reshaping scientific interdisciplinary collaborations

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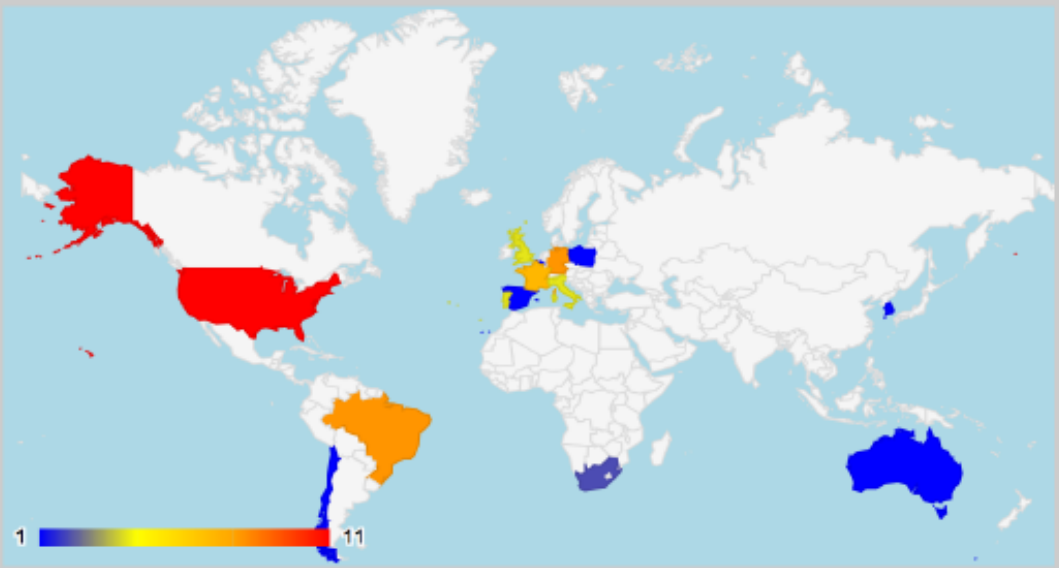
What is COIN?

An acronym made by astronomers...
…outdated but we keep using it anyway

A Group of People

Lead by Rafael de Souza (ELTE, Hungary)
60 researchers from **15** countries

Nearly half actively involved in an ongoing project



Country	Members
Australia	1
Belgium	1
Brazil	8
Chile	1
France	7
Germany	8
Italy	4
Netherland	1
Poland	1
Portugal	4
South Africa	2
South Korea	1
Spain	1
United Kingdom	4
USA	11

Scientific outcomes

In 2.5 years

1	GLM I	de Souza *et al.*, 2014
2	GLM II	Elliott *et al.*, 2014
3	AMADA	de Souza & Ciardi, 2015
4	CosmoABC	Ishida *et al.*, 2015
5	GLM III	de Souza *et al.*, 2015
6	DRACULA	Sasdelli *et al.*, 2015
7	AGNlogit	de Souza *et al.*, 2016

1	CosmoPhotoZ	de Souza *et al.*, 2014,
2	AMADA	de Souza & Ciardi, 2015
3	CosmoABC	Ishida *et al.*, 2015
4	DRACULA	Aguena *et al.*, 2015

+ 2 papers
+ 2 photoz catalogs

What is its goal?

Long term:

Contribute to the establishment of Astrostatistics as a discipline on its own.

Short term:

Make astronomers, statisticians, computer scientists and machine learning experts understand each other … WHILE doing science!

Try to remember:
they might work as robots, but they are not!

Why is it different?

Collaboration as a goal by itself

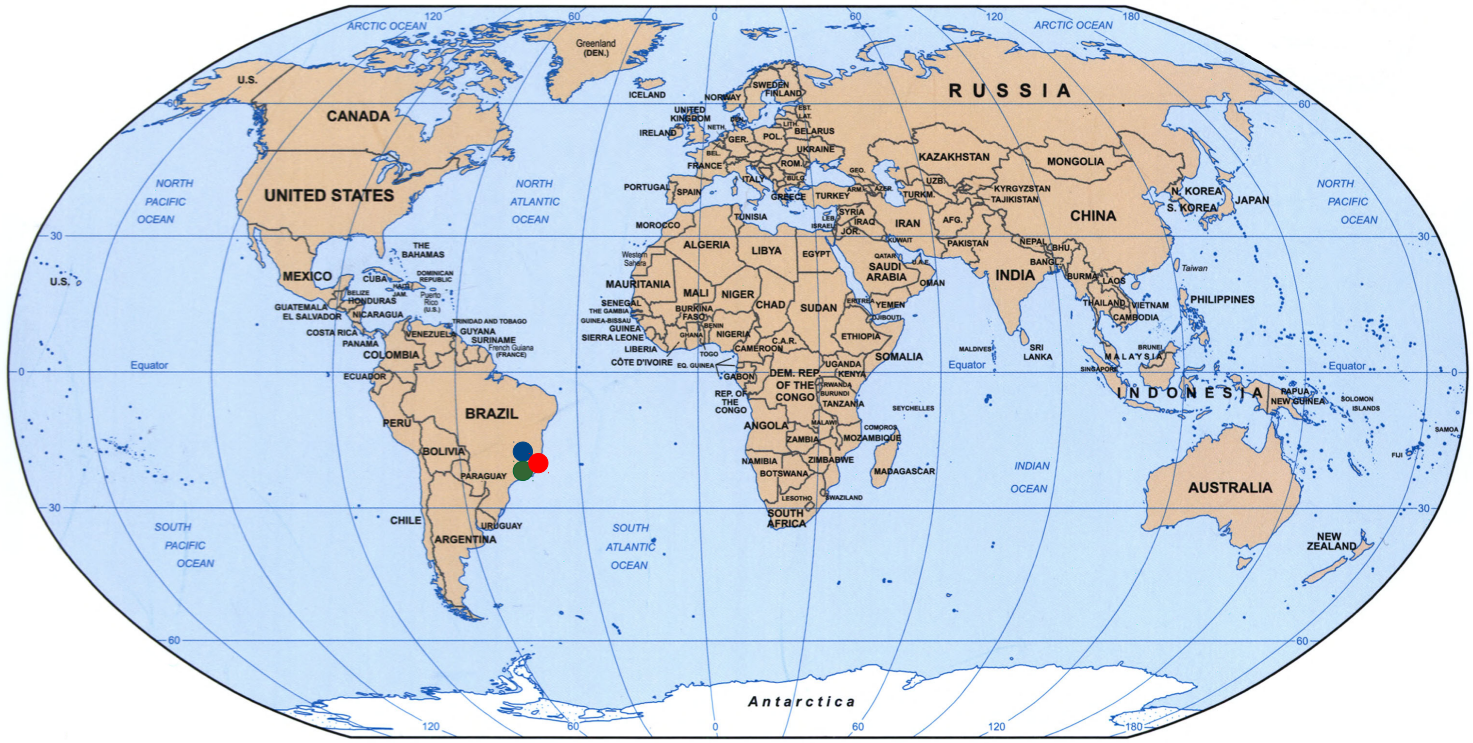
A Brazilian approach to science development

Rafael S. de Souza
(head) - statistics

Alberto Krone-Martins
astrometry

Emille E. O. Ishida
SN cosmology

2009



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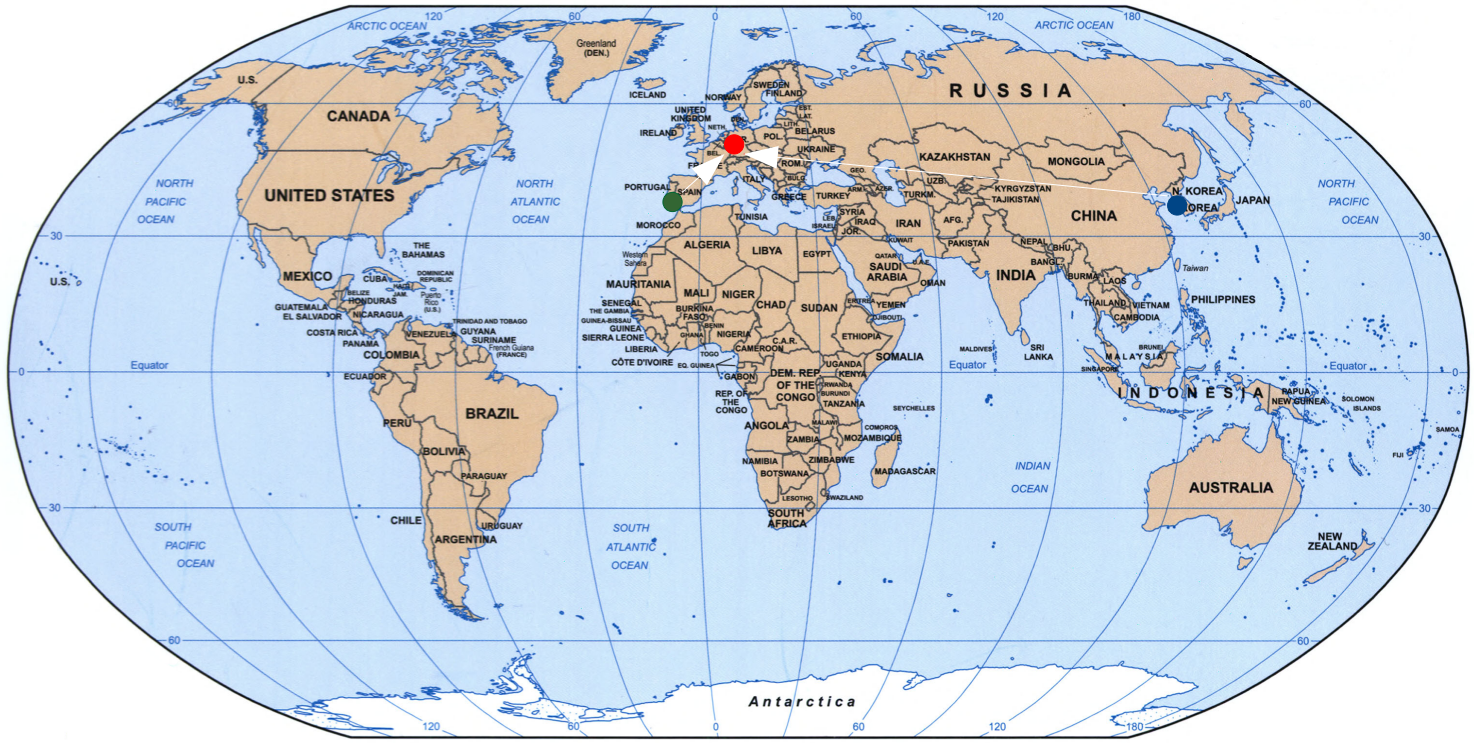
2012



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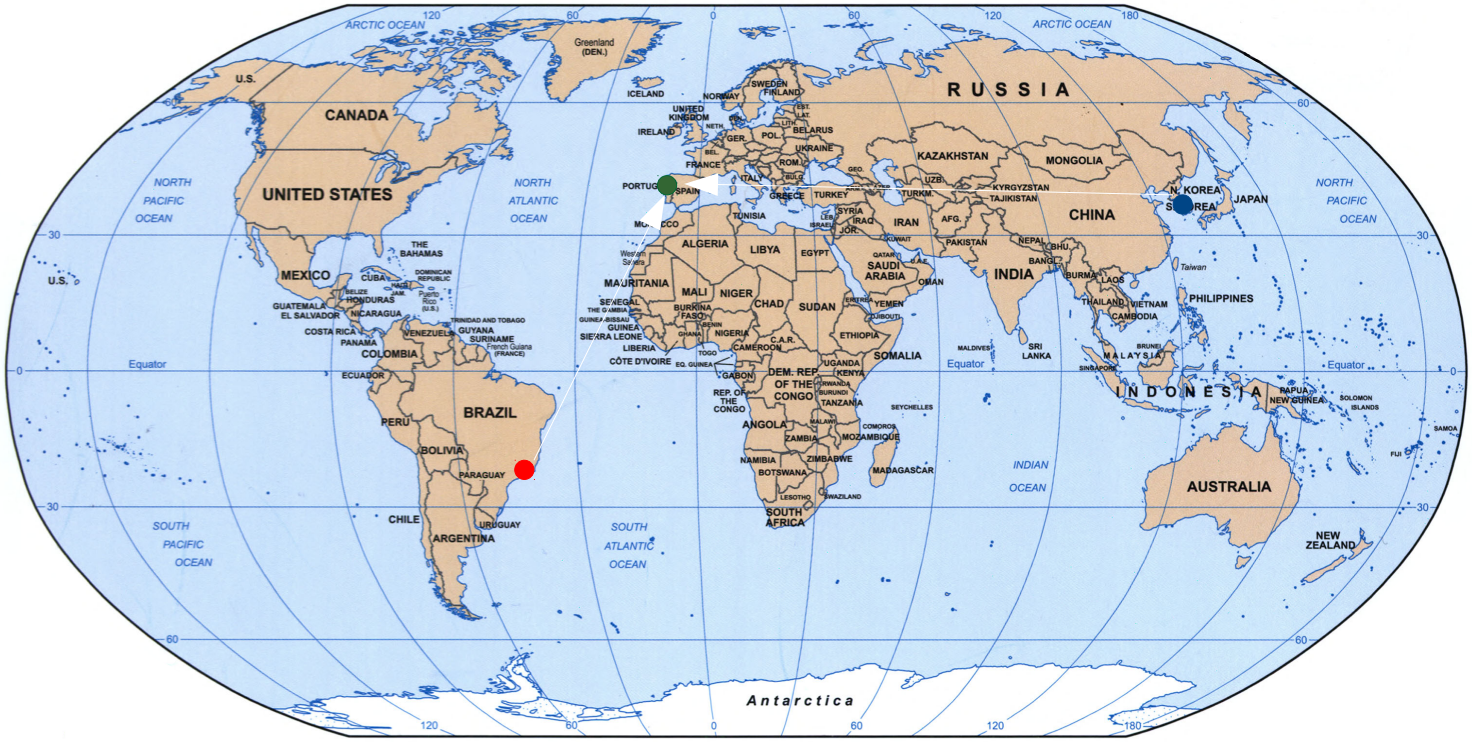
2013



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SN cosmology

2013

17 days
In August!

LISBOA | UNIVERSIDADE DE LISBOA

The first analytical expression to estimate photometric redshifts suggested by a machine

A. Krone-Martins,[1★] E. E. O. Ishida[2,3] and R. S. de Souza[4,5]

Why not more people?

MNRASL **443,** L34–L38 (2014)

doi:10.1093/mnrasl/slu067

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Emille E. O. Ishida
SN cosmology

2014

STATISTICAL CHALLENGES in 21st CENTURY COSMOLOGY

IAU SYMPOSIUM 306 Lisbon Portugal 25-29 May 2014

Monday

Session: CMB (Chair: Graca Rocha)

16h15 – Anomalies – Hiranya Peiris
16h50 – Transforming Data into Science: Planck data and the CMB non-Gaussianity – Anna Mangilli
17h10 – Applications of the Gaussian Kinematic Formula in Cosmology – Yabebal Fantaye
17h30 – Detectability of multi-connected topologies – Ophélia Fabre
17h50 – Cosmology with photometric quasars – Boris Leistedt
18h10 – Session ends

18h10 to 18h40 – *Meeting of the IAA Working Group on Cosmostatistics – Hosted by Rafael de Souza*

How does it work?

The COIN Residence Program

What we can NOT guarantee up front

SUBJECT

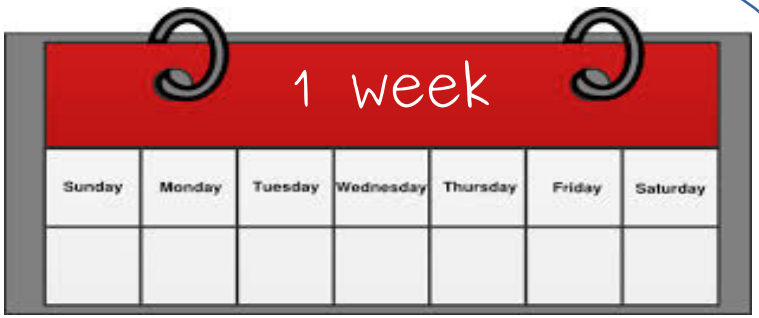
SOCIAL PROTOCOL

Authorship

Talks

CATERING

CLEANING SERVICES



Lots of coffee

1 house

paper

What we can guarantee up front

What we require from participants

PER DIEM

Be Proactive!

Speak English

Always Keep It OPEN

What it has achieved so far?

CRP #1 – Lisbon, Aug/2014

The Overlooked Potential of Generalized Linear Models in Astronomy - I: Binomial Regression and Numerical Simulations

R S. de Souza[a], E. Cameron[b], M. Killedar[c], J. Hilbe[d,e], R. Vilalta[f], U. Maio[g,h], V. Biffi[i], B. Ciardi[j], J. D. Riggs[k], for the COIN collaboration

Astronomy and Computing 12 (2015) 21–32

The Overlooked Potential of Generalized Linear Models in Astronomy-II: Gamma regression and photometric redshifts

J. Elliott[a], R. S. de Souza[b], A. Krone-Martins[c], E. Cameron[d], E. E. O. Ishida[e], J. Hilbe[f,g], for the COIN collaboration

Astronomy and Computing 10 (2015) 61–72

[ascl:1408.018]

cosmoabc: Likelihood-free inference via Population Monte Carlo Approximate Bayesian Computation

E. E. O. Ishida[1], S. D. P. Vitenti[2], M. Penna-Lima[3,4], J. Cisewski[5], R. S. de Souza[6], A. M. M. Trindade[7,8] E. Cameron[9] and V. C. Busti[10] for the COIN collaboration

Astronomy and Computing 13 (2015) 1–11 [ascl:1505.013]

CRP #2 – Isle of White, UK – Oct/2015

Is the cluster environment quenching the Seyfert activity in elliptical and spiral galaxies?

R. S. de Souza[1⋆], M. L. L. Dantas[2], A. Krone-Martins[3], E. Cameron[4], P. Coelho[2], M. W. Hattab[5], M. de Val-Borro[6], J. M. Hilbe[7], J. Elliott[8] and A. Hagen[9], for the COIN Collaboration

MNRAS (2016) 461, Issue 2, p.2115-2125

Exploring the spectroscopic diversity of type Ia supernovae with DRACULA: a machine learning approach

M. Sasdelli[1,2⋆], E. E. O. Ishida[2,3], R. Vilalta[4], M. Aguena[5], V. C. Busti[5], H. Camacho[5], A. M. M. Trindade[6,7], F. Gieseke[8], R. S. de Souza[9], Y. T. Fantaye[10], and P. A. Mazzali[1,2], for the COIN collaboration

MNRAS (2016), 461 Issue 2, p.2044-2059 **[ascl:1512.009]**

CRP #3 – Budapest – Aug/2016

Paper 1 :

Do not trust your photoz because your validation set is fooling you!
in prep

Paper 2:

Unsupervised AGN classification
in prep.

Does the collaborative part work?

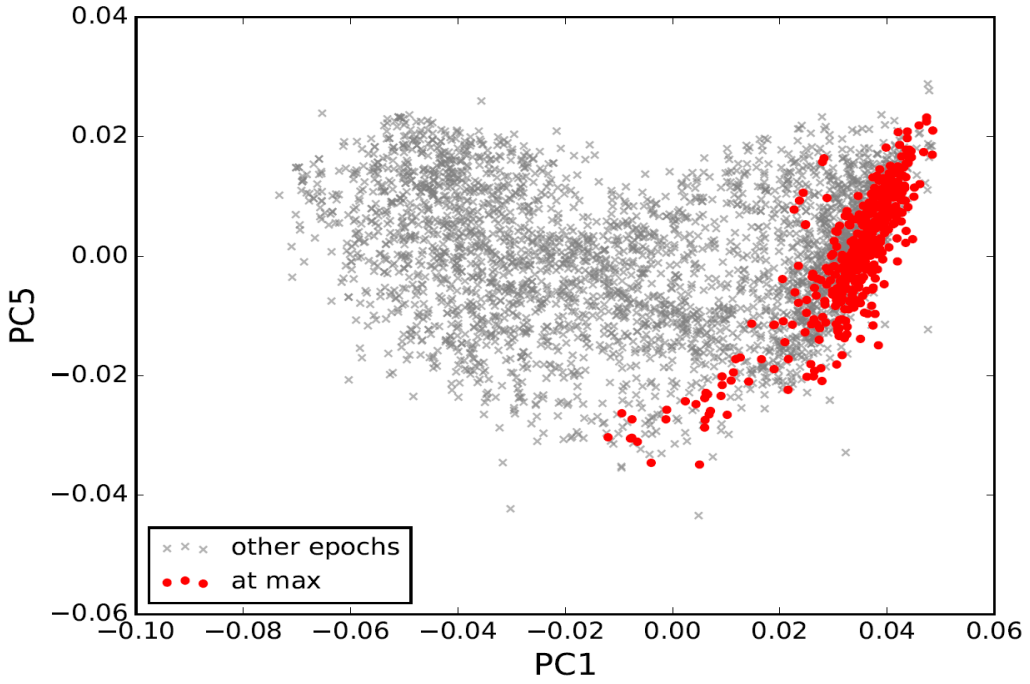
During CRP #2 – UK - Oct/2015

Problem:

Too few spectra of Sne Ia at maximum

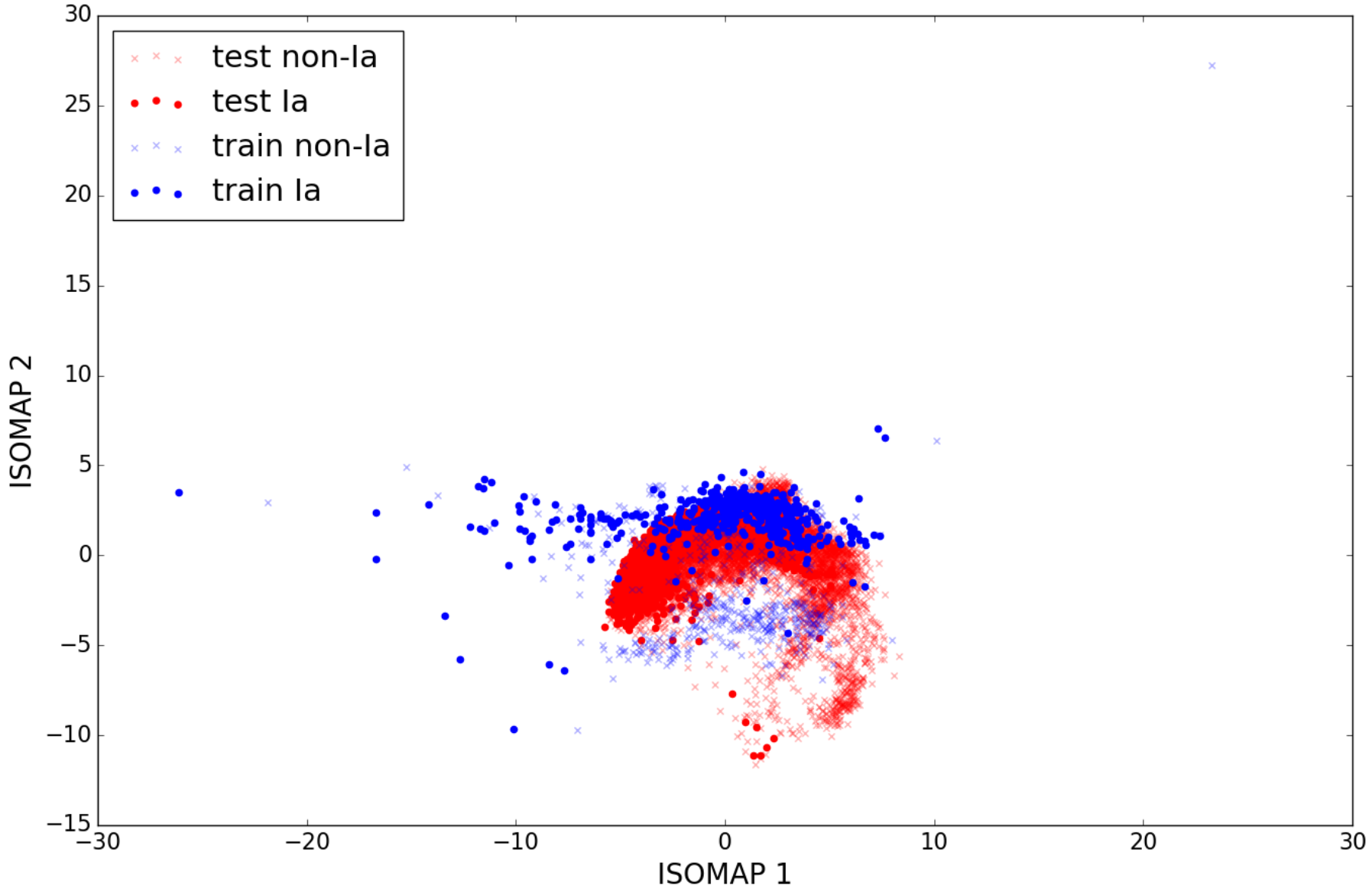
Solution:

Transfer learning



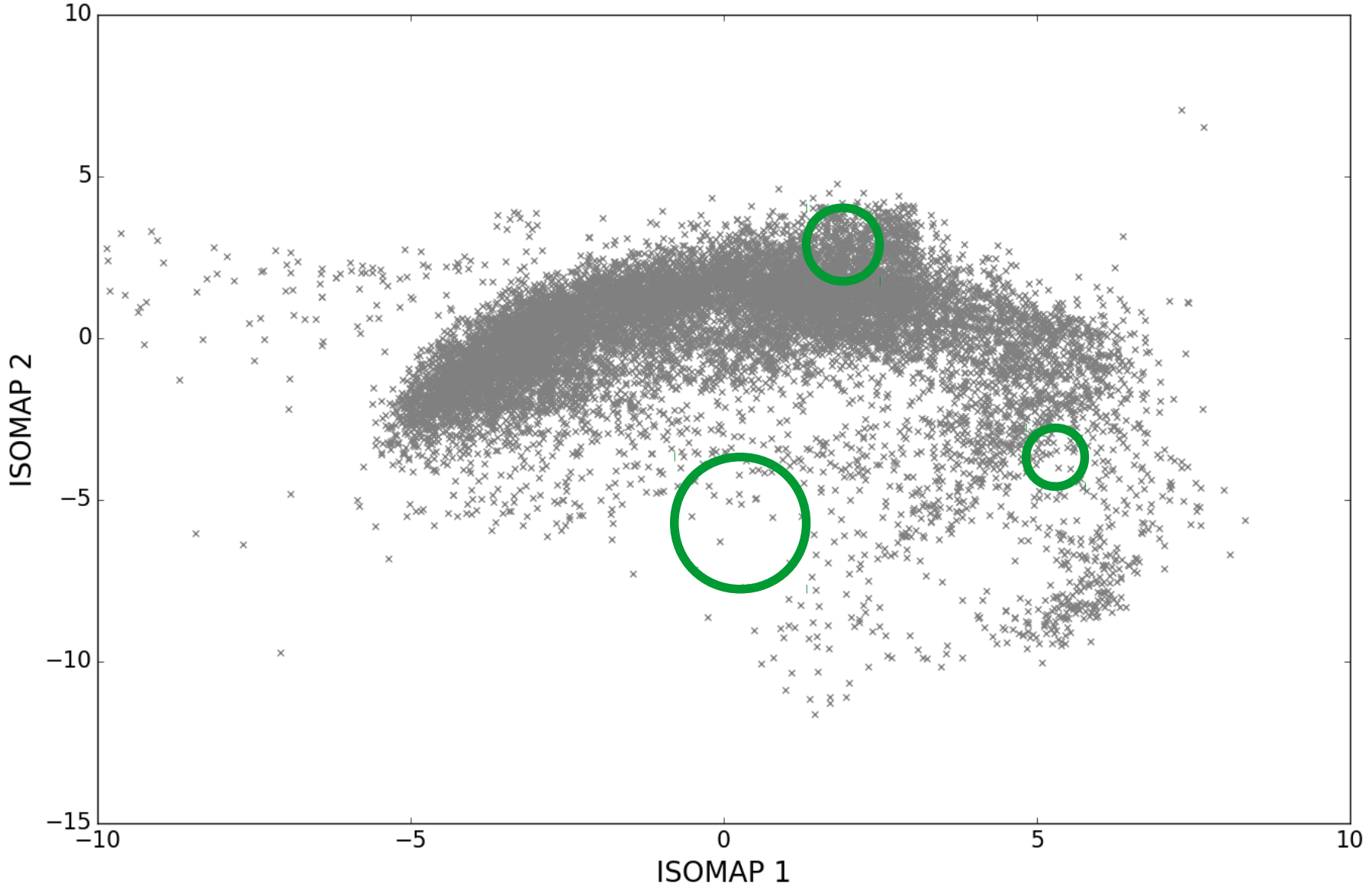
After CRP #2 – UK - Oct/2015

SNe photometric classification



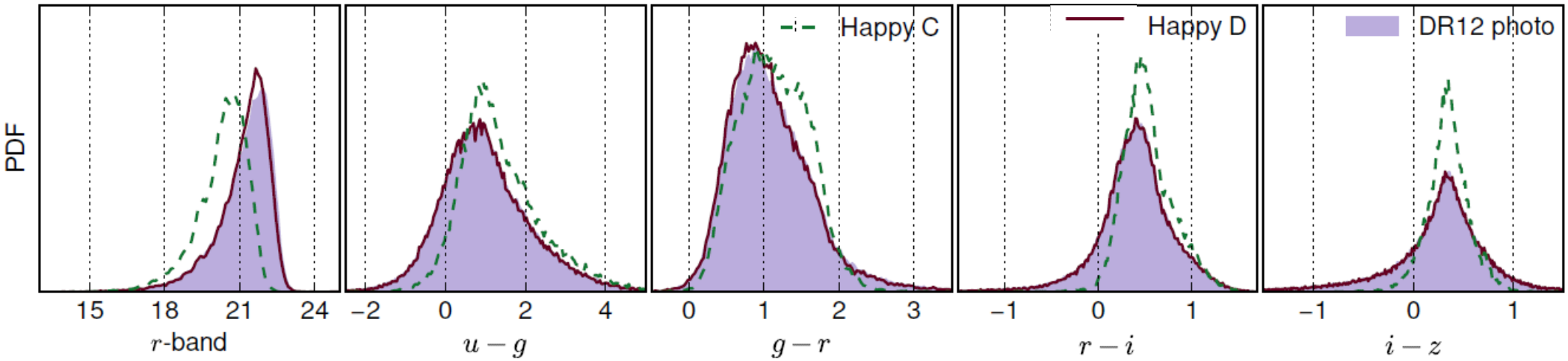
After CRP #2 – UK - Oct/2015

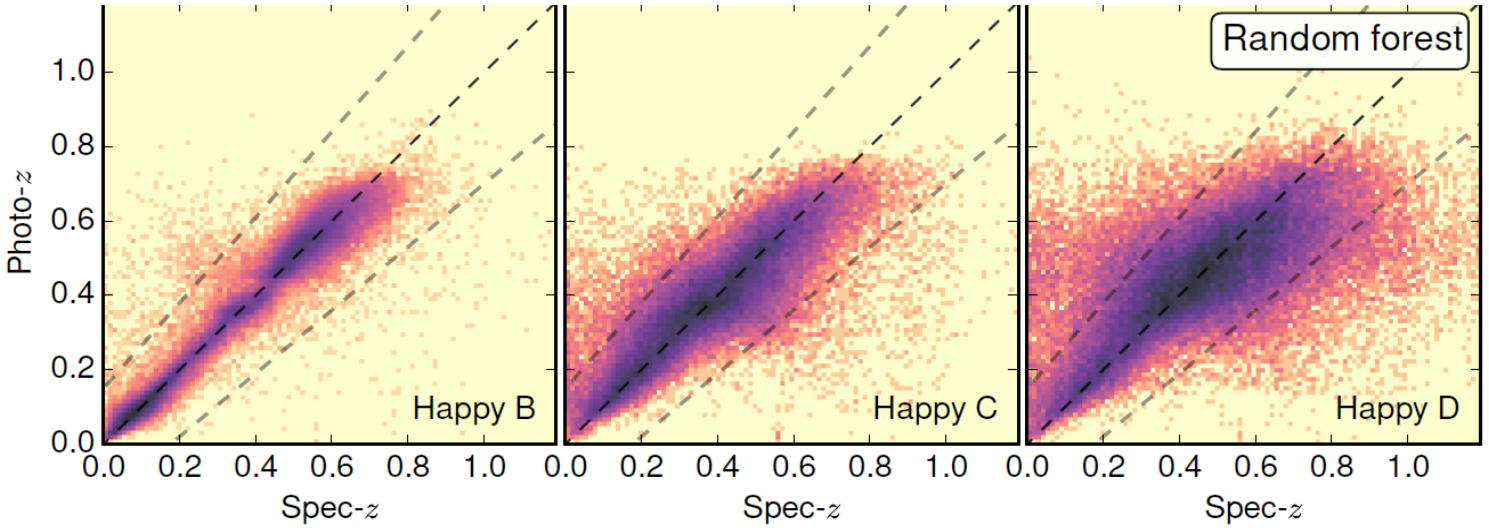
Forget spec/sample distinction: Active learning



During CRP #3 – Budapest - Aug/2016

How to quantify photoz accuracy?





Lin, C.A, Beck, R. *et at. - in prep – for the COIN collaboration*

What is next ?

Find people …

Solve bureaucracy

Let it go …

For up to date information on COIN:

https://www.facebook.com/InternationalAstrostatisticsAssociation/

https://twitter.com/iaa_coin

Thank
you