

WHAT?

Bulk Solar Wind
Coronal Hole
Interstream
CME

WHERE?

Earth-Sun L1

WHEN?

Dec 2001 to
March 2004

HOW?

Passive collectors:

Silicon
Sapphire
Aluminum
Gold
Germanium

Active collectors:

Silicon carbide
13C diamond
Diamond-like-carbon

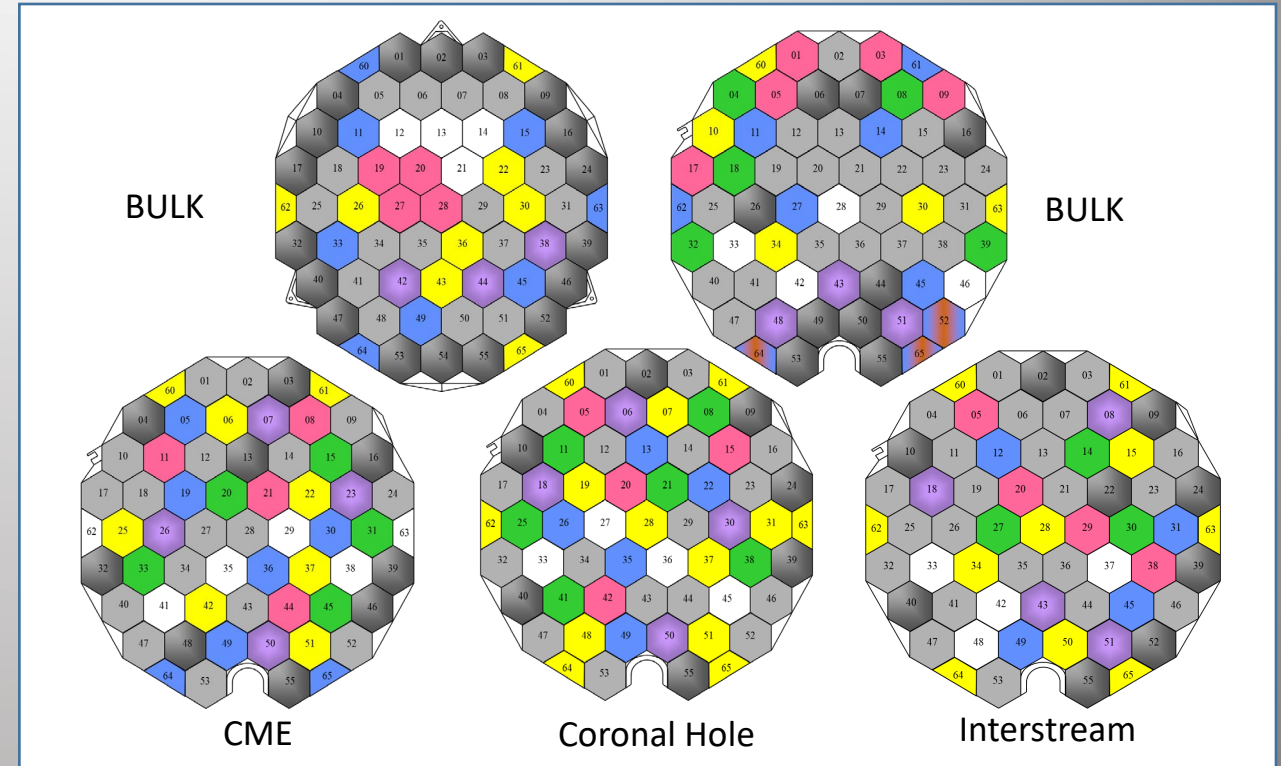
Genesis Solar Wind Sample Curation Documentation

Astromaterials Acquisition and Curation Office

NASA/Johnson Space Center
Judy Allton, Genesis Curator



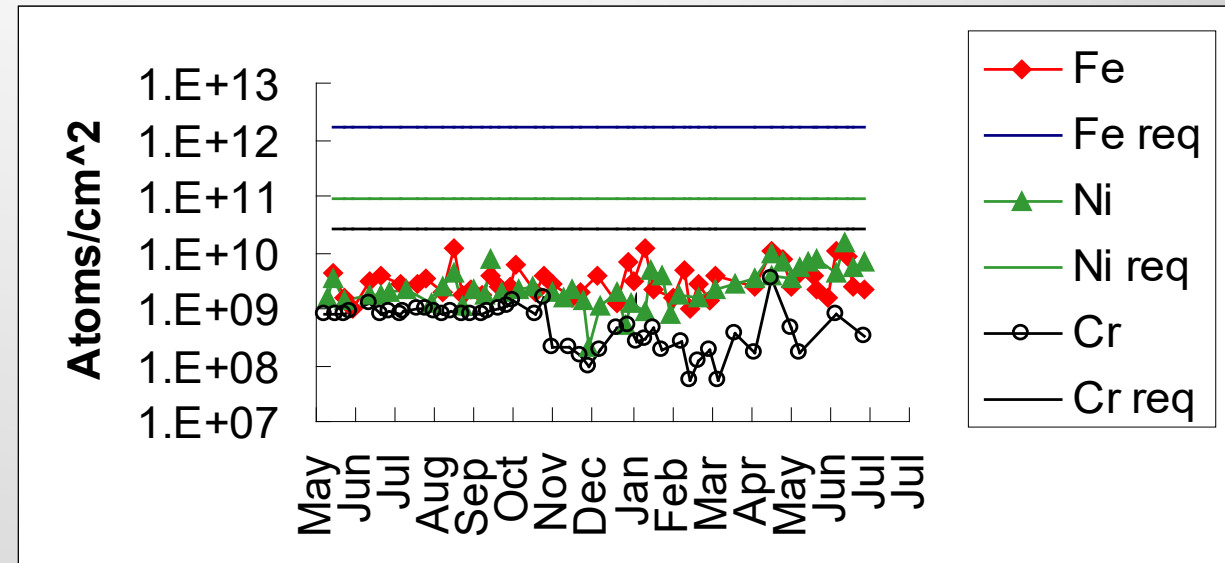
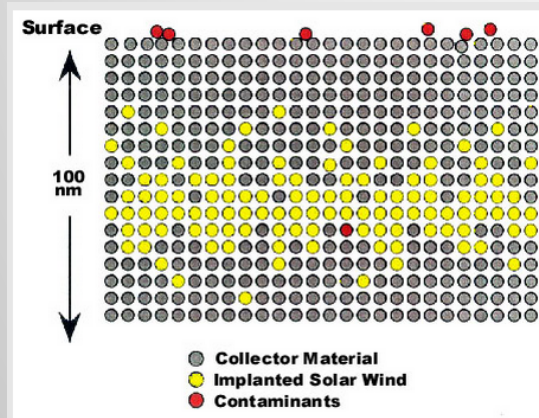
- 301 hexagons, 8 materials
- Various manufacturers, batches
- Reference collectors from flight batches



Genesis Solar Wind Sample Return Mission – pre-flight data

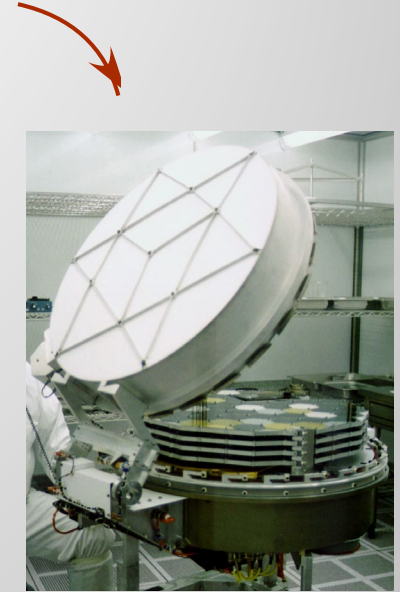
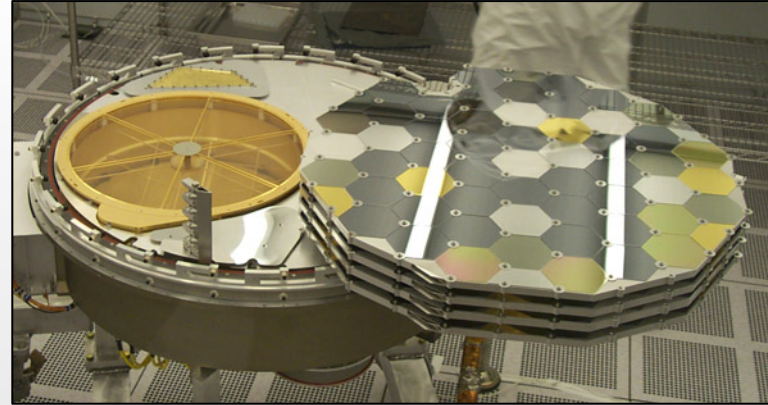
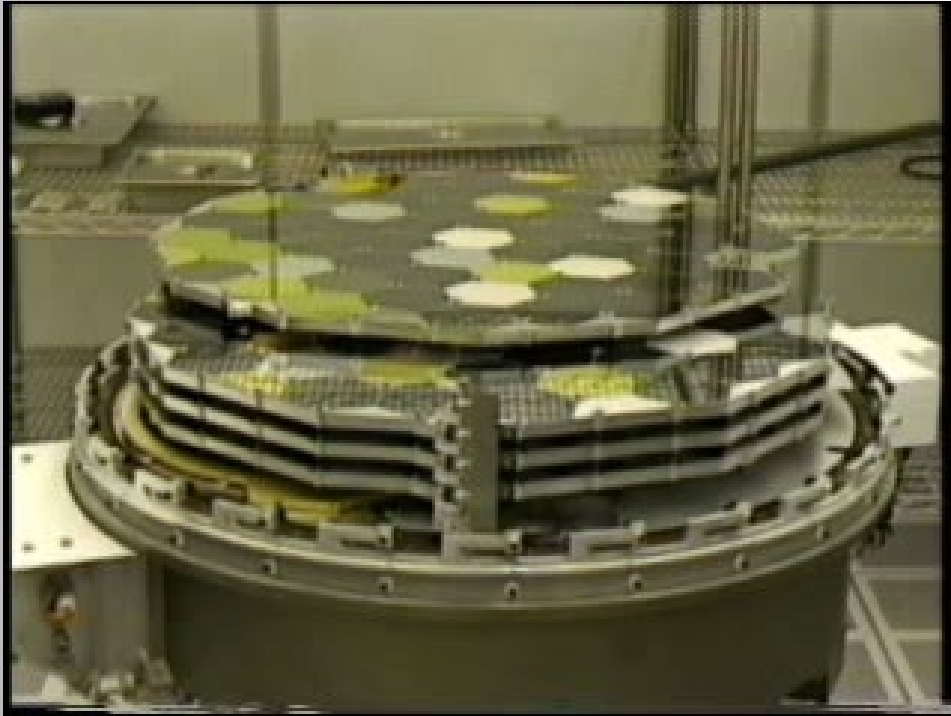
Genesis Solar Wind Sample Collectors

- Collector Materials are “containers” which will capture and hold solar wind

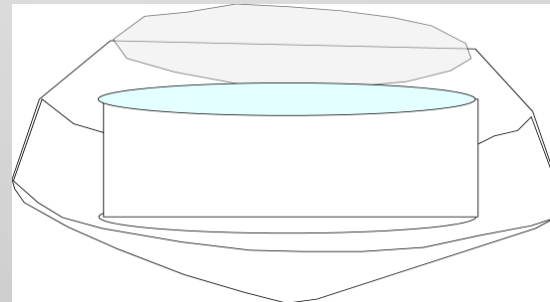


- Must capture and retain solar wind
- Must be pure enough
 - Solar wind fluence is low
 - Design goal is signal to noise ratio >100, critical requirement SNR >10
- Must be clean enough
 - Surface contamination < 2 year SW fluence for any element
 - If some surface contamination does occur, there must be methods for removing it

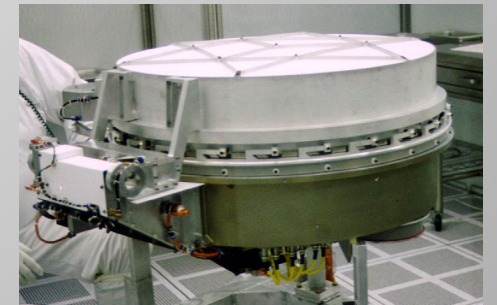
Preparing for Testing and Launch: JPL, JSC, LMA, KSC

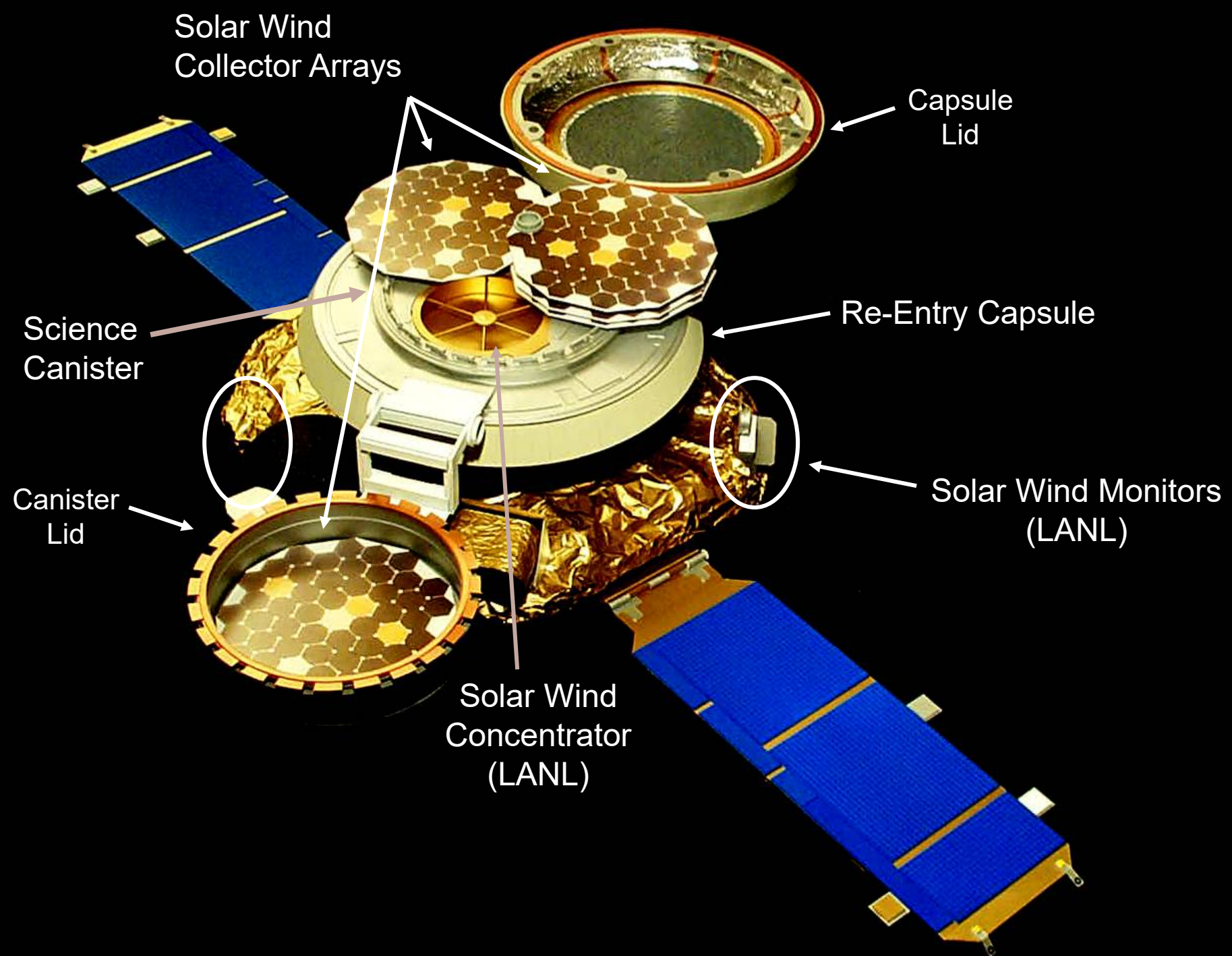


FINAL CLOSING – August 2000
JSC

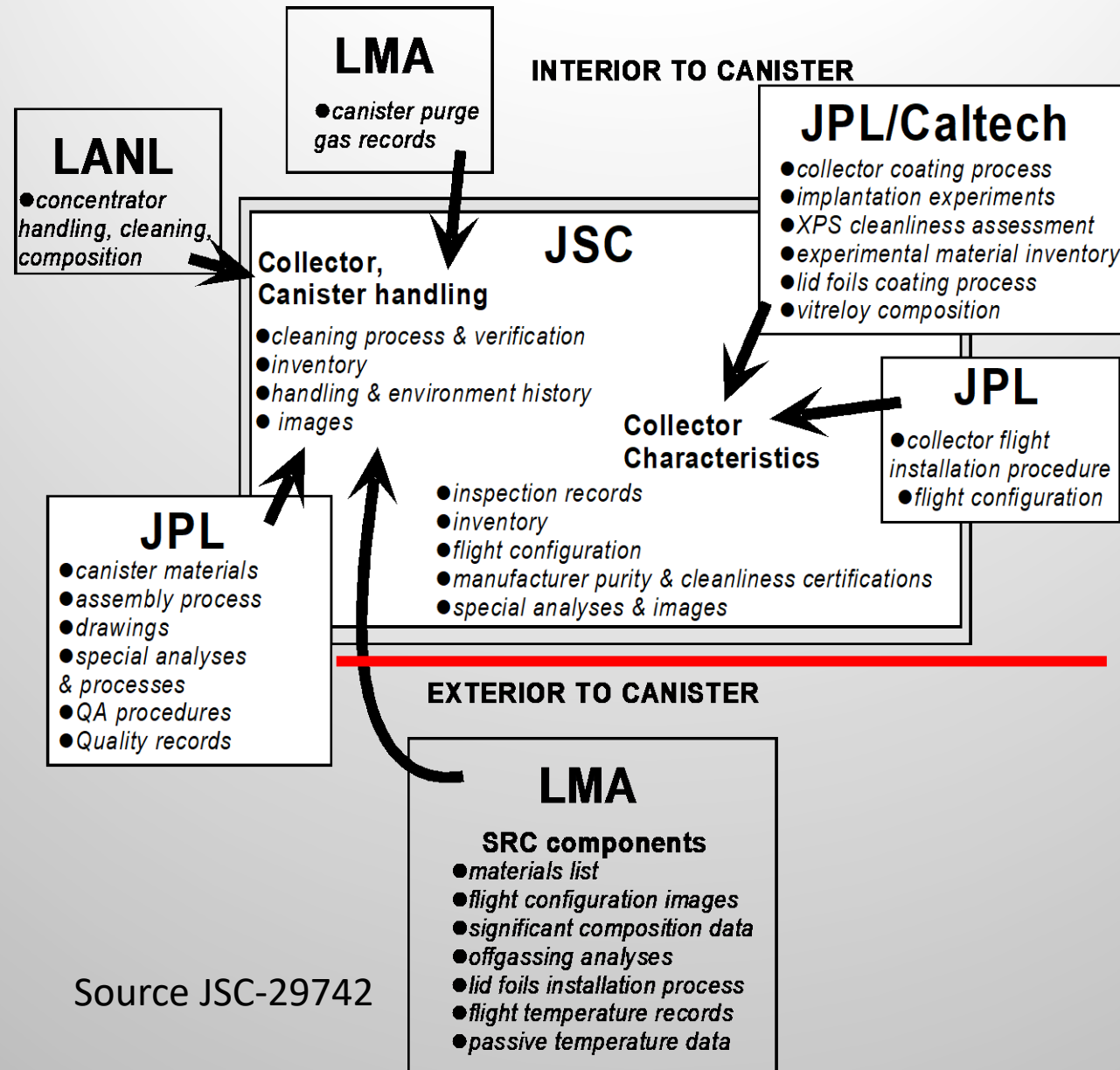


Enclosed in Sample Return Capsule





Genesis Solar Wind Sample Return Mission – pre-flight data



IMPORTANT-

- Information from CAD models for Science Canister and for Sample Return Capsule
- Information from Materials Identification and Usage Lists

WHY?

- Relative orientation and dimensions of various materials
- Precision composition of materials (offgassing, particulate shedding)



Source JSC-29742

Genesis Solar Wind Curation– pre-flight databases

	FLOWN	NON-FLOWN
COLLECTORS	Sample number Solar wind regime Location Material, dimensions, area Subdivision Handling history Images Requests Inventories External document upload 1	Sample number Location Material, thickness Manufacturer, batch Handling history Type of witness or standard 2
NON-COLLECTORS	Sample number Location Description Handling history Images Requests Inventories External document upload 3	Sample number Location Type of witness or standard Environmental witness Environmental material sample Payload component Material description Cleanliness results Handling history 4

Genesis Solar Wind Curation– pre-flight data document types

FLIGHT HARDWARE DOCUMENTS

Cleaning protocol logs, results for each batch (rinse particle counts, UPW purity)

QA material certification records

Purchase orders, shipping documents

Analytical chemistry reports on hardware

ENVIRONMENTAL DOCUMENTS

Airborne particle counts

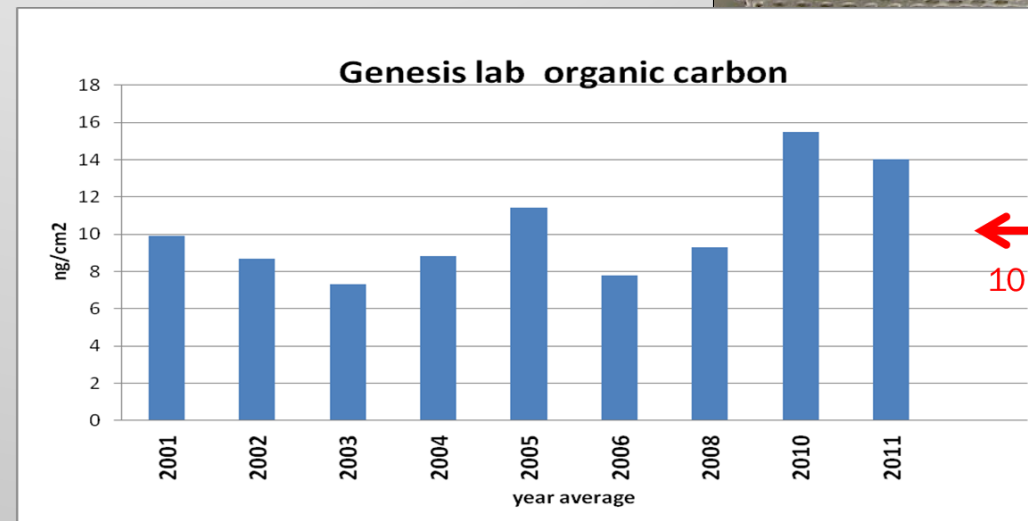
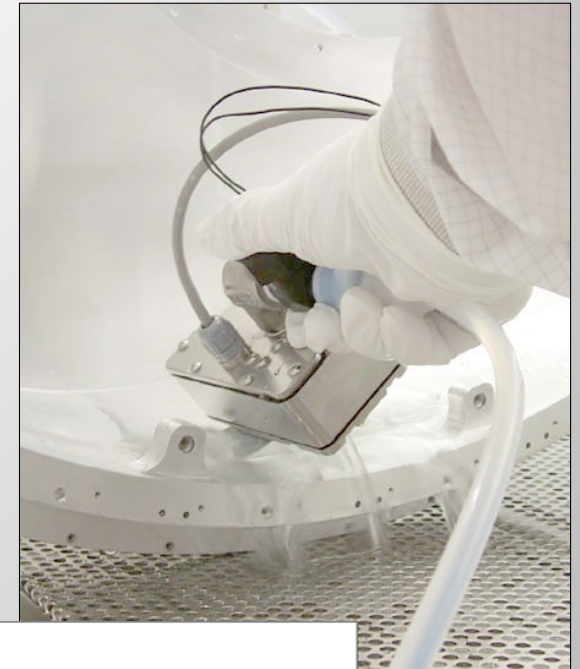
Airborne molecular contamination

Airborne inorganic contamination

UPW chemistry

Purge consumables chemistry

Analytical reference material chemistry reports



Genesis Solar Wind Curation– post-flight data

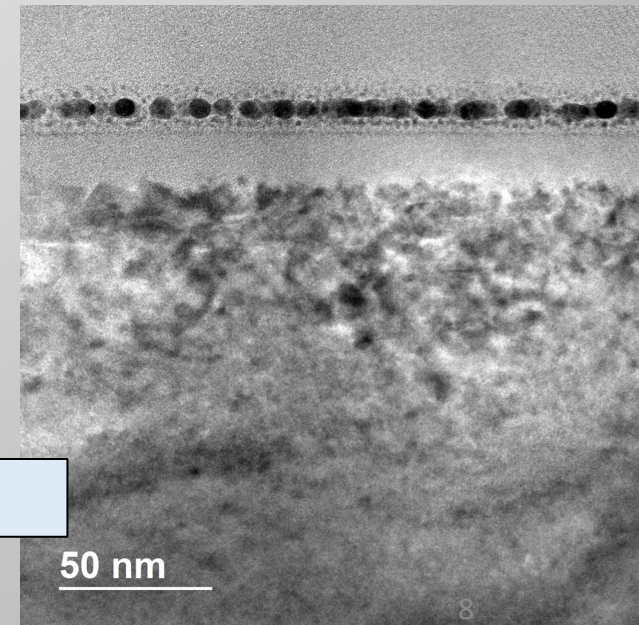
Curation-generated data for collectors

Sample number
Solar wind regime
Location
Material, dimensions, area
Subdivision
Handling history
Images
Requests
Inventories
External document upload

New ways of characterizing the analytical substrate and providing internal standards will add science value to the samples

- Understanding the effects of solar irradiation
- Providing improved internal standards
- Involving expertise of materials science

Allton et al 2019, LPSC
Abstract #1118



for environment

Developing improved cleaning

In reports and abstracts

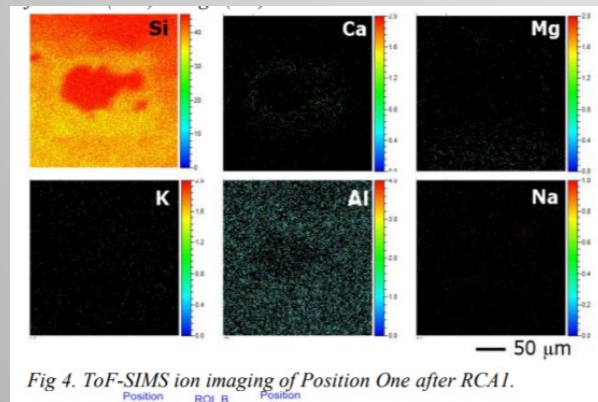
Ongoing airborne particles, organics, inorganics, UPW chemistry in reports and spreadsheets

Genesis Solar Wind Curation– post-flight data

PI-generated data for collectors

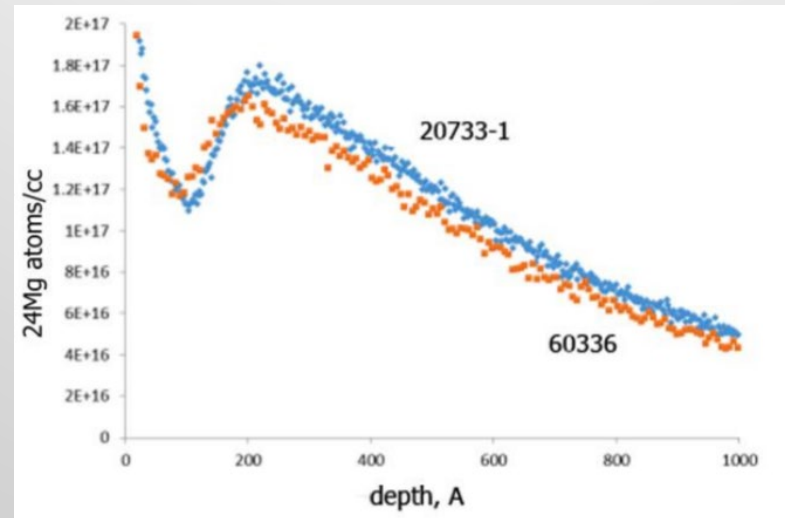
Published in reports and abstracts

Goreva et al 2015, LPSC
Abstract #2333



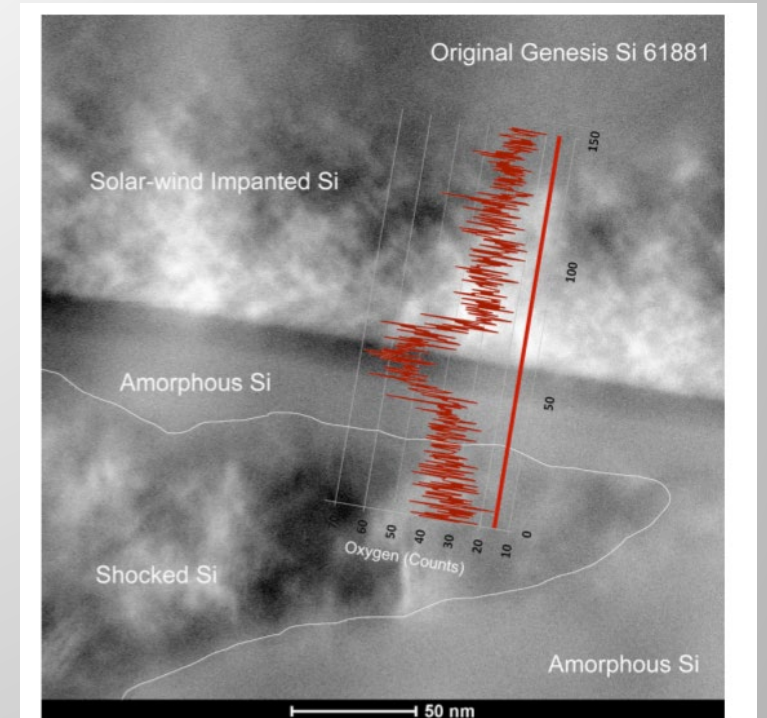
Cleanliness Assessment

Goreva et al 2016, LPSC
Abstract #2253



Cleaning Protocols

Kuhlman et al 2016, LPSC
Abstract #2640



Detailed Characterization

Figure 3. HAADF STEM image of the interface between the silicon contamination in Figure 1 and the Genesis silicon collector material. The line profile is the EDS measurement of oxygen (counts). Note the elevated oxygen in what appears to be the collector silicon.

SUMMARY-

PRE-FLIGHT

Accurate enumeration and tracking of samples

Design and fabrication

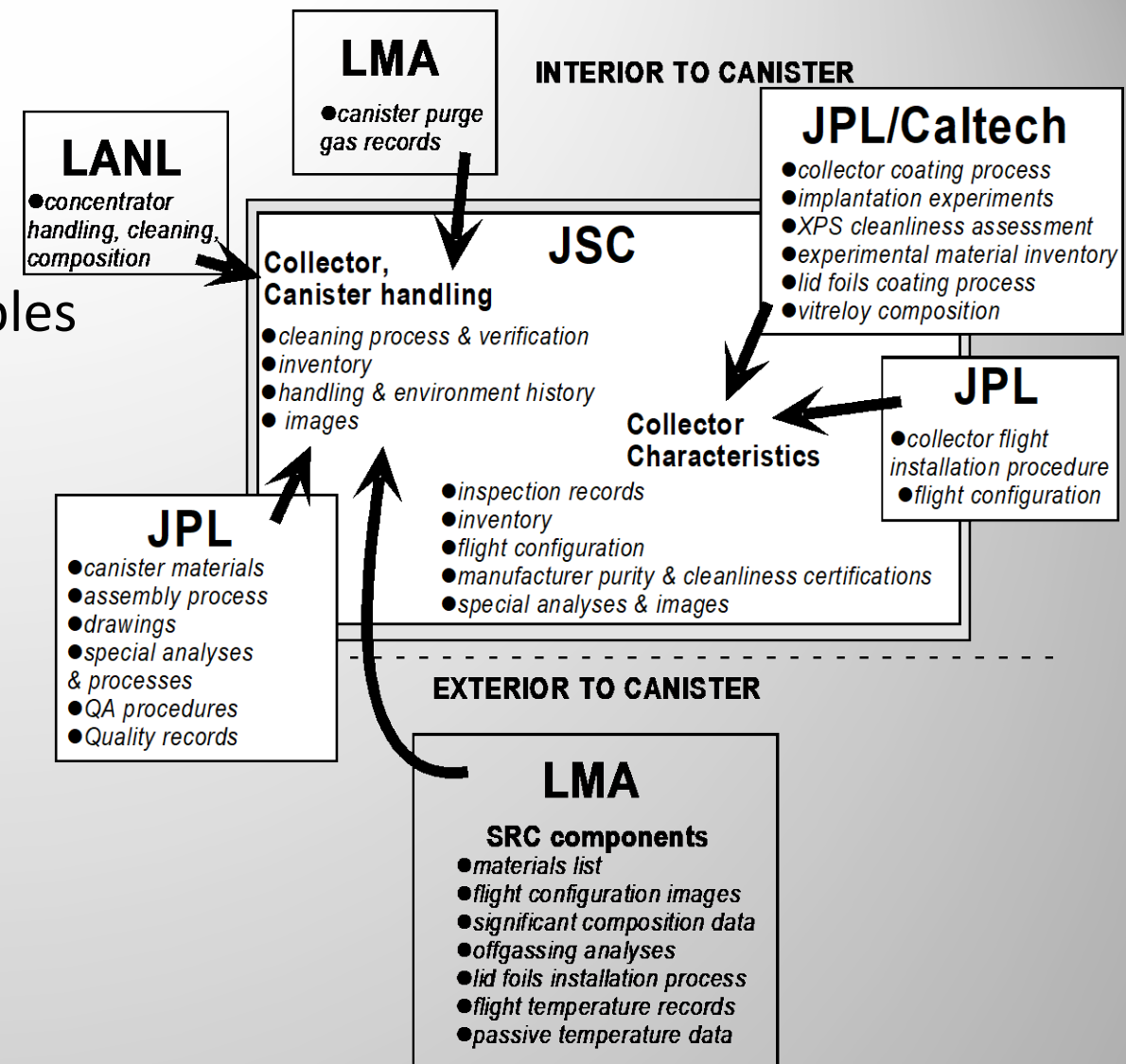
Purity and cleanliness

Cleaning and cleanliness assessment

POST-FLIGHT

Curation-generated data

PI-generated data



Complete data archives for returned astromaterial samples must be broad in types and formats, and inclusive of environmental monitoring.