



constellation School on

X-rays from Star Forming Regions

DATA ANALYSIS SESSION: RESULTS

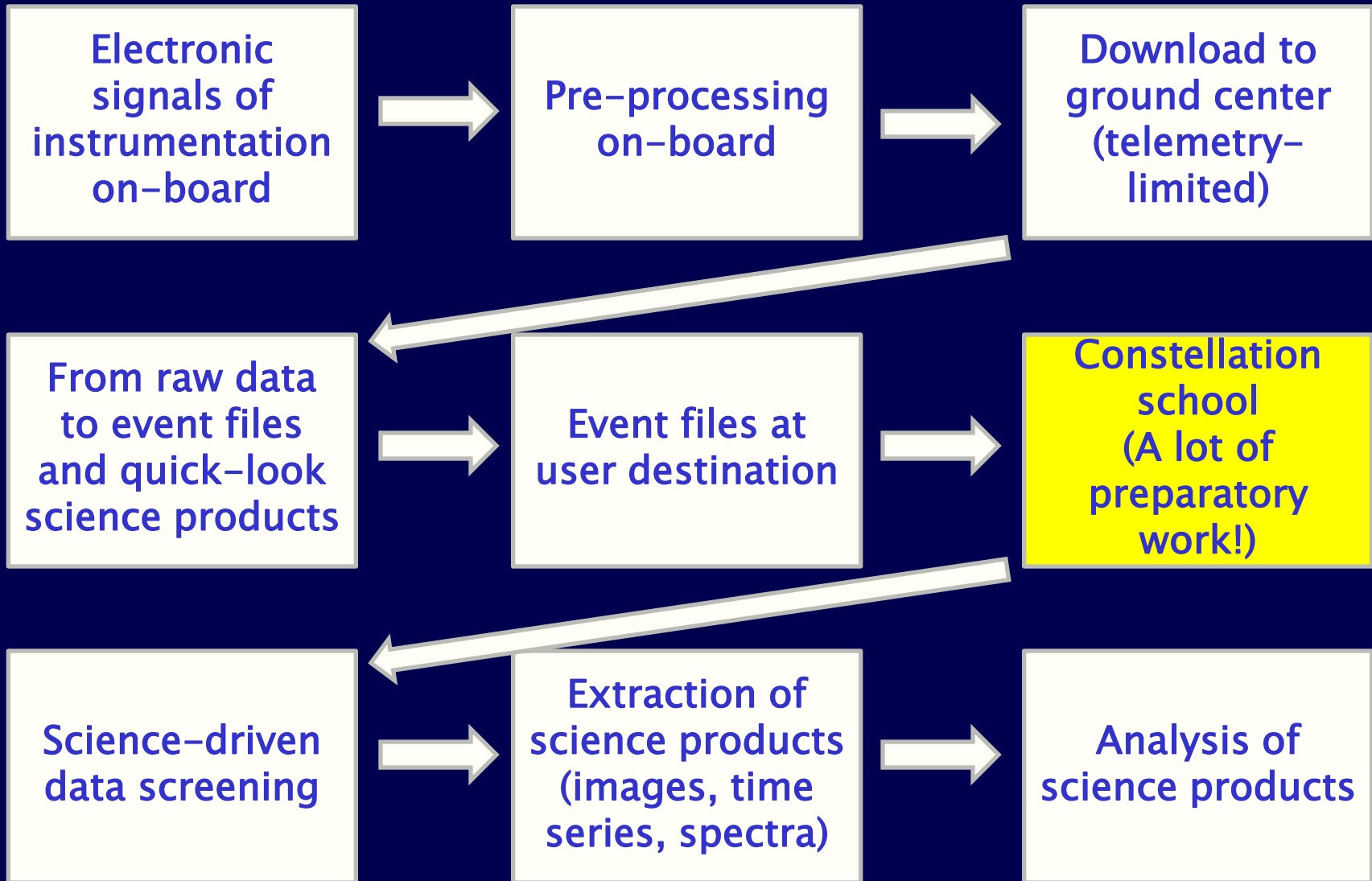
Reports from students

Coordinator: A. Maggio and the OAPA tutor team

List of Data Sets

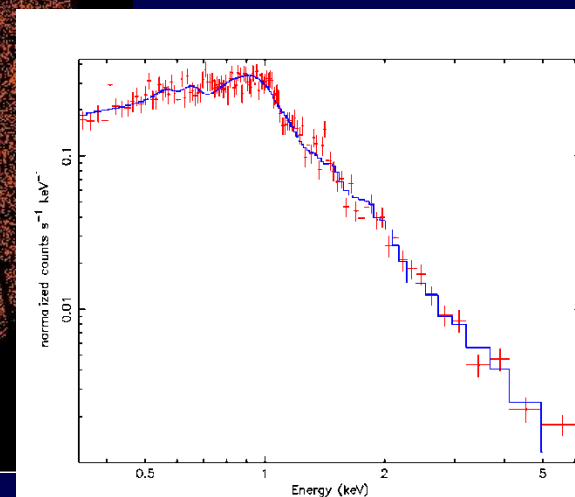
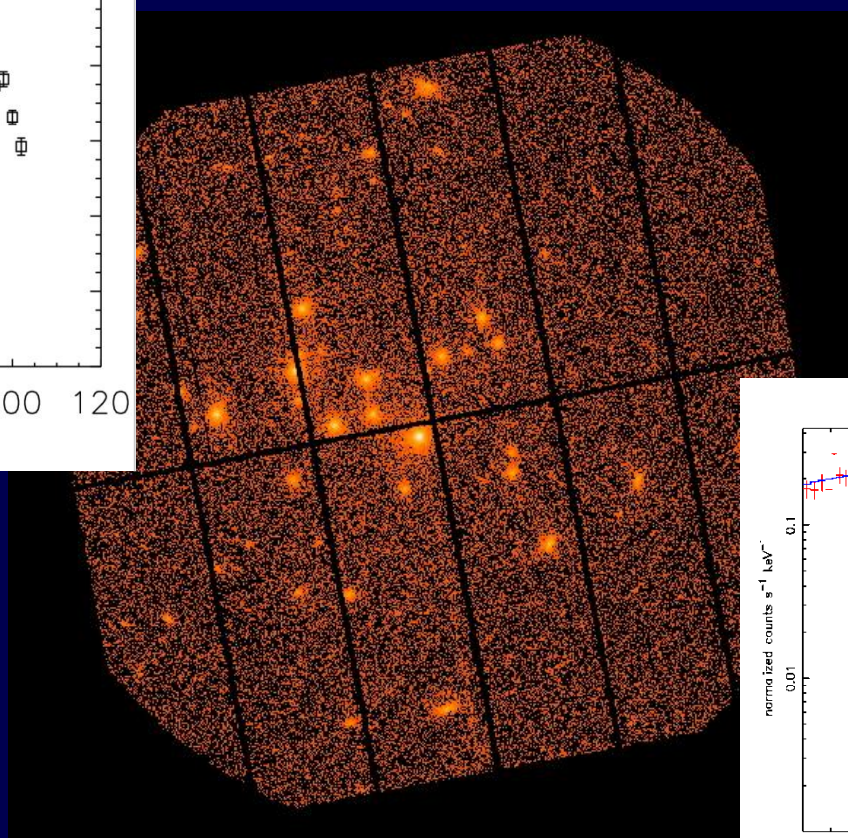
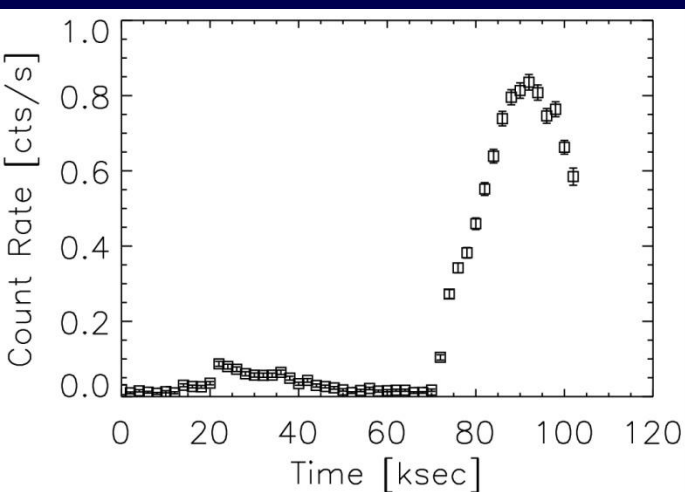
- **ORION Nebula Cluster** (Chandra; **User1 and User2**)
- **ρ Ophiuchi core**
 - Chandra (**User3 and User4**)
 - XMM–Newton (**User9 and User10**)
- **NGC 6530** (Chandra; **User5 and User6**)
- **σ Orionis field** (XMM–Newton; **User7 and User8**)
- **Taurus–Auriga Star Forming Region** (XMM–Newton)
 - Field1 (**User11 and User12**)
 - Field2 (**User14 and User15**)
 - BP Tauri field (**User16 and User18**)

Recalling the Sequence of steps



Recalling Science Products

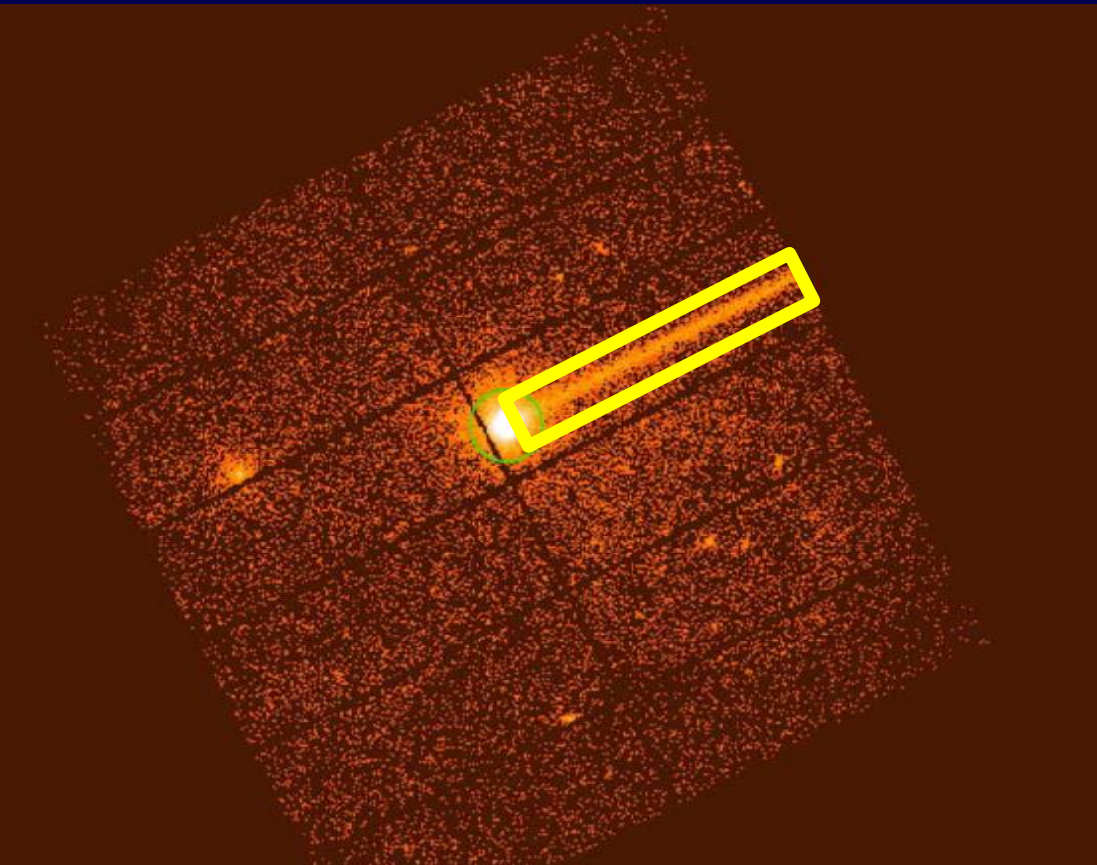
- XMM–Newton European Photon Imaging Camera (EPIC) observation of a Star Forming Region with the pn CCD detector



Possible issues to discuss

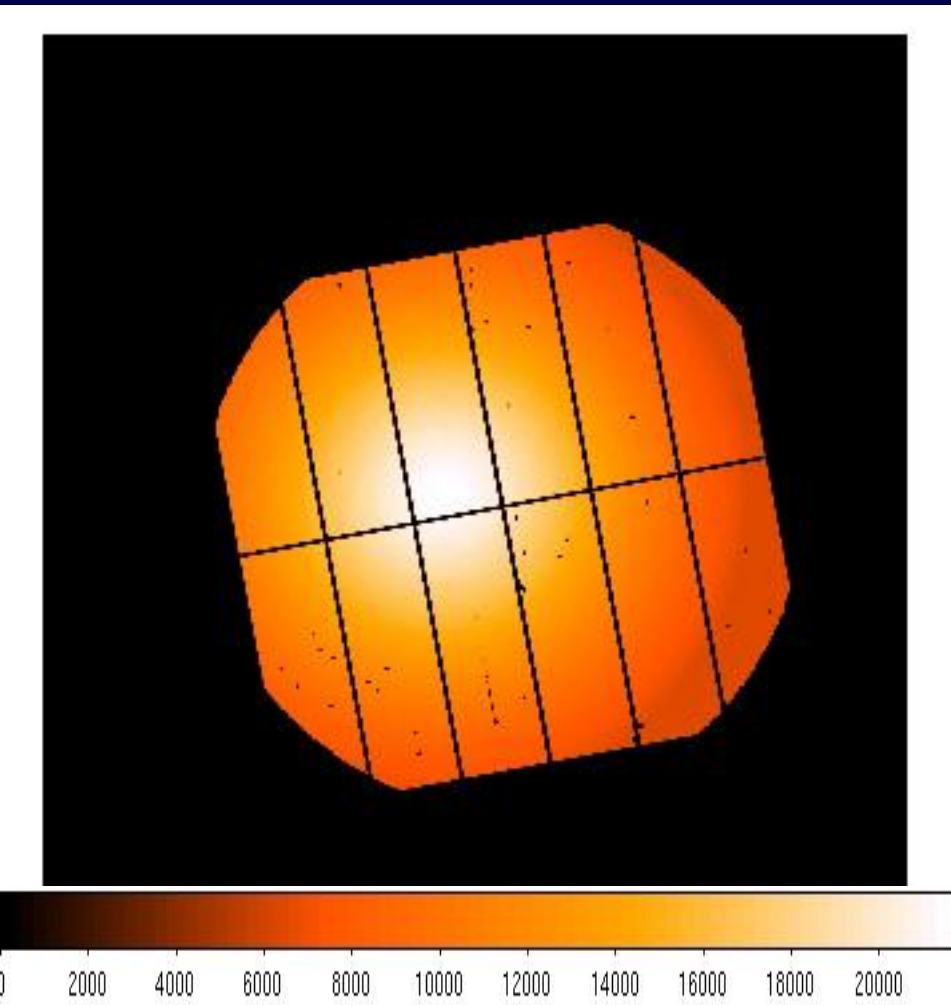
- Data screening/filtering
 - Chandra/ACIS vs. XMM-Newton/EPIC-pn images
- Detection of X-ray sources
 - Exposure and background maps
 - Crowdyness and source location issues
- Source Identification
- Extraction of source and background X-ray photons
- X-ray light curves (**quiescent vs. flaring emission**)
- X-ray spectra
 - Stellar vs. Extragalactic sources
 - Low- vs. High-absorption spectral signatures
 - Temperature diagnostics
 - Late-type stars vs. Early-type stars
 - Quiescent vs. Flaring plasma
 - Abundance diagnostics

Recalling Out-of-Time (OoT) events



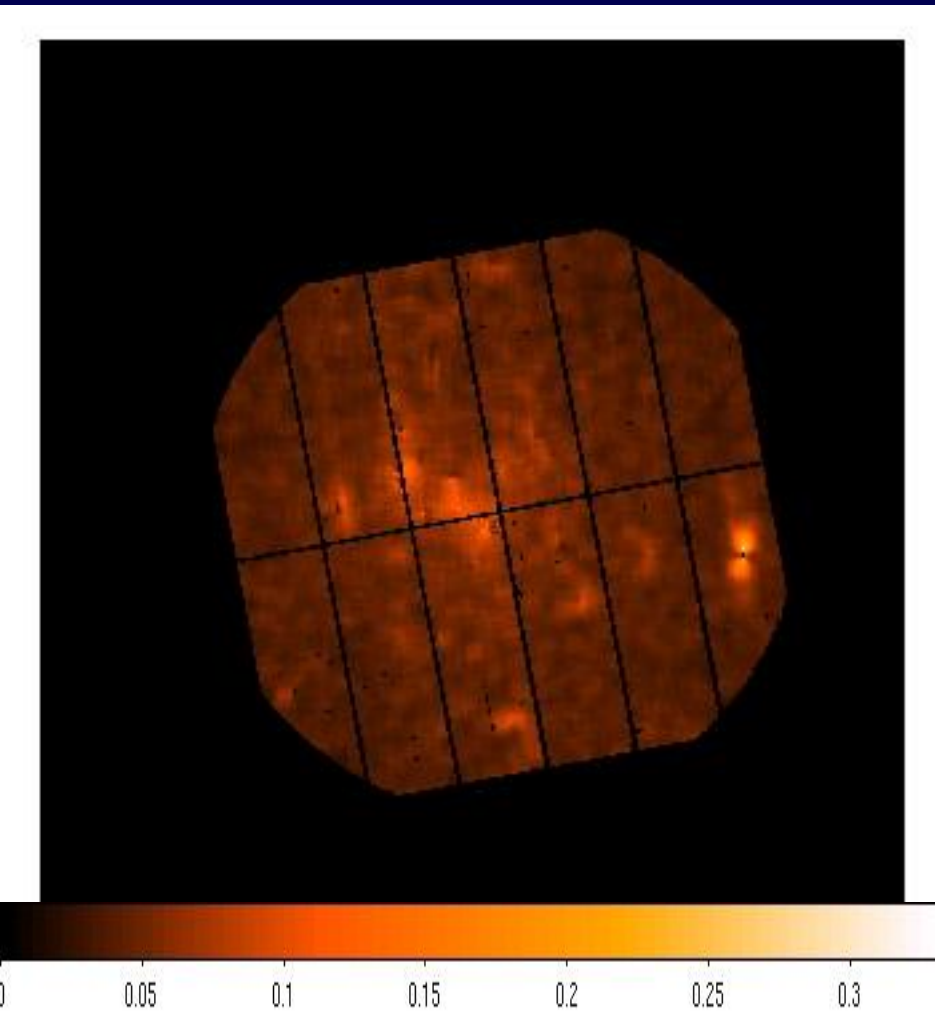
- **OoT events:** photons registered during CCD read-out
- OoT events create in images a **strip of wrongly reconstructed event positions** and broaden spectral features in RAWY (see CTE correction issues)
- Spurious sources can be found along this strip by the detection algorithm, requiring interactive screening “by hand”

Recalling the Exposure Map



- Instrument sensitivity decreases from the **aim point** (optical axis) toward the edges of the field of view (**vignetting effect**)
- This effect is described as a decrease of the **exposure time for increasing off-axis angle**
- The exposure map also describes other **obscuration effects** in the field of view (e.g. CCD gaps)
- It is qualitatively similar to a “flat field” in optical images

Recalling the Background Map



- Background includes all sources of instrumental noise + diffuse sky emission (including a solar contribution) + **photons in the PSF tails of actual X-ray sources in the field**
- Required for source detection and S/N ratio
- Equivalent to dark+bias+sky frames in optical photometry