

ESWD - A STANDARDIZED, FLEXIBLE DATA FORMAT FOR SEVERE WEATHER REPORTS

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ABSTRACT

To improve accessibility of severe weather data for forecast evaluation and climatological analysis throughout Europe, a prerequisite is the international agreement upon a standardized and flexible format for these data. We present such a format, initially designed to store reports of severe weather associated with deep moist convection, but allowing to be augmented in future by other types of severe weather like floods or snowstorms, avalanches, freezing rain, or weather-related aviation incidents. The data format is designed to be read easily by both computers and the human eye and was tested during the 2004 warm season. It will be proposed for wider acceptance at the ECSS 2004 Conference.

1. INTRODUCTION

Scientists and operational weather forecasters have an interest to know what severe weather has occurred or is occurring in their region of interest, which may extend beyond national boundaries. In Europe, despite some initiatives by individuals and organizations including some of the National Weather Services, collecting and storing data is not yet done uniformly and consistently. If at all, the data are collected on a national level and in a variety of formats. To overcome this situation, the ESWD data format has been designed to gain widespread acceptance in Europe.

The new data format is designed for the documentation of severe weather observations. The initial version primarily deals with severe events associated with deep, moist convection, but can flexibly be expanded to encompass other types of severe weather later on. The ESWD data format committee will take care that changes or additions to the data format will come to effect in an agreed form to ensure sustained standardization of the participating databases in Europe.

The ESWD format is generally *observation-based*: It is designed to handle observations rather than *events*. For example, when multiple reports of a hailstorm are received, they should be recorded individually rather than merging them into one record. In this way, the amount of subjectivity that can be added by the managers of the database is minimized. The underlying concept is that data interpretation is left to the researchers using them. The general rule therefore is "*Each observation gets its own record in the database*". Exceptions are made in case of *TORNADOES*, *GUSTNADOES*, *FUNNELS*, and *LESSER WHIRLWINDS*. These phenomena are better described per event than per observation.

2. INITIAL ESWD DATA FORMAT STRUCTURE

Basic severe weather types in the initial standardized ESWD data format version comprise the following phenomena (event groups, in alphabetical order):

FUNNEL - funnel cloud

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

GUSTNADO - gust front vortex

A vortex, occurring along the gust front of a convective storm that is 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 cumuliform cloud.

HAIL - large hailstones

Hailstones observed having a maximum diameter of 2.0 cm or more, or smaller hail that forms a layer of at least 2.0 cm on flat ground. The hailstones should not have been accumulated because of transport by water, wind or by any other means.

PRECIP - heavy precipitation

Damage caused by excessive precipitation is observed, or no damage is observed but one of the following limits of precipitation accumulation is exceeded: 30 mm in 1 h, 60 mm in 6 h, 90 mm in 12 h, 150 mm in 24 h.

TORNADO - tornado, waterspout

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

WIND - severe straight-line winds

Measured wind speeds of 25 m/s or higher, or wind damage likely due to winds stronger than 25 m/s.

LESSER WHIRLWIND - land or water devil

A vortex, resulting from temperature differences between the surface and the air above, 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.

The structure of the data format can be summarised by the following hierarchy: FILES contain RECORDS that contain GROUPS that contain FIELDS:

- A database file consists of a number of records. Each record contains information about one event or various events of the same type that occurred simultaneously at the approximately same place. Records are separated by a # and two new lines.
- 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 (see above), and possibly a PATH group.
- A group consists of a number of fields. Every first field of a group is the group identifier. Fields are separated by the character | (ASCII character 124). A field contains one physical quantity or one type of information. Fields can be *required* or *optional*.

3. OUTLOOK

At the ECSS 2004 Conference, the ESWD data format committee will form and decide upon the first standard form of the ESWD format. The participation of additional European countries (e. g. National Weather Services) is encouraged to foster growth and acceptance of the ESWD data format, based on a formal data protocol signed by the participating groups and organizations.

The ESSL web page will provide the data format and related information: <http://essl.org/projects/ESWD/>.