EXCELENCIA SEVERO OCHOA

NEAs observations at the IAC

Javier Licandro & Julia de León
Instituto de Astrofísica de Canarias

EURONEAR

Visible and near-Infrared spectra of low -ΔV NEAs :

Web page maintained by the Jet Propulsion Laboratory (JPL)

Observational program to obtain VNIR spectra using **ACAM** and **LIRIS** instruments at the **4.2m William Herschel Telescope (WHT)** – El Roque de los Muchachos Observatory (La Palma)

INSTITUTO DE ASTROFÍSICA DE CANARIAS

38200 La Laguna, Tenerife, (Islas Canarias)
Teléfono: 922 605 200 - Fax: 922 605 210

PETICIÓN DE TIEMPO DE OBSERVACIÓN (CAT NOCTURNO)

CAT Español

Observatorios del Roque de Los Muchachos y del Teide

1. Título

Compositinal characterization of low-deltaV near-Earth asteroids

2. Datos personales

2.1. Investigador principal

Julia de Leon Cruz

Telescopio	Instrumento	Noches/Disp.	Horas	Luna
WHT	LIRIS	2 Noc.	9	A
Cfg. instr.: Spec lr-zj + lr-hk 2.5" slit		**I. 2ario:**		
WHT	ACAM	2 Noc.	9	A
Cfg. instr.: Spec V400 + 2.5" slit		**I. 2ario:**		**I. visit.:**

Semesters 2015A and 2015B
4 nights each semester

15 NEAs observed so far

Visible spectra using 10.4m GTC of potential targets for the NASA Asteroid Initiative

An e-mail alert is received from the PI of the mission (Paul Abel) every time a newly discovered NEA fulfils the requirements to become a potential target for the human exploration programme

INSTITUTO DE ASTROFÍSICA DE CANARIAS

38200 La Laguna, Tenerife, (Islas Canarias)
Teléfono: 922 605 200 - Fax: 922 605 210

PETICIÓN DE TIEMPO DE OBSERVACIÓN (CAT NOCTURNO)

CAT Español - ToO

Observatorios del Roque de Los Muchachos y del Teide

1. Título

NASA Asteroid Initiative: visible spectra of NEAs using the GTC

2. Datos personales

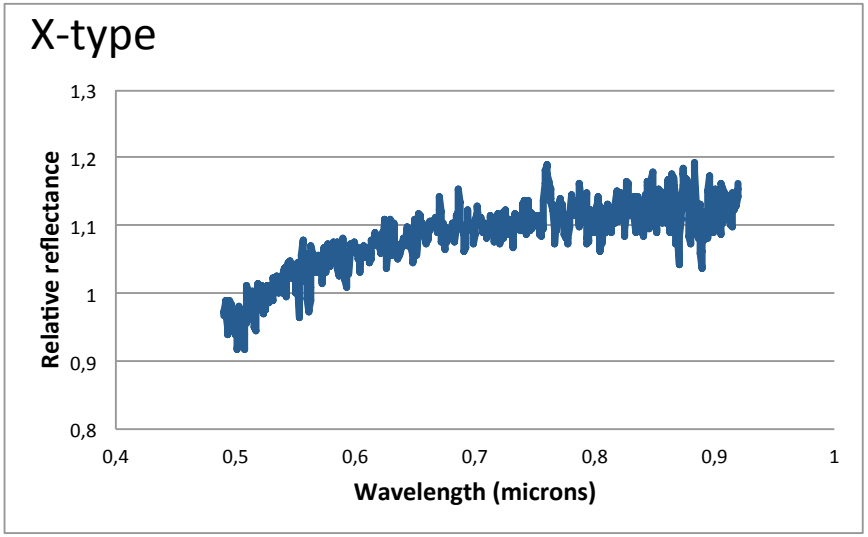
2.1. Investigador principal

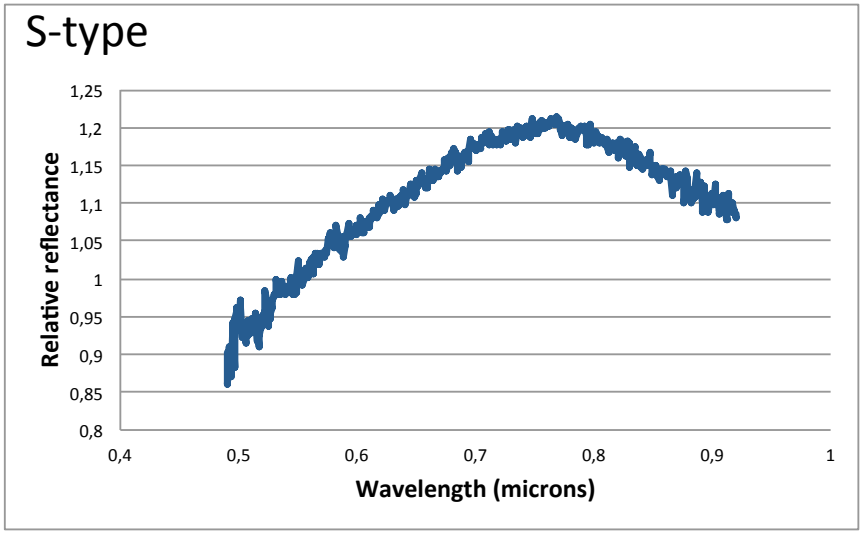
Julia de Leon Cruz

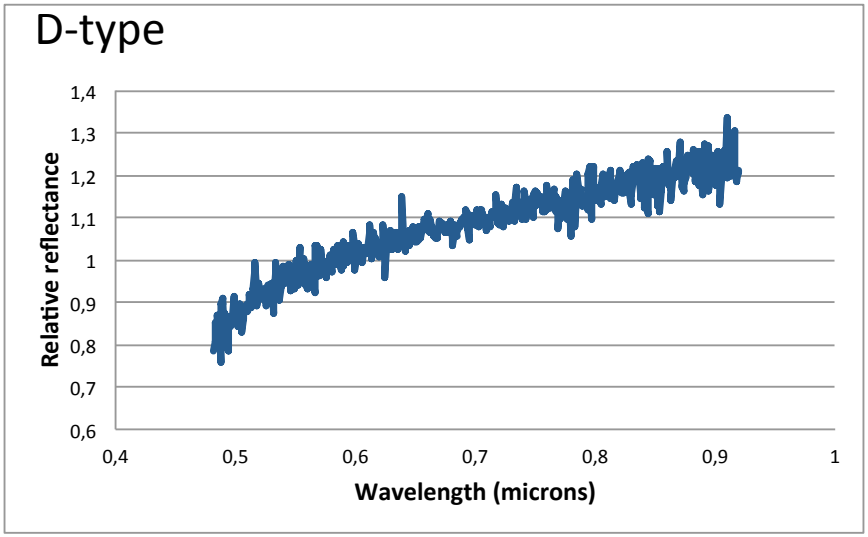
10 hours awarded for 2015B
Visible spectra using OSIRIS@GTC
10 NEAs observed so far

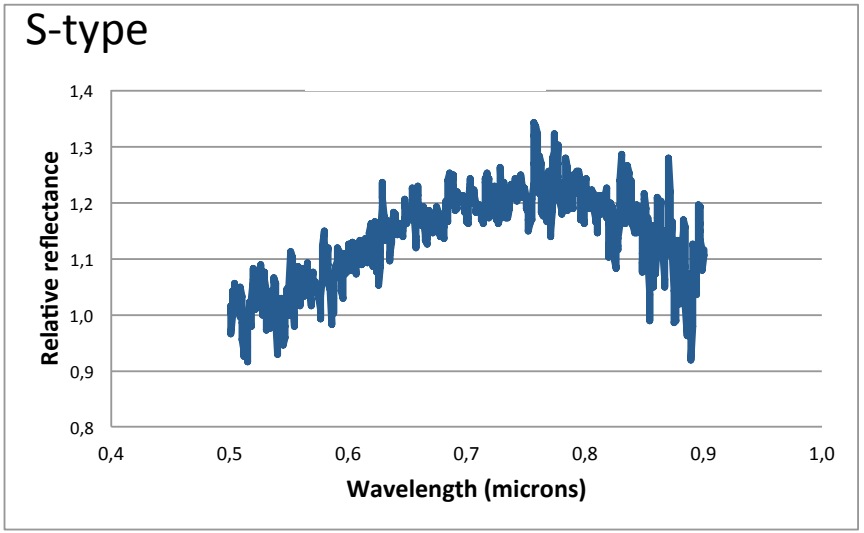
Telescopio	Instrumento	Noches/Disp.	Horas	Luna	Fechas óptimas	Fechas imposibles
GTC	Osiris	10 Dis.	1	A		
Cfg. instr.: R300R grism + 5" slit		**I. 2ario:**			**I. visit.:**	
Modo Obs.: Colas		**Seeing:** 0		**Cobertura:** Cualq.	**Vapor de agua:**	

Visible spectra using 10.4m GTC of potential targets for the NASA ARM mission



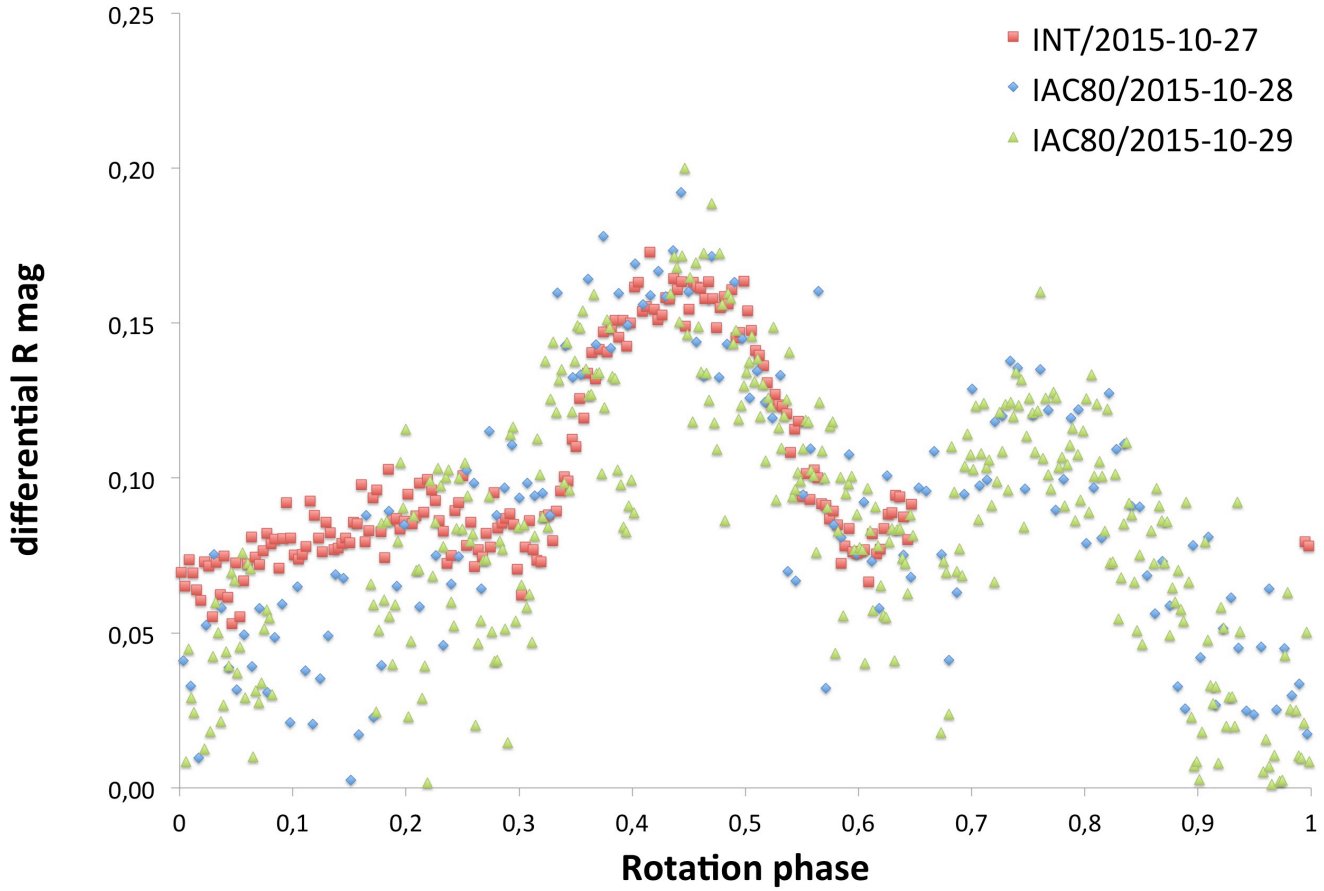






Time-series Photometry of selected NEAs

We also use INT, IAC-80 an other 1m-class or smaller telescopes to obtain lightcurves



EXCELENCIA SEVERO OCHOA

IAC Winter School 2016

Solar System Exploration

November 7-16th, 2016

Javier Licandro & Julia de León
Contact: jlicandr@iac.es

Visible and near-Infrared spectra of low -ΔV NEAs

List of NEAs considered as potential targets for space missions: web page maintained by the Jet Propulsion Laboratory (JPL)

Near-Earth Asteroid Delta-V for Spacecraft Rendezvous

Delta-V is computed following the approach described by Shoemaker and Helin (1978),
Earth-approaching asteroids as targets for exploration, NASA CP-2053, pp. 245-256.

Last update: Wed Jan 20 12:16:56 PST 2016
Source for NEA orbits: Minor Planet Center
http://www.minorplanetcenter.org/iau/lists/Atens.html
http://www.minorplanetcenter.org/iau/lists/Apollos.html
http://www.minorplanetcenter.org/iau/lists/Amors.html

Calculations by Lance A. M. Benner
Jet Propulsion Laboratory, California Institute of Technology
http://echo.jpl.nasa.gov/~lance/delta_v/delta_v.rendezvous.html

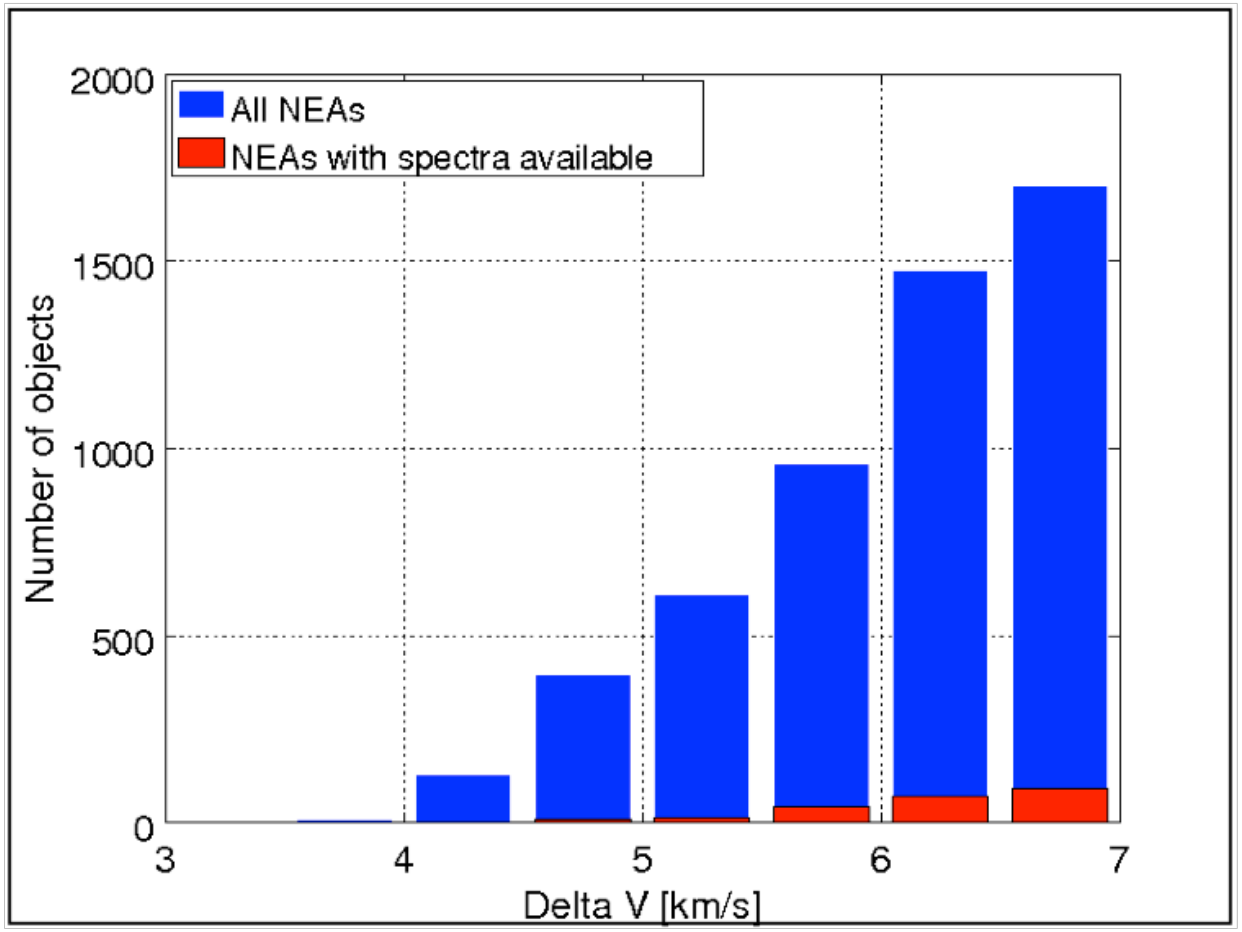
N = 13626

For comparison, delta-v for transferring from low-Earth orbit to rendezvous
with the Moon and Mars:
Moon: 6.0 km/s
Mars: 6.3 km/s

RANK	PERCENTILE	ASTEROID NAME	PROVISIONAL DESIGNATION	DELTA-V (KM/S)	DELTA-V (ASTEROID)/ DELTA-V FOR THE MOON	DELTA-V (ASTEROID)/ DELTA-V FOR MARS	H (mag)	a (AU)	e	i (deg)	
1	99.99		2006 RH120	3.813	0.635	0.605	29.5	1.033	0.025	0.6	RADAR
2	99.99		2007 UN12	3.823	0.637	0.607	28.7	1.054	0.060	0.2	
3	99.98		2010 UE51	3.829	0.638	0.608	28.3	1.055	0.060	0.6	
4	99.97		2012 TF79	3.867	0.644	0.614	27.4	1.050	0.038	1.0	
5	99.96		2009 BD	3.870	0.645	0.614	28.1	1.062	0.052	1.3	

Visible and near-Infrared spectra of low -ΔV NEAs

There is a considerable lack of NEAs with published visible and/or near-infrared spectra (less than **5%** from the total by **2015**)



Visible spectra using 10.4m GTC of potential targets for the NASA ARM mission

NASA Asteroid Redirect Mission (ARM): The ARM consists of two mission segments: 1.) the ARRM, the first robotic mission to visit a large (greater than ~100 m diameter) near-Earth asteroid (NEA), collect a multi-ton boulder from its surface along with regolith samples, and return the asteroidal material to a stable orbit around the Moon; and 2.) the Asteroid Redirect Crewed Mission (ARCM), in which astronauts will explore the boulder and return to Earth with samples .