IMPORTANCE AND FUTURE OF THE MAGNETIC OBSERVATORY NETWORK IN SOUTH AMERICA

3-04

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Introduction

The Earth's magnetic field is known in South America since the beginning of twentieth century. The first Magnetic Observatory was Pilar (PIL), and started operations in 1904 with the absolute determination of Declination, Horizontal and Vertical components and their variations with a photographic recorder. Following PIL, the other observatories were Huancayo (HUA, started in 1922), Vassouras (VSS, started in 1915) La Quiaca (LQA, started in 1920 and stopped in 1992), Islas Orcadas del Sur (ORC, started in 1905, before the International Geophysical Year (IGY) in 1957). After the IGY, followed the installations of the observatories of Tatuoca (TTB, started in 1957), Trelew (TRW, started in 1957), Las Acacias (LAS, started in 1961) and Port Stanley (PST, started in 1994). Now, the Goverment of Uruguay is constructing the non-magnetic houses to install a new observatory at a place named "Casa de Aigua" (Fig. 1).
The future Observatory of Aigua (ODA), and the others observatories locations are shown in Fig. 2. The objective of this paper is to give a brief overview of the state of the Total Magnetic Intensity for ODA, and comparatively for the others observatories, using the IGRF-11 model.

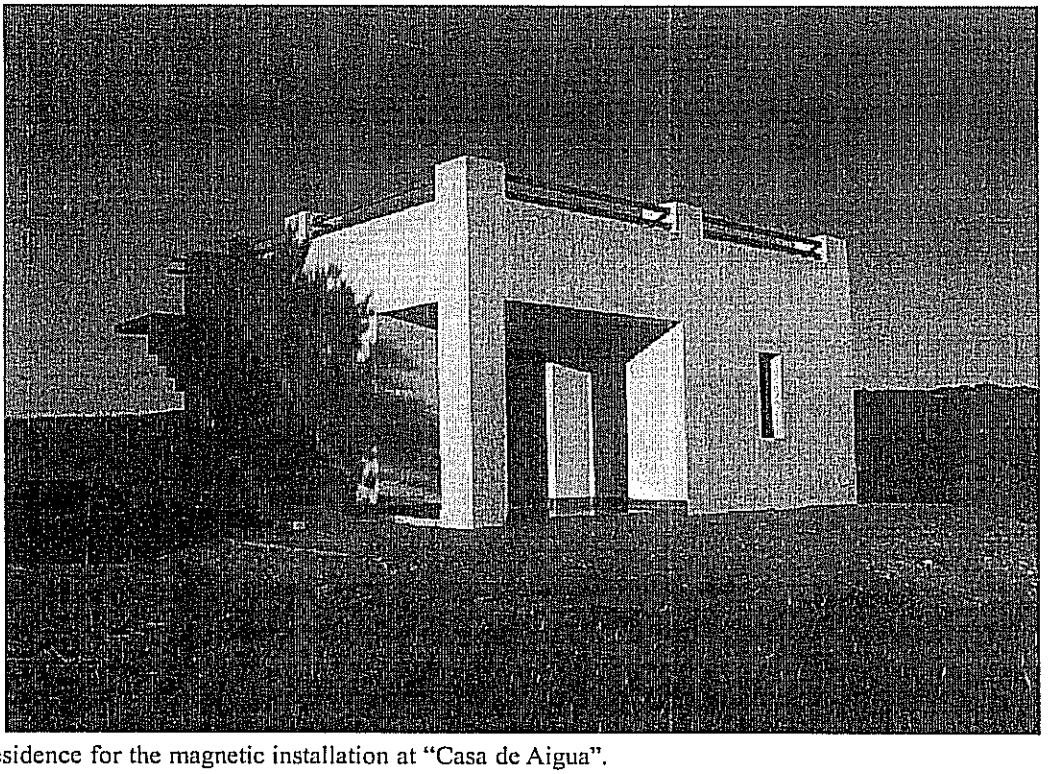

Fig. 1 - Residence for the magnetic installation at "Casa de Aigua".

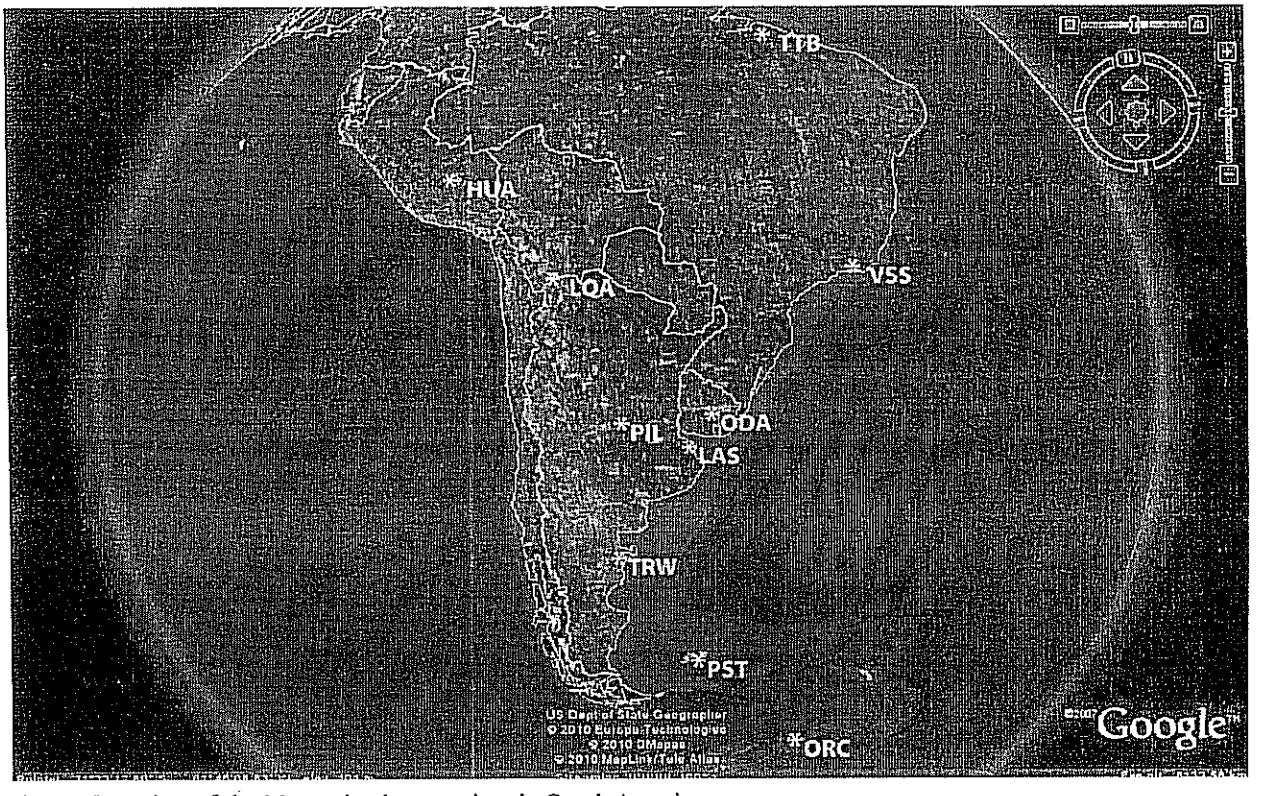

Fig. 2 - Location of the Magnetic observatoires in South America.

Data analysis and results

The proton precession magnetometer installed at the "Casa de Aigua" was designed in the Faculty of Astronomical and Geophysical Sciences (UNLP) by Ing. Ezequiel Garcia and Ing. Guillermo

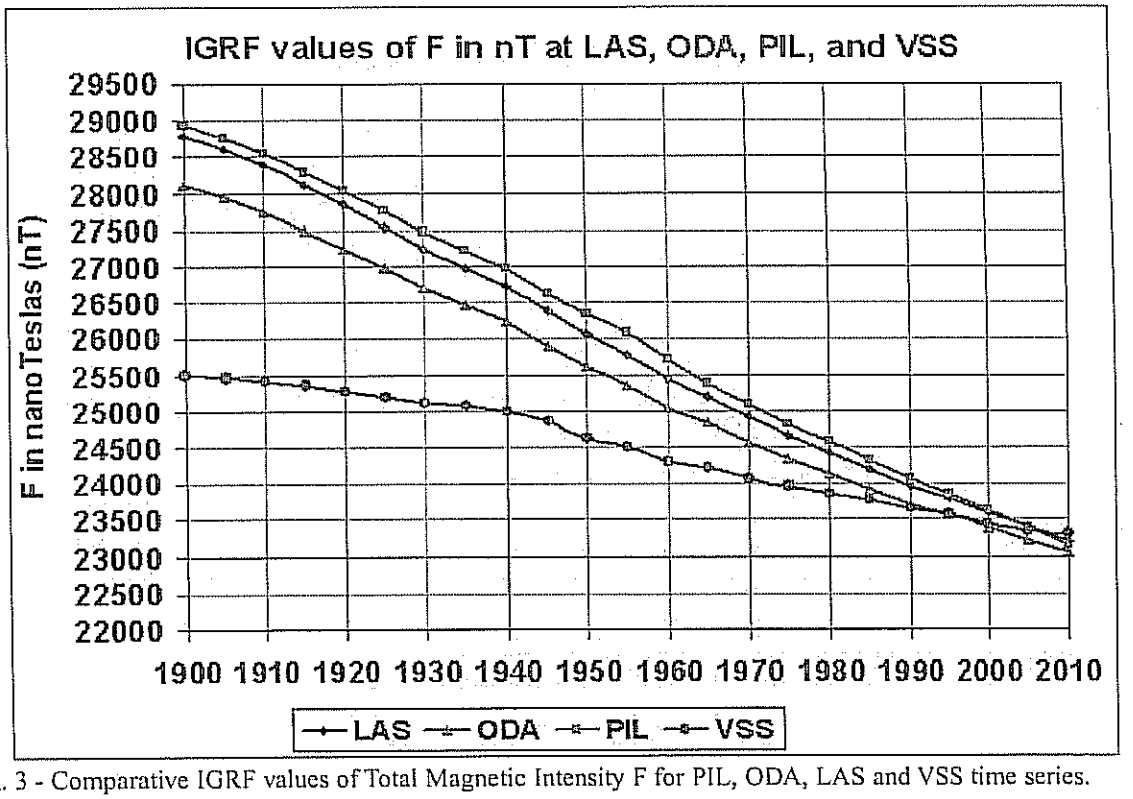

Fig. 3 - Comparative IGRF values of Total Magnetic Intensity F for PIL, ODA, LAS and VSS time series.

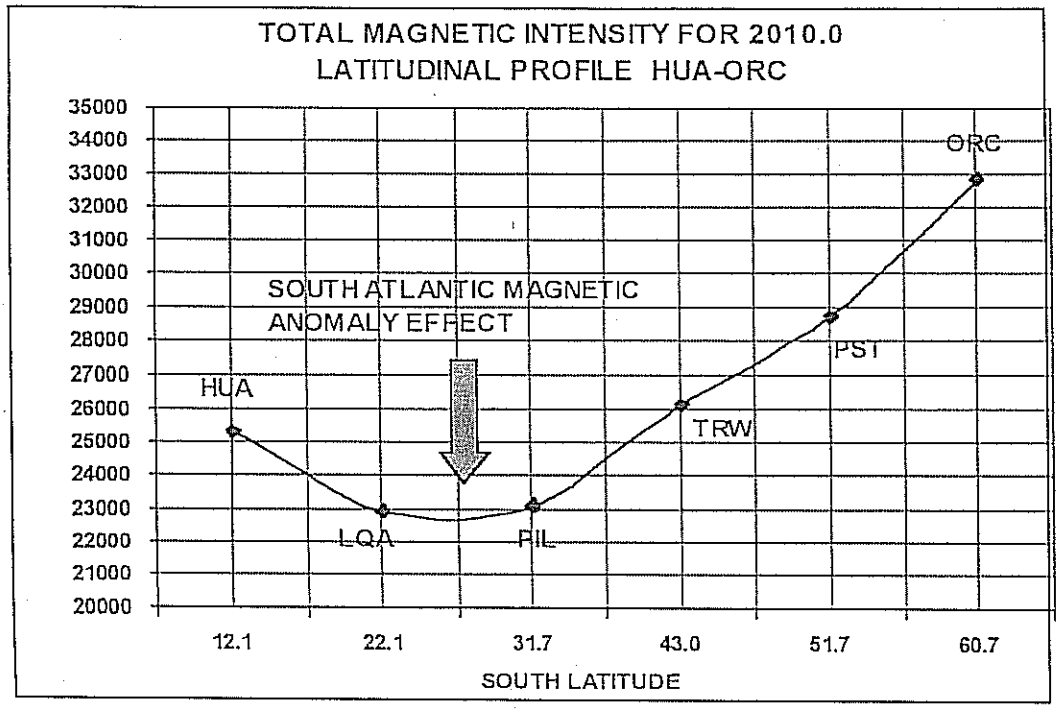

Fig. 4 - The total magnetic intensity changes with latitude determined for HUA, LQA, PIL, TRW, PST and ORC

Rodriguez. The system is similar to the instrument wich operates at LAS Magnetic Observatory (Garcia et al., 2007). For analyzing the site of ODA, we evaluated and compared all the elements of the geomagnetic field, obtained by the model of the International Geomagnetic Reference Field (IGRF-11) from 1900 to 2015. This model is based in the Spherical Harmonic Analysis up to degree 10 of the all absolute values obtained by the World Magnetic Observatory Network (Lanza and Meloni, 2006; Merrill et al., 1996).

The results of IGRF evaluation for each observatories show important values for the magnetic total

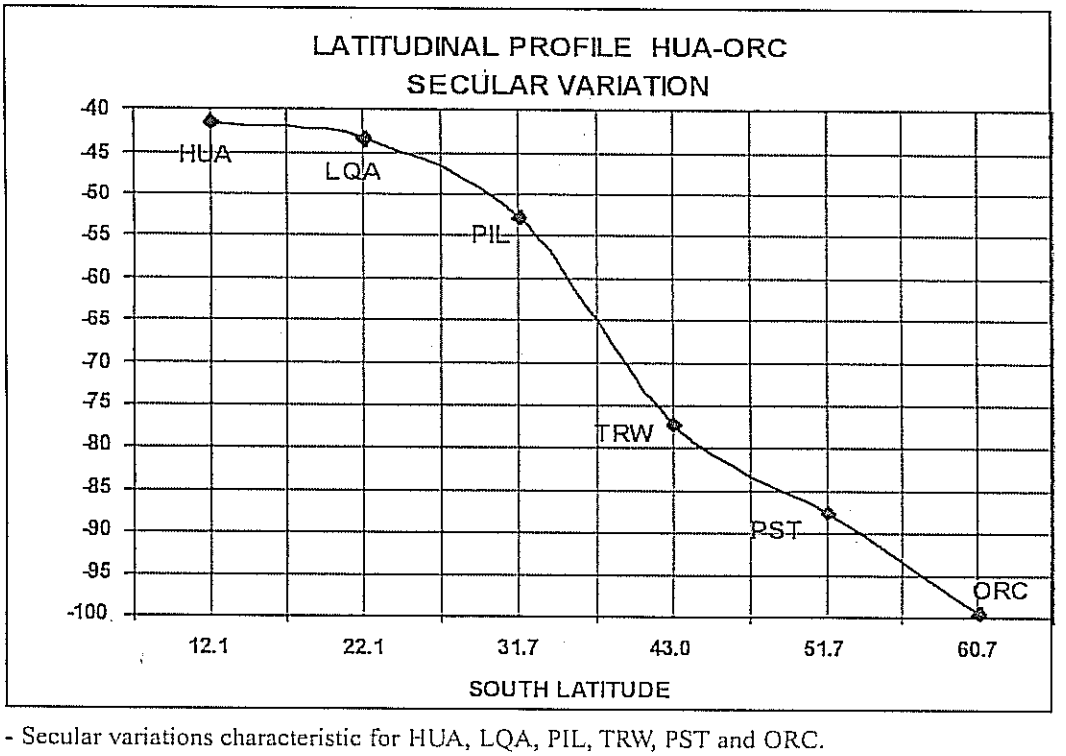

Fig. 5 - Secular variations characteristic for HUA, LQA, PIL, TRW, PST and ORC.

intensity secular change in the time interval 1900-2010:
TTB=-44.3 nT/year; HUA=-41.4 nT/year; LQA=-43.2 nT/year; VSS=-20.1 nT/year; PIL=-52.7 nT/year; ODA=-46.2 nT/year; LAS=-50.9 nT/year; TRW=-77.1 nT/year; PST=-87.5 nT/year; ORC=-99.5 nT/year.
These values demonstrate that this region has the minimum change of the secular variation in the region of the VSS Observatory. LAS, PIL, and ODA sites have similar values.
The comparative IGRF values of Total Magnetic Intensity F for PIL, ODA, LAS and VSS time series is shown in Fig. 3.
The total magnetic intensity changes with latitude determined for HUA, LQA, PIL, TRW, PST and ORC, is shown in Fig. 4. The minimum of F is seen in the region of PIL.
The secular variations characteristic for HUA, LQA, PIL, corresponding to continental environment aspects, and TRW, PST and LQA, corresponding to oceanic environment, are shown in Fig. 5.

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