

Archimedes Palimpsest Metadata Standard XRF Extensions

DRAFT

[These metadata extensions to the Archimedes Palimpsest Metadata Standard 1.0X are currently under review. Comments may be provided to Bob Morton at mortontec@bartnet.net and M.B. Toth at mbt.rbtoth@starpower.net]

Introduction

1. Objectives. The objectives of these extensions are to provide a common set of terminology and definitions for the archival documentation of X-Ray Fluorescence (XRF) digital scanning data used in the study of the Archimedes Palimpsest, in conjunction with the *Archimedes Palimpsest Metadata Standard*. These extensions establish the names and definitions of data elements, specifies the types and ranges of values these elements may contain, and defines requirements for the entry of metadata for these elements.

The primary uses of this metadata are:

- a) to maintain a standard for the research team's use of multispectral imagery data;
- b) to provide information about an organization's data holdings to external data catalogs;
- c) to provide information needed to process and interpret data to be transferred to an external source.

2. Scope. These extensions are intended to support the collection and processing of XRF digital scanning data. It is intended for use by the Archimedes Palimpsest imagery team and hosts of the archival imagery and data. The standard is not intended to reflect an implementation design. Its development draws from existing standards that allow four criteria provided by metadata to be determined:

- a) availability: data needed to determine the sets of data that exist for a given location;
- b) fitness for use: data needed to determine if a set of data meets a specific need;
- c) access: data needed to acquire an identified image and its associated data set;
- d) transfer: data needed to process, share and use an image and its data set.

As such, these extensions establish the names of data elements and compound elements to be used for these purposes, definitions of these data elements and compound elements, and information about the values that are to be provided for the data elements. These extensions do not specify the means by which this information is organized in a computer system, nor the means by which this information is transmitted, communicated, or presented to the user.

4. Related Standards. These extensions were draw from collaborations with experts in the field of XRF imaging, with features and goals in common with the XRF imaging of the Archimedes Palimpsest.

DEFINITION OF METADATA

Metadata are data elements about the content, quality, condition, and other characteristics of the data sets that make up the digital holdings.

METADATA PRODUCTION RULES

Conventions used in these rules are:

CORE: required metadata

TYPE: single or multiple (compound) entries may be present

DOMAIN: permissible metadata formats and values

6.8 Metadata Extensions: a reference to extended elements to the standard which may be defined by a metadata producer or the academic community. Extended elements are subjective elements outside the Standard, but needed by the metadata producer or user, sometimes referred to as dynamic metadata. If extended elements are created, they must follow the guidelines in Appendix A, Guidelines for Creating Extended Elements to the Archimedes Digital Multispectral imagery metadata.

CORE:NO TYPE: COMPOUND

DOMAIN: TEXT

6.8.1 X-Ray Beam Source: The type of equipment that produced the X-Ray beam:

CORE:YES TYPE: COMPOUND

DOMAIN: TEXT

6.8.2 Tube Voltage: Voltage applied to the X-Ray source expressed in 6.8.1 in kilovolts

CORE:NO TYPE: SINGLE

DOMAIN: nn

6.8.3 Tube Current: Strength of current applied to the X-Ray source expressed in 6.8.1 in amperage.

CORE:NO TYPE: SINGLE

DOMAIN: nn

6.8.4 Source Bandwidth: Bandwidth of the X-Ray beam in Bremstrahlung or Delta eV.

CORE:NO TYPE: SINGLE

DOMAIN: nn

6.8.5 Source Intensity: Strength of the X-ray beam on the Reference Specimen in Photon Count

CORE:NO TYPE: SINGLE

DOMAIN: nn

6.8.6 Scan Matrix Dimensions X by Y: The horizontal and vertical scan distance, expressed in millimeters

CORE:NO TYPE: SINGLE

DOMAIN: nn

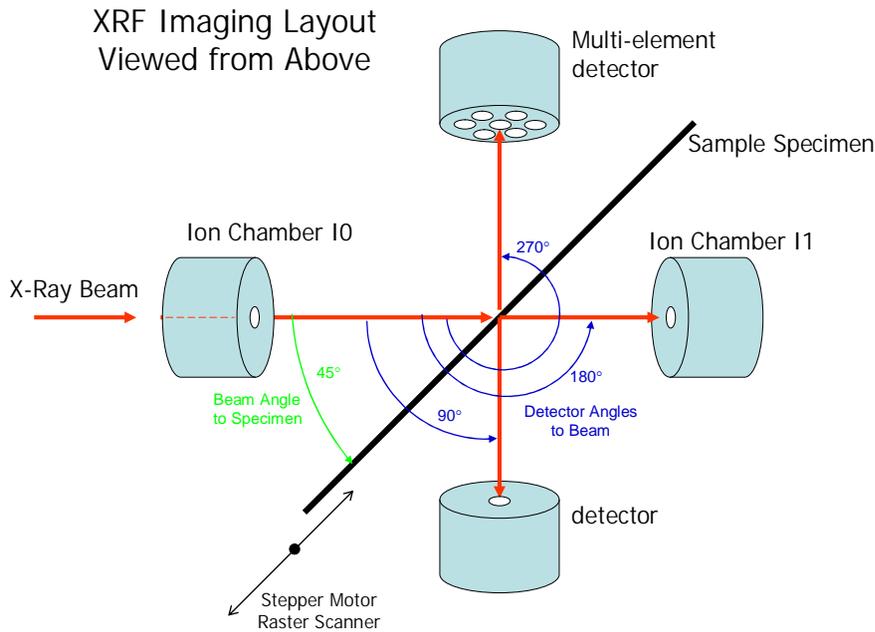
- 6.8.7 Beam Dimension: The diameter of the X-Ray beam in microns
CORE:NO TYPE: SINGLE
DOMAIN: nn
- 6.8.8 Beam Scan Line Spacing: The vertical distance between each line of the scan in microns
CORE:NO TYPE: SINGLE
DOMAIN: nn
- 6.8.9 Scanning Mode: The method used to move the scan across the specimen
CORE:NO TYPE: SINGLE
DOMAIN: "Step", "Continuous", "Mono-directional", or "Bi-directional"
- 6.8.10 Scanning Speed: The speed of the scan across the specimen in motor steps per second
CORE:NO TYPE: SINGLE
DOMAIN: nn
- 6.8.10.1 Steps per millimeter: The number of motor steps per millimeter
CORE:NO TYPE: SINGLE
DOMAIN: nn
- 6.8.10.2 Pixel Acquisition Time: The dwell time of the X-Ray Beam in milliseconds
CORE:NO TYPE: SINGLE
DOMAIN: nn
- 6.8.10.3 Time for Scan: Length of time for the scan in hours and minutes
CORE:NO TYPE: COMPOUND
DOMAIN: TEXT
- 6.8.11 Beam Distance from Specimen: Space between specimen and the beam source measured in millimeters.
CORE:NO TYPE: SINGLE
DOMAIN: nn
- 6.8.12 Beam Angle to Specimen: The angle of the object to the beam in degrees going counterclockwise starting at the beam looking down, or "right hand rule" thumb up.
CORE:NO TYPE: SINGLE
DOMAIN: nn
- 6.8.13 Lens Type: The type of lens used to focus the X-ray beam
CORE:NO TYPE: COMPOUND
DOMAIN: "Polycapillary" or "Monochromator "
- 6.8.14 Primary Beam Filter: Filter material or type between the X-Ray Beam and the object.
CORE:NO TYPE: COMPOUND
DOMAIN: TEXT

6.8.15 Detectors: Number of XRF detectors.
 CORE:NO TYPE: SINGLE
 DOMAIN: nn

6.8.15.1 Detector Identification: Name of the XRF detector in the collection system.
 CORE:NO TYPE: COMPOUND
 DOMAIN: TEXT

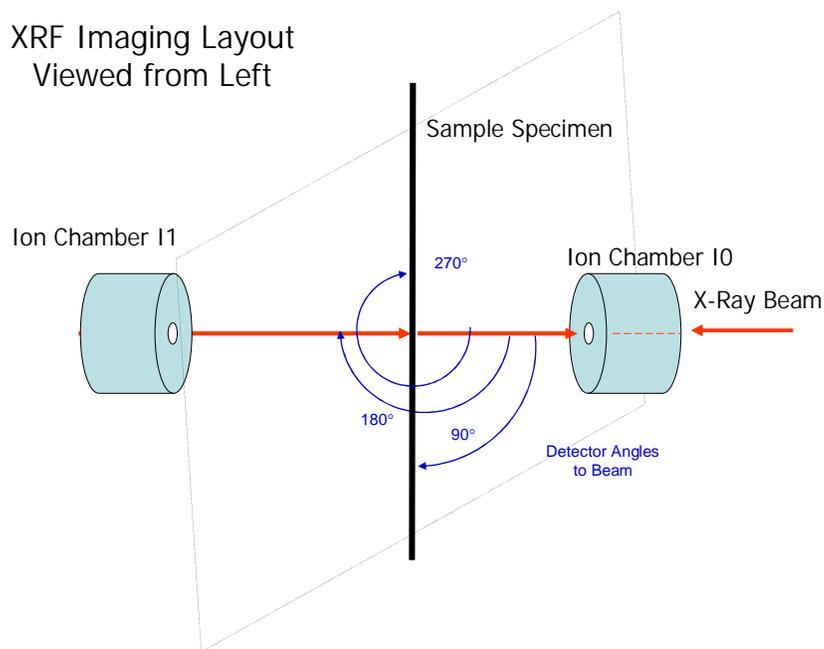
6.8.15.2 Longitude: The angle of the detector horizontally around the object in degrees going counterclockwise starting at the beam looking down, or “right hand rule” thumb up (see Fig 1).
 CORE:NO TYPE: SINGLE
 DOMAIN: nn

Figure 1



6.8.15.3 Latitude: The angle of the detector vertically around the object in degrees going down in a clockwise direction starting at the beam looking from the left of the beam, or “right hand rule” thumb toward X-Ray source (see Fig 2).
 CORE:NO TYPE: SINGLE
 DOMAIN: nn

Figure 2



- 6.8.15.4 Distance: Distance from the specimen to the detector in millimeters.
CORE:NO TYPE: SINGLE
DOMAIN: nn
- 6.8.15.5 Detector Make: Make of the detector.
CORE:NO TYPE: COMPOUND
DOMAIN: TEXT
- 6.8.15.6 Detector Model: Model of the detector.
CORE:NO TYPE: COMPOUND
DOMAIN: TEXT
- 6.8.15.7 Detector Bias Voltage: Difference in potential specified for the detector, measured in voltage
CORE:NO TYPE: SINGLE
DOMAIN: nn
- 6.8.15.8 Amp Time Constant: milliseconds
CORE:NO TYPE: SINGLE
DOMAIN: nn
- 6.8.15.9 Make of Counting Electronics: The name of the manufacturer of the counting unit(s).
CORE:NO TYPE: COMPOUND
DOMAIN: TEXT

- 6.8.15.10 Model of Counting Electronics: The model name or number of the counting unit(s)
CORE:NO TYPE: COMPOUND
DOMAIN: TEXT
- 6.8.15.11 Primary Detector Window: Type of material and thickness in millimeters of the detector window.
CORE:NO TYPE: COMPOUND
DOMAIN: TEXT
- 6.8.15.12 Number of Detector Elements: Number of detector elements behind the window.
CORE:NO TYPE: COMPOUND
DOMAIN: TEXT
- 6.8.15.13 Intermediate Windows: Number of intermediate windows between primary detector and object, and type of material and thickness of windows.
CORE:NO TYPE: COMPOUND
DOMAIN: TEXT
- 6.8.15.14 Intermediate Atmosphere: Intermediate atmosphere between detector and object
CORE:NO TYPE: COMPOUND
DOMAIN: TEXT
- 6.8.16 Chamber Atmosphere: The atmosphere in the chamber, either "Air" or a given gas.
CORE:NO TYPE: COMPOUND
DOMAIN: TEXT
- 6.8.17 Chamber Temperature: The temperature of the atmosphere in the XRF chamber in degrees Fahrenheit or Celcius.
CORE:NO TYPE: SINGLE
DOMAIN: nn
- 6.8.18 Chamber Humidity: The percentage of moisture in the atmosphere in the XRF chamber at the given temperature
CORE:NO TYPE: SINGLE
DOMAIN: nn
- 6.8.19 Post Processing Module: The name or type of module used for processing XRF data.
CORE:NO TYPE: COMPOUND
DOMAIN: TEXT
- 6.8.19.1 Second Post Processing Module: The name or type of additional module(s) used for processing XRF data.
CORE:NO TYPE: COMPOUND
DOMAIN: TEXT

- 6.8.20 Ion Chamber: Name or type of Ion detector.
CORE:NO TYPE: COMPOUND
DOMAIN: TEXT
- 6.8.20.1 Ion Chamber Length: Length of the ion chamber in centimeters
CORE:NO TYPE: SINGLE
DOMAIN: nn
- 6.8.20.2 Type of Gas: Sensing medium in the ion chamber.
CORE:NO TYPE: COMPOUND
DOMAIN: TEXT
- 6.8.21 Gain: Amount of amplification in the signal path from the detectors as a whole number.
CORE:NO TYPE: COMPOUND
DOMAIN: nn
- 6.8.22 Voltage to Frequency Ratio: The ratio of the amount of voltage from the detector to the resulting frequency of the XRF emission.
CORE:NO TYPE: COMPOUND
DOMAIN: nn
- 6.8.23 Channels: Number of channels in the ASCII File.
CORE:NO TYPE: SINGLE
DOMAIN: nn
- 6.8.23.1 Channel Number: The identification number assigned to a given channel
CORE:NO TYPE: SINGLE
DOMAIN: nn
- 6.8.23.2 Detector: The detector output that is assigned to a given channel
CORE:NO TYPE: COMPOUND
DOMAIN: TEXT
- 6.8.23.3 Element: The natural element collected in a given channel
CORE:NO TYPE: COMPOUND
DOMAIN: TEXT
- 6.8.23.4 Windows: Type of detector window(s).
CORE:NO TYPE: COMPOUND
DOMAIN: TEXT