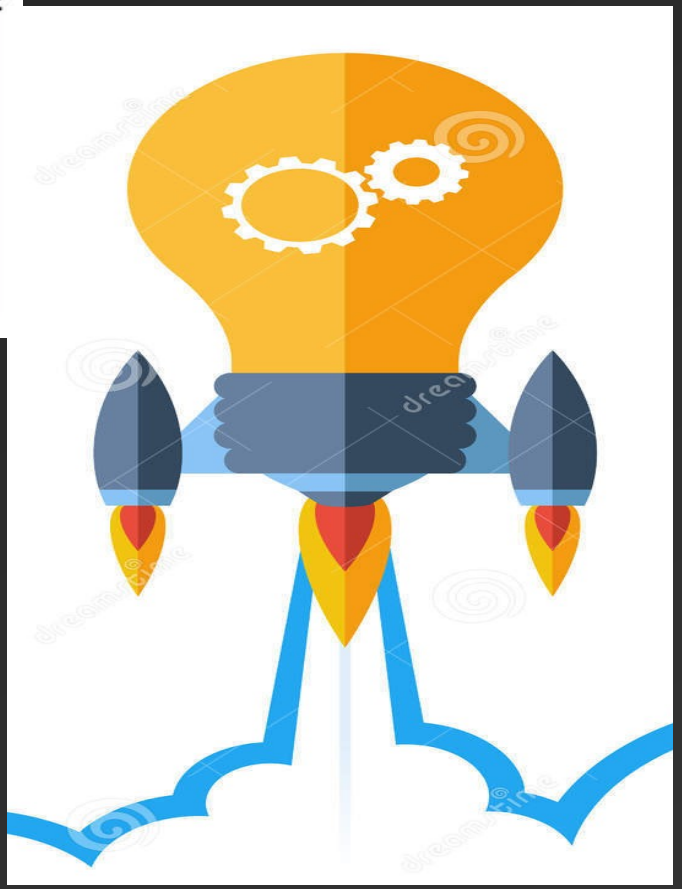
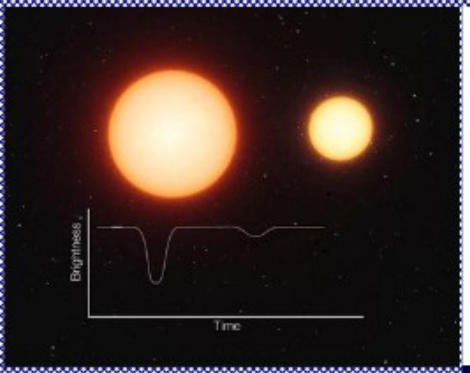
Finishing NITZA

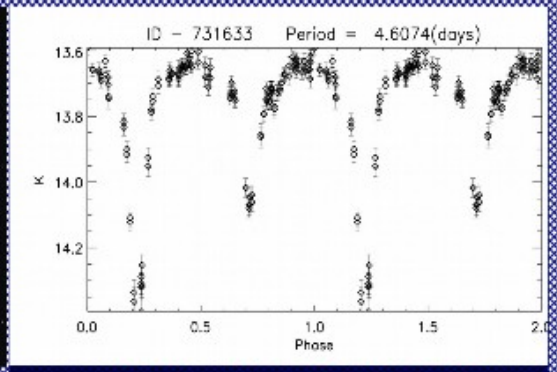
New Ideas



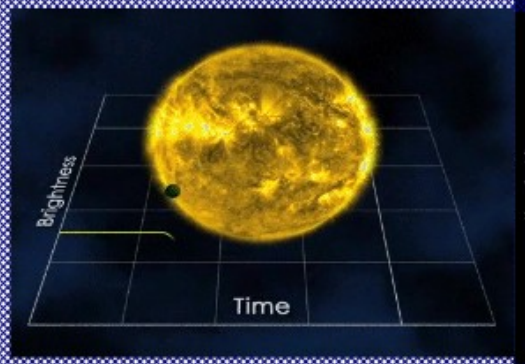
Carlos Eduardo Ferreira Lopes
Francisco Jablonski

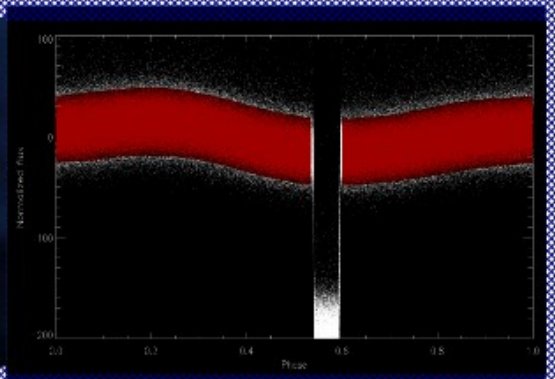
1. Motivações



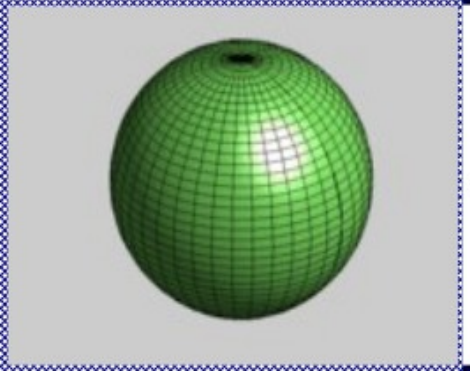


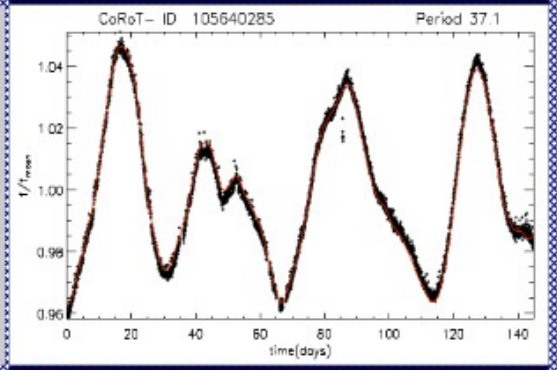
VVV – Ferreira Lopes



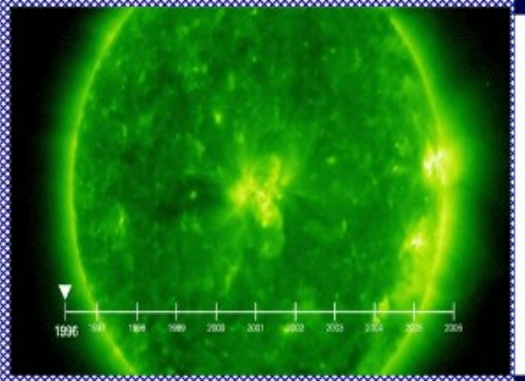


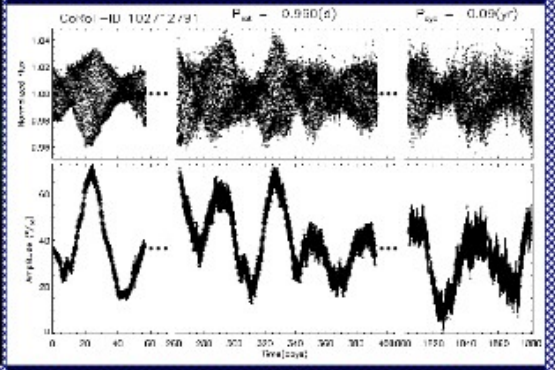
Almeida et al. in prep.



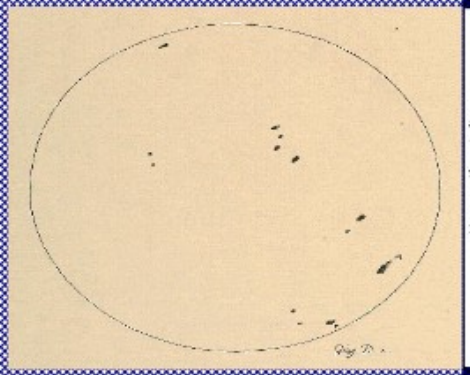


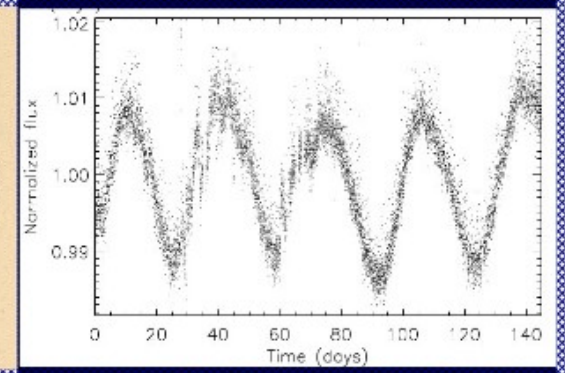
Ferreira Lopes et al. 2015A



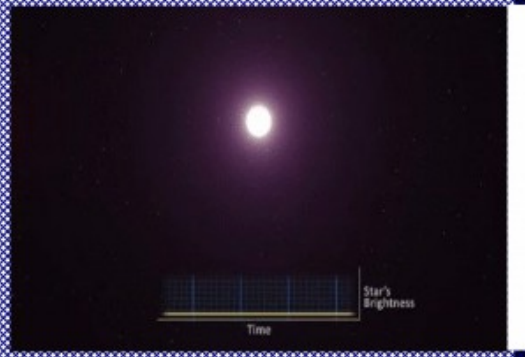


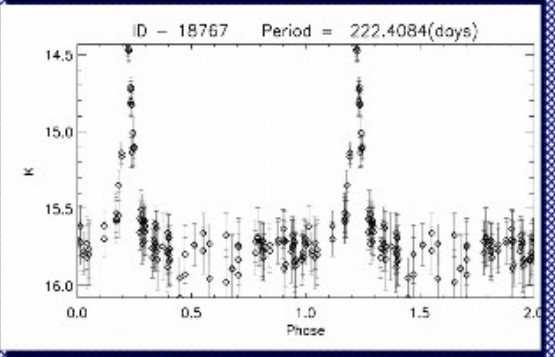
Ferreira Lopes et al. 2015B





De Medeiros et al. 2013

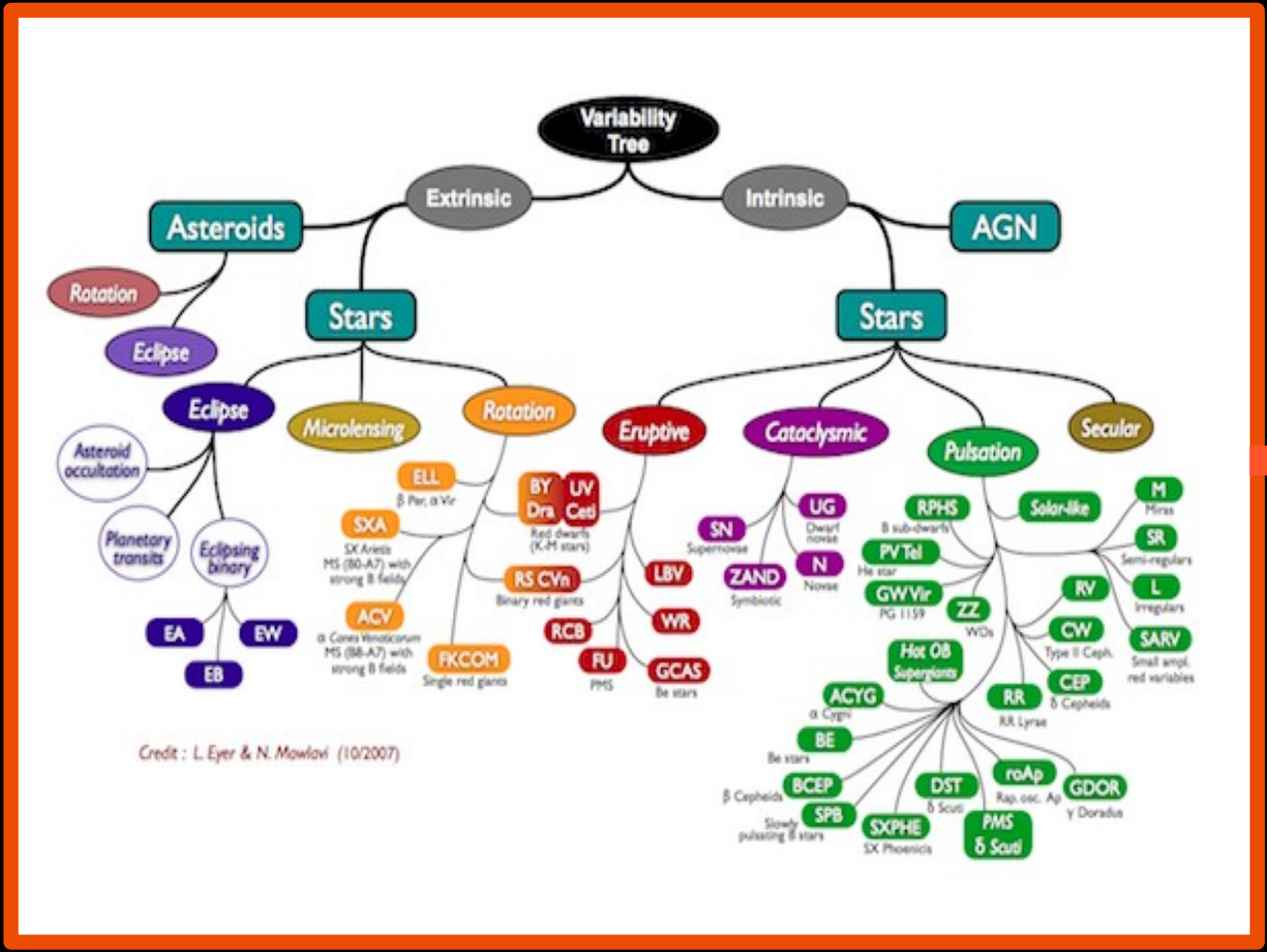




VVV – Ferreira Lopes

Data mining on photometric surveys

Preliminar Selection → Period search → Relevant data → Classification



Survey

Gaia,VVV,LSSt,..

Methods

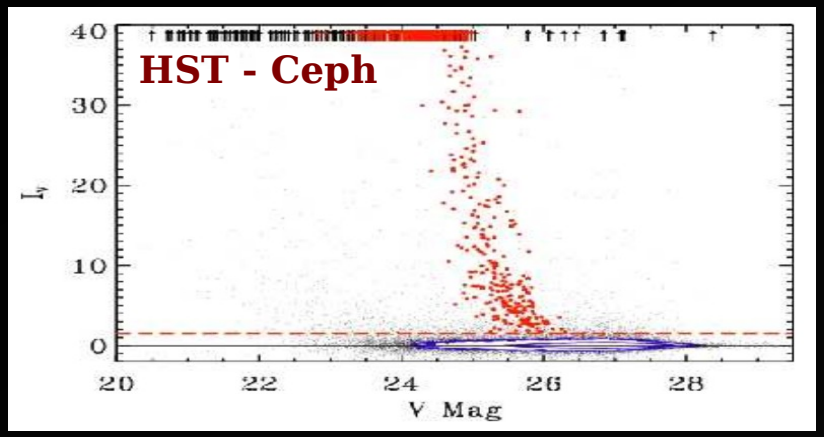
Stetson,Chi2,..

Results

Completeness?
Reliable?
Visual inspection..

Coffee taste good?
Flavors,
Temperture,
Water...

Lack of a single agreed methodology



Benjamin et al. 2011

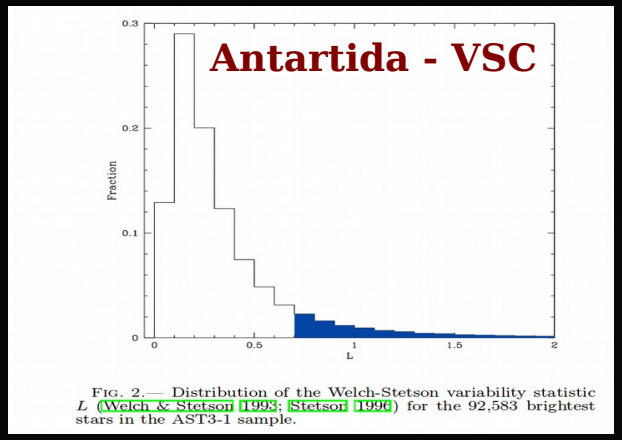
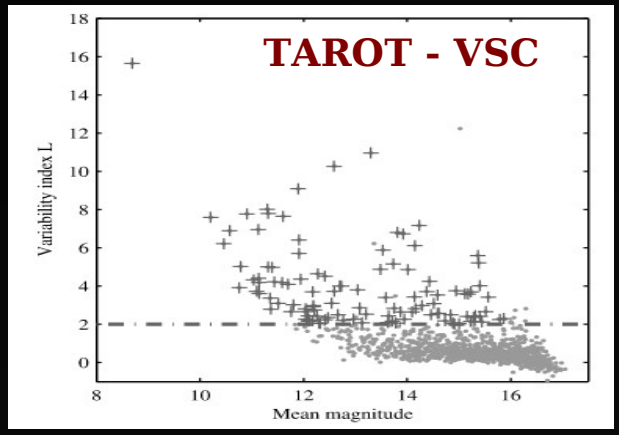
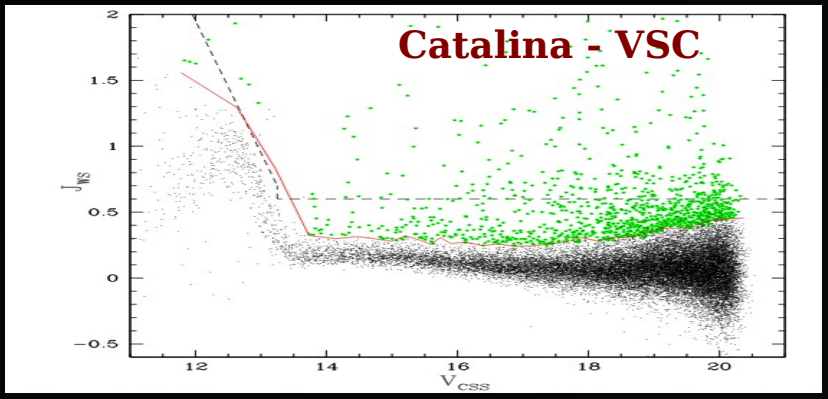


FIG. 2.— Distribution of the Welch-Stetson variability statistic L (Welch & Stetson 1993; Stetson 1996) for the 92,583 brightest stars in the AST3-1 sample.

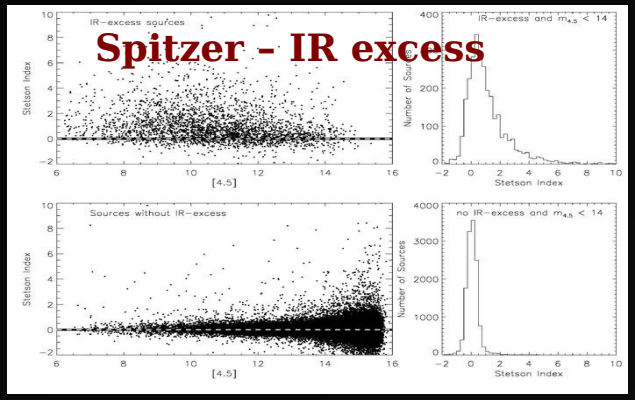
Wang et al. 2017



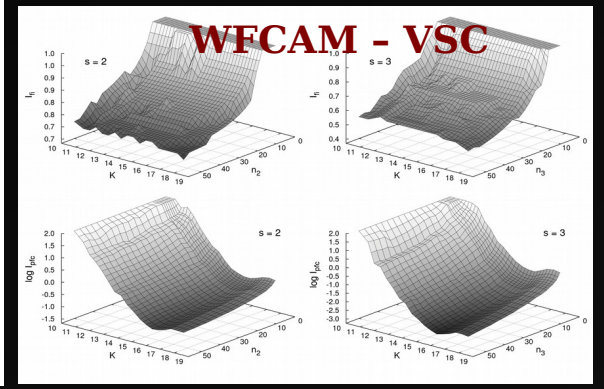
Damerdj et al. 2007



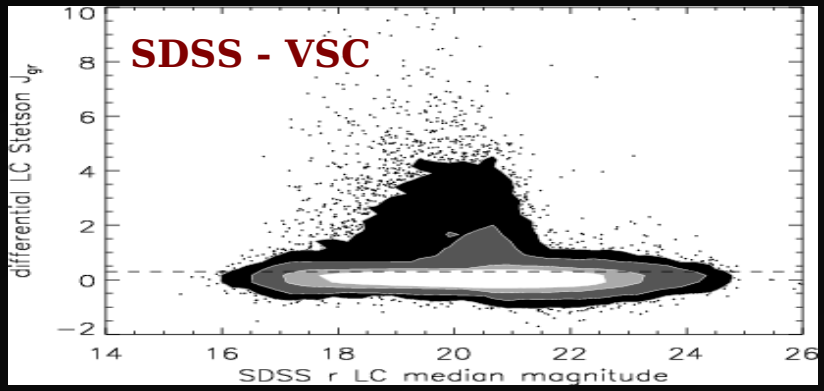
Drake et al. 2014



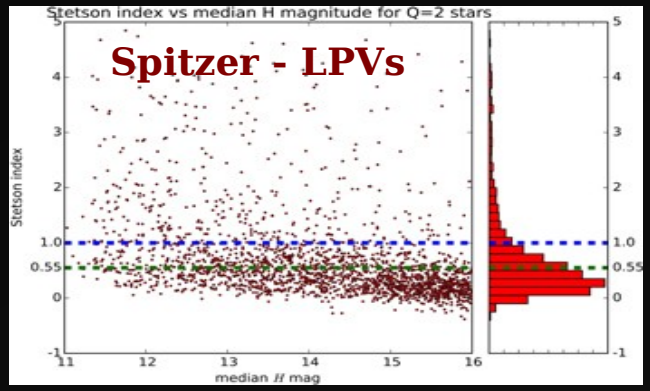
Marrgharet et al. 2012



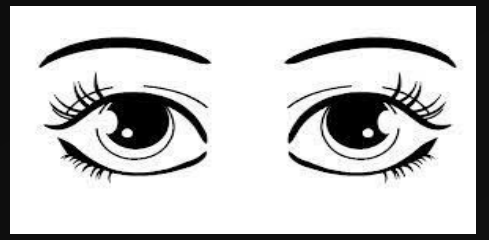
Ferreira Lopes et al. 2015



Bhatti et al. 2010

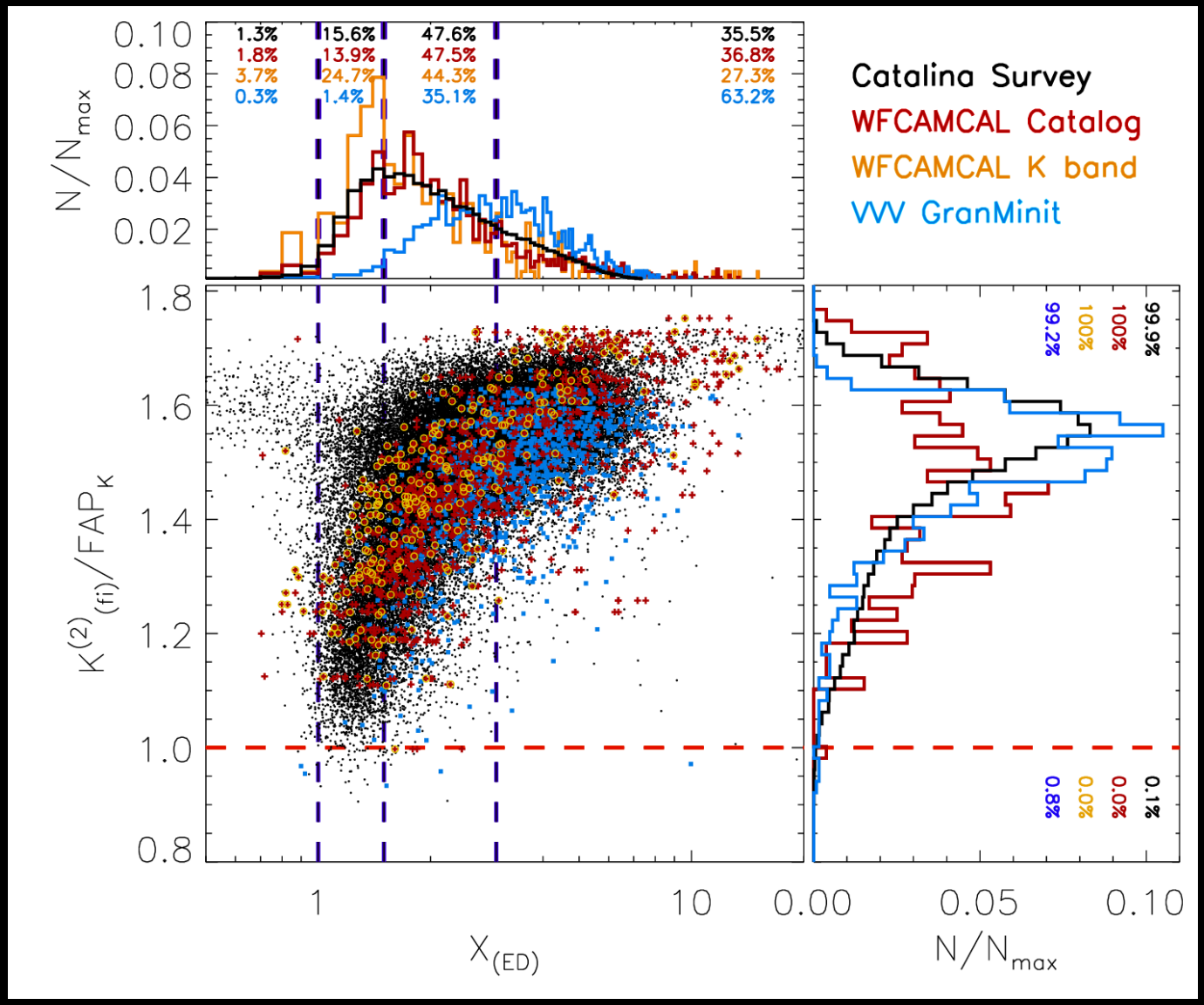


Rice et al. 2015



Preliminar Selection

Uniform and general way to select targets !!!



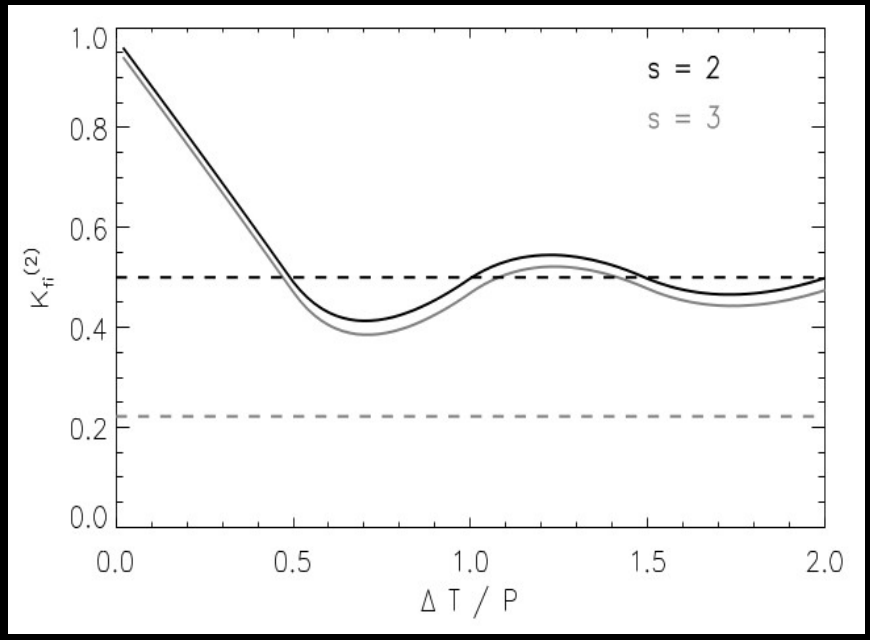
Ferreira Lopes et al 2016-2017-2018

Playing with the norms....

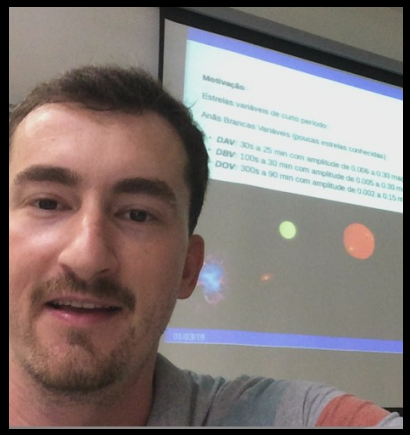
Searching LPVs (PhD Thesis)....

Marcio Catelan

Fatemeh Nikzat

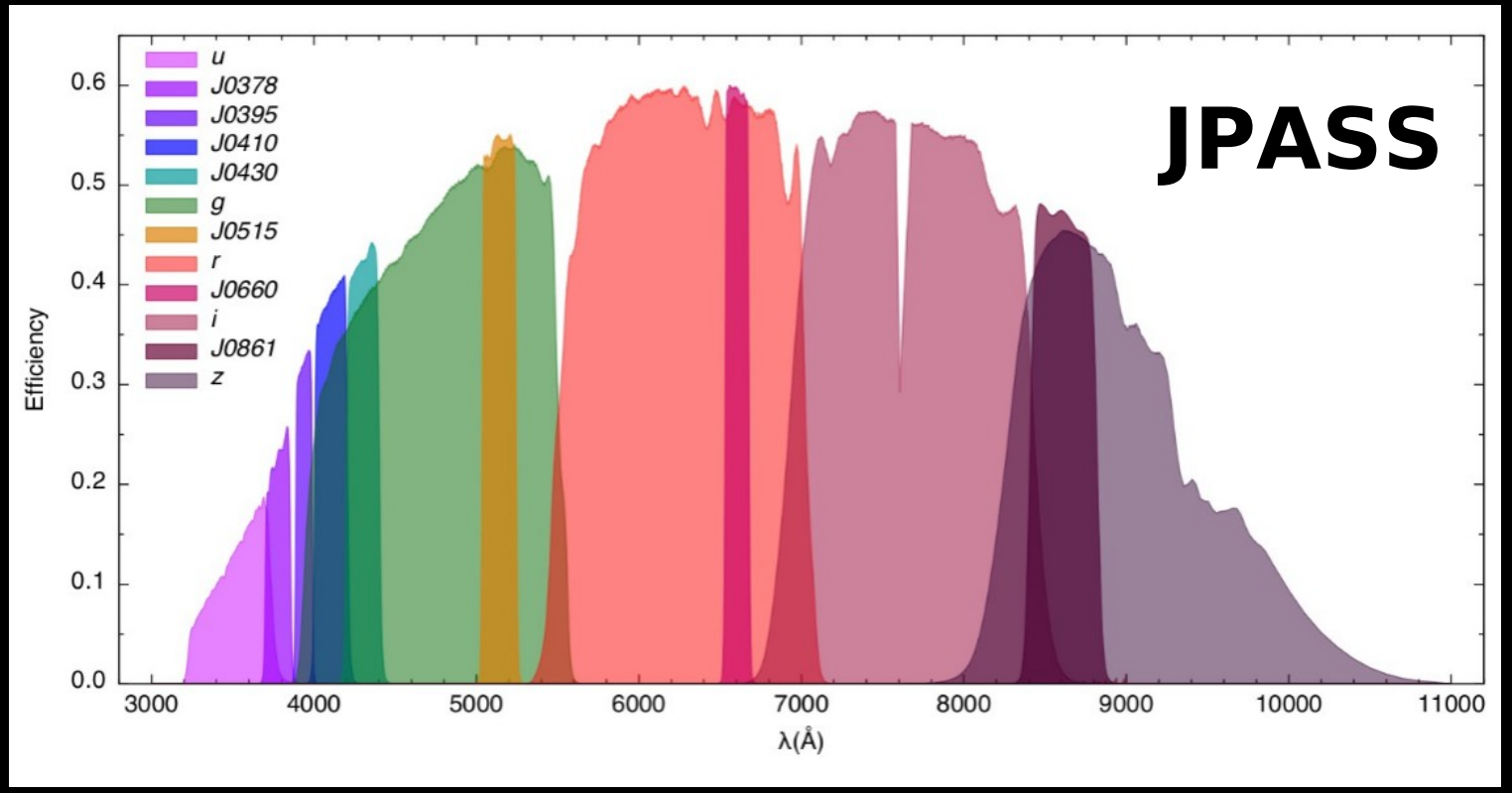


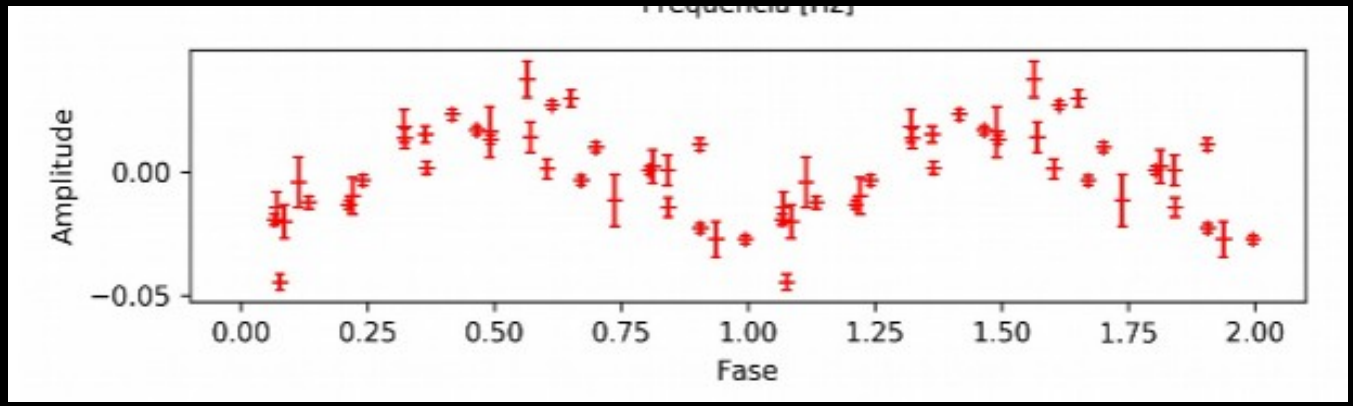
Exploring new ideas (PhD Thesis)....



Everton Botan

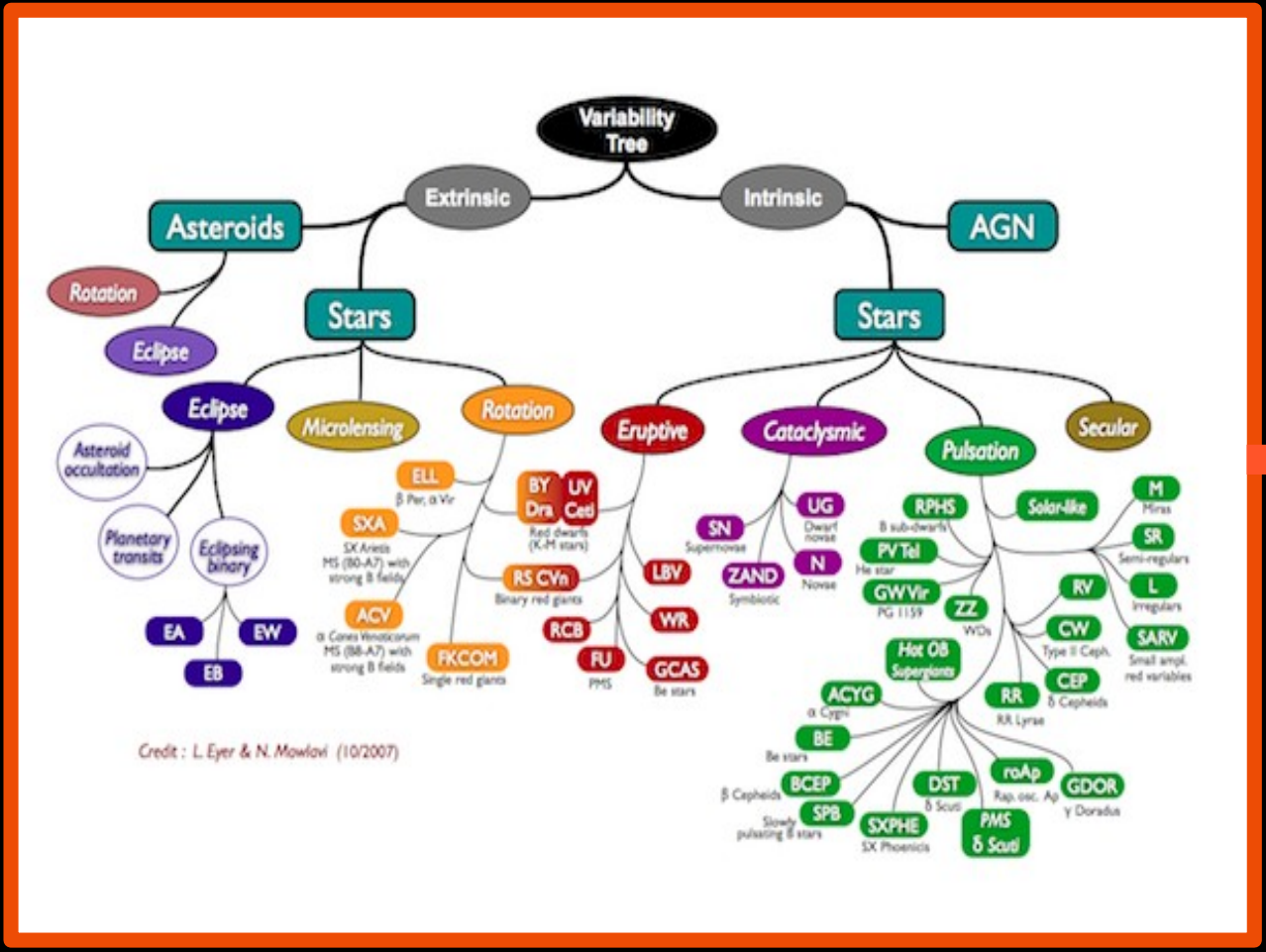
Antonio Kanaan





Data mining on photometric surveys

Preliminar Selection → **Period search** → **Relevant data** → **Classification**



Period search

What are the best constraints ?

Survey	$f_{min}(d^{-1})$	$f_{max}(d^{-1})$	$\overline{T_{tot}}(d)$	N_f
CoRoT	$2/T_{tot}$	3	~ 136	2×10^3
GAIA	$2/T_{tot}$	3.9	~ 1700	$\sim 3\times10^3$
Kepler	$\sim 3/T_{tot}$	1	~ 90	1300
OGLE	0	24	~ 2780	10^4
TAROT[1]	$2/T_{tot}$	f_{max}	~ 900	10^5
WFCAM[2]	$2/T_{tot}$	f_{max}	~ 1058	10^5

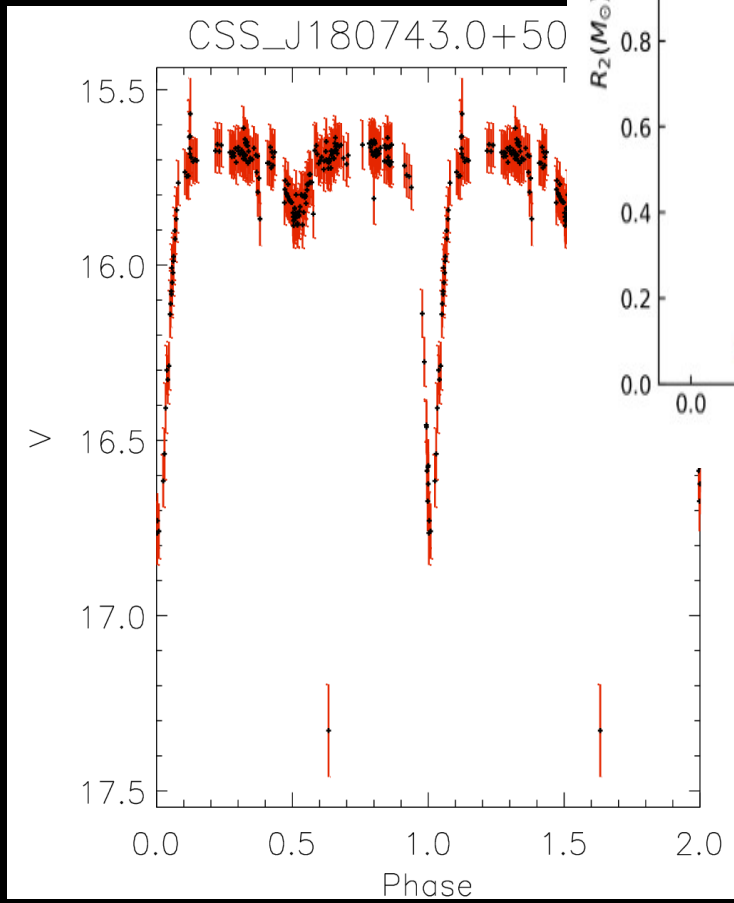
$$N_f \simeq \frac{f_{max}\times T_{tot}}{\delta_\phi}$$

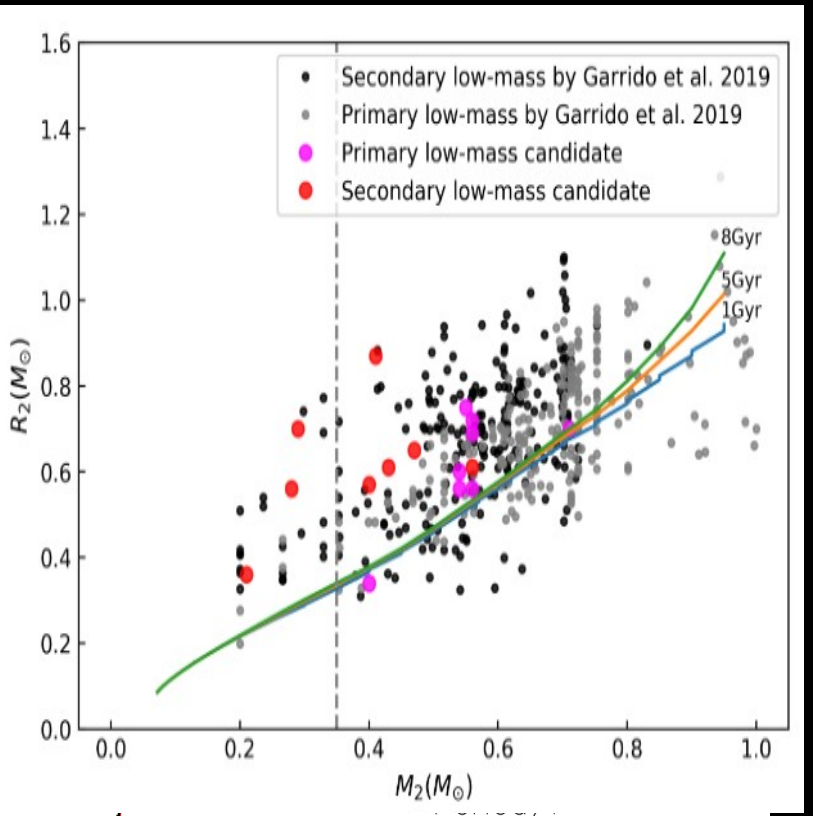
Period search

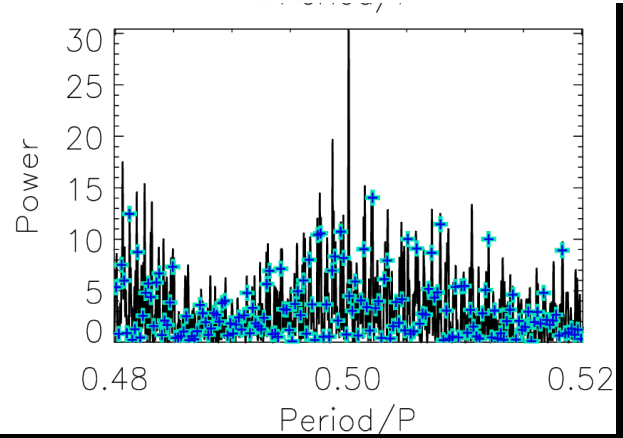
Detecting missing signals (Oliveira et al. in prep.)

Aysses Olieira

Athanasious Papageorgios



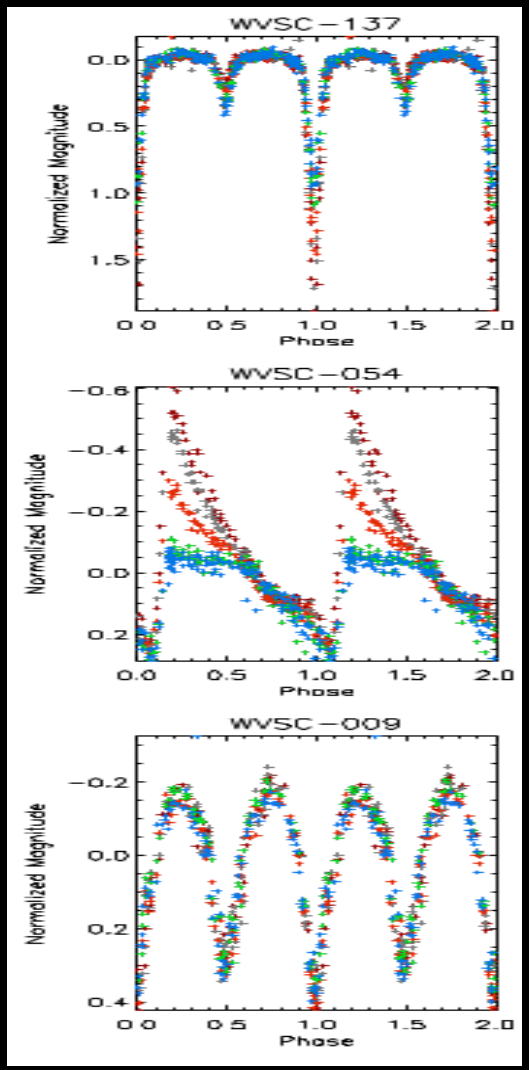




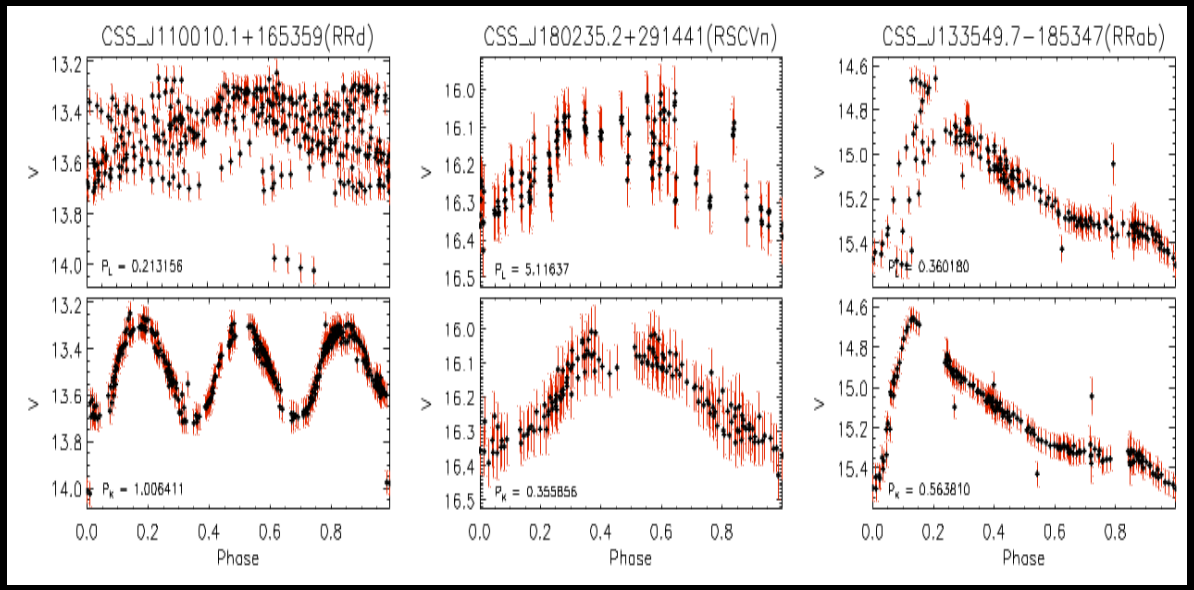
Period search

New method to search varaibility periods

Multiwaveband method



Previous methods



Our method

Ferreira Lopes et al 2019 - submited

LPVs (Molina 2019)
SMC (Ita 2018)
Hubble data (Moreti 2018)
VAST (Solkoviski 2016-2017-2018)
Machine Learning (Pashchenko 2018)
....

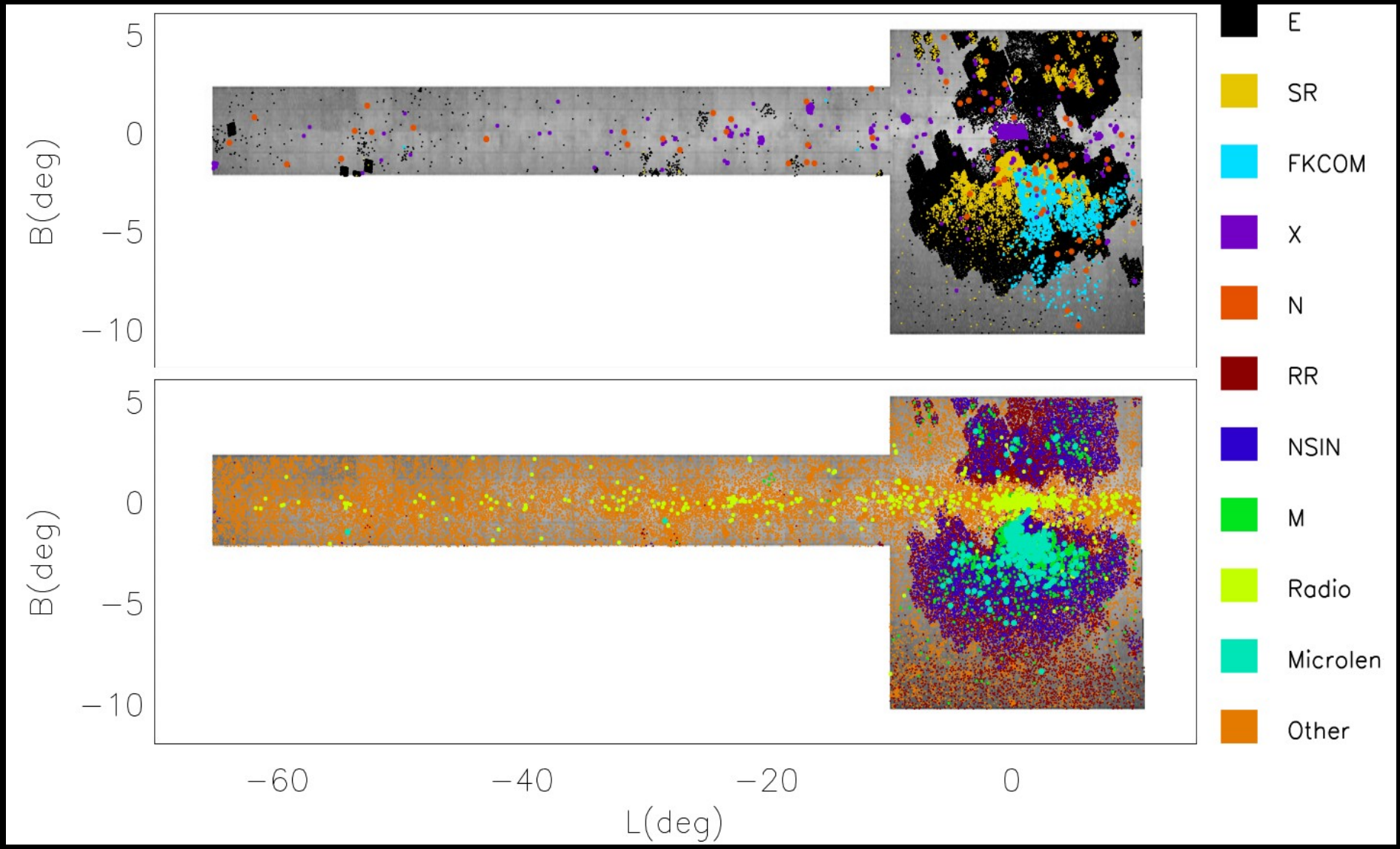
Summary of this project

Three PhD projects are using these resutls.

VVV project...

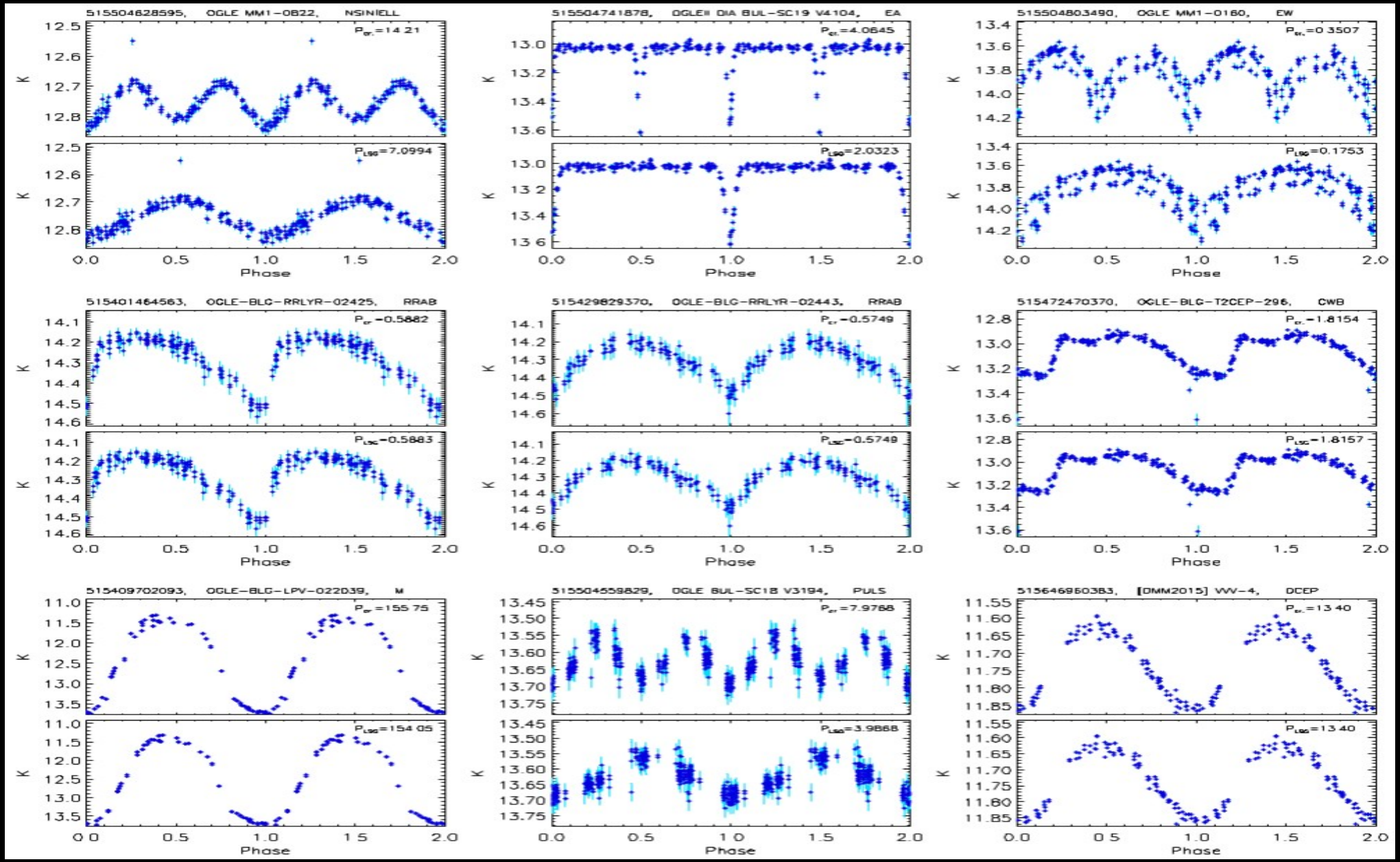
Final test

45 Million variable stars in the VVV survey – Ferreira Lopes et al in prep.

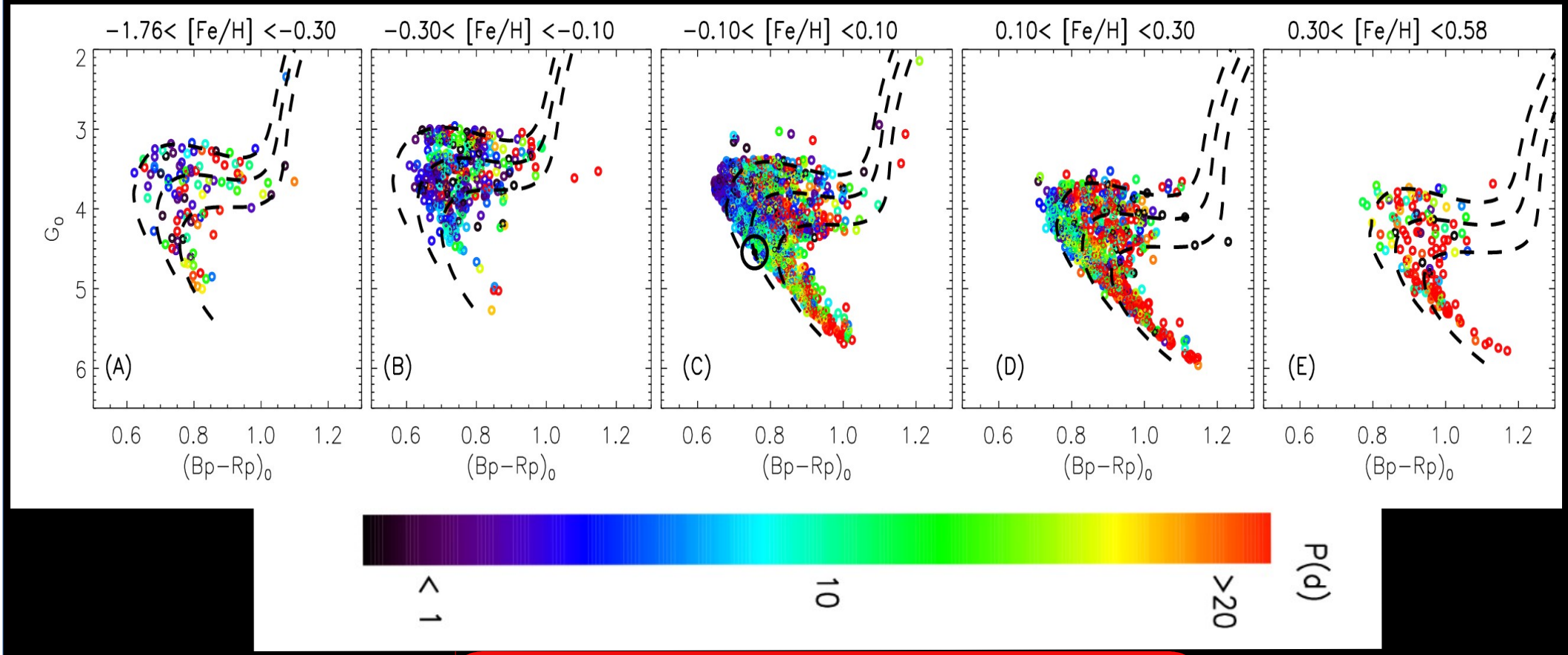


Final test

45 Million variable stars in the VVV survey – Ferreira Lopes et al submited

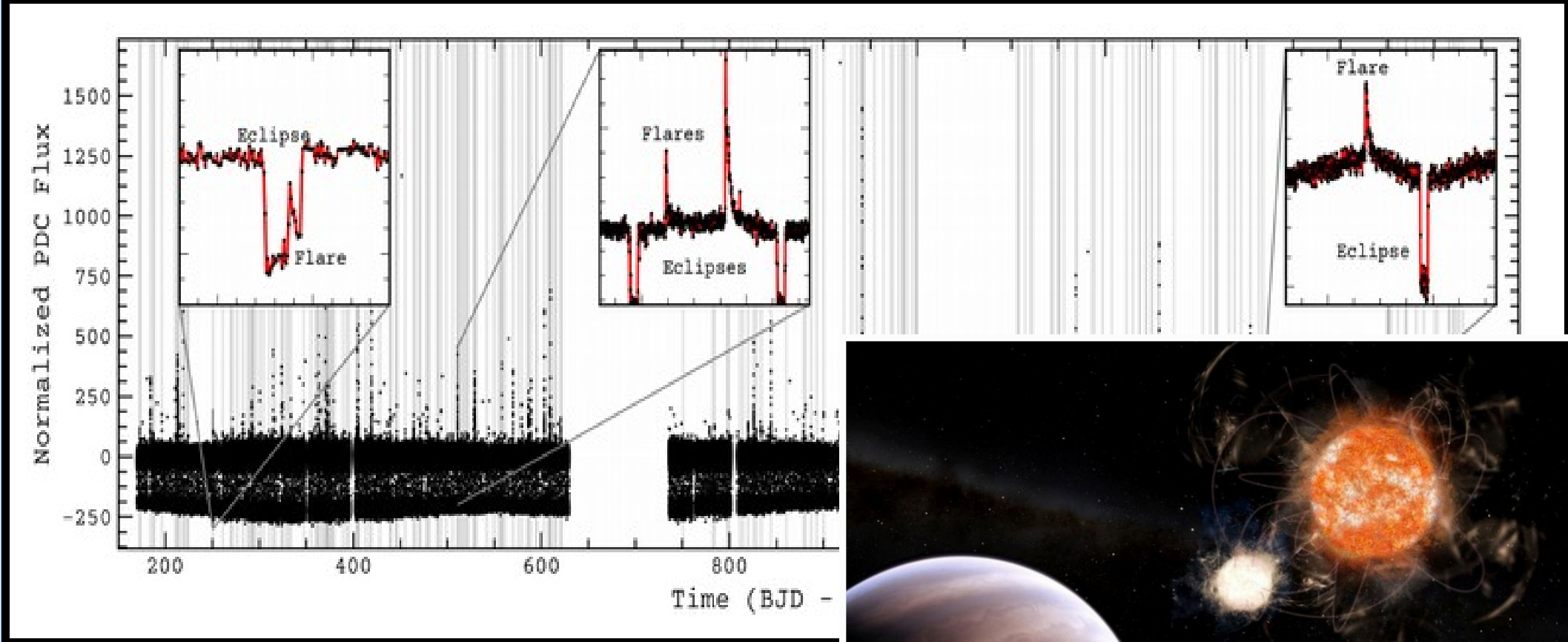


Correlações entre rotação estelar e metalicidade - Cortes et al in preparation Gaia+Kepler+LAMOST



Períodos de rotação

Applegate versus Magnetic cycles
Almeida et al. 2019



Brazilian researchers have identified robust signs of the existence of a giant object in the Cygnus constellation orbiting a binary system of a live star and a white dwarf. LEANDRO ALMEIDA

New Type II Cepheids from VVV data towards the Galactic center Braga et al 2019 - submited

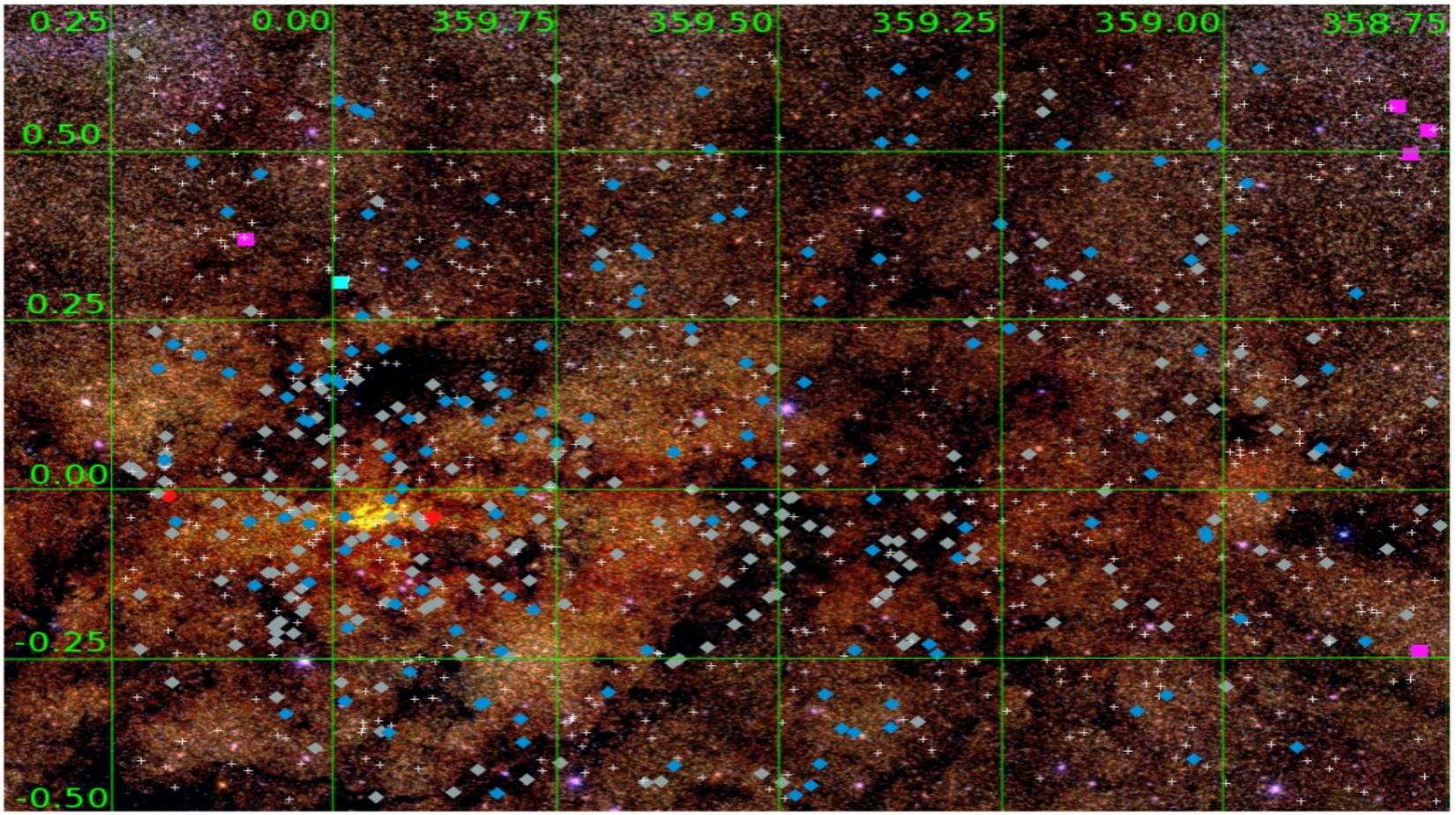
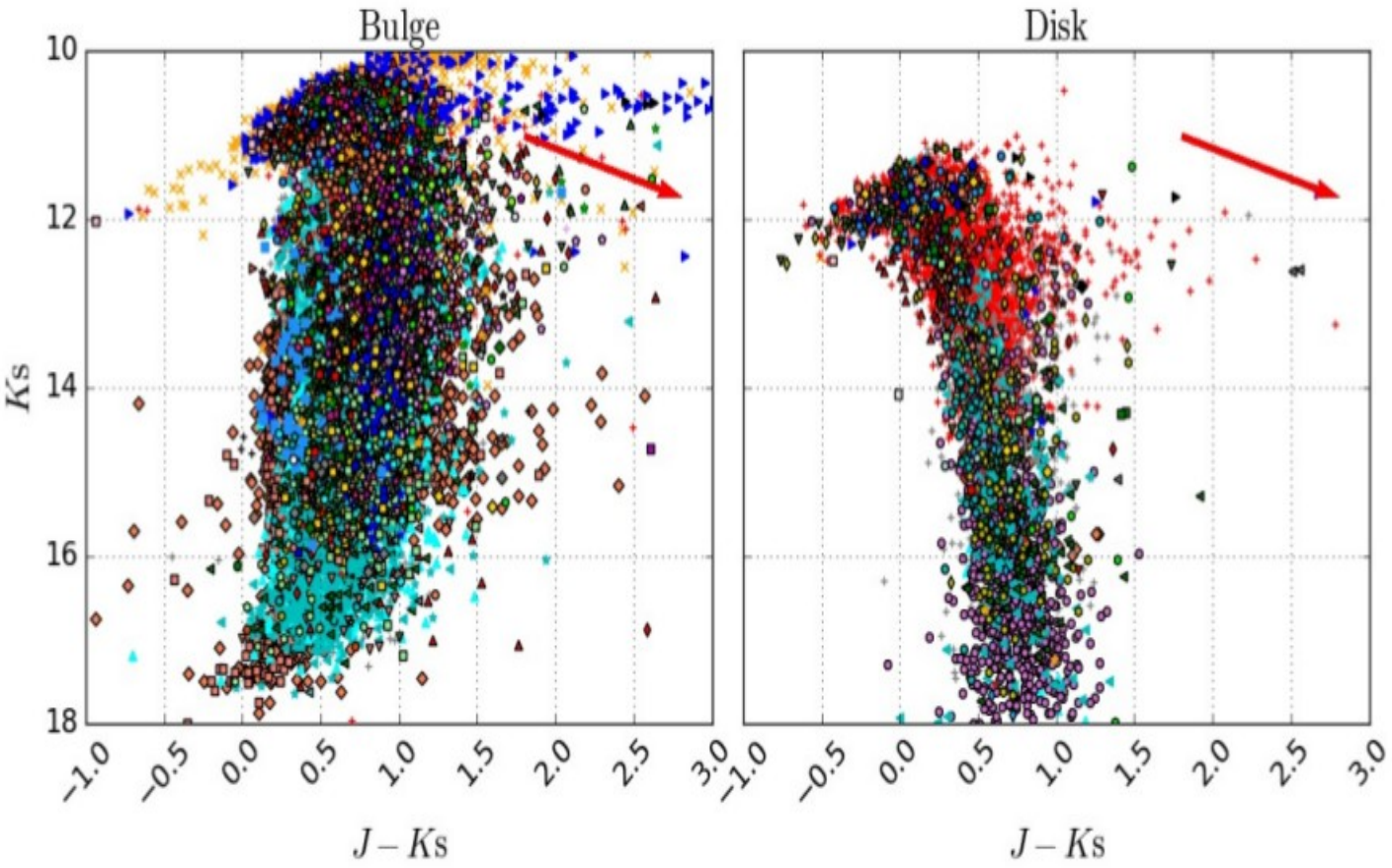


Fig. 12. Map in Galactic longitude and latitude (l,b) showing the **distribution** in the sky of the sample variable stars. Map obtained with Aladin Sky Atlas v10.076 (Bonnarel et al. 2000), using the 2MASS JHK_s images catalog (Skrutskie et al. 2006). Blue diamonds represent T2Cs, **which are spread over the whole field**. Grey diamonds display Miras, which are more concentrated at low latitudes. Red ovals display CCs (the ones by Matsunaga et al. 2011). The magenta squares in this map are the RRLs, the cyan square is the AC and the small **white pluses** display all the other types of variables.

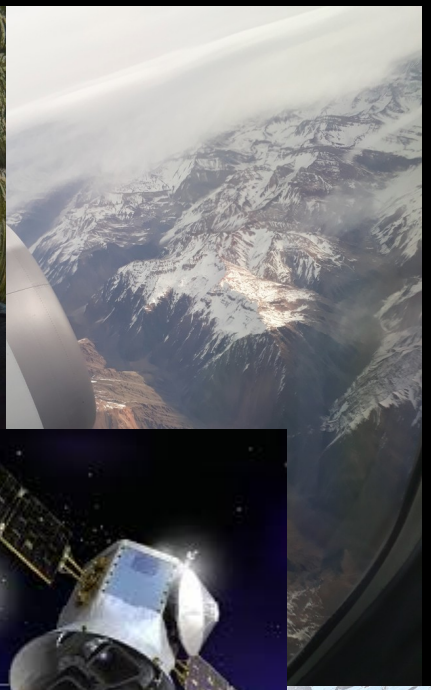
ACV : 34
AGN : 1
AHB1 : 1
AM : 2
APER : 60
BCEP : 13
BE : 104
BLAP : 3
BY : 29
CBSS : 2
CEP : 18
CST : 17
CTTS : 11
CV : 60
CWA : 103
CWB : 153
DCEP : 43
DCEP(B) : 3
DCEP – FO : 1
DCEP – FU : 1
DCEPS : 4
DCEPS(B) : 6
DQ : 5
DSCT : 108
DSCTC : 8
DSCTr : 1
E : 3277
EA : 1585
EB : 187
EC : 1084
ECL : 3
ED : 41
ELL : 29
EP : 7
ESD : 33
EW : 1047
GCAS : 2
GDOR : 10
HADS : 23
HADS(B) : 7
HMXB : 6
I : 26
IA : 1
IN : 26
INA : 1
INB : 6
INS : 1
IS : 1
ISB : 1
L : 640
LB : 14
LMXB : 12
LPV : 203
M : 1914
MISC : 528
Microlens : 3
N : 24
NA : 26
NB : 5
NC : 1
NON – CV : 1
NR : 1
NSIN : 15
NSINELL : 27
PER : 377
PULS : 1022
R : 2
RCB : 12
ROT : 67
RR : 49
RRAB : 10038
RRC : 3616
RRD : 54
RS : 2333
RV : 29
RVA : 8
RVB : 5
S : 130
SIN : 48
SPB : 8
SR : 9342
SRA : 38
SRB : 56
SRD : 3
SRS : 23
SXARI : 1
SXPHE : 3
TTS : 235
UG : 76
UGSS : 3
UGSU : 2
UGWZ : 1
UNC : 426
UV : 8
UVN : 1
V361HYA : 1
VAR : 4910
WR : 2
WTTS : 13
XN : 1
YSO : 105
ZAND : 29



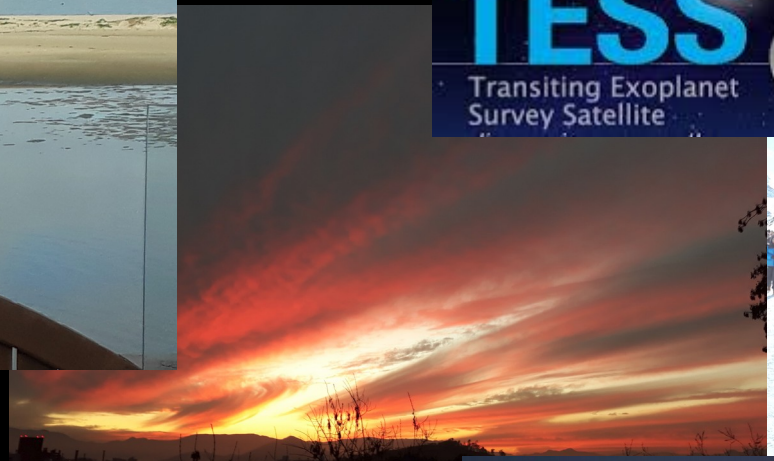
VVV catalogue of known variable stars Herpich et al 2019 - submited

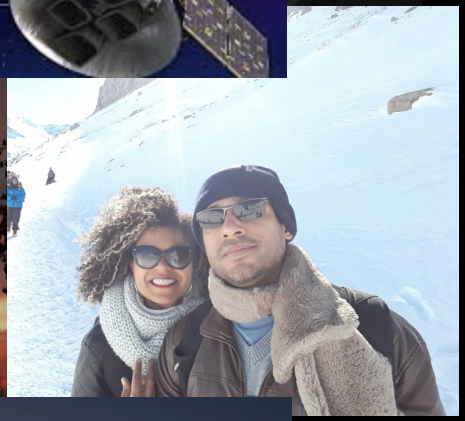
3D View of Galatic center and Glatic Disk - Christopher Russell

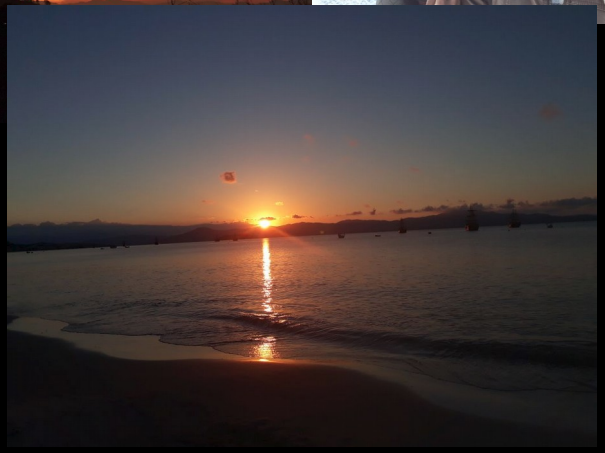
https://www.youtube.com/watch?v=wBxW2_B9_Is&feature=youtu.be




TESS
Transiting Exoplanet
Survey Satellite







Desafios, áreas, colaboração, ...
Incríveis descobertas, suporte acadêmico, ...
Incertezas, frustrações, suporte financeiro, ...
Welcome to astronomy world !!!