

TRiDaS 1.1: The tree-ring data standard

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Abstract

Tree-ring research and collaboration are currently being hampered by the lack of a suitable data-transfer standard for both data and metadata. This paper highlights the issues currently being faced and proposes a solution that, if adopted by the global dendro community, will open up the possibility of exciting new research collaborations. The solution consists of a data model for dendrochronological data and metadata, and an eXtensible Markup Language (XML) schema as a technical vehicle to exchange this data and metadata. The technology and structure of the standard enables future versions to be developed that will satisfy evolving requirements whilst remaining backwards compatible.

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A. Data Attribute Dictionaries

Table 1: Details of the attributes available for projects.

	Definition	Mandatory	Repeatable	Usage Notes
title	Name of the project	Y	N	
identifierValue	Laboratory project identification such as a report number	Y	N	Must be unique in combination with laboratory
createdTimestamp	Date and time that this record was created	N	N	
lastModifiedTimestamp	Date and time that this record was last modified	N	N	
type	Examples include: dating, provenance, wood-technology, vegetation reconstruction, climate study	Y	Y	Ideally value should be taken from a controlled vocabulary. Examples are given in section ??
description	More information about purposes of the dendrochronological research	N	N	
file	Results of the project in digital files	N	Y	Link to separate file(s)
laboratory	Name of the dendrochronological research laboratory	Y	Y	
category	Former vegetation, archaeology, building history, ship’s archaeology, art/furniture, actual vegetation	Y	N	Ideally value should be taken from a controlled vocabulary. Examples are given in section ??
investigator	Principal investigator	Y	N	If unknown then value must be stated explicitly ‘unknown’
period	When the dendrochronological project took place	Y	N	Could consist of a start- and end-date. If unknown it should be estimated
requestDate	Date of the request for dendrochronology	N	N	If unknown it should be estimated.
commissioner	Commissioner	N	N	Person and/or institute
reference	Dendrochronological publications	N	Y	Bibliographical description of publication
researchIdentifierDomain	National or international system in which the research project is registered	N	Y	Must be unique in combination with research_id
researchIdentifierValue	National or international registration of research: registration number	N	Y	Must be unique in combination with researchIdentifierDomain

Table 2: Details of the attributes available for objects.

	Definition	Mandatory	Repeatable	Usage Notes
title	Individual name (such as the name of a ship, building or painting)	Y	N	
identifier	Inventory number. Equivalent to Dublin Core element “identifier”	N	N	
identifierDomain	Inventory system	N	N	
createdTimestamp	Date and time that this record was created	N	N	
lastModifiedTimestamp	Date and time that this record was last modified	N	N	
type	Functional description: building (church, house etc.) water well, painting, musical instrument (and type), ship (and type), type of forest	Y	N	Ideally value should be taken from a controlled vocabulary. Examples are given in section ??
description	More elaborate description of the object itself; this could include important characteristics which are mainly domain specific. For example in building history “type of joints” or dimensions of the object	N	N	
linkSeries	Reference to a derivedSeries which is a combination of measurements of this object	N	Y	
file	Digital pictures; word-docs; excelsheets; maps; files with geo-measurements	N	Y	
creator	Name, place of the workshop/wharf	N	N	
owner	Owner of object	N	N	
coverageTemporal	If the date is already known in more or less detail: historical period (broad). Equivalent to Dublin Core term “temporal”	N	N	When an object can not be dated, a date can be estimated using for instance stylistic properties or stratigraphy
coverageTemporal-Foundation	Method of dating support (e.g. archive sources, inscriptions, stratigraphic context, associated finds, typology, stylistic aspects, carpenter marks, radiocarbon, OSL, other methods)	N	N	
locationGeometry	Objects in situ: coordinates point or polygon. Equivalent to Dublin Core term “spatial”	N	N	Point or polygon ideally in WGS84.
locationType	One of: Growth location; Location of use (static); Location of use (mobile); Current location; Manufacture location	N	N	For example, point taken from center or corner of area, which corner
locationPrecision	Stores potential difference; number of meters difference, so 0 is exact.	N	N	
locationComment	Extra information	N	N	For example, point taken from center or corner of area, which corner

Table 3: Details of the attributes available for element.

	Definition	Mandatory	Repeatable	Usage Notes
title	Name of the element	Y	N	
identifier	External registration-number, find number, code	N	N	
identifierDomain	Domain from which the identifierValue was issued	N	N	
createdTimestamp	Date and time that this record was created	N	N	
lastModifiedTimestamp	Date and time that this record was last modified	N	N	
type	Functional term of the part of the object	N	N	
description	Other information about the element	N	N	
linkSeries	Reference to a derivedSeries which is a combination of measurements of this element	N	Y	
file	drawings or pictures of the element; position in the object	N	Y	
taxon	The most detailed taxonomic name known: species, genus, family etc	Y	N	Ideally the value should be taken from the Catalogue of Life. See section ??
shape	Shape of element - used primarily for beams	N	N	Ideally value should be taken from a controlled vocabulary. Examples are given in section ??
dimensions	Dimensions of element. Depending on the type of element this can include one or more of the following: diameter; height; width; depth	N	N	When the element is a tree, this would likely contain height and diameter but in most other cases it is likely to contain height, width and depth
unit	SI-units used for the dimensions	N	N	
authenticity	Original/repair/later addition	N	N	
locationGeometry	See table 3	N	N	
locationType	See table 3	N	N	
locationPrecision	See table 3	N	N	
locationComment	See table 3	N	N	
processing	Processing (carved, sawn etc.) rafting marks	N	N	
marks	Carpenter marks, inscriptions	N	N	
altitude	Altitude in metres if this element is a live tree in situ	N	N	
slopeAngle	Angle of slope from horizontal in degrees	N	N	
slopeAzimuth	Angle in degrees from north along with the slope lies	N	N	
soilDescription	General description of soil type	N	N	
soilDepth	Depth of soil in centimetres	N	N	
bedrockDescription	General description of the underlying bedrock	N	N	

Table 4: Details of the attributes available for sample.

	Definition	Mandatory	Repeatable	Usage Notes
title	Name of the sample	Y	N	
identifier	Unique sample identifier	N	N	
identifierDomain	Domain from which the identifier-value was issued	N	N	
createdTimestamp	Date and time that this record was created	N	N	
lastModifiedTimestamp	Date and time that this record was last modified	N	N	
type	Method that was used to take a sample from the element	Y	N	
description	More information about the sampling	N	N	
file	Digital photo or scanned image	N	Y	
samplingDate	Year of dendrochronological sampling	N	N	
samplingDateCertainty	Certainty of the date of sampling	N	N	
position	Position of sample in element	N	N	
state	State of material (dry/wet/conserved/burned, woodworm, rot, cracks) things that indicate the quality of the measurements.	N	N	
knots	Presence of knots	N	N	

Table 5: Details of the attributes available for radius.

	Definition	Mandatory	Repeatable	Usage Notes
title	Name of the radius	Y	N	
identifier	Unique radius identifier	N	N	
identifierDomain	Domain from which the identifierValue was issued	N	N	
createdTimestamp	Date and time that this record was created	N	N	
lastModifiedTimestamp	Date and time that this record was last modified	N	N	
pith	Whether pith is present or absent	Y	N	
heartwood	Whether present or absent			
missingHeartwoodRings-ToPith	Estimated number of missing heartwood rings to the pith	N	N	
missingHeartwoodRings-ToPithFoundation	Description of the way the estimation was made and certainty	N	N	
sapwood	One of: n/a; absent; complete; incomplete	Y	N	
missingSapwoodRings-ToBark	Estimated number of missing sapwood rings to the bark	N	N	
missingSapwoodRings-ToBarkFoundation	Description of the way the estimation was made and certainty	N	N	
numberSapwoodRings	Number of observed sapwood rings	N	N	
lastRingUnderBark	Information about the last rings under the bark	N	N	If the last ring is under the bark is present, include information about the completeness of this ring and/or season of felling.
bark	Bark present/absent	Y	N	
azimuth	Angle in degrees from north along which this radius lies	N	N	

Table 6: Details of the attributes available for measurementSeries.

	Definition	Mandatory	Repeatable	Usage Notes
title	Name of the measurementSeries	Y	N	
identifier	Unique measurementSeries identifier	N	N	
identifierDomain	Domain from which the identifierValue was issued	N	N	
createdTimestamp	Date and time that this record was created	N	N	
lastModifiedTimestamp	Date and time that this record was last modified	N	N	
analyst	Name of the analyst that made the series	N	N	
dendrochronologist	Name of the dendrochronologist that oversaw the analyst	N	N	
measuringMethod	What method was used to measure	Y	N	
comments	More information about the measurements	N	N	
usage	How the series is used, for instance in which chronology	N	N	
usageComments	Comments by later users on quality of series	N	Y	
variable	Measured variable (ring width, earlywood, latewood etc)	Y	N	
firstYear	Year of the first measured ring. This is derived from the chronology that was used to date this series	N	N	Not to be confused with sproutYear. A suffix of BC, AD or BP may be used otherwise value is assumed to be a signed integer representing BC/AD year.
datingReference	Chronology used to interpret the measurement	N	N	
statValue	Statistical value used to support match with chronology	N	Y	
statType	Type of statistic used to support match with chronology	N	Y	
significanceLevel	Significance of statistical match with the chronology	N	Y	
sproutYear	Estimated year that the tree sprouted	N	N	A suffix of BC, AD or BP may be used otherwise value is assumed to be a signed integer representing BC/AD year.
usedSoftware	Software used to perform the statistic match with the chronology	N	Y	
deathYear	Estimated year of death of the tree	N	N	A suffix of BC, AD or BP may be used otherwise value is assumed to be a signed integer representing BC/AD year.
provenance	Estimated provenance derived from the matching chronology	N	N	

Table 7: Details of the attributes available for derivedSeries.

	Definition	Mandatory	Repeatable	Usage Notes
title	Name of the derivedSeries	Y	N	
identifier	Unique derivedSeries identifier	N	N	
identifierDomain	Domain from which the identifierValue was issued	N	N	
createdTimestamp	Date and time that this record was created	N	N	
lastModifiedTimestamp	Date and time that this record was last modified	N	N	
type	Type, e.g. chronology, object curve	Y	Y	
linkSeries	Series from which this series was derived	Y	Y	
objective	The reason/rationale why this series was made	N	N	
standardizingMethod	Numerical method used to standardise the series	N	N	
author	Author	N	N	
version	Version number	N	N	
comments	See table 7	N	N	
usage	See table 7	N	N	
usageComments	See table 7	N	Y	
firstYear	See table 7	N	N	
datingReference	See table 7	N	N	
statValue	See table 7	N	Y	
statType	See table 7	N	Y	
significanceLevel	See table 7	N	Y	
sproutYear	See table 7	N	N	
usedSoftware	See table 7	N	Y	
deathYear	See table 7	N	N	
provenance	See table 7	N	N	
extentGeometry	Geographical extent that the derivedSeries covers	N	N	
extentComment	Comments on the geographical extent	N	N	

Table 8: Details of the attributes available for value.

	Definition	Mandatory	Repeatable	Usage Notes
index	Alphanumeric code to identify the sequential position of the value, e.g. nr1001, nr1002 etc.	Y	N	To avoid confusion with years, the index should have a prefix of "nr"
value	The actual value being recorded	Y	N	
remark	Remark about this ring. A controlled vocabulary can be used to standardise important remarks such as 'fire damage', 'frost damage' etc	N	N	