BSMEFFG System Verification Results and Challenges

Presented by

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Outline

- WMO Definition of Verification
- TSMS Extreme Event Observation (FEVK) Records
- Are There Methods for Verification?
- Comparison of FF Events Observed from Different Sources in 2014
- Spatial Distribution of Flash Floods Occurred in 2014
- 2X2 Contingency Table for 2014
- Comparison of FF Events Observed from Different Sources in 2015
- Spatial Distribution of Flash Floods occurred in 2015
- Summary

Definition of Verification

WMO specifies that the main goal of a verification process is to constantly improve the quality (skill and accuracy) of the services including;

- Establishment of a skil and accuracy reference against which subsequent changes in forecast procedures or introduction of new technology can be measured,
- Identification of the specific strengths and weaknesses in a forecaster's skill and the need for forecaster training and similar identification of a model's particular skill and the need for model improvement, and
- Information to the management about a forecast program past and current level of skill to plan future improvements; information can be used in making decisions concerning the organizational structure, modernization and restructuring the national Hydrometeorological services. (WMO)

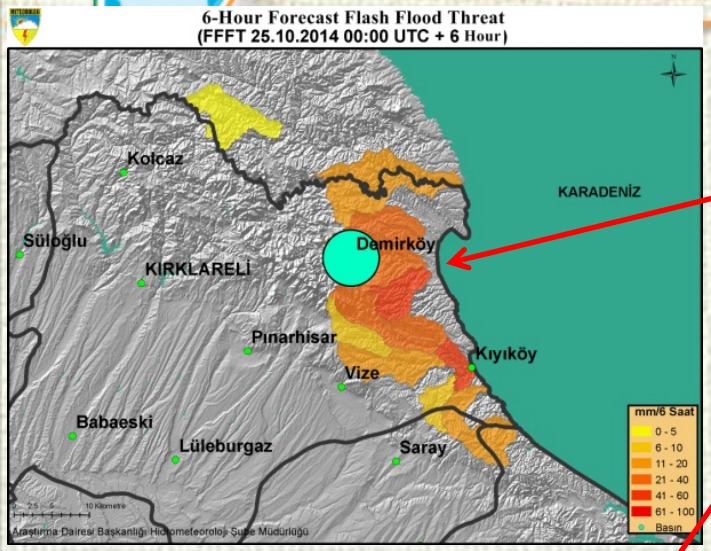
T.C.
Orman ve Su İşleri
Bakanlığı

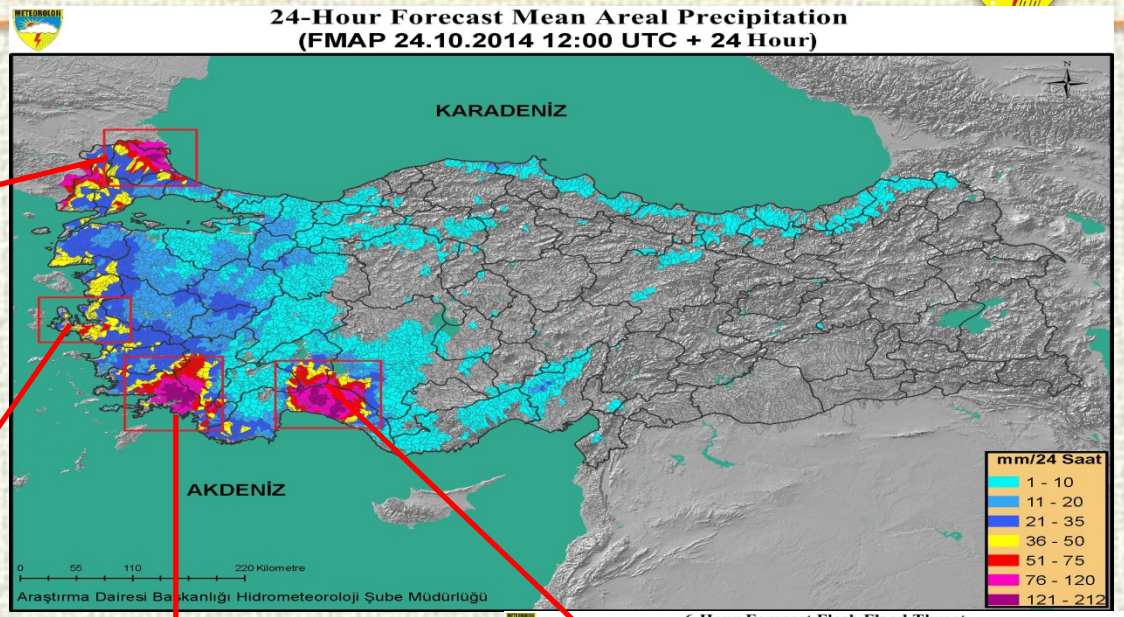
TSMS Extreme Event Observation (FEVK) Records

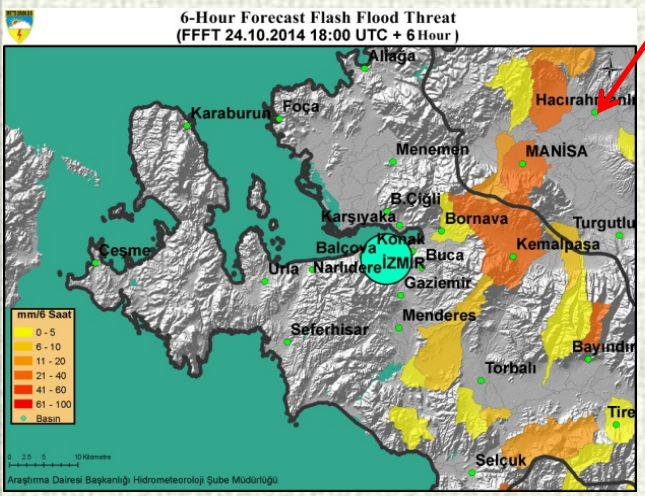
METEOROLOJİ

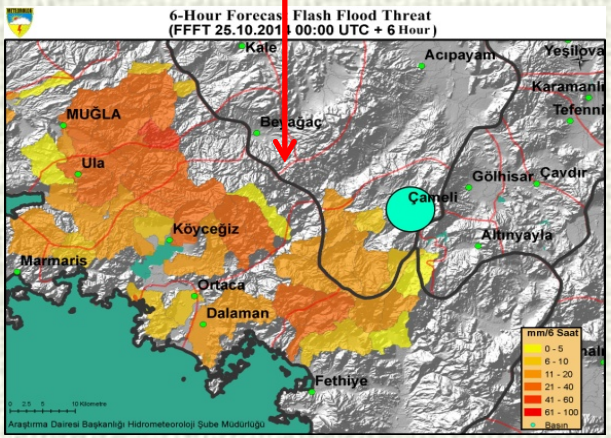
No	Std.No	St Lat	St Lon	Event start/finish date/time	Precipt. Amount (mm)	Remarks	Event Loc. I	Event Loc. II	Event Loc. III	Event IV	Event loc.Lat	Event. Loc. Long	Images	Bulletin
1	17220	38.3949	27.0819	28.01.2014 15:13 - 29.01.2014 07:03	45.6	Shower and heavy shower were effective in İzmir city center and Urla, Uzunkuyu, Gümüldür, Aliağa, Kemalpaşa, Menemen, Seferihisar, Çeşme and Dikili towns causing flooding, land slide and property damages.	İzmir				38.3949	27.0819		√
2	17340	36.7808	34.6031	03.03.2014 03:30 - 04.03.2014 09:15	69.8		Mersin				36.7808	34.6031		x
3	17292	37.2095	28.3668	03.03.2014 06:05 - 04.03.2014 04:15	123.2	İzmir had floods but there were no human losses.	Muğla				37.2095	28.3668		√
4	17265	37.7553	38.2775	09.03.2014 20:35 - 10.03.2014 22:05			Adıyaman				37.7553	38.2775		√
5	17155	39.4171	29.9891	27.04.2014 11:20 - 27.04.2014 11:48	34.6	Heavy shower and hail storm occurred in Kütahya province on 27.04.2014 between 11:20 - 11:48 am. Floods occurred in the following districts Celebi, Cumhuriyet, Bahçelievler ve Ziraat (Karapınar).	Kütahya				39.4171	29.9891		√

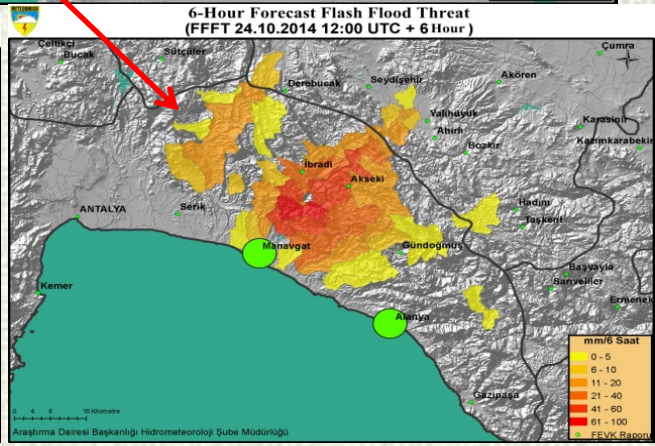
Method for Verification





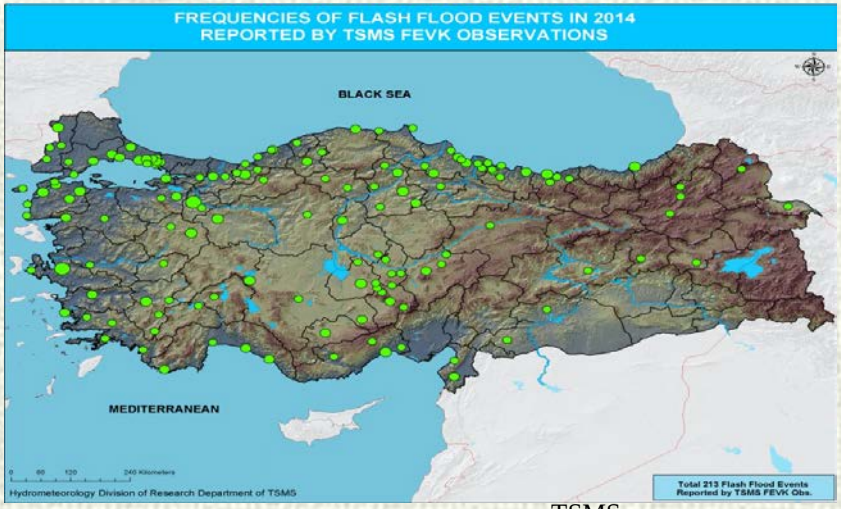




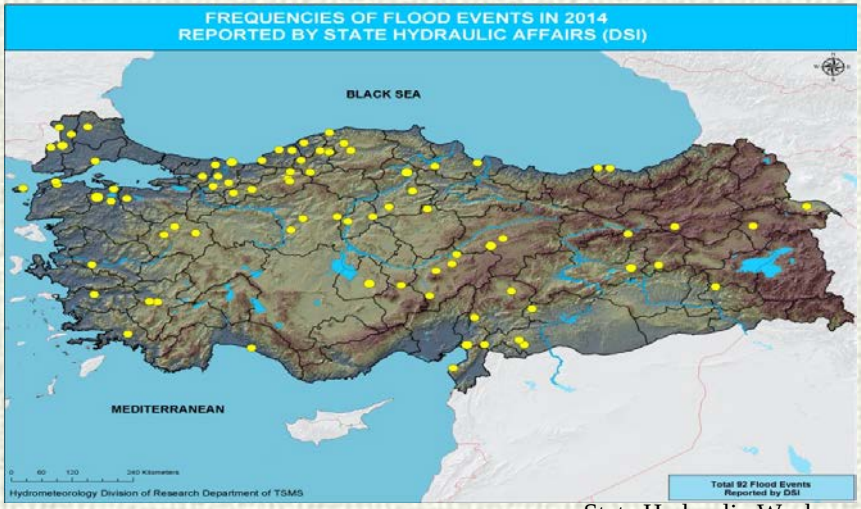


- The main challenge is to specify locations where FF occurs, 11700 subbasins, 64 km^2
- FFG: The amount of rainfall of a given duration and over a given catchment that is just enough to cause flooding condition at the outlet of draining system.
- county

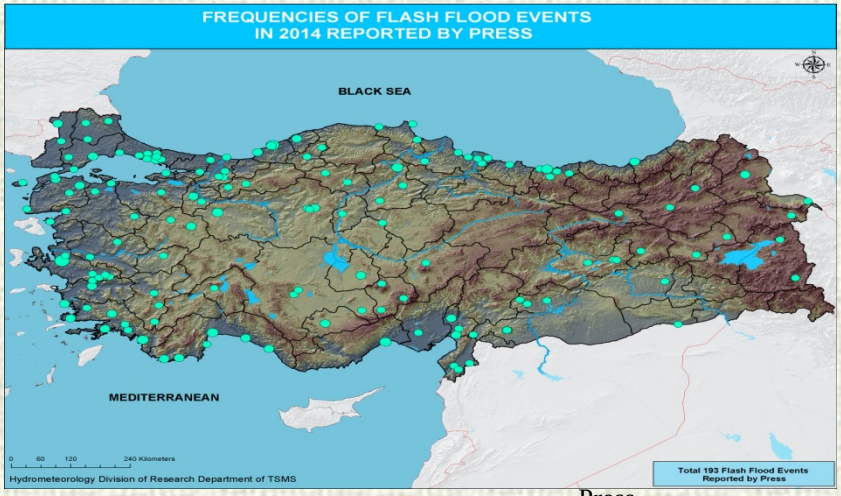
Comparison of FF Events Observed from Different Sources in 2014



TSMS



State Hydraulic Works



Press

A number of TSMS extreme event observation records for FF have 213, while 89 and 193 FF events were reported by State Hydraulic Works and press respectively.

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Spatial Distribution of Flash Floods Occurred in 2014

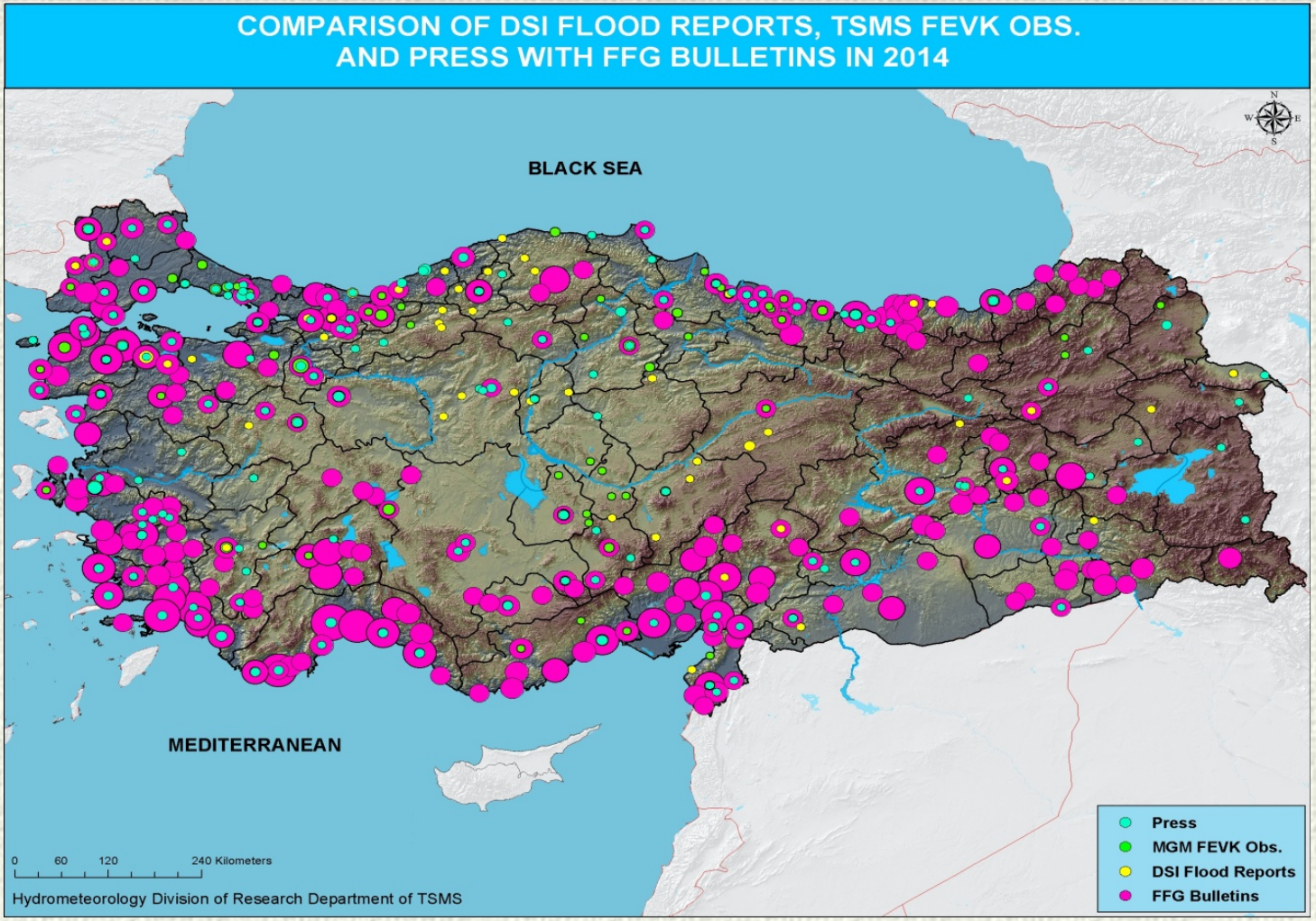


Figure shows different data sources (TSMS FEVK, State Hydraulic Works and press and FFG bulletins) reporting FF in 2014

2X2 Contingency Table for 2014

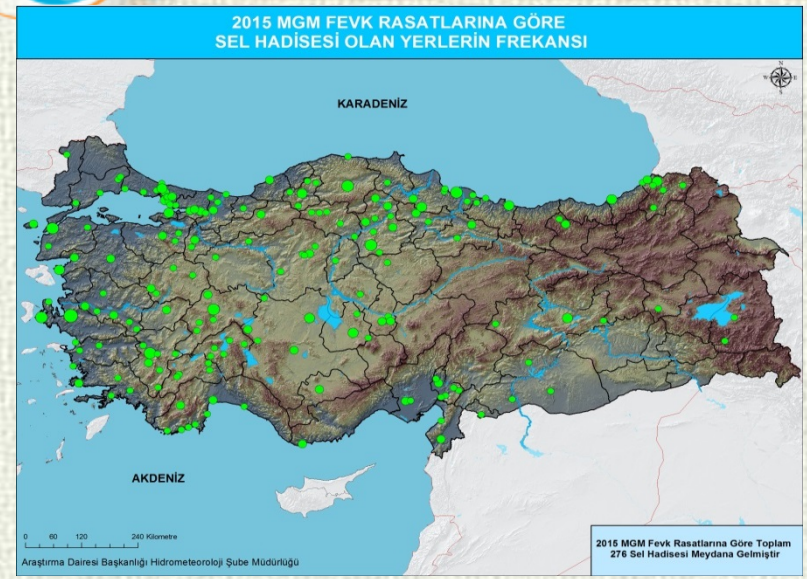
operational evaluation

FF Events occurred simultaneously from different sources were counted as a single event.

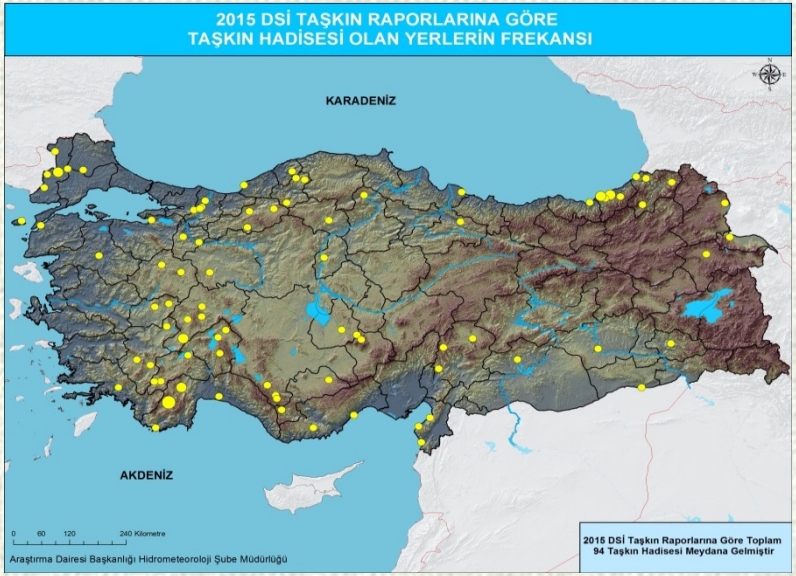
2014	Are FF Events Observed ? (TSMS, State Hydraulic Works, Press)		
Were Bulletins issued ?	**YES**	**NO**	**Σ**
YES	**58 (a)** hits	**10 (b)** false alarms	**68**
NO	**48 (c)** (misses)	**249 (d)** correct negatives	**297**
Σ	**106**	**259**	**365**

Hit Rate (POD), correct warned events out of total observed events, 1 is perfect : (a/(a+c))	0.55
False Alarm Ratio (FAR), falsely warned events out of all warnings, 0:perfect: (b/(a+b))	0.15
Critical Success Index (POFD) correct warned events out of all warnings issued and unwarned events, 1 is good: a/(a+b+c)	0.04

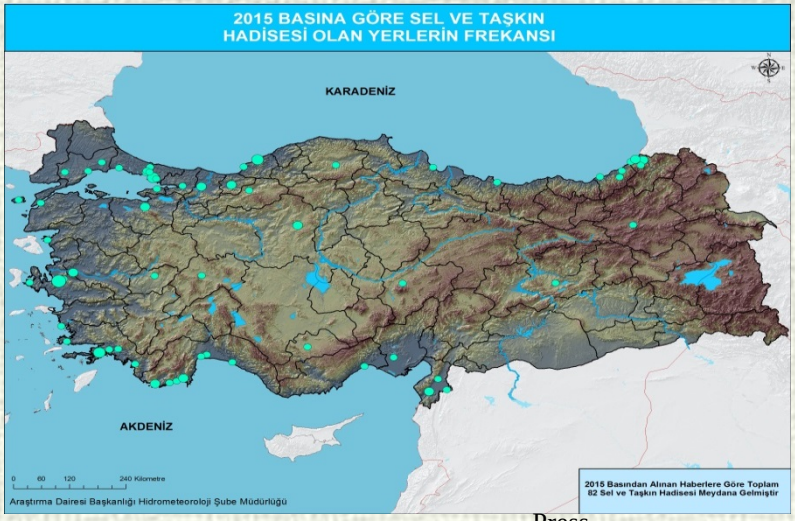
Comparison of FF Events Observed from Different Sources in 2015



TSMS



State Hydraulic Works



Press

A number of TSMS extraordinary event observation records for FF have 276, while 94 and 82 FF events were reported by State Hydraulic Works and press respectively.

Spatial Distribution of Flash Floods occurred in 2015

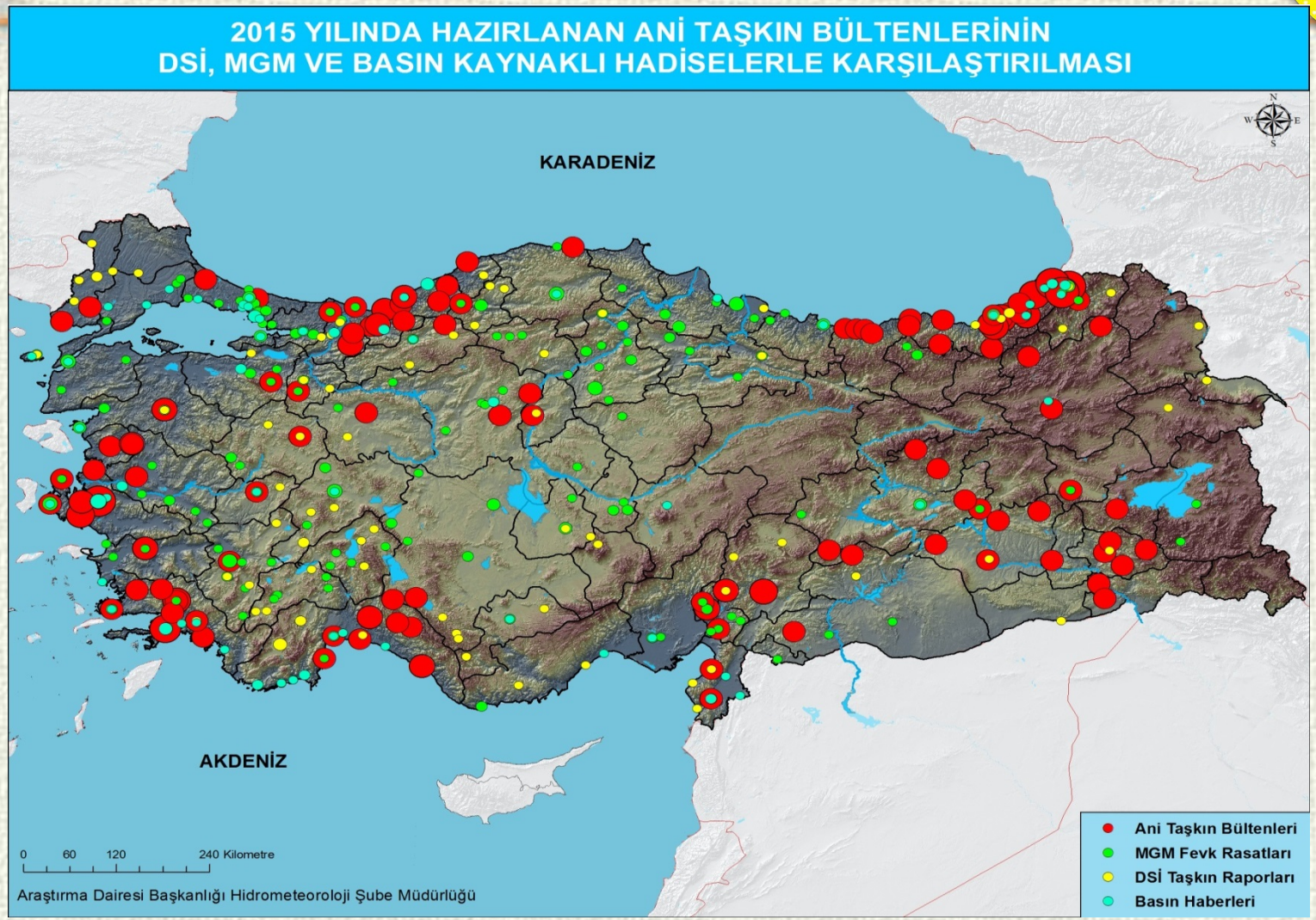


Figure shows different data sources (TSMS FEVK, State Hydraulic Works and press and FFG bulletins) reporting FF in 2015

Summary

- Verification of FF events is necessary to evaluate the performance of the FFGS.
- Data from available sources like disaster management agency, meteorological services or press can be used to constitute contingency table.
- It is important to collect
  - FF information such as pictures and amount of precipitation, date and time of the FF occurrence,
  - type of precipitation as an example convective, stratiform or orographic,
  - causes of FF as an example melt or heavy rainfall, etc

THANK YOU FOR YOUR ATTENTION