A Tables of ADES Tags and Structures

A.1 Table of ADES Elements

XML elements are the things which appear as XML tags, such as <permID> value </permID>. The ones in this table are all top-level elements, which means they can be the root of their own XML document and thus validated against XSD individually. The last element in the table, "ades," is intended to be used as the root element for every XML document used for interchange. All elements are written in camelCase with the first character not capitalized.

Elements and their Descriptions

ADES observation sub-elements		
Name	Type	Description
permID	PermID	IAU permanent designation, i.e., IAU number (MPCID group)
provID	ProvID	MPC provisional designation (unpacked form) for unnumbered object (MPCID group)
trkSub	String	Observer-assigned tracklet identifier, unique within submission batch Typically the same as observer-assiged termporary designation currently employed for the MPC1992 format. Observsers are encouraged to use values with eight or fewer alphanumeric characers (OpticalID group)

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(continued)

obsID	String	Globally Unique Observation ID assigned by MPC (optical and radar ID groups)
trkID	String	Globally Unique alphnumeric observation identifier assigned by MPC (optical and radar ID groups)
mode	Mode	Mode of optical observations. See Mode type for allowed values
prog	String	Program code as assigned by the MPC. The *prog* field is used to identify different observing programs/observers at the the same telescope. For surveys and other large producers, the MPC will increment *prog* for a given observatory code to document a significant operational change reported by the observing team.

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obsTime	xsd:dateTime	UTC time of the observation in ISO 8601 extended format, i.e., *yyyy-mm-ddThh:mm:ss.ssZ*. The reported time precision should be appropriate for the astrometric accuracy. The trailing *Z* indicates UTC and is optional.
ra	RightAscension	Astronmetric equatorial right ascension in decimal ° in the reference frame specified by *frame*.
dec	Declination	Astronmetric equatorial declination in decimal ° in the reference frame specified by *frame*. Positive δ values may optionally include a + sign
deltaRA	xsd:decimal	Measured $\Delta(\mathrm{RA}\cos\delta)$ in ″. For offset measurements of a satellite with respect to its planet, or for occultation observations with respect to the star.
deltaDec	xsd:decimal	Measured $\Delta\delta$ in ″. For offset measurements of a satellite with respect to its planet, or for occultation observations with respect to the star.
raStar	RightAscension	RA of decimal ° of the occulted star

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(continued)

decStar	Declination	δ in decimal $^\circ$ of the occulted star
frame	String	Reference from for reported angular measurements, e.g., 'J2000' for J2000.0 equatorial. (This field is not anticipated to be used until a new reference epoch is indentified, e.g., J2050.0
astCat	AstCat	Star catalog used for the astrometric reduction or for the occulted star in the case of occultation observations. Full list of acceptable field names to be provided and maintained by the MPC. (The MPC—specified value of 'UNK' will be used for some archival observations to indicate astrometric catalog unknown.)

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rmsRA	PositiveDecimal	Random component of the RA $\cos\delta$ 1σ uncertainty in $''$ as estimated by the observer as part of the image processing and astrometric reduction. Presumed systematic errors, e.g., those arising from star catalog biases, should not be folded into the uncertainties reported in this field. rmsRA^2 and rmsDec^2 are the diagonal elements of the RA-δ covariance matrix, which convolves errors from target PSF fitting, telescope tracking, reference star fit, etc.

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rmsDec	PositiveDecimal	Random component of the δ 1σ uncertainty in $''$ as estimated by the observer as part of the image processing and astrometric reduction. Presumed systematic errors, e.g., those arising from star catalog biases, should not be folded into the uncertainties reported in this field. rmsRA^2 and rmsDec^2 are the diagonal elements of the RA-δ covariance matrix, which convolves errors from target PSF fitting, telescope tracking, reference star fit, etc.
rmsCorr	xsd:decimal	Correlation between RA and δ that may result from the astrometric reduction. It can be especially relevant for trailed images or cases with a poor distribution of reference stars. This is derived from the RA-δ covariance matrix, where the off-diagonal term is $\text{rmsCorr}*\text{rmsRA}*\text{rmsDec}$.
mag	xsd:decimal	Apparent Magnitude in specified band (Photometry group)

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(continued)

band	Band	Filter designation for photometry. Full list of acceptable fields names are to be provided and maintained by the MPC. (Photometry group).
photCat	PhotCat	Star catalog used for photometry measurements. Full list of acceptable field names to be provided and maintained by the MPC. (Photometry group)
rmsMag	PositiveDecimal	Apparent magnitude 1σ uncertainty in magnitudes (Photometry group)
photAp	PositiveDecimal	Photometric aperture radius in ″ (Photometry group)
nucMag	Logical	Nuclear magnitude flag for comets. 0 for total magnitude (i.e., for most archival comet observations and all asteroid observations), 1 for nuclear magnitude. Primarily used for archival data as photAp should be used to communicate this information in the new standard (Photometry group)

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logSNR	xsd:decimal	$\log_{10}$ of the signal-to-noise ratio of the source in the image integrated on the entire aperture used for the astrometric centroid.
seeing	PositiveDecimal	Size of seeing disc in ″, measured at Full Width Half Maximum (FWHM) of target point spread function (PSF).
exp	PositiveDecimal	Exposure time in s. Total exposure time in the case of stacked image detections
rmsFit	PositiveDecimal	RMS of fit of astrometric comparison stars in ″.
nStars	xsd:positiveInteger	Number of stars in astrometric fit.
ref	String	Standard reference field used for citations.
disc	Disc	Discovery flag; '*' marks a new discovery record; otherwise not present
subFmt	String	Format in which the observation was originally submitted to the MPC, e.g., M92 for MPC1992 format or I15 for this standard. Filled by the MPC according to a list provided and maintained by the MPC.

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precTime	PositiveDecimal	Precision in millionths of a day of the reported obeservation time for achived MPC1992 data records
precRA	PositiveDecimal	Precision in $''$ of the reported RA for archived MPC1992 data records.
precDec	PositiveDecimal	Precision in $''$ of the reported δ for archived MPC1992 data records.
uncTime	PositiveDecimal	Estimated time uncertainty in s. Unlike the preceding RMS fields, which indicate random errors, this field indicates a presumed lvel of systematic clock error. NB: This field is generally only to be used to communicate exceptions and problems with clock calibration and is not intended to be used in routine submissions where clock errors are not a significant source of astrometric error.
notes	String	A set of one-character note flags to communicate observing circumstances. List of acceptable flags and their interpretation to be provided and maintained by the MPC.

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(continued)

remarks	Remark	Comment field provided by the observer. This field can be used to report additional information that is not reportable in the notes field, but that may be of relevance for interpretation of the observations.
sys	Sys	Coordinate system for station coordinates and covariance. • WGS84: geodetic reference eilipsoid. GPS coordinates are normally obtained in this frame • ITRF: cylindrical • IAU: IAU planetary cartographic model for bodies other than Earth • ICRF_AU: For space-based stations, in ua • ICRF_KM: For space-based stations, in km

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(continued)

ctr	xsd:integer	Origin of the reference system. Use public SPICE codes, e.g., 399 is the geocenter, 10 is the Sun center. Note; sys=WGS84 implies ctr=399

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(continued)

pos1	xsd:decimal	Position of observer, first value. • WGS84: E longitude(°), latitude (°), and altitude (m) • ITRF: E longitude (°), R_{xy} (km), R_z (km) • IAU: longidule (°), latitude (°) and altitude (m) as defined by the corresponding IAU cartography standard • ICRF: equatorial rectangular coordinates (km or ua) in reference frame given by *frame* The number of digits provided should be consistent with the uncertainty of the coordinates
pos2	xsd:decimal	Position second value per sys
pos3	xsd:decimal	Position third value per sys
posCov11	xsd:decimal	11 covariance per sys

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(continued)

posCov12	xsd:decimal	12 covariance per sys
posCov13	xsd:decimal	13 covariance per sys
posCov22	xsd:decimal	22 covariance per sys
posCov23	xsd:decimal	23 covariance per sys
posCov33	xsd:decimal	33 covariance per sys
delay	xsd:decimal	observed radar delay value in s.
rmsDelay	xsd:decimal	Measurement 1σ uncertainty in µs for radar delay
doppler	xsd:decimal	observed radar doppler value in Hz
rmsDoppler	xsd:decimal	Measurement 1σ in uncertainty Hz for radar doppler
com	Logical	Flag to indicate that the observation is reduced to the center of mass. 0 implies a measurement to the peak power position, which is usually interpreted as the leading edge of the target, with the reflection point being modeled one object radius prior to the center of mass.
frq	PositiveDecimal	Carrier reference frequence in MHz
trx	RadarStation	Station code of transmiting antenna. List of station codes and associated locations provided by the MPC

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(continued)

rcv	RadarStation	Station code of receiving antenna. List of station codes and associated locations provided by the MPCradar receiver.

observations residual sub-elements		
Name	Type	Description
orbProd	String	Orbit producer. Can be institution, individual, or even email address, e.g.'MPC'
photProd	String	Producer of photometric residuals. Can be institution, individual, or even email address, e.g.'MPC'
resRA	xsd:decimal	Residuals in RA $\cos\delta$ in decimal $^\circ$
resDec	xsd:decimal	Residuals in δ in $''$
orbID	String	Local reference for orbit, e.g., 'JPL 7' or 'MPO 12345'.
selAst	SelRes	Inclusion/rejection flag for astrometry
sigRA	PositiveDecimal	Adopted RA $\cos\delta$ 1σ uncertainty in $''$. Default $1''$
sigDec	PositiveDecimal	Adopted δ 1σ uncertainty in $''$. Default $1''$
sigCorr	PositiveDecimal	Adopted correlation between RA $\cos\delta$ and δ. Default 0. May be different from the observer-provided correlation

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(continued)

sigTime	PositiveDecimal	Adopted 1σ time uncertainty in s. Default 0. May be different from the observer-provided uncertainty
biasRA	xsd:decimal	Adopted RA $\cos\delta$ bias in $''$. Default 0
biasDec	xsd:decimal	Adopted δ bias in $''$. Default 0
biasTime	xsd:decimal	Adopted time bias in s. Default 0
resMag	xsd:decimal	Photometric residual in magnitudes
selPhot	SelRes	Inclusion/rejection flag for photometry
sigMag	PositiveDecimal	Adopted 1σ magnitude uncertainy in magnitudees. Could be different from the observer-provided uncertainty
biasMag	xsd:decimal	Adopted photometric bias in magnitudes
photMod	String	Description of the photometric model. For example, a value of $G = 0.35$ indicates the value of G in the H-G system. Other standard values for this field will be established by the MPC in consultation with the research community. Default is H-G model with $G = 0.15$

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resRad	xsd:decimal	Residual of the radar measurement in μs for delay, Hz for Doppler
selRad	SelRes	Inclusion/rejection flag for radar astrometry
sigRad	PositiveDecimal	Adopted uncertainty for the radar measurement in μs for delta, Hz for Doppler

observation-context sub-elements

Name	Type	Description
observatory	Observatory	observatory information block
contact	Contact	Contact information block
observers	Names	list of observer names (initials then surname)
measurers	Names	list of measurer names (intialis then surnames)
telescope	Telescope	Description of telescope
software	Software	Description of software
comment	String	comment for observation context
coinvestigators	Names	list of coinvestigator names (initials then surname)
collaborators	Names	list of collaborator names (initials then surname)
fundingSource	String	funding source

observation types

Name	Type	Description
optical	Optical	optical observation
offset	Offset	optical offset
occultation	Occultation	optical occultation
radar	Radar	delay or doppler radar

observation-context, observationChunk, submitBatch

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Name	Type	Description
observationContext	ObservationContext	observation context information
observationChunk	ObservationChunk	observationChunk contains an observationContext and a list of observations of one kind
submitBatch	SubmitBatch	batch is a list of ObservationChunk's

Free-Standing Residuals

Name	Type	Description
opticalResidual	OpticalResidual	optical residual
radarResidual	RadarResidual	radar residual

ADES root

Name	Type	Description
ades	ADES	document root

A.2 Table of Restricted Simple Types

Restricted simple types are a single XML value with some additional restrictions, such as requiring an decimal value to be in some range (such as 0.0 to 90.0) or requiring a string to be from an enumerated list. Some of these restrictions, such as the possible station string values, will eventually be pulled out of MPC-provided files and referenced over the web.

Simple Types with their Restrictions

Type	Description
String base is xsd:string –pattern: `[^|]*[\w-[|]][^|]*`	String follows the ADES specification that that the pipe character is disallowed in PSV. To allow data conversion from XML, it must disallowed in XML as well. Also disallow blank elements. Therefore, all elements must match this pattern

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Type	Description
RightAscension base is xsd:decimal –minInclusive: `0.0` –maxExclusive: `360.0`	RA in ° limited to [0.0, 360.0)
Declination base is xsd:decimal –minInclusive: `-90.0` –maxInclusive: `90.0`	δ in ° in range [-90.0, 90.0]
PositiveDecimal base is xsd:decimal –minExclusive: `0.0`	PositiveDecimal in range [0.0, +inf)
Logical base is xsd:integer –enumeration: `0` –enumeration: `1`	0 for false, 1 for true to match C and FORTRAN
SelRes base is xsd:string –enumeration: `A` –enumeration: `D` –enumeration: `a` –enumeration: `d`	SelRes must be "A," (automatic accept) "a," (manual accecpt)"D," (automatic delete) or "d" (manual delete)
Mode base is xsd:string –enumeration: `CCD` –enumeration: `Photo`	Mode must be "CCD" or "Photo"
Disc base is xsd:string –enumeration: `*`	Used to mark the discovery record – must be '*' if present
Sys base is xsd:string –enumeration: `WGS84` –enumeration: `ITRF` –enumeration: `IAU` –enumeration: `ICRF_AU` –enumeration: `ICRF_KM`	Coordinate system for station coordinates. This used by the pos[123] and poscov[123][123] elements to determine the meaning of cooridnates. WGS84, ITRF and IAU are for roving stations, ICRF_AU and ICRF_KM are for fixed stations.
FormatType base is xsd:string –enumeration: `IAU2015`	allowed submission formats with no extra fields

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Type	Description
MPC80ColFormat base is xsd:string –enumeration: `MPC1992` –enumeration: `MPC1947`	MCP1992 format with extra fields precTime, precRA and precDec
PermID base is xsd:string –pattern: `(\d+([A-Z]*(-[A-Z]*)?)?)|([A-Z]+\d*)`	A permID (permanent ID) string may be a positive integer, a positive integer followed by upple-case letters, upper-case letters followed by a positive integer, or a positive integer followed by upper-case letters followed by a hyphen followed by more upper-case letters. That is, "134340," "1P," "73P-C," "83P-AC," and "J13" are all allowed.
ProvID base is xsd:string –pattern: `([PCS]/)?\d{4} ([-A-Z \d]*)`	A provID (provisional ID) is based on a four-digit year number possibly prefixed by P/, C/ or S/ followed by a space and then some combination of upper-case lettesr, digits, hyphens and spaces. That is, "2014 AA," "2001 P-L," "S/2001 S 31," "P/1886 S1" Perhaps a clearer description would result in a better regular exparession
Remark base is String –maxLength: `200`	A remark is a String limited to 200 characters
FixedStation base is xsd:string –enumeration: `123` –enumeration: `456` –enumeration: `F51`	The MPC maintains a list of allowed FixedStations. at http://somewhere/stationary
RoverStation base is xsd:string –enumeration: `427`	The MPC maintains a list of allowed RoverStations. at http://somewhere/rovers
RadarStation base is String –maxLength: `5`	MPC maintains a list of radar stations at http://somewhere/radarstations
AstCat base is String –maxLength: `5`	MPC maintains a list of astrometry catalogs at http://somewhere/astrometrycats

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(continued)

Type	Description
Band base is String –maxLength: 5	MPC maintains a list of bands for magnitude observations at http://somewhere/bands
PhotCat base is String –maxLength: 5	MPC maintains a list of phototmetry catalogs at http://somewhere/photometrycats

A.3 Groups

This is the documentation for the groups. Groups are a convenient way of organizing rules in complicated structures, used as components of other groups or of complex types. Unlike complex types, groups may appear inside other complex types or groups with no tag. Because groups act a bit like types, their names are all CamelCase with the first letter capitalized.

grouptype: MPCIDGroup

MPCIDGroup	**permID or provID or both in that order**		
choice			
sequence			
	element	permID	
	element	provID	(Optional)
sequence			
	element	provID	

grouptype: OpticalID

OpticalID	**An MPCIDGroup or trkSub or both in that order. Of permID, provID or trkSub at least one must be present in an optical observation but all three might be present. Also, MPC will assign unique obsID and trkID fields for distribution**				
sequence					
	choice				
		sequence			
			group	MPCIDGroup	
			element	trkSub	(Optional)
		sequence			
			element	trkSub	
	element	obsID	(distribOnlyRequired)		
	element	trkID	(distribOnlyRequired)		

grouptype: RadarID

RadarID	**An MPCIDGroup only; radar has no equivalent of the optical "trkSub" field. MPC will add a unique obsID field for distribution**			
sequence				
	group	MPCIDGroup		
	element	trkSub	(Optional)	
	element	obsID	(distribOnlyRequired)	

grouptype: RadarValue

RadarValue	**A RadarValue is used for doppler or delay values and errors in a radar observation.**	
choice		
	sequence	
	element	doppler
	element	rmsDoppler
	sequence	
	element	delay
	element	rmsDelay

grouptype: Station

Station	**stationary or rover with location data. Either location comes last or we need a new element name (maybe rover) for the rover stations.**		
choice			
	sequence		
	type FixedStation	stn	
	sequence		
	element	sys	
	element	ctr	
	element	pos1	
	element	pos2	
	element	pos3	
	element	posCov11	(Optional)
	element	posCov12	(Optional)
	element	posCov13	(Optional)
	element	posCov22	(Optional)
	element	posCov23	(Optional)
	element	posCov33	(Optional)
	type RoverStation	stn	

grouptype: SubmissionFormat

SubmissionFormat	**SubmissionFormat validates the required extra fields for the MPC1992 submission format. As with Station, the subFmt has to come last to avoid XML LR0 parsing cruft.**
choice	
sequence	
type FormatType	subFmt
sequence	
element	precTime
element	precRA
element	precDec
type MPC80ColFormat	subFmt

grouptype: Photometry

Photometry	**The Photometry group is optional in all optical observation types (optical, offset, and occultation). The "mag" and "band" fields must be present; the rest are optional but can only occur if "mag" and "band" are present to define this as a Photometry group**
sequence	
element	mag
element	band
element	photCat (Optional)
element	rmsMag (Optional)
element	photAp (Optional)
element	nucMag (Optional)

grouptype: OpticalResRADec

OpticalResRADec		**OpticalResRADec is optional for the OpticalResiduals group**	
sequence			
	element	resRA	
	element	resDec	
	element	selAst	
	element	sigRA	(Optional)
	element	sigDec	(Optional)
	element	sigCorr	(Optional)
	element	sigTime	(Optional)
	element	biasRA	(Optional)
	element	biasDec	(Optional)
	element	biasTime	(Optional)

grouptype: OpticalResMag

OpticalResMag		**OpticalResRADec is optional for the OpticalResiduals group**	
sequence			
	element	photProd	
	element	resMag	
	element	selPhot	
	element	sigMag	(Optional)
	element	biasMag	(Optional)
	element	photMod	(Optional)

grouptype: OpticalResiduals

OpticalResiduals	**The OpticalResiduals group is optional for adding residuals to optical observations, or as a separate obsResidual element tagged by obsID**	
sequence		
element	orbProd	
element	orbID	
group	OpticalResRADec	(Optional)
group	OpticalResMag	(Optional)

grouptype: RadarResiduals

RadarResiduals	**The RadarResiduals group is optional for adding residuals to optical observations, or as a separate obsResidual element tagged by obsID**	
sequence		
element	orbID	
element	resRad	
element	selRad	
element	sigRad	(Optional)

A.4 Complex Types

This is the documentation for the complex types, which may be used directly as similarly-named elements or as components of other complex types and groups. Unlike a group, a complex type is always the only thing inside a tag. The names of complex types, like groups and simple types, are all CamelCase with the first letter capitalized.

complextype: Names

Names	List of one or more names of type String		
sequence			
	type String	name	(Unbounded)

complextype: Observatory

Observatory	Observatory Identification	
all		
type String	mpcCode	
type String	name	(Optional)

complextype: Contact

Contact	Submitter contact information. A name field (initials plus surname), an address string, and an e-mail address to which a return receipt will be sent with ackMessage	
all		
type String	name	
type String	address	(Optional)
type String	ackMessage	(Optional)
type String	ackEmail	

complextype: Telescope

Telescope	telescope information		
all			
type String		name	(Optional)
type String		design	(Optional)
type PositiveDecimal		aperture	(Optional)
type String		detector	(Optional)
type PositiveDecimal		fRatio	(Optional)
type String		filter	(Optional)
type String		arraySize	(Optional)
type PositiveDecimal		pixelScale	(Optional)

complextype: Software

Software	information about software used in processing		
all			
type String		astrometry	(Optional)
type String		fitOrder	(Optional)
type String		photometry	(Optional)
type String		objectDetection	(Optional)

complextype: Optical

Optical	Optical Observation with RA and Dec		
sequence			
	group	OpticalID	
	element	mode	
	group	Station	
	element	prog	(Optional)
	element	obsTime	
	element	ra	
	element	dec	
	element	frame	(Optional)
	element	astCat	
	element	rmsRA	(Optional)
	element	rmsDec	(Optional)
	element	rmsCorr	(Optional)
	group	Photometry	(Optional)
	element	logSNR	(Optional)
	element	seeing	(Optional)
	element	exp	(Optional)
	element	rmsFit	(Optional)
	element	nStars	(Optional)
	element	ref	(distribOnlyRequired)
	element	disc	(distribOnlyOptional)
	group	SubmissionFormat	(distribOnlyRequired)
	element	uncTime	(Optional)
	element	notes	(Optional)
	element	remarks	(Optional)
	group	OpticalResiduals	(Optional)

complextype: Offset

Offset	Optical Offset Observation with RA and Dec		
sequence			
	group	OpticalID	
	element	mode	
	group	Station	
	element	prog	(Optional)
	element	obsTime	
	element	deltaRA	
	element	deltaDec	
	element	frame	(Optional)
	element	astCat	
	element	rmsRA	(Optional)
	element	rmsDec	(Optional)
	element	rmsCorr	(Optional)
	group	Photometry	(Optional)
	element	logSNR	(Optional)
	element	seeing	(Optional)
	element	exp	(Optional)
	element	rmsFit	(Optional)
	element	nStars	(Optional)
	element	ref	(distribOnlyRequired)
	element	disc	(distribOnlyOptional)
	group	SubmissionFormat	(distribOnlyRequired)
	element	uncTime	(Optional)
	element	notes	(Optional)
	element	remarks	(Optional)
	group	OpticalResiduals	(Optional)

complextype: Occultation

Occultation	**Optical Occultation Observation with deltaRA, deltaDec, raStar and decStar**	
sequence		
group	OpticalID	
element	mode	
group	Station	
element	prog	(Optional)
element	obsTime	
element	deltaRA	
element	deltaDec	
element	raStar	
element	decStar	
element	frame	(Optional)
element	astCat	
element	rmsRA	(Optional)
element	rmsDec	(Optional)
element	rmsCorr	(Optional)
group	Photometry	(Optional)
element	logSNR	(Optional)
element	seeing	(Optional)
element	exp	(Optional)
element	rmsFit	(Optional)
element	nStars	(Optional)
element	ref	(distribOnlyRequired)
element	disc	(distribOnlyOptional)
group	SubmissionFormat	(distribOnlyRequired)
element	uncTime	(Optional)
element	notes	(Optional)
element	remarks	(Optional)
group	OpticalResiduals	(Optional)

complextype: Radar

Radar	Radar Observation using either doppler or delay values from RadarValue		
sequence			
	group	RadarID	
	element	obsTime	
	group	RadarValue	
	element	com	(Optional)
	element	frq	
	element	trx	
	element	rcv	
	element	remarks	(Optional)
	group	RadarResiduals	(distribOnlyOptional)

complextype: ObservationContext

ObservationContext	observation context header type	
all		
element	observatory	
element	contact	
element	observers	
element	measurers	
element	telescope	(Optional)
element	software	(Optional)
element	comment	(Optional)
element	coinvestigators	(Optional)
element	collaborators	(Optional)
element	fundingSource	(Optional)

complextype: ObservationChunk

ObservationChunk	**A list of all optical or all radar observations, with context**		
sequence			
element	observationContext		
choice			
element	optical	(Unbounded)	
element	offset	(Unbounded)	
element	occultation	(Unbounded)	
element	radar	(Unbounded)	

complextype: SubmitBatch

SubmitBatch	**a list of observationChunk**	
sequence		
element	observationChunk	(Unbounded)

complextype: OpticalResidual

OpticalResidual	**Optical Residual outside of the optical/occulatation/offset structure**
sequence	
group	OpticalID
element	obsTime
group	OpticalResiduals

complextype: RadarResidual

RadarResidual		Radar Residual outside of the radar structure
sequence		
	group	RadarID
	element	obsTime
	group	RadarResiduals

complextype: ADES

ADES		This is what is allowed in ades documents – any of these in any order
choice	(Unbounded)	
	element	optical
	element	offset
	element	occultation
	element	radar
	element	opticalResidual
	element	radarResidual
	element	submitBatch
	element	observationChunk