IBIS Status Report: Crab long term variability and Matrices production

IUG 22-23
January 2013

P. Ubertinil L. Natalucci & IBIS team


Will INTEGRAL be the last to retire?!...


1 mm W Hopper to limit the CdTe F.o.V.
Alenia
Detection system
Anticoincidence system
32 BGO slabs, 20 mm thick
Read out by 64 PMs
Energy range 0.175-10 MeV


APCO
Alenia
SPAZIO
APCO

ASI Contacts: Scientific & Technical Staff Status per January 2013

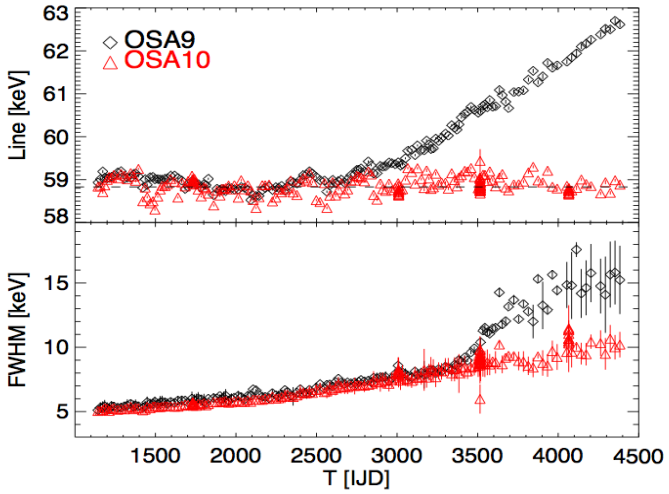
- **A progress meeting has been held on January 18 between the INTEGRAL program Italian coordinator (PU) and the ASI contract officer (EC).**
- **ASI has confirmed the provision in the 2013-2016 planned budget of the financial support for the in flight INTEGRAL operation and calibration support.**
- **The final negotiation will be carried out at the end of the present 3 years contacts, formally expiring next August 2013. The new contract is expected to start just after (August 2013).**

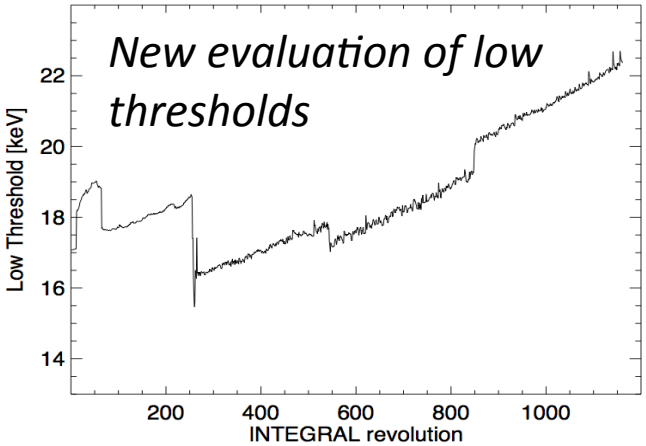
People on contract and fellowship FULL TIME now:

Contracts	Institute	Started	End Phase III
•M. T. Fiocchi	Art. 15 IAPS-Roma	1/10/2010	18/12/2012*
•R. Landi	Art. 15 IASF-Bologna	1/10/2010	31/08/2013
•F. Panessa	Art. 15 IAPS-Roma	1/10/2010	31/05/2013
•A. Tarana	Art. 15 IAPS-Roma	1/10/2010	30/06/2012
•Fellowship			
•M. Molina	Ass. Ric. IASF-Bologna	1 y	30/10/2013
•P. Parisi	Ass. Ric. IAPS	1 y	30/11/2013
•S. Lotti	Ass. Ric. IAPS	1 y	30/05/2013

IBIS/OSA10 calibration

- New OSA10 calibration of gain and energy correction, corrects many spurious effects left in OSA9
- 12 new ARFs delivered for the OSA10 distribution





PROCEEDINGS OF SCIENCE

INTEGRAL IBIS/ISGRI energy calibration in OSA 10

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All details in the paper submitted as POS (INTEGRAL Conf 2012)

Current response status/performance

- Check status using the most recent Crab data (revs. 1214-1221)
- One on-axis, plus 2 off-axis (mask) observations. Off axis angles range ~6-9.5 deg
- Folded by current response
- Count rate spectra not well modeled, also a feature near ~55 keV appears.
- Off axis data show departure from model especially at E<30 keV

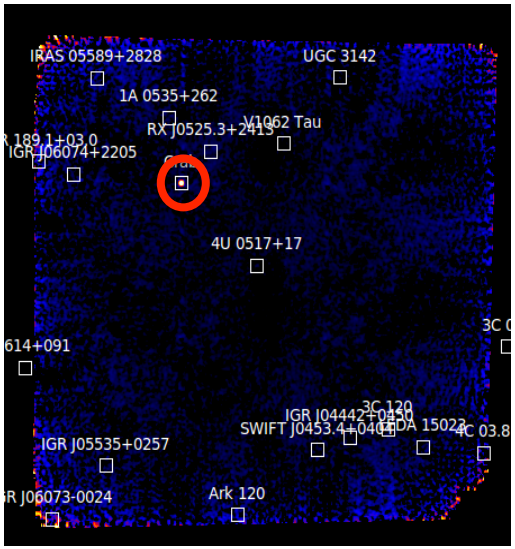
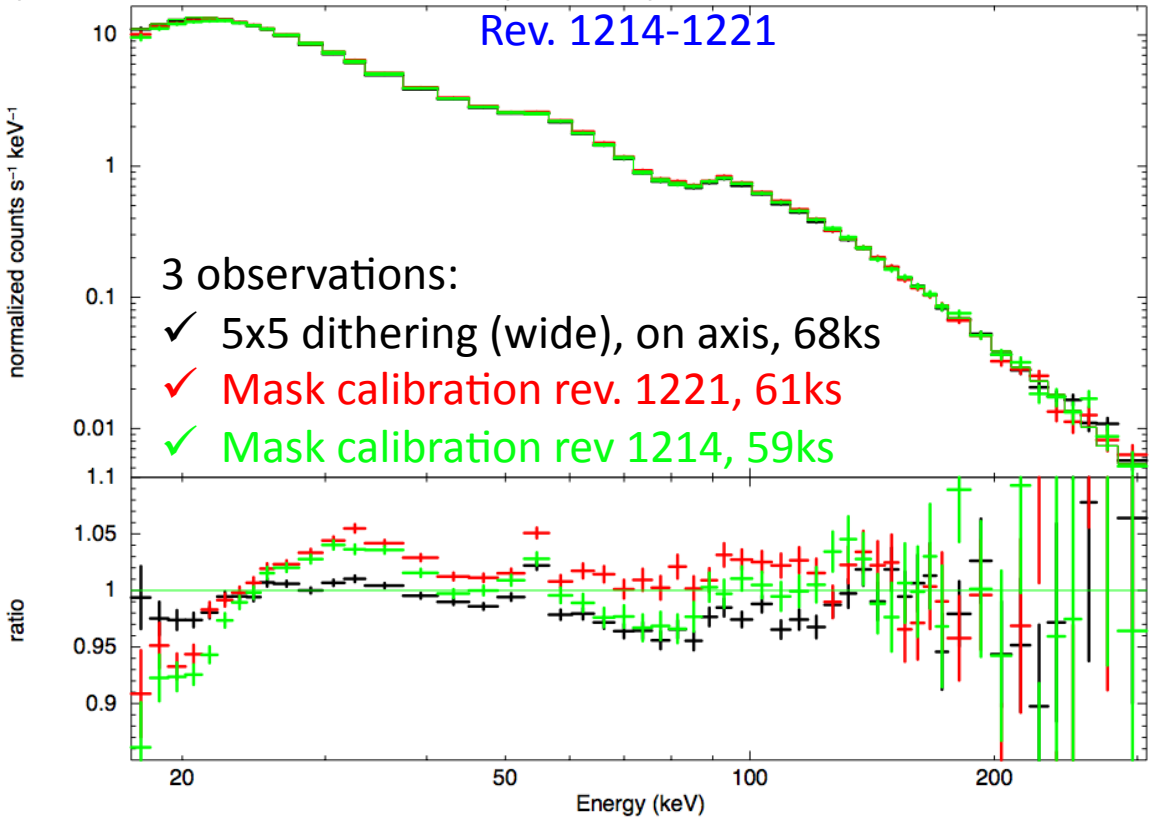
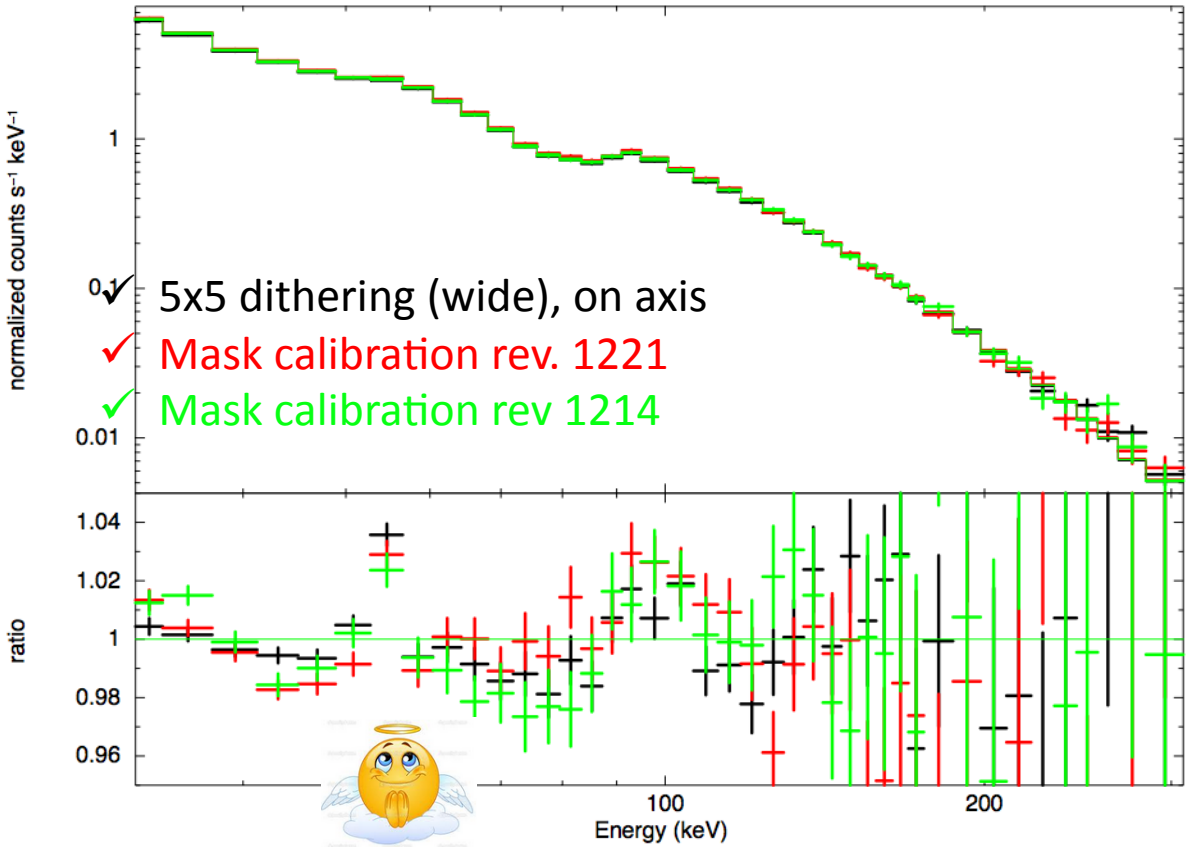


Image mosaic for mask calibration, rev. 1221 (similar for rev. 1214)



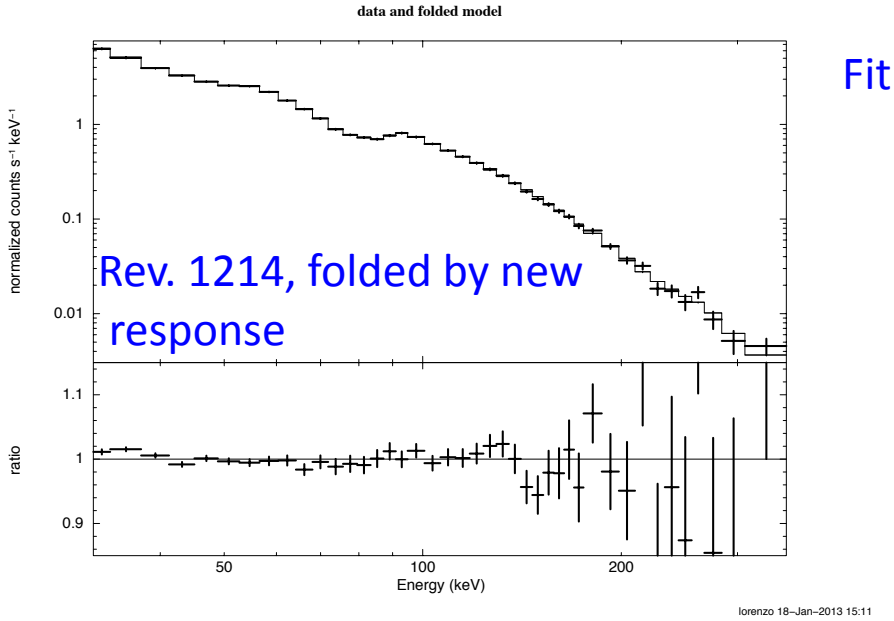
Fit > 30 keV, on- vs off-axis

- E>30 keV, fit with free normalization constants
- Yields a factor ~2-3.5% higher for the off-axis data respect to the on-axis data
- The fit is formally satisfactory (χ^2=1.06 for syst=1.5%) but residual features appear especially at ~55 keV



New ARF for OSA10, rev. 1221

- The above tests show need for a new ARF
- We have computed one more ARF to account for the most recent observations. Using Crab dithering data of rev. 1221
- The ARF will be delivered to Saclay and tested
- We propose to re-calibrate ARF 2 times/year instead of 1/year. Use of all Crab periodic calibration observations
- The re-calibration procedure is standard, and fully supported.



Fit with broken power law

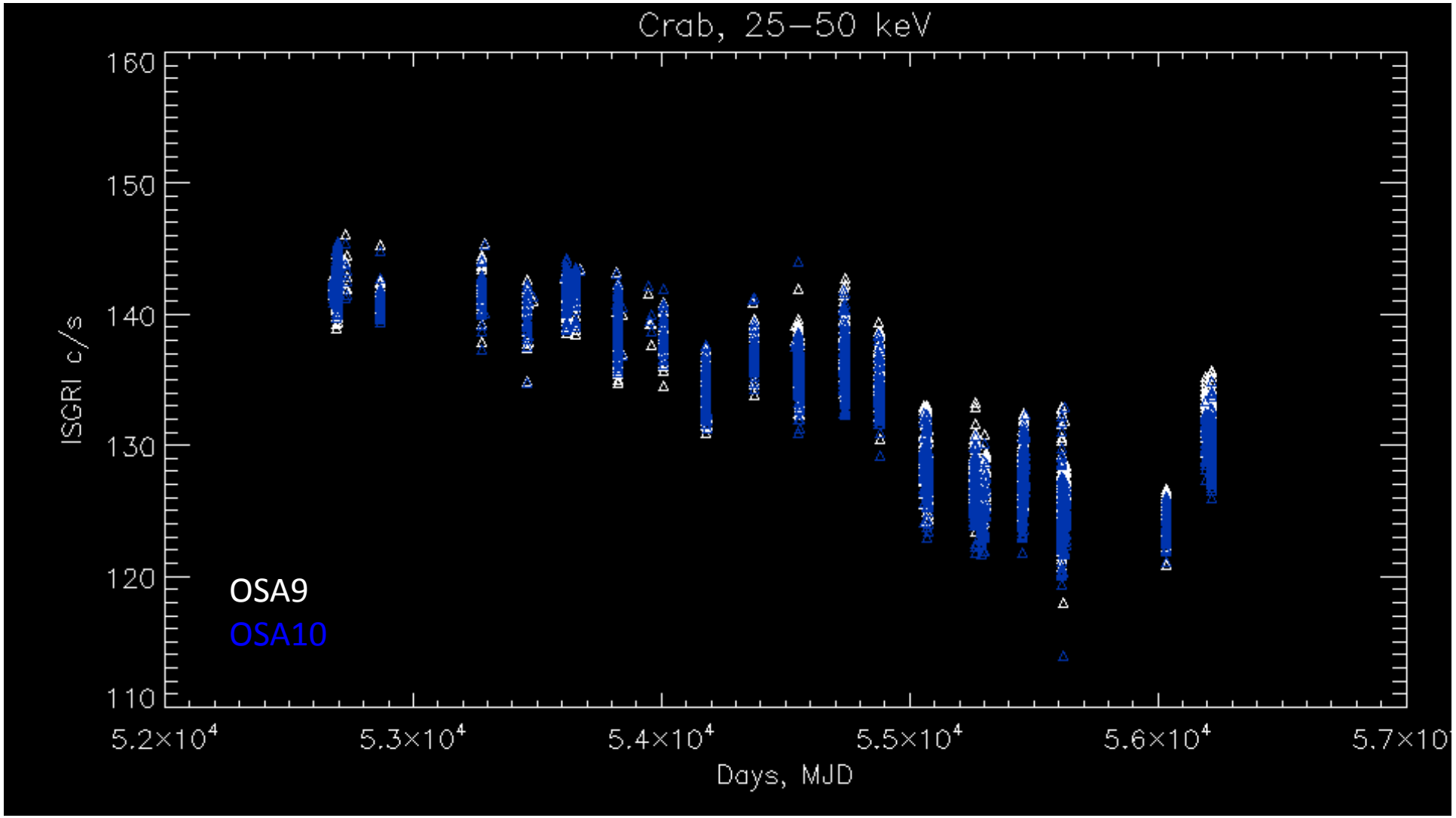
Γ_1=2.08±0.02,
Γ_2=2.28±0.08
E_{break}=111±8 keV

Flux 20-100 keV:
0.274 ph cm-2 s-1

X^2=28.4/38dof

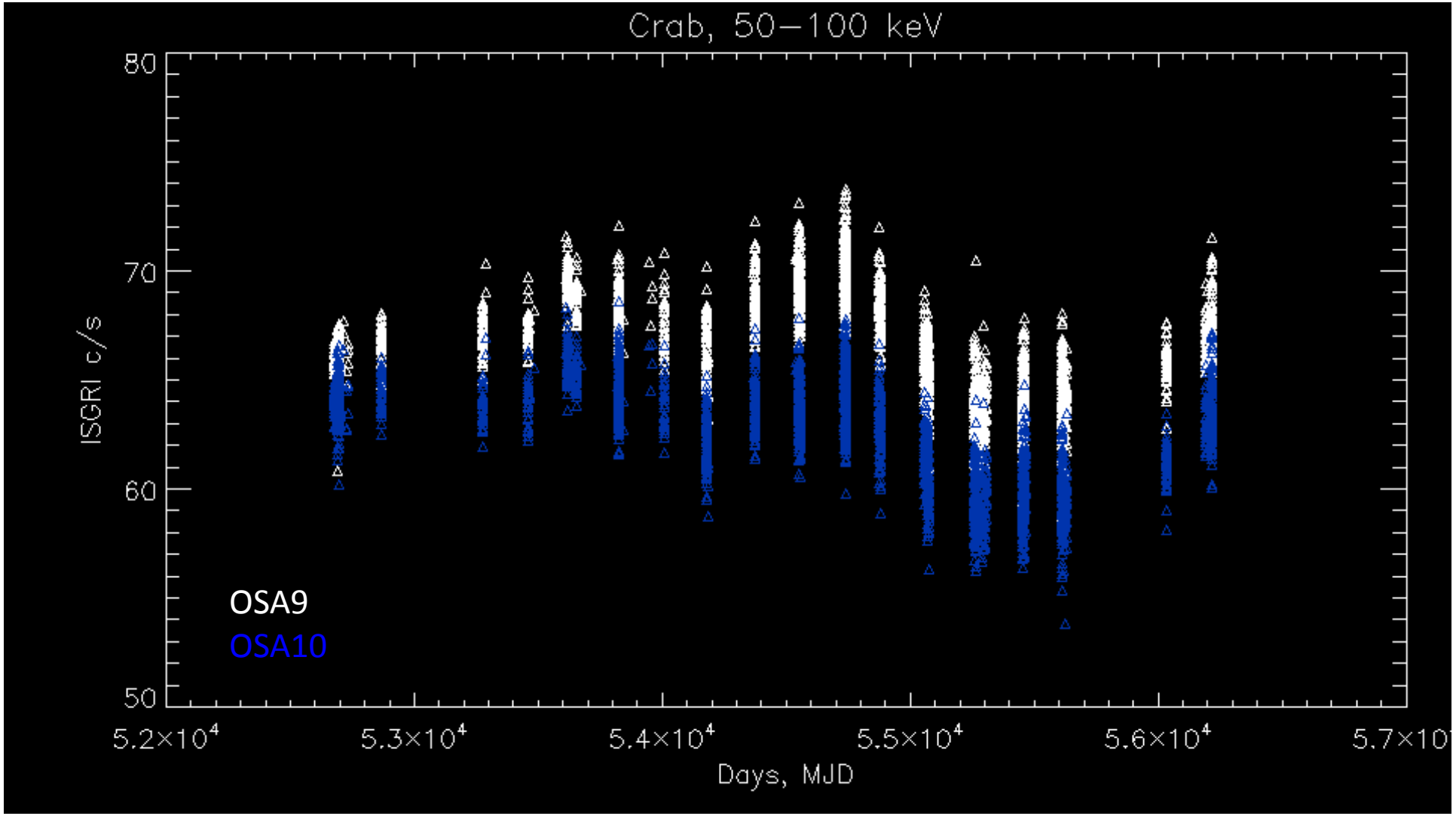
OSA10 vs OSA9

◆ Crab light curve, 10 years, 25-50 keV. No significant difference.



OSA10 vs OSA9 C/s …not ph!

◆ Crab light curve, 10 years, 50-100 keV. Rates are ~5% lower in OSA10.



Cross-calibration activities

- Recently launched Nustar has pushed cross-calibration studies and nearly simultaneous campaigns with several satellites including INTEGRAL
- Nearly simultaneous observations of the Crab with Nustar are now available from INTEGRAL. Work is in progress to exploit cross-calibration.
- Data from G21.5-0.5 and 3C273 will be also used in the future
- A special E >10 keV session on cross-calibration will be organized at the 8th IACHEC (2013 March, 25-28 at Hothorp Hall, UK)