugoslav Republic of Macedonia

iii) including its European dependencies

Appendix B: Quality control levels

The meaning of the three quality-control (QC) levels in the ESWD and the underlying regulations for their assignment are summarized within the following table.

Quality level	Designation	Description	QC performed by
QC0	as received	The report is new and pending quality control	–
QC0+	plausibility checked	The report is plausible, given the overall meteorological situation in, or data from the affected region and timeframe	VON, NHMS or ESSL
QC1	confirmed by reliable source	Only some aspects of the report are still under discussion	VON, NHMS or ESSL
QC2	fully verified	All information available about this event is verified, consistent and comes from reliable sources.	NHMS or ESSL

VON stands for Voluntary Observing Network, NHMS is National HydroMeteorogical Service.

ESWD quality-control levels denote the reliability of the contained information, and do not refer to the mere quantity of information (number of filled database fields). The significant step in report quality takes place from QC0+ to QC1. Both QC1 and QC2 reports are confirmed and suitable for quantitative analysis. However, for some analyses, even the QC0+ reports will still be adequate.