

Operational Applications of Awos Network in Turkey

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ABSTRACT

Turkish State Meteorological Service (TSMS) has been operating a huge observation network consisting of several types of automated weather observing systems. Operating and maintenance policies are mainly based on protective maintenance, corrective maintenance, calibration of sensors and quality control of meteorological data. New studies and approaches have been developed to be able to obtain more reliable data. In line with this goal, some projects and studies were initiated such as training of technical staff, developing special software used for logging the failures and maintenance activities, applications to receive Quality Management Certificate of ISO 9001 and training of staff on ISO 17025 calibration laboratory standards. In this presentation, all of the studies to be able to upgrade the observing network in Turkey and to operate it smoothly shall be demonstrated.

1) INTRODUCTION

Location and Geographical Profile of Turkey

The Republic of Turkey is situated in Southern Europe between Asia and Europe. The actual area of Turkey is 814,578 square kilometres, of which 790,200 are in Asia and 24,378 are located in Europe. In addition to these mountains cover big part of country and these mountains run parallel to the coasts. Therefore significant differences in climatic conditions arise between regions.

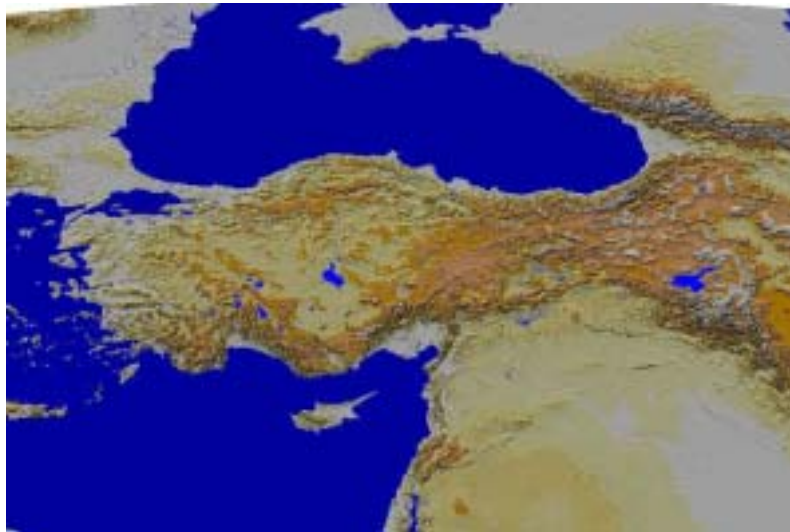


Figure-1: Geographical Image of Turkey

Turkish State Meteorological Service (TSMS) was founded in 1937. From that time to nowadays, many improvements have been realized by TSMS in observation stations and observation methods. The first Automated Weather Observing System (AWOS) was established in 1987. Nevertheless modernization studies of meteorological systems were started by TSMS in 1997. Renovation of the existing observation network and establishment of automated measuring and reporting systems constitute the basic structure of those modernization studies.

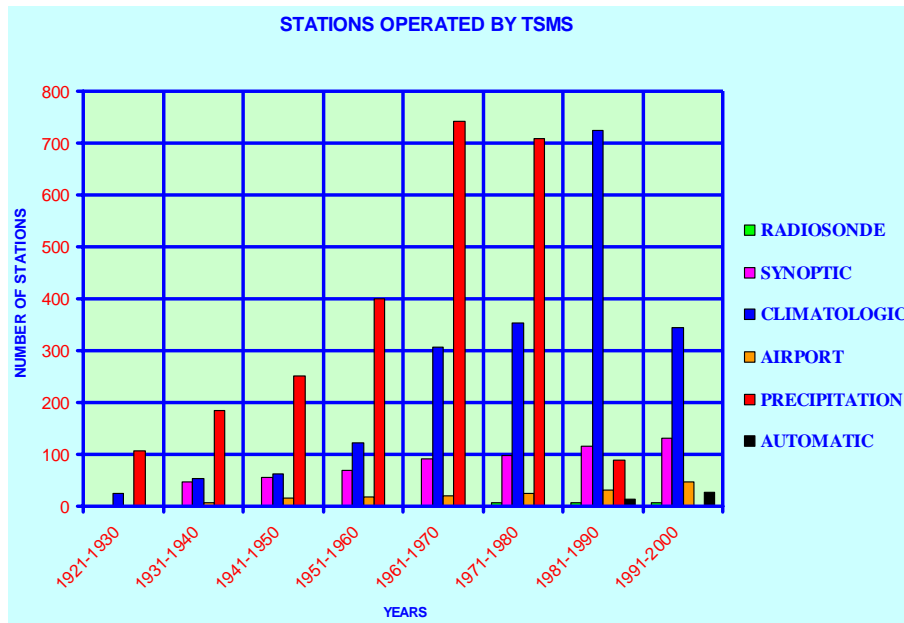


Figure-2: Stations Operated by TSMS

Present Awos Network in Turkey

The AWOS network is growing continuously and today it comprises 230 stations. Four different type AWOSs are used in airports for the aviation purpose and their number reached to 24. They have special sensors (like ceilometer and present weather sensor) and software to prove the safety of flight.

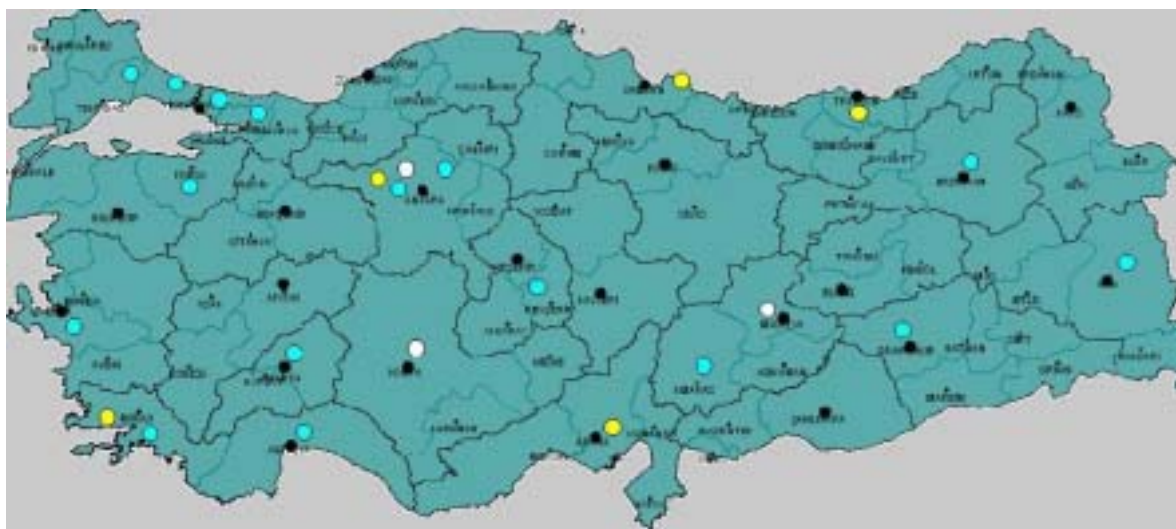


Figure-3: Aviation AWOSs

On the other hand 206 AWOSs have been established for climatologic and synoptic purpose. They have been classified in different four groups according to sensor equipments. Generally they have been installed into west part of country. Main reason of this is to constitute an early warning system against flood disaster. However, new observation network studies covering eastern part of the country have been started. In this context 150 AWOSs will be installed into the east part and thus whole of country will have been covered with automated weather observation network.



Figure-4: Climatologic and Synoptic AWOSs

2) OPERATING AND MAINTENANCE POLICIES

Quality of meteorological data and economical span of instruments depend on maintenance policies of institutes. Generally, maintenance policies of **Electronic Observing Systems-EOS** division is based on

- Protective Maintenance
- Corrective Maintenance
- Calibration
- Quality Control of Data

Protective Maintenance is realized by operators, local technicians and trained technical personnel. Daily, weekly and monthly maintenance procedures are realized by operators and local technicians. On the other hand more specific issues are realized by trained technical personnel at the six months interval.

In case of any failure on systems, corrective maintenance is applied to operate the systems regularly. At this point firstly local technicians take necessary actions with remote support from centre office. If the failures can not be repaired by local technicians, technical personnel from the center office reach the station as soon as possible and solve the problem.

TSMS is planning to reach international standards on all related issues. For this reason TSMS has started to do some works to be able to receive ISO-9001 Quality Management Systems Certificate. EOS division has supported these works preparing maintenance forms, failure tables, related procedures and other documents related with AWOS operations. Besides renovation of calibration laboratory works continue to ensure condition of ISO-17025. TSMS plans to provide international traceability for the AWOS instruments with these works.

Quality control of data generated by AWOS is the other work subject. In this issue present quality control algorithm has considered and some alterations have been taken into account. Meanwhile new quality control algorithm produced for synoptic observations has been investigating to adapt AWOSs.

First stage of our modernization program was the installation of the AWOSs. Meanwhile training of technical personnel on high technological sensors and communication systems was started. TSMS intended to have trained technical person to operate and maintain the own AWOSs. In this context personnel structure of electronic observing system division was renovated. After the required arrangement, personnel distribution of electronic observing system division became as in the following table.

	Bsc	Msc	Total
Electronics Engineer	4	3	7
Machine Engineer	1		1
Industrial Engineer	1		1
Agriculture Engineer	1	1	2
Physics Engineer	1		1
Electronics Teacher	1		1
Electronics technician			3
Total			16

Table-1: Personnel Structure of EOS Division

In general, TSMS and EOS determine the training policy as continuous training. Main reason of this policy arises from speed of technological developments. For this aim our personnel has participated in the national and international technical conferences, seminars and fairs. In this conferences many presentations, papers and posters has been presented. Thus contribution to scientific studies has been provided.



Figure-5: TECO-2005



Figure-6: TECO-2005-2

It is seen that operators and local technicians are trained systematically by trained technical personnel. For this reason trained EOS division personnel orderly trains the operators and local technicians every year. In 2006 four different trainings were prepared for aviation purposed AWOS operators and technicians. Furthermore trainings for climatologic and synoptic purposed AWOS have started and these trainings continue suited to training programme.



Figure-7: National AWOS Training



Figure-8: National AWOS Training-2

TSMS has organized international AWOS courses to give contribution to the capacity building activities for member countries of World Meteorological Organization-WMO. To exchange the experiences and information between the meteorological services of different countries are the main objectives of these courses. Our trained personnel have found a chance to share their knowledge and to see their weak points on AWOS in these courses. Moreover special course on maintenance of AWOSs has realized for the demand of United Arab Emirates.



Figure-9: International AWOS Training



Figure-10: International AWOS Training-2

During maintenance operations some requirements have arisen about storing of records. As it was mentioned in the beginning TSMS has very huge AWOS network including different type and characteristic instrument. Therefore special software has been designed and developed to classify instruments, to store the failure and maintenance records, to monitor the last conditions of instruments and such these functions.

İZLENİP İTİFAZ	İZLENİLE	İZLENİLMİŞ	İTİ NO	İZLENİLE/İZLENİLMİŞ	İTİ ÇEŞİDİ	İZLENİM	İZLENİM TARİHİ	ADRESİ	
A1	AFYON BÖLGE	AFYON	17190	AFBL	S-DR-H1	DÖLGE MÜDÜRLÜĞÜ	3045	3000	1934
A1	AFYON	AFYON	17224	AFON	S-DR-H1	SINOPTİK	3751	2752	56
A1	BALIKESİR	BALIKESİR	17192	BLKS	A1	DÖLGE MÜDÜRLÜĞÜ	3029	2752	147
A1	BOLU	BOLU	17070	BLU	S-DR-H1	SINOPTİK	4044	3130	143
A1	BURSA	BURSA	17190	BRBN	SR-H1	ELVEZ KLİM	3000	2713	37
A1	BURSA	BURSA	17116	LTBR	S-DR-H1	SINOPTİK	4514	2409	131
A1	ÇANAKKALE	ÇANAKKALE	17112	ÇNKL	S-DR-H1	SINOPTİK	4000	3024	6
A1	ERZURUM	ERZURUM	17126	ERZH	A1	DÖLGE MÜDÜRLÜĞÜ	3046	3000	000
A1	ERZURUM	ERZURUM	17062	ERZT	SR-H1	DÖLGE MÜDÜRLÜĞÜ	4000	2900	30
A1	ERZURUM	ERZURUM	17348	ERPH	S-DR-H1	DÖLGE MÜDÜRLÜĞÜ	3749	3000	197
A1	ERZURUM	ERZURUM	17338	ERZL	S-DR-H1	DÖLGE MÜDÜRLÜĞÜ	3024	2700	39
A1	ERZURUM	ERZURUM	17074	ERZT	S-DR-H1	SINOPTİK	4122	3347	508
A1	MARSA	MARSA	17196	MARS	S-DR-H1	SINOPTİK	3037	2726	71
A1	MÜŞLA	MÜŞLA	17022	MÜSL	S-DR-H1	SINOPTİK	3713	2022	648
A1	SİĞİR	SİĞİR	17028	SİGP	S-DR-H1	SINOPTİK	4201	3510	32
A1	TEKİRGÖZ	TEKİRGÖZ	17056	TEKR	S-DR-H1	SINOPTİK	4000	2700	3
A1	UŞAK	UŞAK	17108	UŞAK	S-DR-H1	SINOPTİK	3880	2024	38 8
A1	ZONGULDAK	ZONGULDAK	17022	ZONG	S-DR-H1	DÖLGE MÜDÜRLÜĞÜ	4127	3148	127
A2	ACIYAN	DEMLİ	17000	ADTY	SR-H1	ELVEZ KLİM	3725	2528	147
A2	AKADIN	BURDUR	17239	AKLS	A2	KÜÇÜK KLİM	3729	3002	1190
A2	AYDIN	AYDIN	17006	AYD	A2	AWOS	3706	3138	198
A2	AYYILDIZ	BALIKESİR	17176	AYVA	S-DR-H1	SINOPTİK	3930	2642	4
A2	BATMAN	SANLIURFA	17022	BATR	SR-H1	ELVEZ KLİM	4122	3000	101

Figure-11: Software for Maintenance

3) FUTURE WORKS

EOS Division is planning to improve its knowledge and experiences on operations and maintenance of Automated Weather Observing Stations. In the future in its field to be able to a technological centre is the first target for our division. Fort this aim we will follow the latest technology and we will train our technical personnel continuously to be able to reach our targets.

On the other hand our future works can be ordered stated as below;

- To continue modernization program and to extend AWOS network covering all parts of Turkey.
- To improve researching activities to be able to conduct technology policies of TSMS in the field of AWOS.
- To contribute studies on ISO9001 and ISO17025 to be able to receive these certificates.
- To participate scientific and technical studies to be able to share experiences and knowledge.

4) CONCLUSION

Modernization of meteorological observation network programme has provided great progress and technological substructure to Turkey. Experiences on operations and maintenance of AWOS network have been obtained during elapsed time. Consequently TSMS will continue to improve the knowledge and capacity to be able to operate and maintain the AWOS network.

REFERENCES

1. Guide to Meteorological Instruments and Methods of Observations, WMO-No.8, 2006
2. Routine and Preventive Maintenance, Met Monitoring Guide, www.webmet.com/met_monitoring/85.html
3. Modernization of Observation Network in Turkey, Poster Presentation, P4(2),TECO2005
4. Data quality management, Poster Presentation, P3(33),TECO2005