

**Multimission Archive at
Space Telescope Science
Institute**

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MAST Data

- Mostly ultraviolet, optical, and near-infrared data
- Spectra and images, "raw" and calibrated data
- NASA Missions:
 - Active missions: Hubble Space Telescope, Far Ultraviolet Spectroscopic Explorer, EUVE
 - Completed missions: IUE, Copernicus, Astro, ORFEUS, IMAPS
- Ground-based astronomical data
 - DSS, FIRST, KPNO-Mosaic (future)

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MAST Services

- **On-line, Web-based data retrieval**
- **User search interfaces**
- **Standard data formats**
- **Network or hard-media delivery of data**
- **Specialized analysis software and documentation available for download**
- **Help desk: email and telephone support**
- **Object catalog-based cross-correlation searches**

Current MAST System

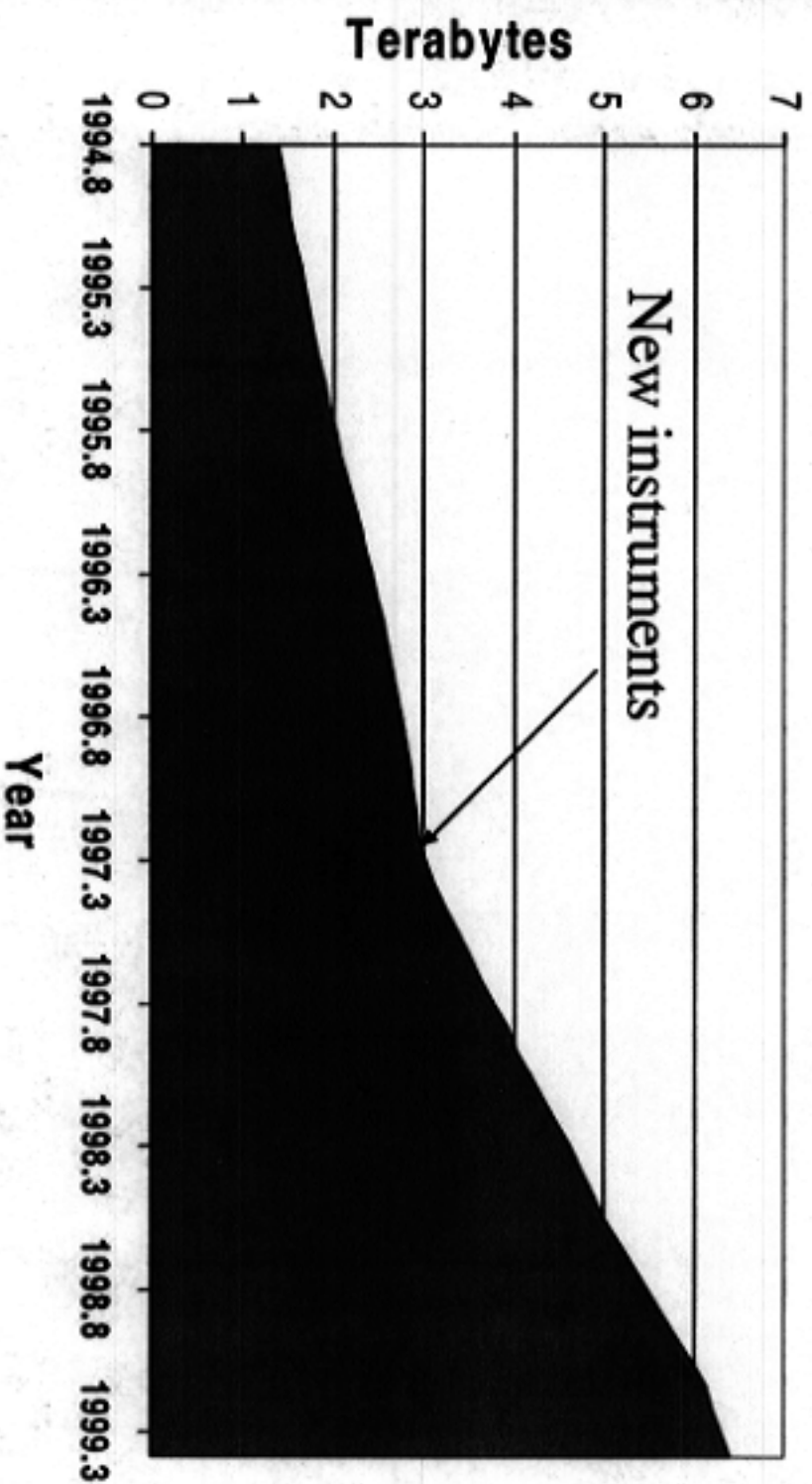
- **Software: Data Archiving and Distribution System**
 - Commercial contract software
 - Requires significant s/w support
 - Static hardware configuration
 - We wrote our own user interface
- **Four Cygnet Jukeboxes of 130 6-GB optical platters**
- **Two CD Jukeboxes hold the rest**
 - Web interface + off-the-shelf s/w
 - In-house s/w development

MAST Data Holdings (subset)

Name	Size	Datasets
HST ('90+)	7.0 TB	300,000+
FUSE ('99+)	540 GB *	
DSS ('50-'56)	5.0 TB	All-sky
HUE ('78-'96)	635 GB	102,510
UIT ('90,'95)	56 GB	1579
HUT ('90,'95)	2 GB	960
Copernicus ('72-'81)	1 GB	551

HST Total Volume

HST Data Archive

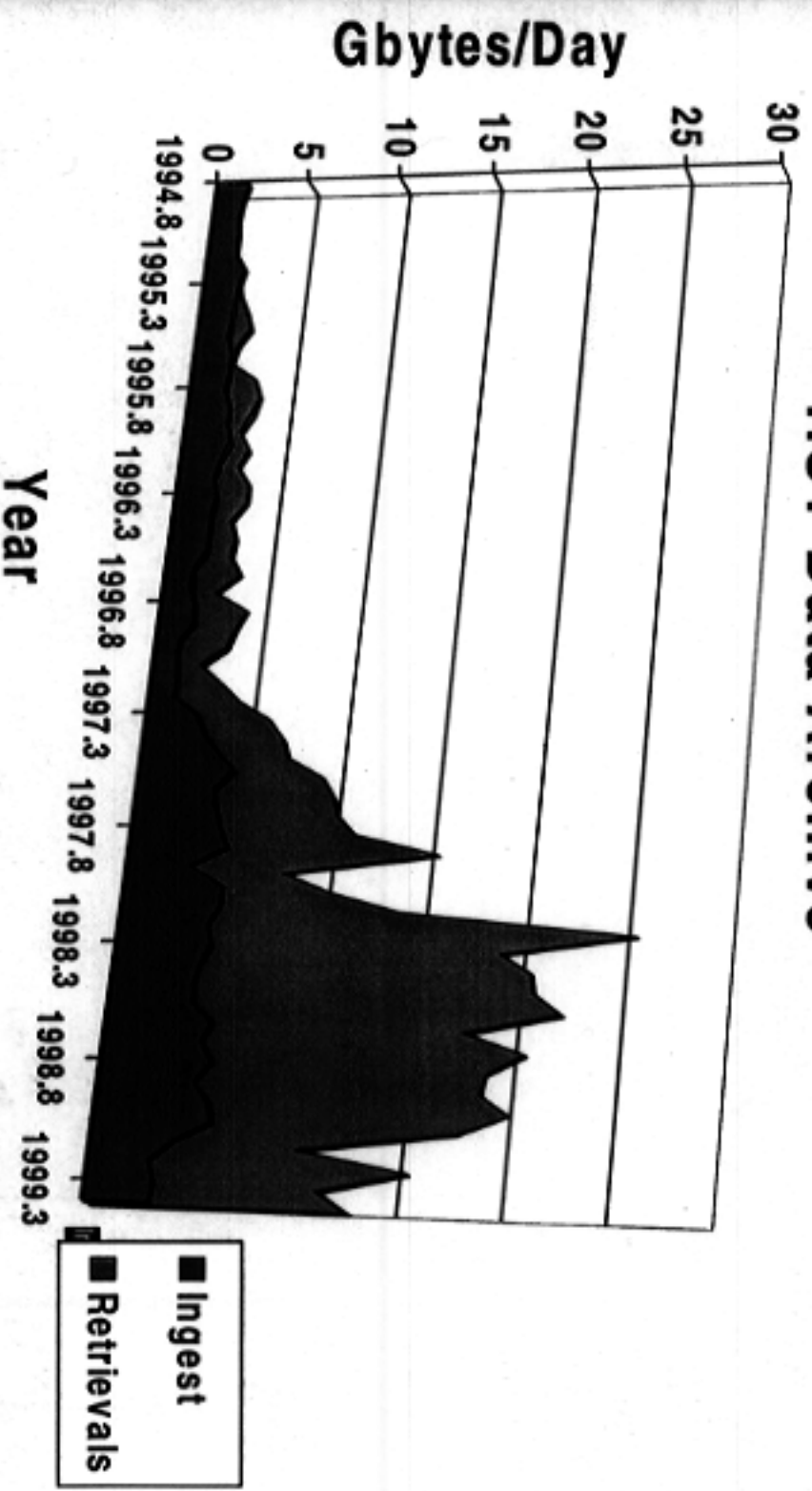


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HST Archive Ingest and Retrievals

HST Data Archive



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MAST System Evolution

● Why:

- Increasing data volume, rates, and demand
- Obsolete, expensive, degenerating hardware

● Solutions:

- Data compression on storage & delivery
- “On-the-fly” calibration, allowing the storage of only the highly compressible raw data
- New hardware: magneto-optical (MO) media & jukeboxes (x5 cheaper)
- DADS replacement with a configurable, flexible s/w system

Archive Hardware Costs

	CD	DVD	DVD	MO	MO	Current
	Plasmon	Cygnat	Plasmon	Plasmon	HP	Cygnat
Density (GB)	0.65	2.6	2.6	5.2	5.2	6
Total (GB)	312	1300	1300	2600	1238	786
# of JB's for 6 TB	20	5	5	3	5	8
Unit Media Cost	\$2	\$19	\$19	\$60	\$71	\$300
JB cost	\$12957	\$23780	\$20000	\$60789	\$45705	\$100,000
Total Media Cost	\$960	\$9500	\$9500	\$30000	\$16898	\$39,300
Full JB Cost	\$13917	\$33280	\$29500	\$90789	\$62603	\$139,300
Cost/GB	\$45	\$26	\$23	\$35	\$51	\$177
Total cost 6 TB	\$278,340	\$166,400	\$147,500	\$272,367	\$313,015	\$1,114,000

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HST Archive Operational Support

- HST archive labor cost: 12 FTEs
 - 2 shifts/day weekdays, 1 shift/day weekends
 - 3 operators, 1 supervisor, 2 systems analysts, 2 systems specialists, 3 archive scientists, 1 branch chief
- Non-labor HST costs: \$250,000/year
- Non-HST labor and hardware contract: \$600,000/year (includes 4 FTEs)

MAST Success Ingredients

- **In-house scientific and technical experts**
- **Community-wide data format standards (FITS)**
- **Some commonly available, no-cost data analysis software**
- **Easy to use Web and Java search tools**
- **On-line access, sufficient data bandwidth**
- **Long-term data plans, system evolution**