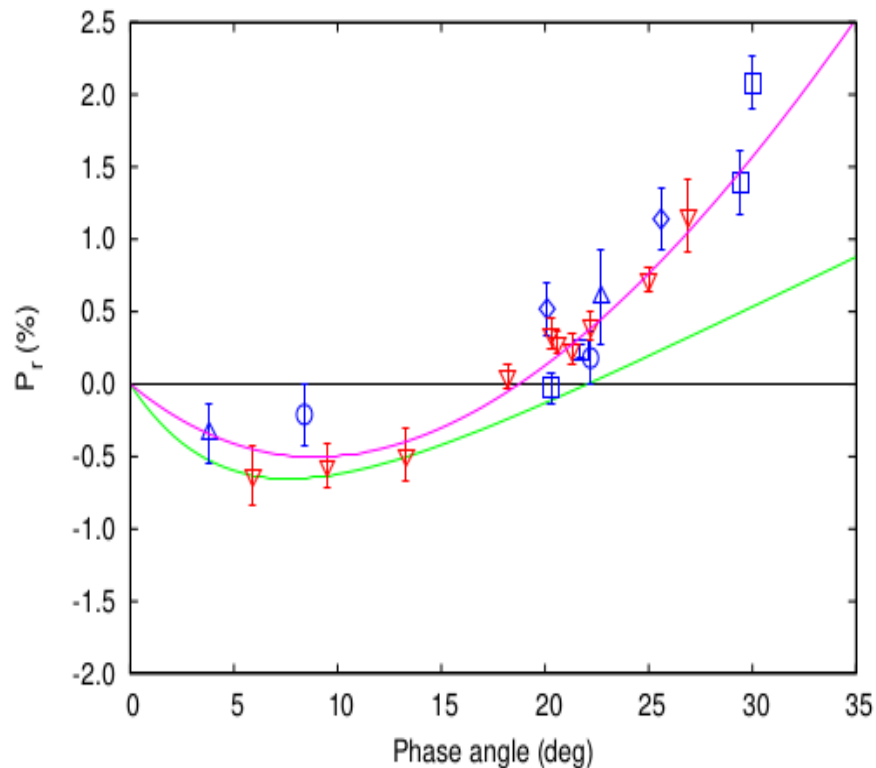


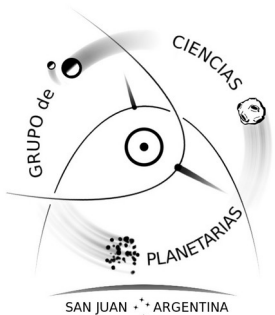
Catálogo de Curvas de Polarización de Asteroides



R. Gil-Hutton

Grupo de Ciencias Planetarias, FCEFN, UNSJ – CONICET
San Juan – Argentina

ricardo.gil-hutton@conicet.gov.ar



Resumen

La polarimetría es una de las técnicas observacionales que nos permite obtener información sobre las propiedades físicas de las superficies de los asteroides pero presenta la importante limitación de la dificultad y lentitud con que las observaciones polarimétricas se obtienen. Como consecuencia, la base de datos polarimétricos de asteroides fue muy pequeña hasta la década de 1990 y muy pocos objetos tenían en ese entonces sus parámetros polarimétricos bien determinados.

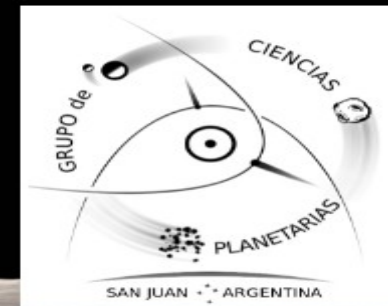
La mejora en el instrumental a partir de la década del 2000 permitió desarrollar varias campañas de observación con el objeto de incrementar la base de datos de observaciones y lograr la determinación de los parámetros polarimétricos para un mayor número de objetos.

En este trabajo se presenta la última versión del Catálogo de Curvas de Polarización de asteroides, el cual concentra unas 3400 observaciones para más de 500 objetos y lista los parámetros polarimétricos para más de 120 asteroides.

Catalogo de curvas de polarización

Grupo de Ciencias Planetarias Planetary Science Group

U.N.S.J - San Juan - Argentina



Principal

Integrantes

Investigación

Enlaces

Catalogue of asteroid polarization curves

Please make reference to: **R. Gil-Hutton (2017) Catalogue of asteroid polarization curves, presented at "Asteroid, Comets, Meteors 2017", Montevideo, Uruguay.**

Please take into account that the catalogue only includes observations made on filters V, R or similar. There are 5 groups:

- **Group A:** Asteroids with at least 5 measurements, excellent phase coverage and a polarization curve.
- **Group B:** Asteroids with at least 4 measurements, good phase coverage and a polarization curve.
- **Group C:** Asteroids with at least 3 measurements, regular phase coverage and a tentative polarization curve.
- **Group D:** Asteroids with at least 3 measurements and bad phase coverage.
- **Group E:** Asteroids with only 2 measurements.

The phase coverage is indicated in the list of objects for each group and it is characterized by a flag which indicate the existence ("X") or not ("O") of a polarimetric measurement in eight bins of phase angle (0 to 3 degrees, 3 to 6 degrees, 6 to 9 degrees, 9 to 12 degrees, 12 to 15 degrees, 15 to 18 degrees, 18 to 21 degrees and larger than 21 degrees). **The most urgent group to observe is the C since the asteroids in this group require only few observations to obtain a reliable polarization curve.**

<http://gcpsj.sdf-eu.org/catalogo.html>

Catalogo de curvas de polarización

Grupo de Ciencias Planetarias Planetary Science Group

U.N.S.J - San Juan - Argentina



Principal

Integrantes

Investigación

Enlaces

Catalogue of asteroid polarization curves

Please make reference to: **R. Gil-Hutton (2017) Catalogue of asteroid polarization curves, presented at "Asteroid, Comets, Meteors 2017", Montevideo, Uruguay.**

Please take into account that the catalogue only includes observations made on filters V, R or similar. There are 5 groups:

- **Group A:** Asteroids with at least 5 measurements, excellent phase coverage and a polarization curve.
- **Group B:** Asteroids with at least 4 measurements, good phase coverage and a polarization curve.
- **Group C:** Asteroids with at least 3 measurements, regular phase coverage and a tentative polarization curve.
- **Group D:** Asteroids with at least 3 measurements and bad phase coverage.

The catalogue is updated to December, 2021.

Total number of polarimetric measurements: 3418.

Total number of asteroids with polarization curves: 125.

Total number of asteroids with polarimetric measurements: 527.

ed
in
es,
ost
ew

Ejemplo para asteroides del grupo A

Group A:

In this group there are 37 asteroids. In [this file](#) you can find a summary for each asteroid with the minimum and maximum phase angles for which observations have been made, the total number of measurements, the flag indicating the phase angle coverage and a code indicating the group.

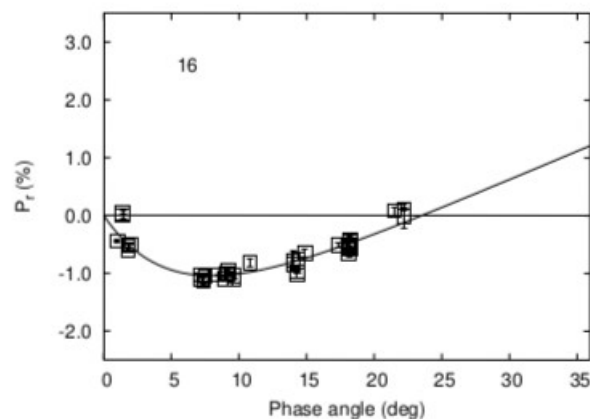
In the following table you can find for each asteroid a complete report, including a figure showing phase angle vs. Pr and the polarization curve, the list of available measurements with a reference to the original paper, the coefficients Coe1, Coe2 and Coe3 of the best fit and the polarimetric parameters of the object with their errors.

1	3	4	5	6	7	8
9	10	12	16	18	19	20
21	27	29	39	40	44	51
55	59	64	84	85	210	214
236	324	335	347	374	431	511
704	1021					

Ejemplo de reporte para un asteroide

Catalog of Asteroid Polarization Curves

Gil-Hutton (2018)



```
16 14.31 -1.03 0.04 R b
16 14.04 -0.78 0.16 V b
16 14.04 -0.85 0.08 R b
```

Polarization Curve Parameters:

The polarimetric parameters were obtained fitting the observations to a polarization curve using the function:

$$P_r(\alpha) = Coe_1 \times \left[\exp\left(-\frac{\alpha}{Coe_2}\right) - 1 \right] + Coe_3 \times \alpha,$$

where α is the phase angle in degrees. The minimum of the polarization curve is identified by Pmin, Phmin is the phase angle where Pmin is reached, Ph0 is the inversion angle, and k is the slope of the polarization curve at Ph0.

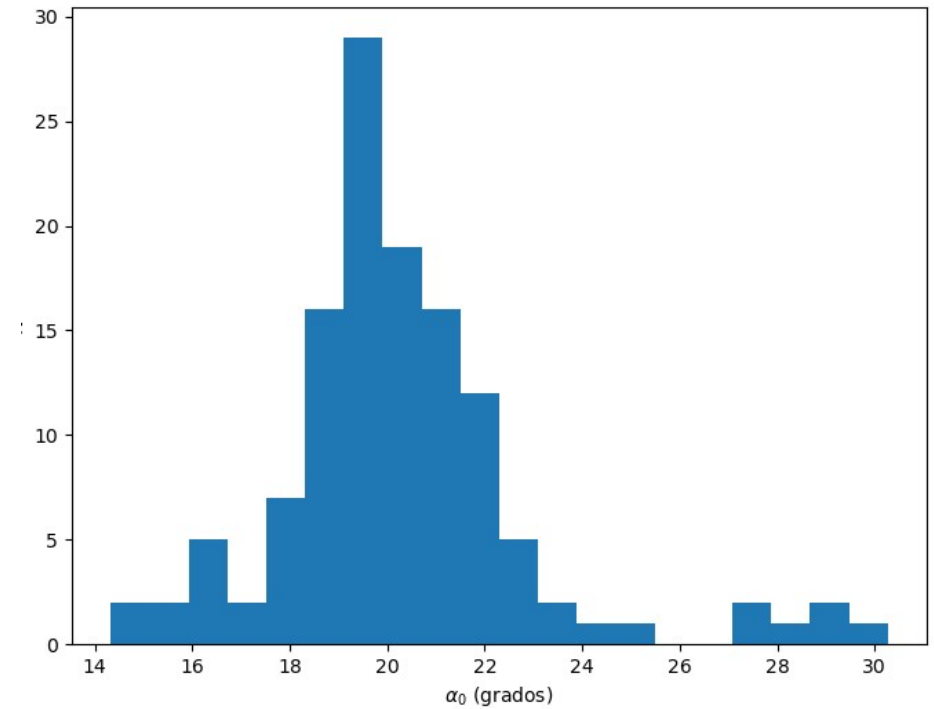
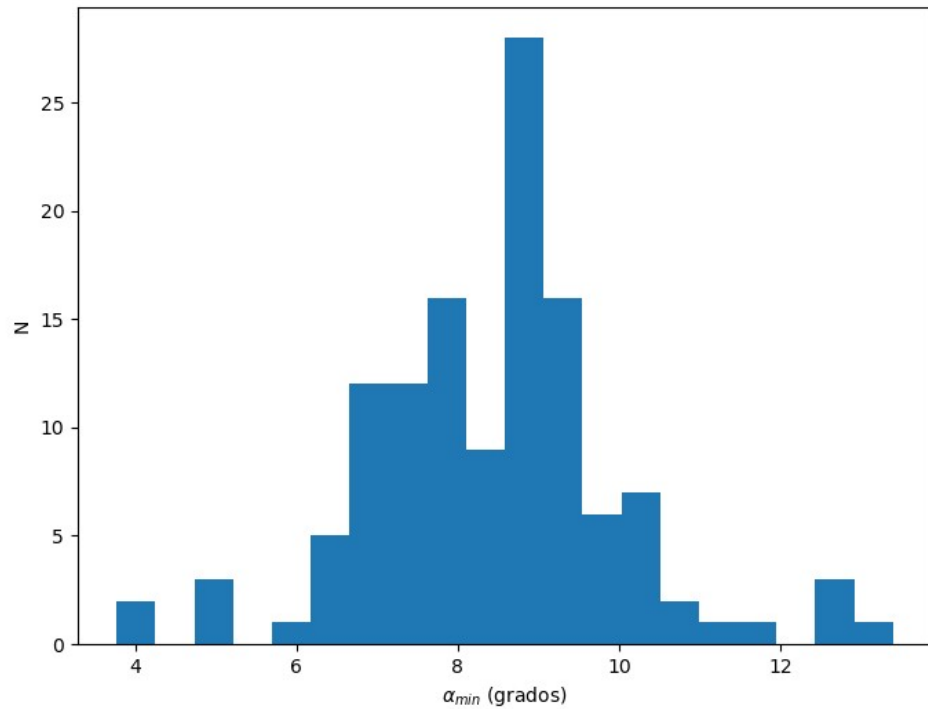
```
#
#   Coe1   eCoe1   Coe2   eCoe2   Coe3   eCoe3
#   2.3584  0.0760  5.3193  0.2012  0.0992  0.0036
#
#   Phmin  err  Pmin  err  Ph0  err  k  err
#   7.96  0.28 -1.041  0.072  23.48  0.43  0.0938  0.0037
```

Polarimetric data:

The columns list the object number, the phase angle (degrees), P_r (%), its error, the filter used, and the reference code.

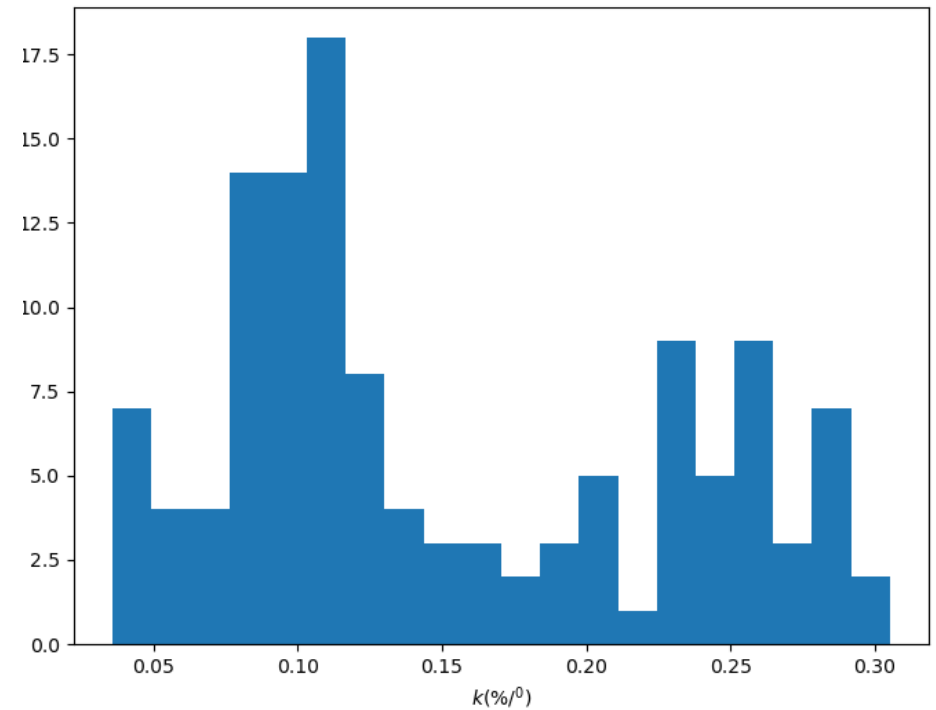
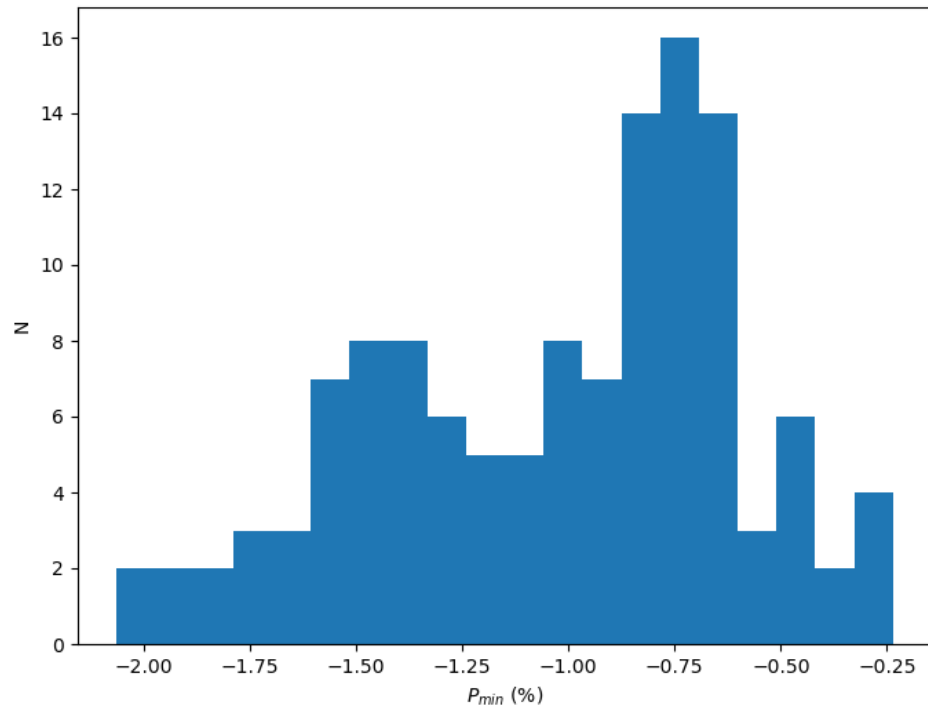
```
16 7.20 -1.03 0.01 V c
16 7.50 -1.05 0.01 V c
16 17.39 -0.51 0.03 G a
16 14.89 -0.65 0.07 G a
16 9.19 -1.02 0.03 G a
16 9.09 -0.99 0.02 G a
16 14.40 -0.74 0.03 G a
```

Distribuciones de parámetros polarimétricos



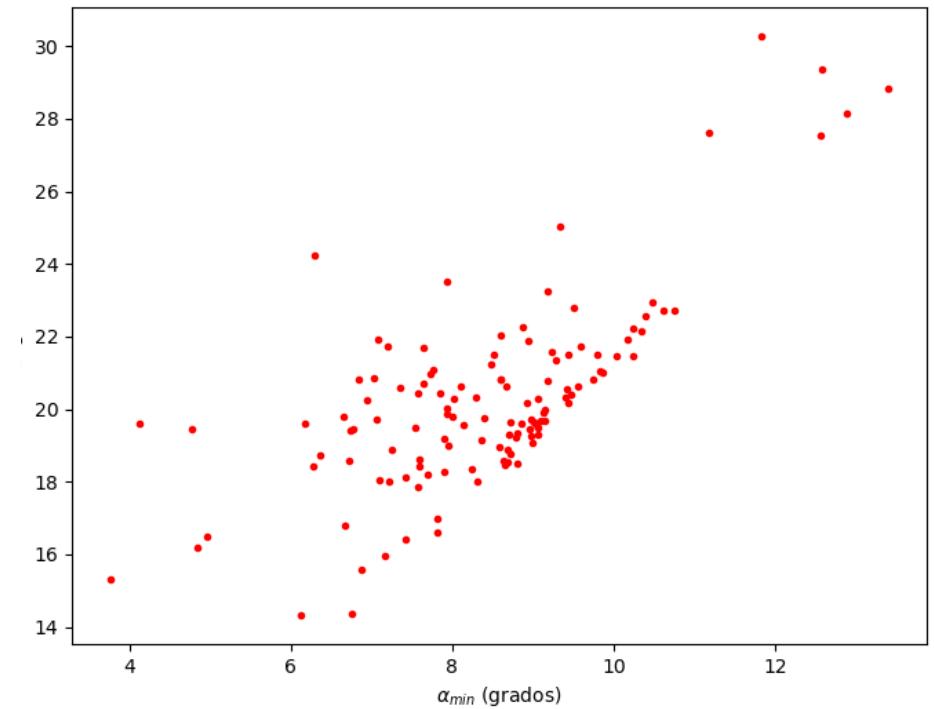
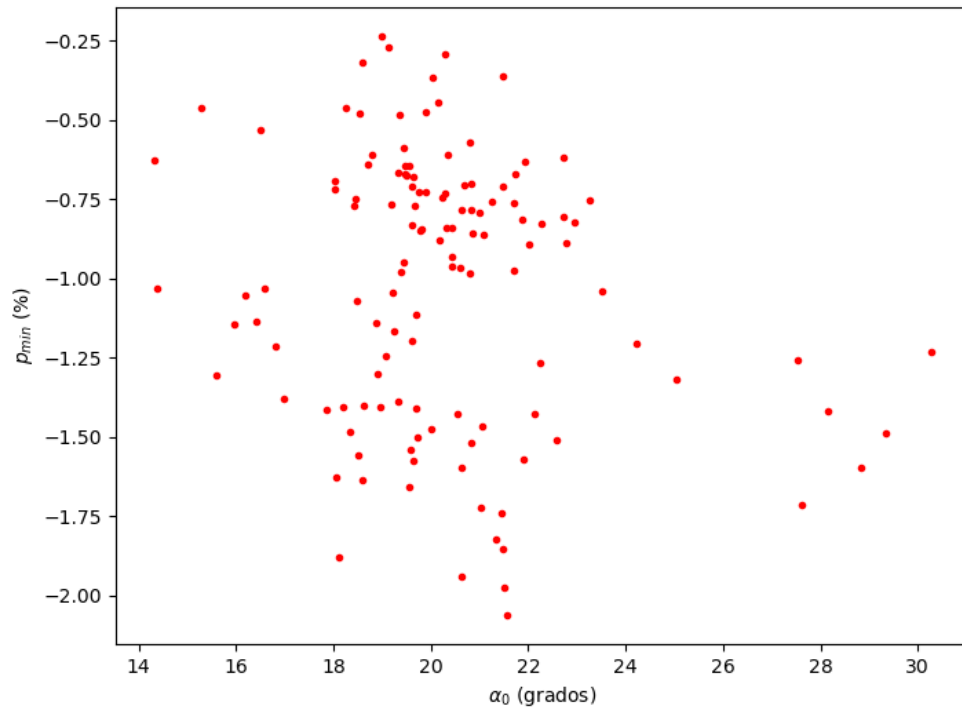
Grupos A y B del catálogo

Distribuciones de parámetros polarimétricos



Grupos A y B del catálogo

Distribuciones de parámetros polarimétricos



Grupos A y B del catálogo

Conclusiones y trabajo futuro

- Incluir el mayor número de datos publicados de manera periódica.
- Incluir en un futuro observaciones en otras bandas.
- Mejorar las curvas de polarización de los asteroides en el grupo B para lograr mayor precisión en sus parámetros polarimétricos.
- Incrementar el número de observaciones disponibles para los objetos del grupo C para obtener curvas de polarización confiables.