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A solar observing station for education and research in Peru

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Abstract. Since 1937 Carnegie Institution of Washington made observations of active regions of the Sun with a Hale type spectro-helioscope in Huancayo observatory of the Instituto Geofísico del Perú (IGP). IGP has contributed significantly to geophysical and solar sciences in the last 69 years. Now IGP and the Faculty of Sciences of the Universidad Nacional San Luis Gonzaga de Ica (UNICA) are planning to refurbish the coelostat at the observatory with the support of National Astronomical Observatory of Japan. It is also planned to install a solar Flare Monitor Telescope (FMT) at UNICA, from Hida observatory of Kyoto University. Along with the coelostat, the FMT will be useful to improve scientific research and education.

Keywords : magnetic field, methods : observational – techniques : spectroscopic – Sun : flares, sunspots, solar-terrestrial relations

1. Introduction

In 1922, Carnegie Institution of Washington established a Geomagnetic observatory near the magnetic equator in Huancayo, a beautiful place in the Mantaro river valley placed

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at 3,300 meters above the sea level. The first observational results showed that the H component of the geomagnetic field was almost double the diurnal variation. This subsequently led to the discovery of equatorial electro-jet.

In 1935, a Hale type heliograph was installed at Huancayo observatory to carry out observations of the Sun, and to understand the effects of the Sun on Earth's magnetosphere and ionosphere. Mutsumi Ishitsuka from the Kyoto university arrived in Huancayo during 1957 (the period of International Geophysical Year, IGY) to take charge of solar observations. In 1960, a new coelostat arrived in Huancayo to improve spectrographic observations of active zones of the sun. A monochromatic heliograph was also installed in 1960 to obtain continuous images of the sun (Fig. 1). Radio observations were started in 1966 at 9.4 GHz with a radio polarimeter.

After almost a 10 year search (to identify a sutiable location for coronagraphic observations), the construction of the Cosmos Coronagraphic observatory was started at about 70 km away from Huancayo observatory. The first image of the corona was obtained in July 1988 (Fig. 2). Unfortunately after a few weeks terrorists occupied the observatory and destroyed the telescope.

Different circumstances in Peru made it difficult to continue operations of scientific instruments of Huancayo observatory, and the Radio polarimeter and Monochromatic heliograph were deactivated. Finally Mutsumi Ishitsuka moved to Ancon observatory,

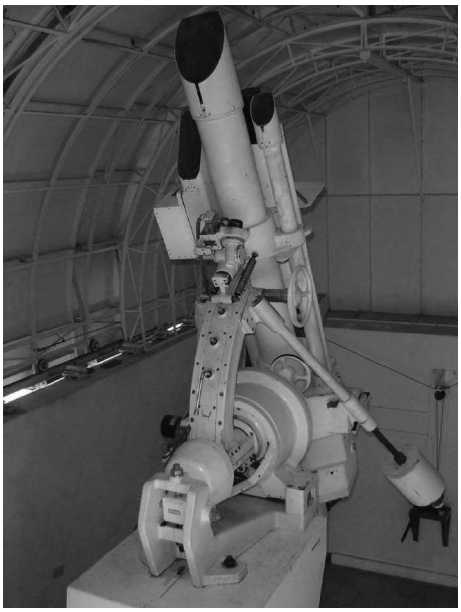

Figure 1. Monochromatic heliograph of Huancayo observatory.

Figure 2. Solar coronagraph at Cosmos observatory.

near Lima. After that, the IGP installed a 15 cm refractor telescope at the Universidad Nacional San Luis Gonzaga de Ica (UNICA) in the year 2000, to observe sunspots. Students of the faculty of sciences are in charge of the observations and data are sent to Brussels World Data Center.

2. Geomagnetic observations

IGP has been performing geomagnetic observations at Huancayo and Ancon, regularly and the data is sent to the World Data Center in Kyoto University. Recently, in cooperation with Kyushu university, a new MAGDAS (MAGnetic Data Acquisition System) magnetometer was installed in Ancon observatory and CPMN (Circum-pan Pacific Magnetometer Network) magnetometers were installed at Caete and Guadalupe stations.

3. Digital spectrum heliograph

In 2004, IGP and the National Astronomical Observatory of Japan (NAOJ) signed a Memory of Understanding (MOU) in order to improve astronomical observations in Peru. Exchange of equipment and people in Radio Astronomy, Solar Physics and Education in Astronomy are contemplated in this programme.

In order to build a digital spectrograph in Peru, some optical parts and electronics were sent from NAOJ to refurbish the coelostat at the Huancayo observatory. The set up will be installed in UNICA's campus. Last year two people from UNICA received training in solar spectrographic observations at NAOJ Mitaka campus and Norikura observatory. They also visited Hida observatory of Kyoto university and Nobeyama Radio observatory.

Solar flare monitor telescope

Since CHAIN project (Continuous H-alpha Imaging Network) aims to cover 24 hours of high resolution solar observations through installation of similar telescopes around the world, UNICA's solar station will be an appropriate place to install a Flare Monitor Telescope (FMT), see Fig. 4.

4. Conclusion

The Geophysical Institute of Peru is involved in solar observations since 1935 and geomagnetic observations since 1922. Thanks to IGY, in 1957-1958, a solar physicist moved from Kyoto university and established the Huancayo observatory. This lead to the development of solar observations in Peru. This year we are celebrating the IHY and definitely international collaborations will allow IGP to continue its contribution to geophysical, ionospheric and solar physics sciences.

Figure 3. Nishimura Seishakusho Coelostat at Ancon observatory.

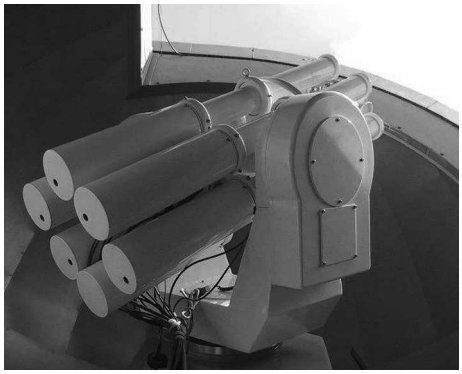

Figure 4. Flare Monitor Telescope at Hida observatory of the Kyoto university, Japan.

IGP is contributing to IHY by hosting equipments like MAGDAS and CPMN for geomagnetic observations. Due to its proximity to the geomagnetic equator, observations with the above instruments are of interest. Additionally, Huancayo observatory continues to record geomagnetic variations (since 1922).

A new digital spectro-heliograph will be constructed in collaboration between IGP and UNICA for observations of active solar regions. The Solar station will be placed within the university campus, thereby allowing the students to use the equipments and learn solar science.

Also a Flare Monitor Telescope from Hida observatory of the Kyoto university will be installed at UNICA. This collaboration will improve education in science in Peru.

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