5.10.1 j-bkg-spat-select

Type: executable **Responsible:** S. Maisala

Purpose: 18.17

Function: This component selects automatically the most appropriate spatial instrument and diffuse background models. Spatial distributions are selected from either observed or simulated models. Selection depends on orbit, attitude and radiation level parameters. Simulated and observed shadowgram catalogues are indexed group tables where each model is a separate FITS file. Catalogues can be updated during mission.

Instrumental background: *JMXi-SPAT-BKG-IDX* is a list of individual models of normalized background shape shadowgrams. Models are categorized as subgroups where each subgroup has a selection of shadowgram shapes which are proportional to parameter values. Decisive parameters are *orbital phase, sun aspect angle* and *radiation level*. Subgroup separation is done by setting the selection keywords for the other parameters to the disregard values. This scheme makes possible to reduce storage requirements compared to multidimensional array where for every orbital phase we have a list of all possible combinations of solar angle and radiation level models. For each sub group *j-bkg-spat-sel* selects the two closest models corresponding to the parameters values and observation and makes a weighted interpolation between them. The results are multiplied which each other and normalized to create the appropriate background model.

Diffuse background: *JMXi-SPAT-DBG-IDX* is a list of normalized shadowgrams for diffuse background. *JMXi-GALD-DBG* (JMXi GALactical Database Diffuse BackGround) data structure contains information of *gal. longitute, gal. latitude, tilt angle* and *indexed diffuse background spectra*. *j-bkg-spat-sel* selects first the closest shadowgram model from *JMXi-SPAT-DBG-IDX* by longitude and latitude. This model is not suitable for direct usage in data analysis and it must be modified by tilting and rotating. The rotation is defined by the **INTEGRAL** roll angle and the tilt parameters are read from *JMXi-GALD-DBG* (tilt strength and slope).

Inputs:
JMXi-SPAT-BKG-IDX (p. 207) (background spatial models, *not* in the SWG)
JMXi-SPAT-DBG-IDX (p. 207)
AUXL-ATTI-HIS (p. 210) (auxliary data)
AUXL-ATTI-NRT (p. 210)
AUXL-ORBI-HIS (p. 210)
AUXL-ORBI-NRT (p. **??**)
JMXi-CSSW-HRW (p. 200) (house keeping data)
JMXi-CSSW-CNV (p. 200)
JMXi-GALD-DBG (p. **??**) (diffuse background galactical database)

Outputs:
JMXi-SPAT-BKG (p. 207) (spatial models)
JMXi-SPAT-DBG (p. 207)

Parameters:

inSWG p. 38	Input SWG
outSWG p. 39	Output SWG (override)
jemxNum p. 38	JEM-X instrument number (1,2)
clobber p. 37	Clobber existing output data structure (y/n)?
chatter p. 37	Verbosity of logfile output (0,1,2,3,4,5)
simulated p. **??**	simulated (y/n)
bkgSpatIdx p. 37	Instrument background spatial model catalogue DOL (override)
dbgSpatIdx p. 37	Diffuse background spatial model catalogue DOL (override)
bkgSpatial p. 37	Instrument background spatial model DOL (override)
dbgSpatial p. 37	Diffuse background spatial model DOL (override)
dbgGalDbg p. **??**	Diffuse background galactical database DOL

Resources: Executable memory required is about 3 MBytes.
Memory required for arrays and background models at runtime is approximately 2.5 MB. Running time: on a Solaris 8 machine, execution time is 1.5 seconds, using database with 15 models

Processing:

check parameter simulated (y/n)
- call DAL3AUX funtions to get attitude and orbital phase
- call DAL3HK funtions to get radiation level

make model selection:
- Instrument background
  - open JMXi-SPAT-BKG-IDX
  - select orbital BKG model
  - select sun angle BKG model
  - select radiation level BKG model
  - combine and normalize model
  - return JMXi-SPAT-BKG = selected BKG model
- Instrument background
  - open JMXi-SPAT-DBG-IDX
  - open JMXi-GALD-DBG
  - select DBG model
  - select tilt parameters
  - rotate model
  - tilt model
  - return JMXi-SPAT-DBG = selected DBG model

write JMXi-SPAT-BKG and JMXi-SPAT-DBG to SCW

Parent components: j-bkg-model(p. 106)

Subordinate components:
j-bkg-spatGetParams

j-bkg-spatProcessData
j-bkg-spatDbgSelection
j-bkg-spatBkgSelection
j-bkg-spatRotateShadowgram
j-bkg-spatTiltShadowgram

Dependencies from other components: Auxiliary and housekeeping data must exist in the swg-DOL. The catalog databases must exist and be filled with sensible entries.

Pending TBDs: Model selection and database updating during mission.

Completion status: **100%**

ISDC context: Scientific Analysis

Delivery date: v1.3.3 21/03/2002

5.10.2 j-bkg-spec-select

Type: Executable **Responsible:** S. Maisala

Purpose: 18.17

Function: This component generates diffuse and instrument background spectrum catalogue index tables. Tables are the same size as detector size (256*256), and each detector pixel has an index value which corresponds to the characteristic background spectrum model. The sum of each spectrum is normalized to 1.

Instrumental background: *JMXi-SIDX-BKG-IDX* is a multi dimensional list of individual spectrum map models over detector. Each spectral map is proportional to parameter values. Since it makes no real sense to interpolate spectrum index numbers we have to use multi dimensional array of relative parameters as *phase angle, solar angle* and *radiation level*. *j-bkg-spat-sel* selects the closest model corresponding to the parameter values and observation to create the appropriate spectral index map.

Diffuse background: The *JMXi-SIDX-BKG* will have the same selected spectrum index value for the whole detector area. The selected spectrum index number is taken from *JMXi-GALD-DBG* by using longitude and latitude information to select the closest spectrum model.

Inputs:
JMXi-SCAT-BKG (p. 206) (background spectra catalogues, *not* in the SWG)
JMXi-SCAT-DBG (p. 206)
JMXi-SIDX-BKG-IDX (p. **??**) (background spectrum map models)
JMXi-SIDX-DBG-IDX (p. **??**)
AUXL-ATTI-HIS (p. 210) (auxliary data)
AUXL-ATTI-NRT (p. 210)
AUXL-ORBI-HIS (p. 210)
AUXL-ORBI-NRT (p. **??**)
JMXi-CSSW-HRW (p. 200) (house keeping data)
JMXi-CSSW-CNV (p. 200)
JMXi-SPAT-BKG (p. 207) (spatial background models)
JMXi-GALD-DBG (p. **??**) (diffuse background galactical database)

Outputs:
JMXi-SIDX-BKG (p. 206) (spectral maps)
JMXi-SIDX-DBG (p. 206)

Parameters:

inSWG p. 38	Input SWG
outSWG p. 39	Output SWG (override)
jemxNum p. 38	JEM-X instrument number (1,2)
clobber p. 37	Clobber existing output data structure (y/n)?
chatter p. 37	Verbosity of logfile output (0,1,2,3,4,5)
bkgSpecCat p. 37	Instrument background spectrum models DOL(override)
dbgSpecCat p. 37	Diffuse background spectrum models DOL (override)
bkgSpecMap p. 37	Instrument background spectrum map DOL (override)
dbgSpecMap p. 37	Diffuse background spectrum map DOL (override)
bkgSpecMapIdx p. **??**	Instrument background spectrum map models DOL (override)
dbgGalDbg p. **??**	Diffuse background galactical database DOL

Resources: Executable memory required is about 3 MBytes.
Memory required for arrays and background models at runtime is approximately 1.5 MB. Running time: on a Solaris 8 machine, execution time is 1.5 seconds, using database with 15 models

Processing:
call DAL3AUX funtions to get attitude and orbital phase
call DAL3HK funtions to get radiation level
make model selection:
  Instrument background
    open JMXi-SCAT-BKG-IDX
    open JMXi-SIDX-BKG-IDX
    select closest model by orbital,sun angle and radiation level information
    return JMXi-SIDX-BKG
  Diffuse background
    open 'blank' model from JMXi-SIDX-DBG-IDX
    open JMXi-GALD-DBG
    select spectrum model
    fill JMXi-SIDX-DBG with spectrum index number
    return JMXi-SIDX-DBG
write JMXi-SIDX-BKG and JMXi-SIDX-DBG to SCW.

Design remarks:
None

Parent components: j-bkg-model(p. 106)

Subordinate components:
j-bkg-specGetParams
j-bkg-specProcessData
j-bkg-specDbgSelection
j-bkg-specBkgSelection

Dependencies from other components: Auxiliary and housekeeping data must exist in the swgDOL. The catalog database must exist and be filled with sensible entries.

Pending TBDs: Model selection and database updating during mission.

Completion status: **100%**

ISDC context: QLA and SA

Delivery date: v.1.4.1 01/10/2001

JMXi−SPAT−BKG−IDX

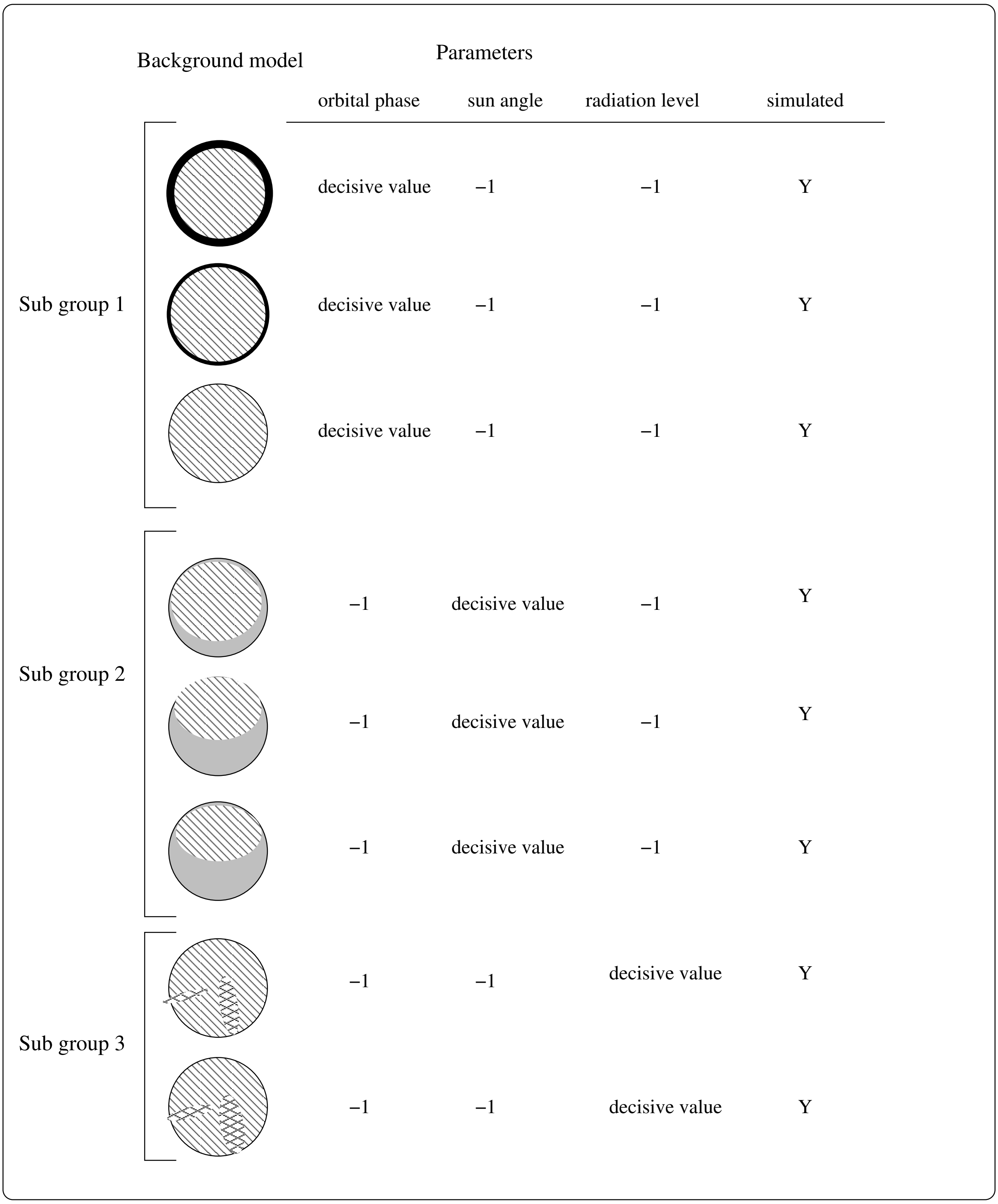

Figure 5.13: j-bkg-spat-select