

TRUSTED SPOTTER NETWORK AUSTRIA – NEW DEVELOPMENTS AND APPLICATIONS AT ESWD

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BASICS

The TRUSTED SPOTTER NETWORK AUSTRIA (TSN)² constitutes the collaboration between the Austrian meteorological service ZAMG¹, the spotter organization SKYWARN AUSTRIA³, the European Severe Storms Laboratory / European Severe Weather Database ESSL / ESWD⁴ and METEOPICS⁵.

- *) A “trusted spotter” provides reports about significant or severe weather and consecutive damages
- *) Resulting in a significant improvement of information - reliability for operational forecasters at ZAMG
- *) ZAMG offers training, annual workshops, online weather information and scientific support for TSN
- *) A web based, real time platform allows displaying ESWD reports for the operational forecaster at ZAMG
- *) Real time evaluation and verification during severe weather periods allow adjustments to warnings for the public
- *) Joint case studies can be swiftly released to the public

METHOD

Within the framework of a short term ZAMG project during the year 2012 the frequency of reports in ESWD according to heavy or extreme precipitation was investigated in relation to measurements from the ZAMG climate station network in Austria.

A selected set of ZAMG Climate stations in Austria fulfilling the following criteria have been used for the investigation (FIG. 1):

- *) Data availability for at least 15 years
- *) A 70% consistency between the sum of the hourly precipitation data and the daily total precipitation value of a station
- *) Minimization criteria for heavy precipitation: > 40mm / 6hrs
- *) This precipitation amount equals a local average 5 year return period in Austria
- *) A dry interval of at least 6 hours is chosen to distinguish two separate precipitation events

The criteria for a report of heavy precipitation in ESWD are defined as following:

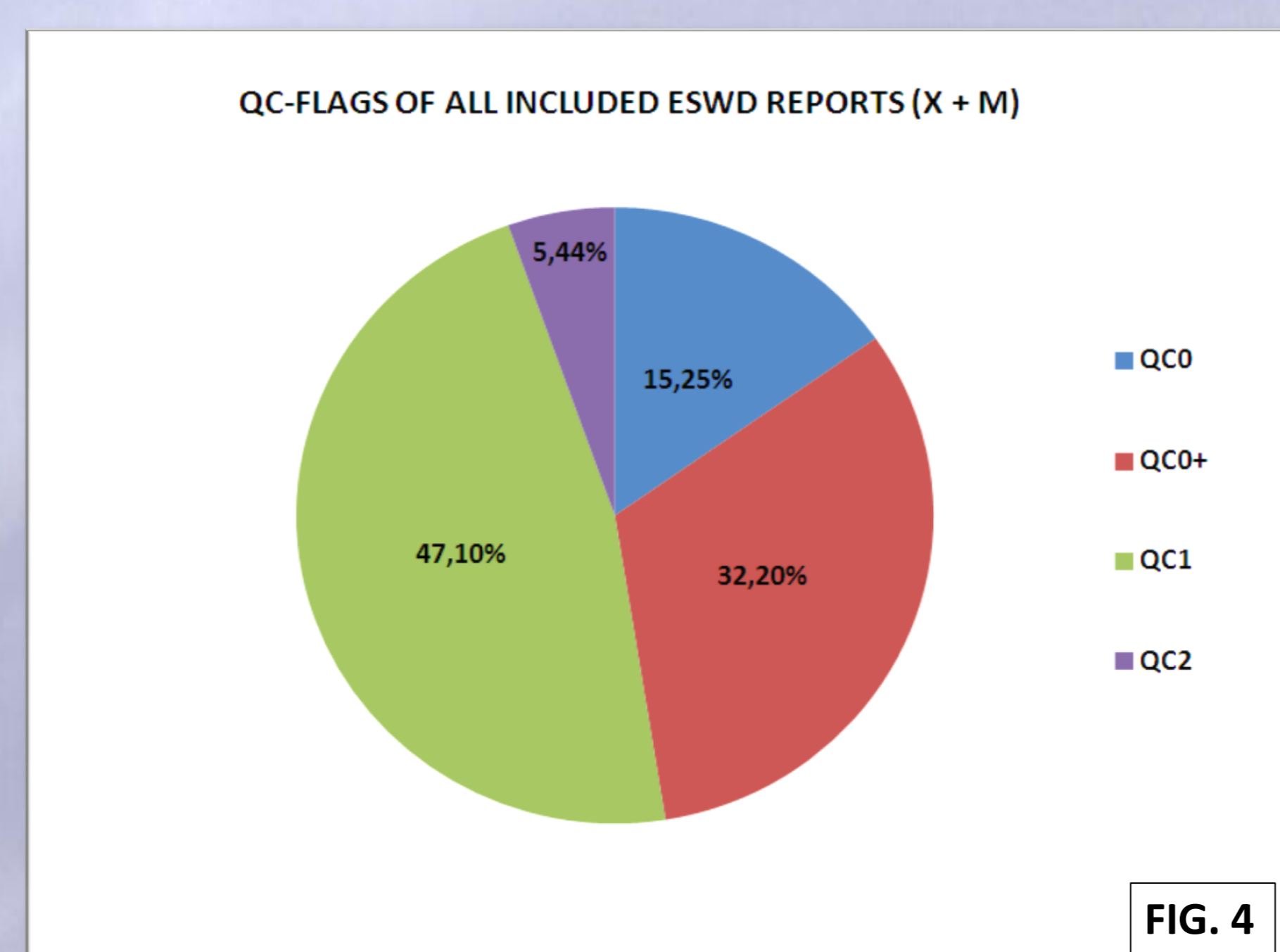
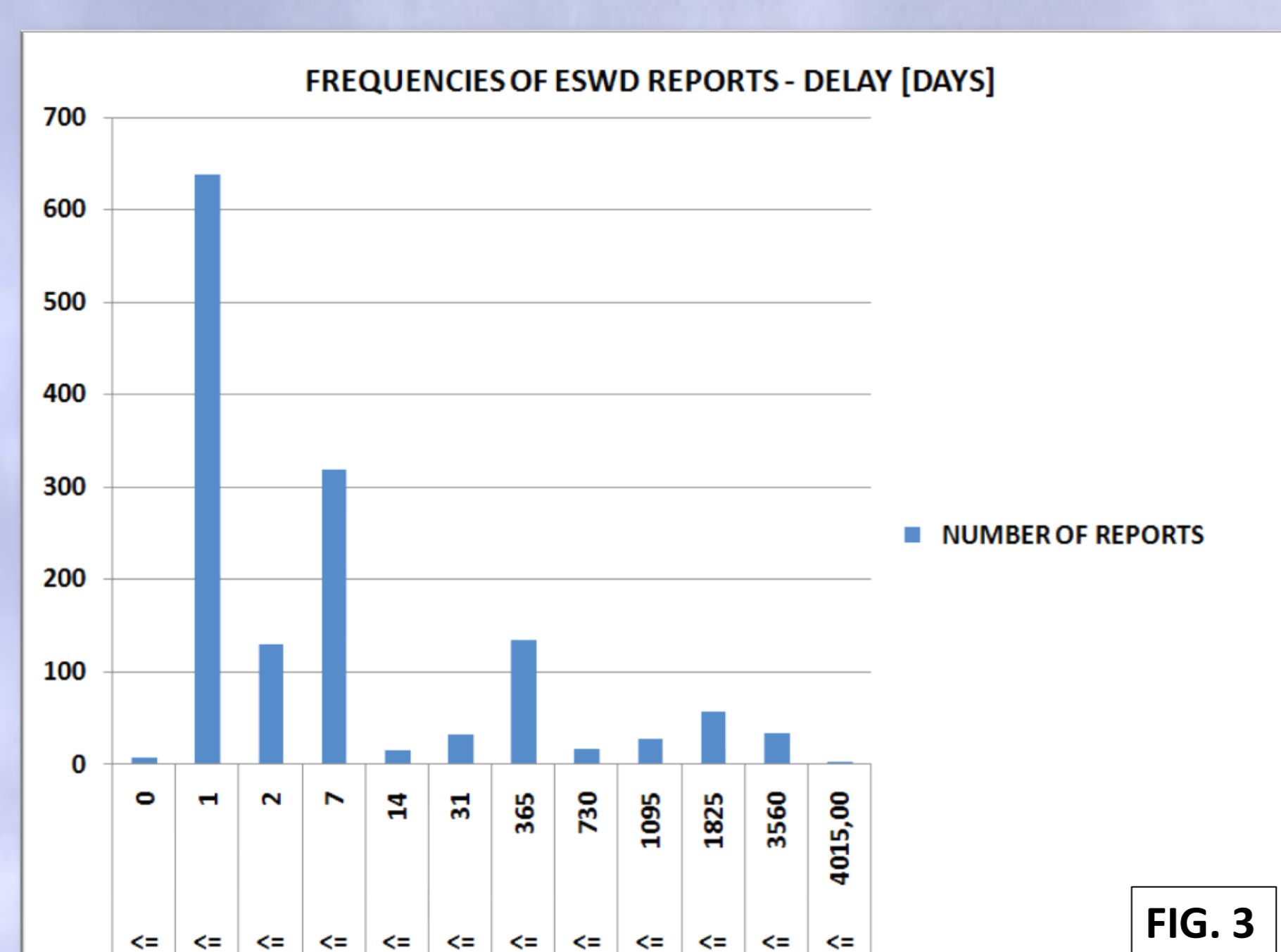
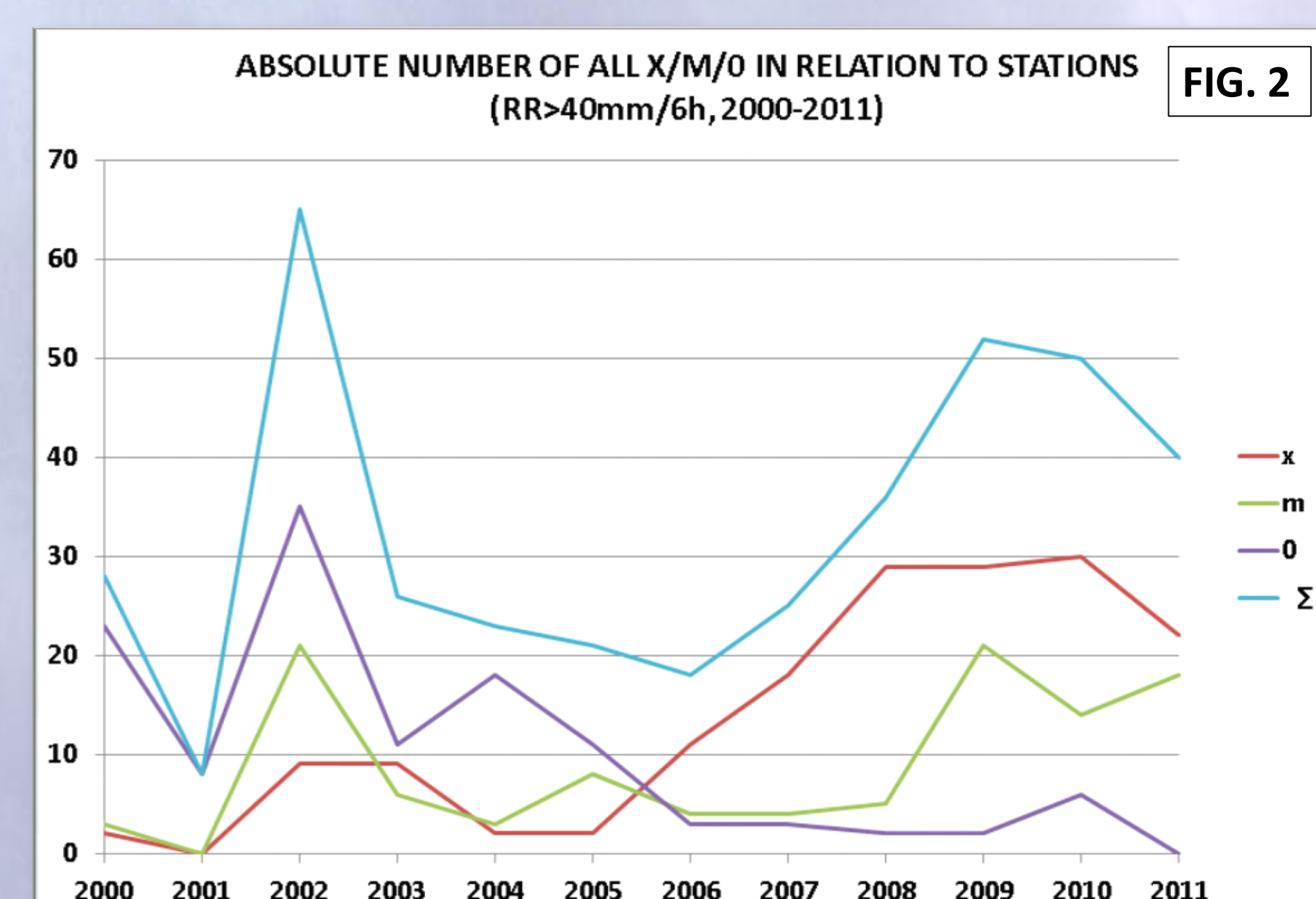
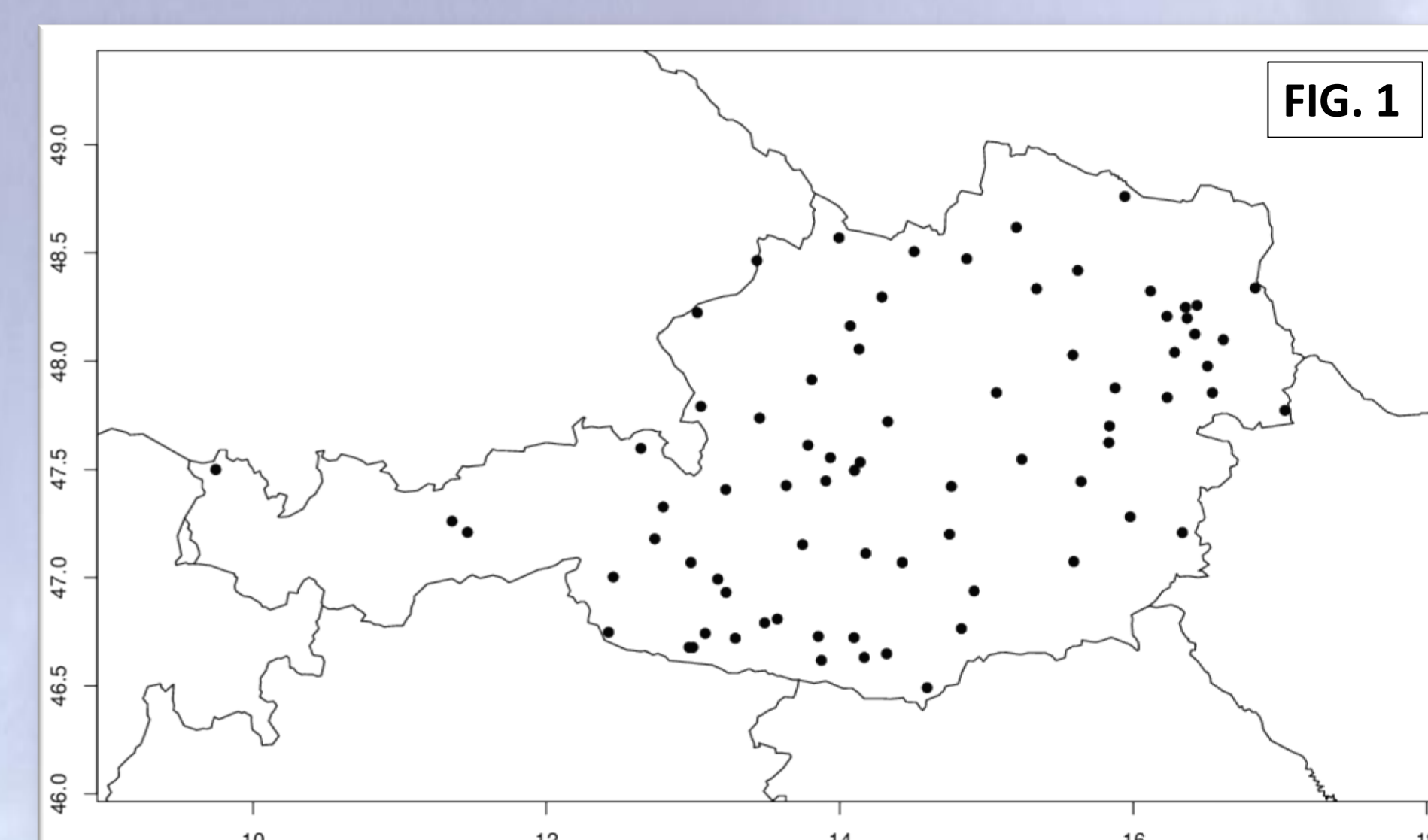
- *) Flooding of at least multiple streets, roads, properties; significant economical damage (i.e. long time road closure)
- *) Spacious damage from resulting flashfloods and mud slides

Precipitation events fulfilling the above defined criteria were divided into 3 different classes to correlate locations of ESWD reports and respective ZAMG stations within a common time period for observation and measurement:

- *) X – Type: ESWD report and precipitation measurement within 30km distance (mesoscale events, e.g. convective precipitation)
- *) M – Type: ESWD report and precipitation measurement within 300km distance. (synoptic scale events, e.g. Adriatic low)
- *) O – Type: No criterion fulfilled

FIG. 2: Annual absolute numbers in relation to station data and ESWD reports (X, M and O Type) between 2000 and 2011:

- *) 1416 ESWD reports were connected to 392 station measurements
- *) The first peak is related to the severe flooding event in central Europe during August 2002
- *) Increasing hit rate due to the growing number of ESWD reports (between 2006 and 2010)



RESULTS

FIG. 3: Time lag between precipitation measurement and ESWD-entry:

- *) 1416 analyzed precipitation events, 2000-2011
- *) Marginal number of reports during field observations of an extreme event
- *) Most entries between 1 to 7 days after the event, fewer after a year
- *) Only a small amount of reports from historical studies (most from ESWD)

FIG. 4: ESWD Quality Clearance - Flags of all hits between 2000 and 2010:

- *) QC0: as received (reports from the public)
- *) QC0+: plausibility check passed (spotter organizations)
- *) QC1: report confirmed individually (TSN, ESWD quality control)
- *) QC2: event fully verified (national weather services, ESWD)

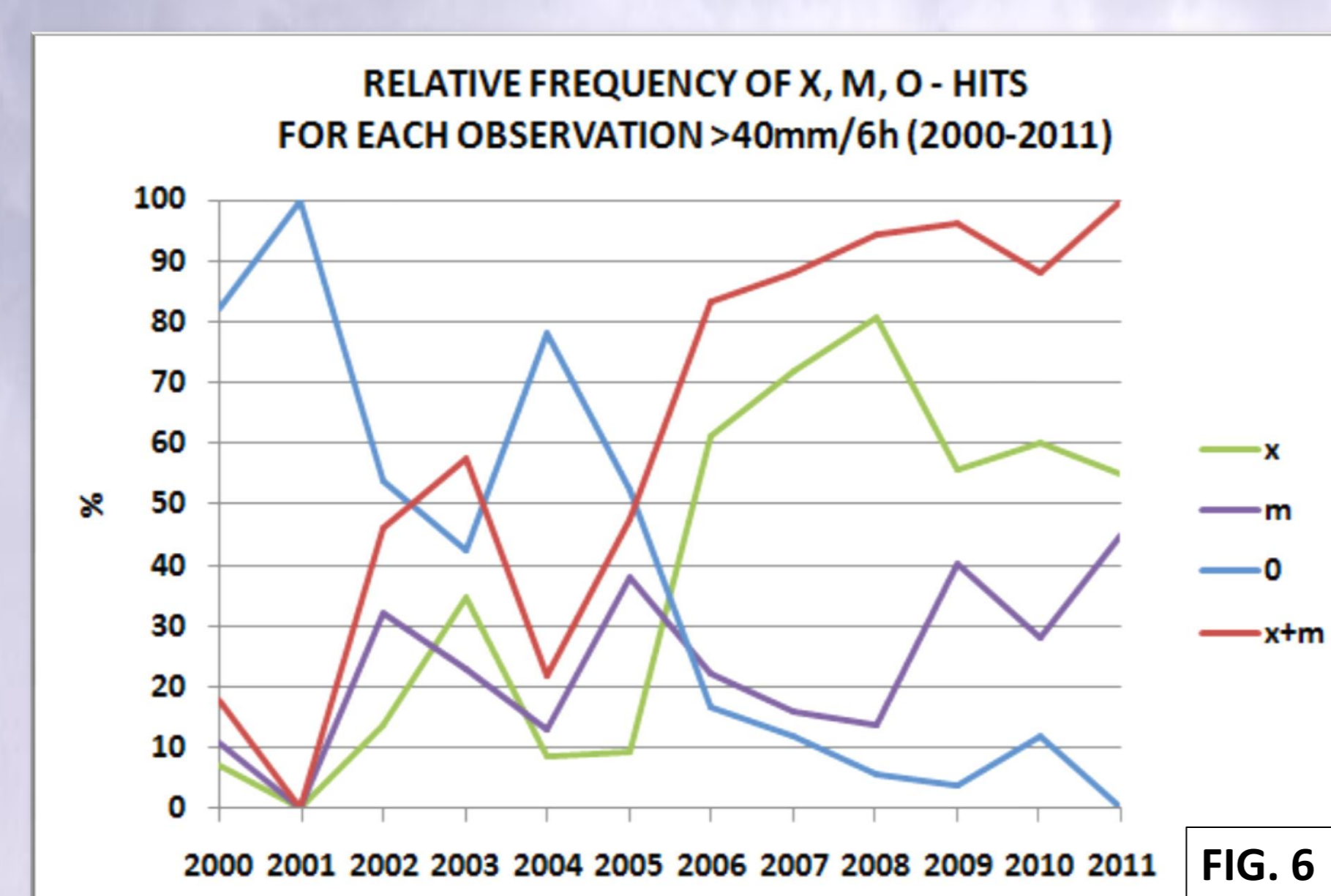
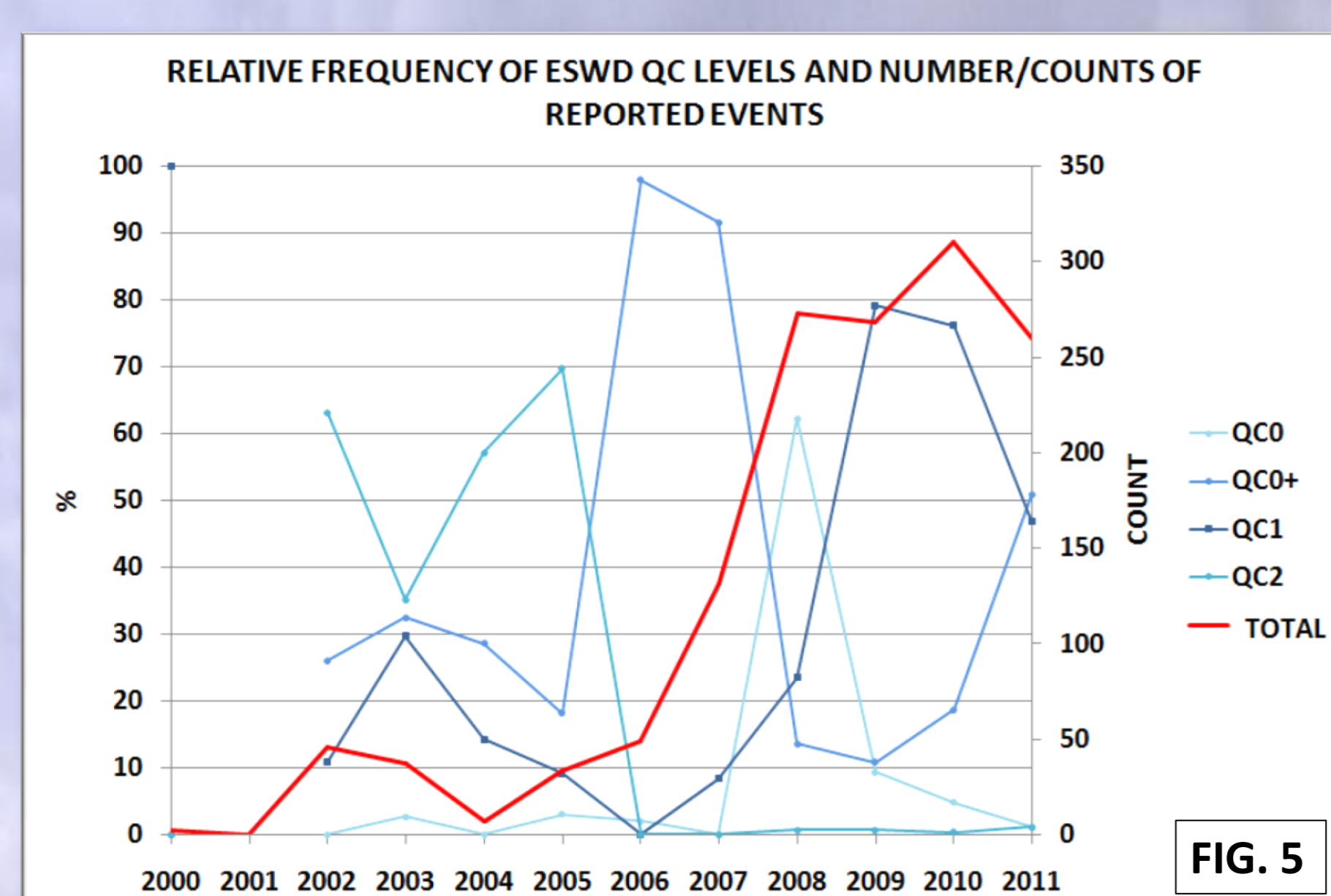


FIG. 5: Temporal distribution for ESWD QC-flags, 2000 – 2011:

- *) Distinct change in quality between 2004 and 2011
- *) Decrease of QC0 is related to increase of reports from higher QC's
- *) Peak of QC0+ reports from spotter organizations around 2006 and 2007
- *) Second peak from increased activity of TSN / ESWD (QC1) around 2009
- *) No reasonable explanation for the trends in 2011

FIG. 6: Relative frequency of all classes and their summation for 2000 – 2011:

- *) Decline of class O events, increase of (X+M) for the whole period
- *) Resulting most probably from the growth of TSN and spotter organizations
- *) Increased location accuracy of the observations (X class)
- *) Class M remains at low frequency during the whole period
- *) (X+M) show a trend towards a full coverage of reports for all events

CONCLUSIONS:

In general the ZAMG investigation under discussion shows a clear and distinct development process of the Austrian spotter organizations, especially SKYWARN AUSTRIA, who intensely collaborates with ZAMG and ESSL / ESWD. This development is a result of both, the increased accuracy of the growing number of observations and the augmented motivation of all involved persons to contribute to ESWD. However, the last year of the investigation 2011 offers a hit rate of about 100% of reports for heavy/extreme precipitation larger than 40mm/6hrs. In other words, during the investigated period 2000 – 2011 nearly every event measured by the ZAMG climate station network with the applied criteria was either individually observed/reported or at least reported to the ESWD. In this respect, the current collaboration between ESWD, spotters like SKYWARN AUSTRIA and ZAMG represents a solid foundation for further combined efforts and developments.