It forms the basis of the coordinate handling facilities in

• It is actively supported and developed by the Joint
    Astronomy Centre, Hilo, Hawaii.

• It includes easy-to-use graphical facilities that allow the
    production of annotated 2D or 3D grids. Graphics are
    draw via a simple “driver” module which AST calls to
    draw lines, strings, markers, etc. AST includes drivers for
    PGPLOT; drivers for other graphics systems (e.g. Tcl/Tk,
    Java/Swing, etc.) can easily be (and have been) written.

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    the Starlink software collection, including GAIA, SPLAT,
    KAPPA, etc. It is also used in other non-Starlink software
    such as DS9 and XIMAGE.

The AST StcsChan class:

• AST version 5.2 includes a new class called StcsChan.
  This class provides methods for creating an AST Region
  from a textual STC-S description, and for creating an
  STC-S description from an AST Region. Once an AST
  Region has been created, all the facilities of AST can be
  used to manipulate and use the Region.

• The AST StcsChan and Region classes support the full
  range of STC-S axes (time, space, spectral and redshift).

• The StcsChan class supports most of STC-S version
  1.33, including compound spatial regions. There are,
  however, a few exceptions and provisos, the main ones
  of which are
  – There is no support for multiple intervals specified
    within a TimeInterval, PositionInterval, SpectralInterval
    or RedshiftInterval.
  – The Convex identifier for the space sub-phrase is not
    supported.
  – There is no support for the following reference
    positions: LOCAL, GROUP, CENTER,
    EMBARYCENTER, MOON, MERCURY, VENUS, MARS, JUPITER, SATURN, URANUS, NEPTUNE,
    PLUTO.
  – Error values are supported but error ranges are not.
  – Resolution, PxSize and Size values are ignored.
  – Space velocity sub-phrases are ignored.

What can AST do with an STC-S description?

• Query and set values for individual STC-S properties.
• Test whether two STC-S regions overlap.
• Test whether points are within an STC-S region.
• Plot the boundary of the STC-S Region
• Convert STC-S Regions into other coordinate systems.
• Mask pixel arrays using an STC-S Region.
• Get the transformation between two STC-S coordinate
  systems.
• Extract specified axes from an STC-Region

STC-S and the Starlink Software
Collection:

• CUPID is an application package within the Starlink
  Software collection that identifies and characterises
  clumps of emission within a 2D or 3D data array. The
  package has been modified to include an STC-S
  description of the spatial shape of each clump within the
  output clump catalogue.

• The GAIA image and cube visualisation tool has been
  modified to allow the 2D and 3D visualisation of the
  spatial STC-S descriptions created by CUPID.

Links:

AST: www.starlink.ac.uk/ast
Starlink Software Collection: starlink.jach.hawaii.edu
STC-S: hea-www.harvard.edu/~arots/nvometa/v1.30/
STC-S-20090724.pdf
STC: www.ivoa.net/Documents/latest/STC.html
GAIA: www.starlink.ac.uk/gaia
CUPID: www.starlink.ac.uk/cupid
Joint Astronomy Centre, Hawaii: www.jach.hawaii.edu

New to AST? Start here...

• AST is a library of functions that implement an object
  oriented model for describing physical coordinate
  systems, and the transformations that exist between
  them.

• It provides a comprehensive range of facilities for
  attaching world coordinate systems (WCS) to
  astronomical data, for retrieving and manipulating that
  information and for generating graphical output such as
  coordinate grids based upon it.

• It can read and write WCS information in several
  different forms, including FITS-WCS headers.

• It is written in pure ANSI C but also has interfaces for
  FORTRAN, Perl and Java (via JNI).

• It has built-in intelligence for identifying flavours of
  celestial, spectral, time and other coordinate systems
  (including compound systems that combine axes of
  different types) and determining how to transform
  between them. This allows general purpose code to be
  written that makes no assumptions about the nature of
  the coordinate systems.

• It includes a flexible and versatile “tool-kit” for creating
  and modifying collections of coordinate frames
  interconnected by arbitrarily complex transformations.

• It includes easy-to-use graphical facilities that allow the
  production of annotated 2D or 3D grids. Graphics are
  draw via a simple “driver” module which AST calls to
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  the Starlink software collection, including GAIA, SPLAT,
  KAPPA, etc. It is also used in other non-Starlink software
  such as DS9 and XIMAGE.

The STC-S language:

• STC is a data model, developed by Arnold Rots and the
  IVOA, for describing regions with a space, time and spectral
  coverage.

• STC-S is a linear textual representation of the STC data
  model geared towards human readers.

An example of a (rather complex!) compound spatial
STC-S description and its rendering by AST

The GAIA image and cube visualisation tool has been
modified to allow the 2D and 3D visualisation of the
spatial STC-S descriptions created by CUPID.

Links:

AST: www.starlink.ac.uk/ast
Starlink Software Collection: starlink.jach.hawaii.edu
STC-S: hea-www.harvard.edu/~arots/nvometa/v1.30/
STC-S-20090724.pdf
STC: www.ivoa.net/Documents/latest/STC.html
GAIA: www.starlink.ac.uk/gaia
CUPID: www.starlink.ac.uk/cupid
Joint Astronomy Centre, Hawaii: www.jach.hawaii.edu

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