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EASTERN ANATOLIA OBSERVATORY (DAG): RECENT DEVELOPMENT IN 2019

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RESUMEN

El Observatorio de Anatolia Oriental (DAG) contendrá el telescopio infrarrojo más grande del mundo (4 m) y será el primer telescopio infrarrojo de Turquía. Éste se encuentra en la ciudad de Erzurum en la parte este de Turquía con una altitud de 3170 m. Presentamos el desarrollo reciente de DAG hasta finales de septiembre de 2019.

ABSTRACT

Eastern Anatolia Observatory (DAG) will be the Turkey's largest (4m) and first infrared observatory is located in Erzurum city at the East part of Turkey with an altitude of 3170 m. We present the recent development of DAG until the end of September in 2019.

Key Words: telescopes

1. SITE

DAG will be an observatory in Erzurum/Eastern Anatolia/Turkey region at the location of Karakaya Tepeleri/Konaklı/Erzurum. The terrain of the region is constituted by a high altitude plato 5 km plus a mountain of 3155 m altitude and acreage of 2500 decares (N39°47′ E41°14′).
Transportation from city to the site is easy and is approximately 35 km and takes ~ 47 minutes by road. The site has more than 250 days of clear night, low humidity (up to 2-10%, so Dry), certain prevailing wind direction (N-E, stable), low wind speeds (calm), low temperature values (up to -35°C for winter, cold), low atmospheric inversion layer ($\sim$ 2600 m, ideal), iced thin snow cover ($<$ 150 cm, Dust-free) and Snow season on November - April, (consistent).

2. INFRASTRUCTURE

DAG's has a modern and reliable infrastructure.

2.1. *Buildings*

ATASAM building is in Ataturk University campus and is $\sim 1000\,m^2$ with Technician, Observer and Guest rooms and Labs. It has a fiber optic connection to the site and a 60 KW UPS.

The service (prefabricated) building-1 in DAG site is a $\sim 100\,m^2$ building. It is a temporary building and house security crew. It contains the technician's and observer's rooms. It has fiber optic connection to all buildings including ATASAM itself and a 30 KW UPS.

The service (prefabricated) building-2 in DAG site is a $40\,m^2$ building. It is also a temporary building with a technician's room. Fiber connection is also available in this building.

Atmospheric systems and Differential Image Motion Monitor (DIMM) tower in DAG site is a steel constructed tower with a height of $7\,m$. It has a fiber optic connection and a 10 KW UPS with numerous atmospheric and astronomical systems.

Aside the energy and snow vehicles garage near DAG site there is a $\sim 300\,m^2$ building. A 20 tons gasoline tank, a generator, transformers and a snow track can be found in this building.

2.2. *Electricity*

DAG operates with a 3 phases medium voltage underground lines. The length of line is approximately 4 km.

2.3. *Power*

For now there is a 3 phase temporary power line in DAG which is supported by a 25 and a 10 KW UPSs.

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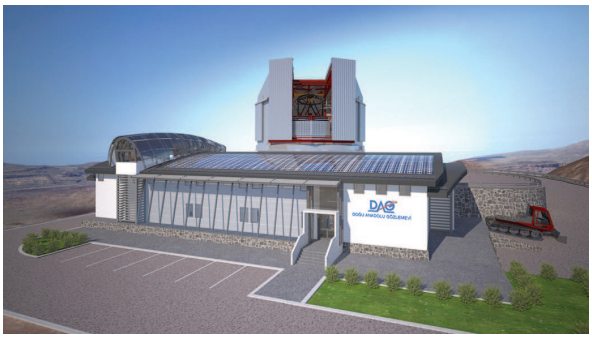

Fig. 1. DAG Main Building

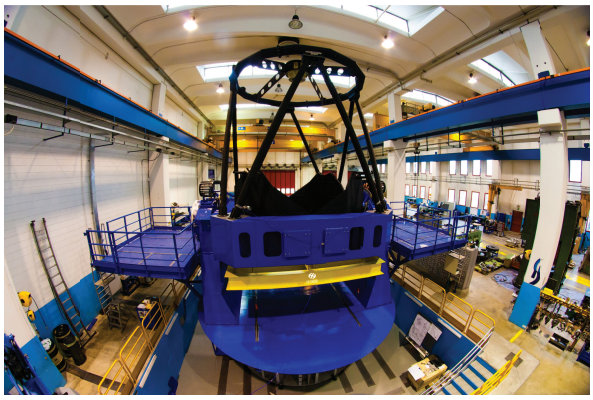

Fig. 2. DAG Telescope

The permanent backup power plan is constituted by 2×120 KW UPSs, 2×400 KW generators and 3×800 KW and 3×150 KW transformers near the DAG site.

2.4. *Lightning Safety*

There are 3 rods in DAG site to prevent lightning strike to equipment and buildings.

2.5. *Internet*

DAG uses a 48 cores/100 Gbps transmission fiber underground line. The length of the line is ~ 30 km and connects ATASAM building to all real estate of DAG project. There is also a 24 Mbps Radiolink connection too working as a backup system.

2.6. *Transportation*

ATASAM building (Ataturk University campus) is ~ 12 km away from the Erzurum airport and has an asphalt road. DAG site is ~ 32 km away from Erzurum airport which has a ~ 25 km asphalt plus a ~ 7 km stable road.

2.7. *Vehicles*

DAG uses two pickup's vehicles (4×4, 2500cc), an ATV(4×4, 800cc), a snow truck (500cc) and a snow cabin truck (5000cc) for transportation.

2.8. *Seismic System*

There are 5 seismographs connected and spread around the DAG site.

2.9. *Geological Analysis*

DAG is located on Basalt ground. So far drilling has been done 20 times down to 10-50 m. Water is considered to be found after 20 m.

2.10. *Water*

Two water sources were found near DAG site (1 and 1.5 km away at 3000 and 2800 m altitudes).

An artificial lake is located close to DAG at 2500 m altitude which belongs to Konaklı Ski Center.

A filtered water tank with a capacity of 60 Tons is located in DAG site.

2.11. *Accommodation*

Ataturk University has 3 guest houses with 160 rooms and capacity of 300 people with a 3-4 star hotel standards.

ATASAM building can host 4 people with a 2 star hotel standards in its 2 rooms in Ataturk University campus.

The service (prefabricate) building-1 in DAG site with 3 rooms can host 6 people.

DAG telescope's main building will be able to host 12 people in its 6 rooms with 4 stars hotel standards.

2.12. *Security System*

There are 8 security personnel active at the DAG site and 5 night vision featured security cameras.

3. BUILDING

The design of DAG building was done by Arch. A. Erkan Şahmalı (GÜNARDA comp.). DAG has a passive solar energy, eco-friendly and disabled-friendly design, stairlift, concrete, and steel construction design. see Fig. 1.

4. ENCLOSURE

DAG has a rotating with a large slit door enclosure with a diameter of 16 m, height of 18 m, active environment control, cooling system, louvers and wind screen, bridge crane all designed and produced by EIE(European Industrial Engineering).

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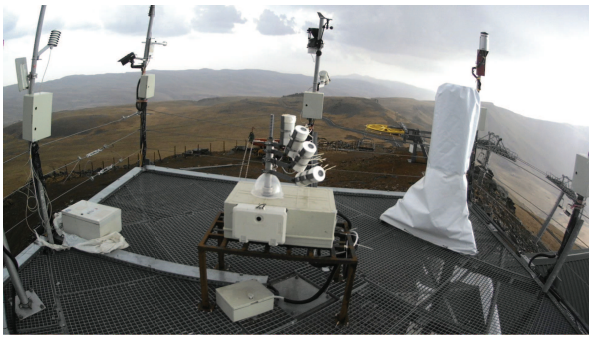

Fig. 3. DIMM Tower and the astronomical and atmospheric equipment

5. TELESCOPE

DAG telescope will be a 4 m class telescope with focal length of 56 m and focal ratio of 1.8. The main observational wave-band of DAG telescope will be in optical and NIR ($< 3.0\,\mu m$). The telescopes field of view will be $30'$ in Large - unvignetted and $10'$ in narrow - vigenetted mode. see Fig. 2.

DAG telescope will have 2 Nasmyth platforms. One of the platforms will be equipped by adaptive optic system which we call N1 and the other will be a seeing limited platform with name of N2. Each platform has a large capacity. N1 will house 6 instruments: 3 in optical, 2 in near infrared wavelength and an adaptive optics system.

DAG telescope will be an altitude-azimuth mounted telescope with a Ritchey-Chrétien optical design and active optics (ao), adaptive optics (AO), derotator and field corrector. This telescope will have the highest performance in its class.

A zerodure (Schott) mirror with pointing of $< 2''$ and tracking accuracy of $< 1''$ (rms) designed by Dr. Laurent Jolissaint (HEIG-VD) and a narrow field plus a ground layer adaptive optics designed by Dr. O. Keskin (OPAM) and manufactured by AMOS&EIE will form the DAG telescope.

6. METEOROLOGICAL & ASTRONOMICAL SYSTEMS

An AWOS, DAVIS, Vaisala meteorology station aside a Boltwood Cloud Sensor and Meteosat System and a GNSS station for PWV calculation constitute the system used for meteorological observations.

Tow All Sky Cameras, 4 Sky Quality Meters (Automated Rotational Sky Quality Meter, R-SQM) and a MASS-DIMM system are located at DAG site and are operational. A SLODAR (Slope Detection And Ranging) system will be placed in the site on 2020.

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