Slews: Fast and Slow
Fast Slew Status

- **XMMSL1**: catalogue of slew sources
  released May 2006

  Revs 314-978, 5180 detections, 2692 clean sources, 259 hard (2-10 keV) sources, 6200 square degrees, attitude error=8’ (1 sigma)

  Read et al, 2006, PASJ - Scientific highlights
Fast Slew: work in progress

- XMMSL1/delta-1 to be released May/June

Revs 1200-1309, 110 slews, 3800 deg^2, 3850 detections.
Still needs to be cleaned.

Total of 10,000 deg^2; about 4000 clean sources.
Exposure Map

XMMSL1 + Delta-1
Fast Slew: work in progress

- XMMSL1/delta-1 to be released May/June
  Revs 1200-1309, 110 slews, 3800 deg^2, 3850 detections.
  Still needs to be cleaned.
  Total of 10,000 deg^2; about 4000 clean sources.

- 6000 deg^2 of useful slews still to process, further deltas planned to be released every few months.
**Fast Slew: fast turn-around**

**Variability analysis**

- Retrieve SDF from XSA – 10-20 days after observation
- Initial processing to event file – 1 day
- Split into discrete images – 1 day
- Source search – 1 day
- Calculate RASS upper limits, cross-correlate with NED, SIMBAD – 1 day

Can find high variability slew sources 14-24 days after slew in time for follow-up
Rev 1210 @ 5 c/s, about 200 x brighter than RXSS upper limit
Probably a Nova on edge of LMC, typical T=20-80 eV

Piled-up, no offset map but can do rough spectral work with slew data
Slow Slew

http://... Available as link from SOC external web
**Slow Slew Test**

- Scan over the Galactic plane at 30 degs/hour
- Orbit 1242 - 16 legs covering 45 x ~0.5 degs with 15 arcmin overlap between legs ~200 deg^2
- Open loop slew for 1.5 hours, followed by closed-loop slew of 17 mins to set position to start of next leg.
- Operationally went very well
- Drift was very small, typical offset was 2 arc mins. will increase if slew rate decreases
### Properties

#### Mean background (c/arcmin²) from slew legs 5,7:

<table>
<thead>
<tr>
<th>INST</th>
<th>0.2-12</th>
<th>0.2-2</th>
<th>2-12</th>
</tr>
</thead>
<tbody>
<tr>
<td>PN</td>
<td>0.56</td>
<td>0.28</td>
<td>0.28</td>
</tr>
<tr>
<td>M1</td>
<td>0.10</td>
<td>0.062</td>
<td>0.041</td>
</tr>
<tr>
<td>M2</td>
<td>0.11</td>
<td>0.067</td>
<td>0.066</td>
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</table>

But extraction region bigger for MOS because of extension in slew direction (1.5x depending on final frame time)

#### Flux Limits

<table>
<thead>
<tr>
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<th>2-12</th>
</tr>
</thead>
<tbody>
<tr>
<td>PN</td>
<td>$5 \times 10^{-13}$</td>
<td>$2.5 \times 10^{-13}$</td>
<td>$1.6 \times 10^{-12}$</td>
</tr>
<tr>
<td>PN+MOS1/2</td>
<td>$4 \times 10^{-13}$</td>
<td>$2 \times 10^{-13}$</td>
<td>$1.3 \times 10^{-12}$</td>
</tr>
</tbody>
</table>

8x deeper than XMM-Newton

PN: Exposure time ~6x normal slew, limits
MOS ~3x lower eff. Area (depending on spectrum, etc.) but 2-3x lower backgnd.

**MOS 3x3 Pattern 0 = Singles + 2/3 doubles + 4/9 (trips+quads) + Part of Patt 31**

Q.E. to be calibrated....
Any advance possible?

Slew speed down to 20 deg/hr certainly possible.
Even 10 deg/hr may be achievable without losing too much positional accuracy. In which case:

Flux Limits at 10 deg/hr

<table>
<thead>
<tr>
<th>INST</th>
<th>0.2-12</th>
<th>0.2-2</th>
<th>2-12</th>
</tr>
</thead>
<tbody>
<tr>
<td>PN+MOS1/2</td>
<td>2.5x10^{-13}</td>
<td>1x10^{-13}</td>
<td>8x10^{-13}</td>
</tr>
</tbody>
</table>

Remains to be tested
**Slow Slew Summary**

- PN - to run in FF mode, Medium filter
- MOS - intended to run in 3x3 pixel free running mode with ~400ms frame time.
- Work to do with s/w (nearly complete), calibration and CCFs - particularly MOS QE / pattern fractions
- For efficiency need to have legs of at least 1 hour as turn-around time is 17 mins.
- Great for mapping large extended sources
- Probe flux levels intermediate between XMM-SL1 and dedicated short pointings, $10^{-13}$
- Position error is ~4 arcsecs - similar to pointed obs for low count sources
**Simulations/Spurious fraction**

- Find dependence of spurious sources on number of photons in image
- Randomize the position of every photon in all 11400 slew images and run the standard source search
- Tabulate number of false sources

Real sources and fluctuation rates for different selections

<table>
<thead>
<tr>
<th>Band</th>
<th>DET_ML&gt;8</th>
<th>DET_ML&gt;8, rate&lt;3</th>
<th>DET_ML&gt;10</th>
<th>DET_ML&gt;10, rate&lt;3</th>
<th>DML&gt;14+(DML&gt;10,rate&lt;3)</th>
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</thead>
<tbody>
<tr>
<td>ALL</td>
<td>4730 (929)</td>
<td>3471 (456)</td>
<td>3015 (195)</td>
<td>2436 (106)</td>
<td>2713 (109)</td>
</tr>
<tr>
<td>0</td>
<td>3882 (580)</td>
<td>3037 (348)</td>
<td>2596 (118)</td>
<td>2171 (86)</td>
<td>2384 (39)</td>
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<tr>
<td>4</td>
<td>694 (272)</td>
<td>429 (93)</td>
<td>314 (61)</td>
<td>241 (24)</td>
<td>261 (25)</td>
</tr>
<tr>
<td>5</td>
<td>2619 (186)</td>
<td>1994 (69)</td>
<td>2042 (46)</td>
<td>1649 (13)</td>
<td>1888 (12)</td>
</tr>
</tbody>
</table>