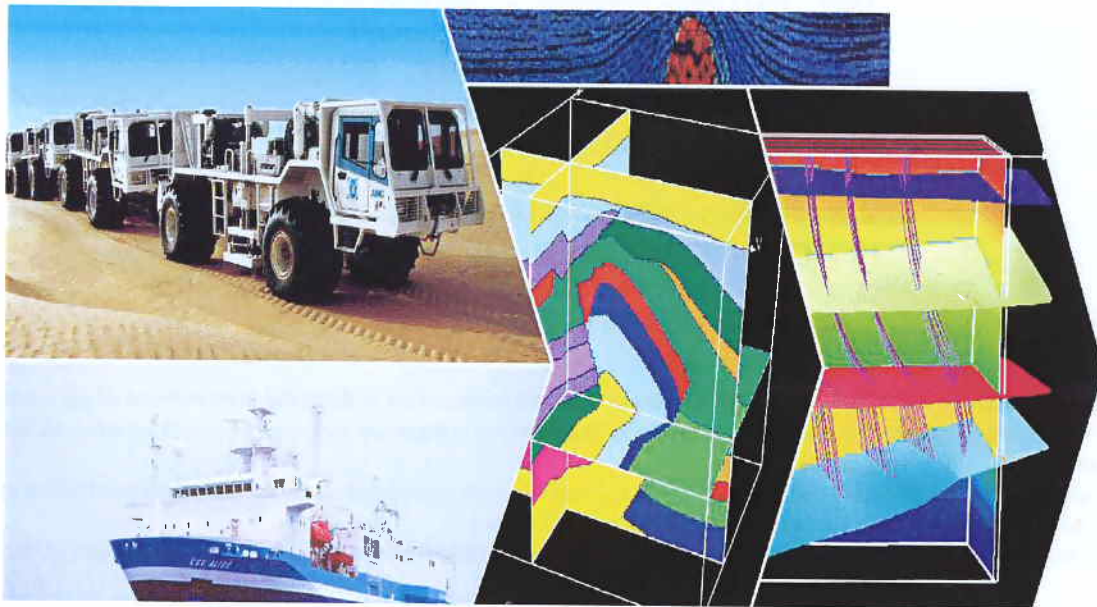


3D Marine Seismic Data Processing

Training documentation

Course: DPM02

Updated: February 2006



3D Binning and Cross-line Interpolation

OVERVIEW

This is the first phase of the offset cube processing: from sail-line, the data will now be split into 24 offset classes with one trace for each bin, and sorted into cross-line / in-line format. HABIN will be used to perform static binning (i.e. discard or flagging duplicate traces): missing traces will be generated by interpolation (MISTR): finally, FXINT will be used to interpolate the cross-line distance from 25.0m to 12.5m.

This will require generating one job for each offset class. An aspro database will need to be created for each offset class (Profile) containing the relevant required input parameters (registers).

Current profile 1 : 01		
1	Offset Class Number	---->01
2	First_InLine	---->
3	Last_InLine	---->
4	First_CrossLine	---->
5	Last_CrossLine	---->
6	Number of Output VTs	---->
7	VT numbers	---->
8	STATUS	---->
9	RUN DATE	---->
10	JOB NUMBER	---->
11	NUMBER of TRACES	---->

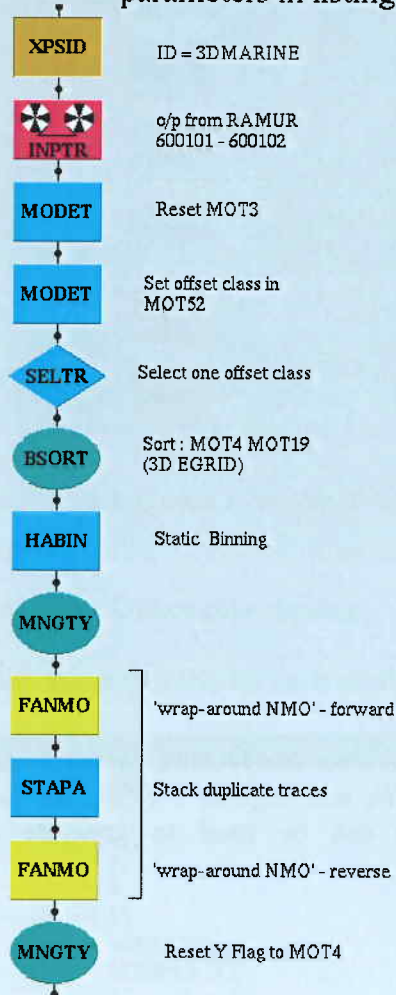
Also a tapefile.aspro will need to be built to manage the VT (Virtual Tapes) stage data. A 'model' job is created in xjob and by cross-referencing this to the profile.aspro database, 24 individual jobs can be created and submitted (either with aspro or geowork)

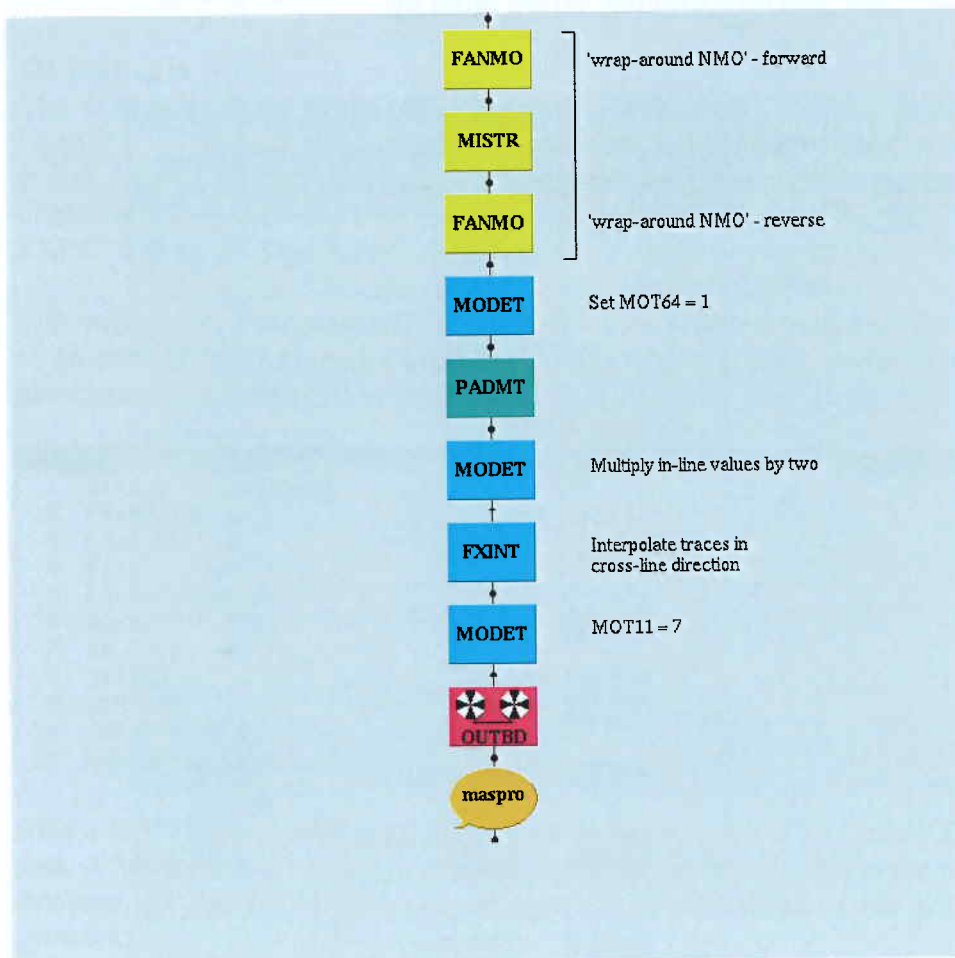
JOB NAME : 3dm_pt03-01_binning_interp_pilot.xjj

HABIN : static binning
MISTR : missing trace interpolation
FXINT : spatial interpolation

Job:
3dm_pt03-01_binning_interp_pilot.xjj

Go to: Tools
Select: Customise ...
Turn off: Explicit
parameters in listing





Having run a pilot job for offset class 1, modify the .gsl file to reference register 1 (#1#) for the SELTR, and register 7 (#7#) for the OUTBD to create a [.mod file](#). Geowork or aspro can be used to generate one job for each offset class.

PURPOSE :

To sort data from sail-line bins (25.0m x 12.5m) to offset cube domain, applying the appropriate binning and outputting 12.5m x 12.5m bins

DESCRIPTION

XPSID : Define the xps database ID

INPTR : Reads data sorted 3D

MODET : Set status word MOT3 = 18874368 ($=2^{23} + 2^{20}$) : sets bit 24 =1 and bit 21 = 1

MODET : Insert offset class number into MOT52

SELTR : Select one offset class (from .aspro)

HABIN : Apply static binning

BSORT : Sort to MOT4, MOT19

MNGTY : Set Y flag on MOT19

STAPA : Vertical sum of duplicate traces

FANMO : Forward NMO

MISTR : Missing trace interpolation

FANMO : Reverse NMO

PADMT : Pad each data set prior to FXINT

MODET : Multiply MOT 19 by 2

FXINT : Interpolate cross-lines

OUTBD : Output stage data

MASPRO : Interrogate .list file to update .aspro file automatically

NB: New versions of all 3D tables in xps will need to be created for subsequent processing

Subsequent processing is performed in the Offset-cube domain

The MASPRO coding should modify the .aspro file for each profile as shown below:

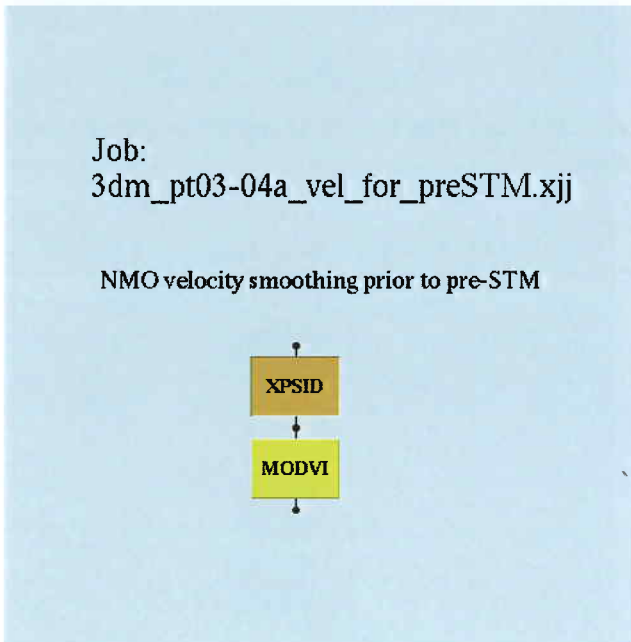
Current profile 1 : 01	
1	Offset Class Number ---->01
2	First_InLine ---->
3	Last_InLine ---->
4	First_CrossLine ---->
5	Last_CrossLine ---->
6	Number of Output VTs ---->1
7	VT numbers ---->C610001
8	STATUS ---->COMPLETED
9	RUN DATE ---->Tue.Mar.22
10	JOB NUMBER ---->008586
11	NUMBER of TRACES ---->32625

TIKIM

OVERVIEW

We now have 24 offset classes fully populated and with a bin size 12.5m by 12.5m. Ideally it is the data to be input to the full 3d migration before stack processing. Due to computer time constraints in the scope of the training session -TIKIM is very much computer time consuming- it is preferred to input a lighter dataset (a bin size 12.5m by 25m) by using the data set prior to FXINT: in this case we just take alternate in-lines from the HABIN-MISTR-FXINT data set..

JOB NAME : 3dm_pt03-04a_vel_for_pre_STM.xjj



PURPOSE:

To smooth the velocity field from any previous 3D velocity analysis (DMO or non-DMO); strong smoothing is required here; note that MODVI performs only 2D smoothing inline by inline.

DESCRIPTION

XPSID : Define the xps database ID

MODVI : performs editing of any possible value which results in negative interval velocities and the 2D smoothing

JOB NAME : 3dm_pt03-04b_vel_for_pre_STM.xjj

Job:
3dm_pt03-04b_vel_for_preSTM.xjj

re-definition of velocity field
prior to preSTM



PURPOSE:

From the smooth velocity field, to create velocity functions every 40 cdp (i.e. every 500m) where the pre-STM velocity picks will be put. The output velocity field will be the reference for TIKIM to migrate.

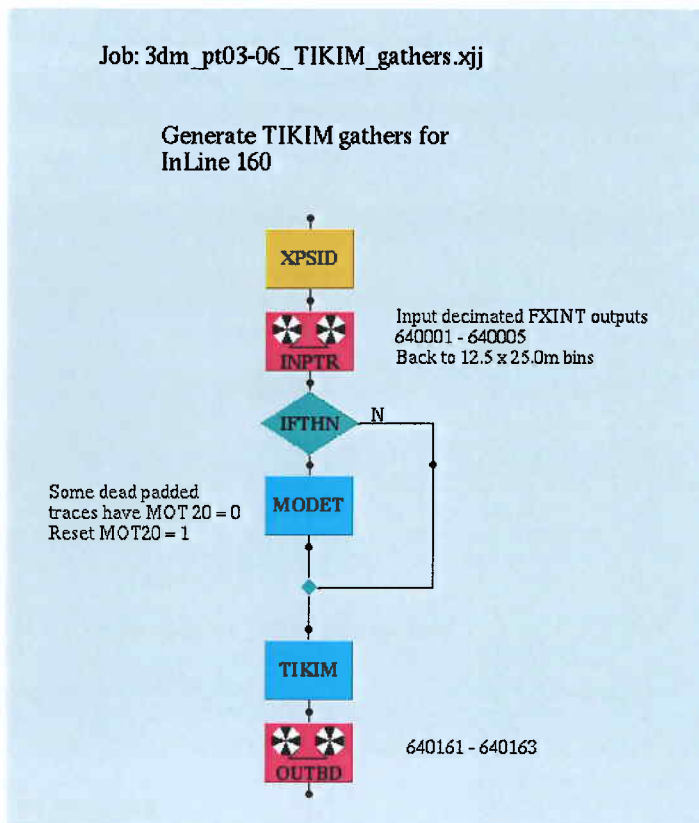
DESCRIPTION

XPSID : Define the xps database ID

TRVEL :converts the velocity field to seismic traces (one function gives one trace)

TRVEL :converts back to velocity field while over-sampling

JOB NAME: 3dm_pt03-06_TIKIM_gathers.xjj
(NB: gsl file generated by xjob needs editing)



PURPOSE:

To output n times all the migrated gathers of the inline 160 where it is planned to perform the pre-STM velocity determination (known as structural picking); gathers are produced as many times as velocity field perturbations are requested (a perturbation is for instance a percentage of the reference velocity field)

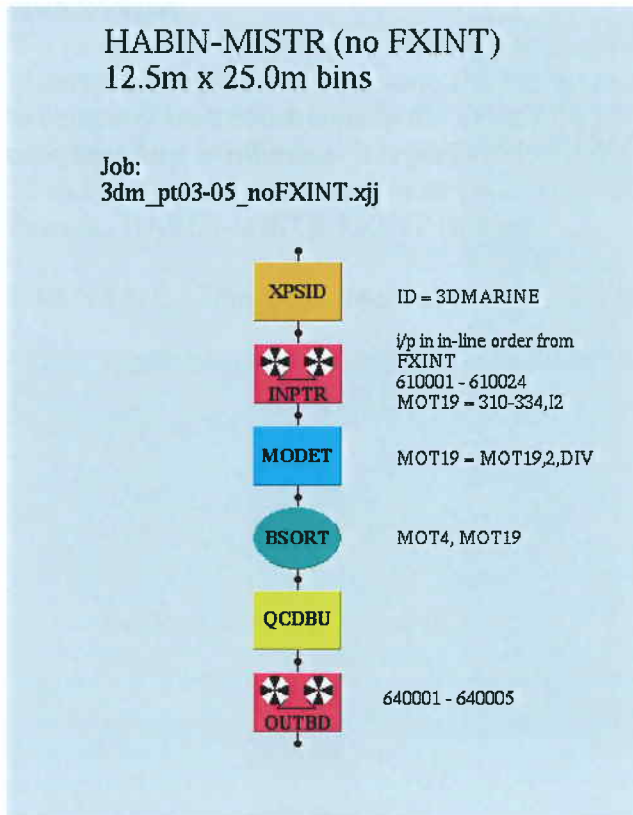
DESCRIPTION

XPSID : Define the xps database ID

TIKIM : blank option is used that-is-to-say input, migration and output are done in one go because the dataset we handle is small. There is no mute application on the gathers.

WUNET : write the migrated NMO corrected gathers to disc.

JOB NAME : 3dm_pt03_05_noFXINT.xjj



PURPOSE:

To reduce the data set size by using input data set without FXINT

DESCRIPTION

XPSID : Define the xps database ID

INPTR : Input the HABIN/MISTR/FXINT data set: select alternate in-lines

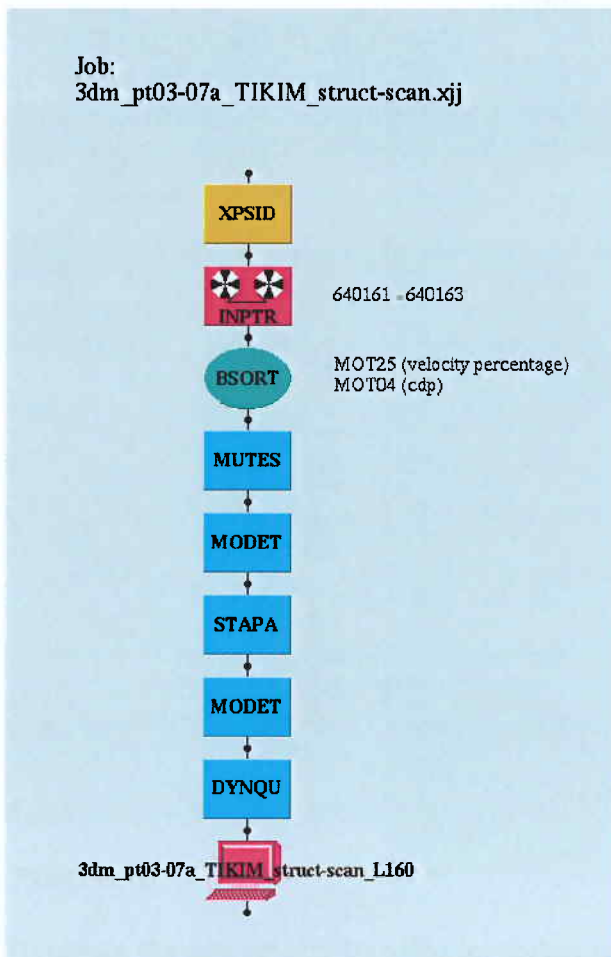
MODET : reset MOT19 to original Inline Numbers

BSORT : Sort to MOT4 MOT19 order

QCDBU : QC the dataset

OUTBD : Write the dataset to stage

JOB NAME : 3dm_pt03_07a_TIKIM_struct_scan.xjj



PURPOSE:

To stack the velocity inline as many times as there are velocity field perturbations.

DESCRIPTION

XPSID : Define the xps database ID

BSORT : the first sort key is WORD25 which contains the velocity percentage value.

MUTES : NMO mute application; mute function should be derived from examination of the gathers in *exam* or from mute test.

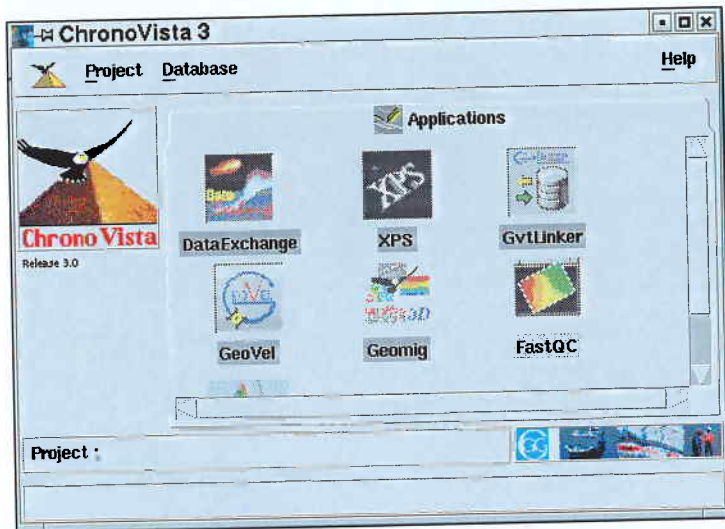
MODET : WORD25 being used by STAPA, it is necessary to provisionally save the velocity percentage value in WORD50

STAPA : stacks n times the gathers of each bin of the line.

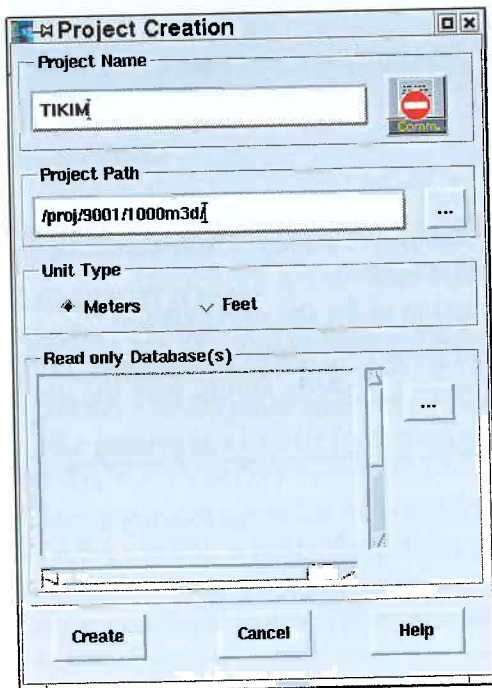
WUNET : write the n stacks to one .cst file. This file is to be loaded to Chronovista for the structural picking; discrimination to be made with WORD25

This section concerns the usage of ChronoVista in conjunction with the TIKIM structural scans and gather scans

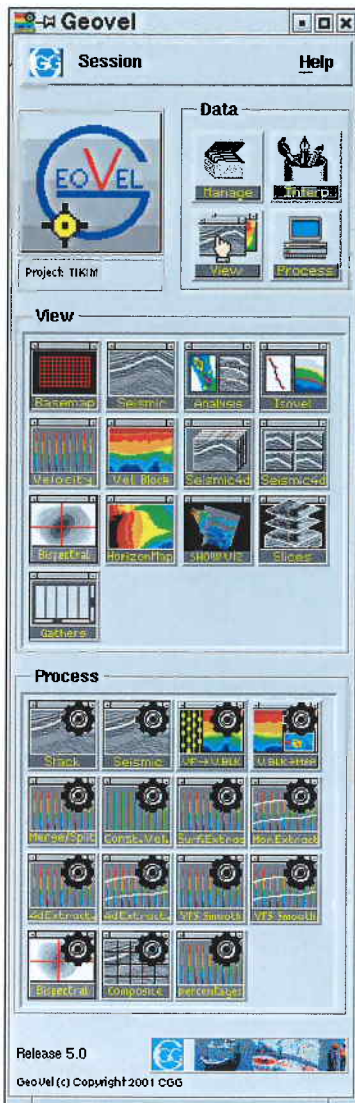
Start ChronoVista




If a project does not already exist, it will have to be created
(Note the project path)



Start Geovel



Click on the Seismic4D  button to reveal a dialog box which should be completed as shown

Seismic Loading from CGG Format

Input Data

Files :

prog/9001/1000u3/DATA/3dm_p103_07a_11b

3D Topo: (optional)

Output in Database

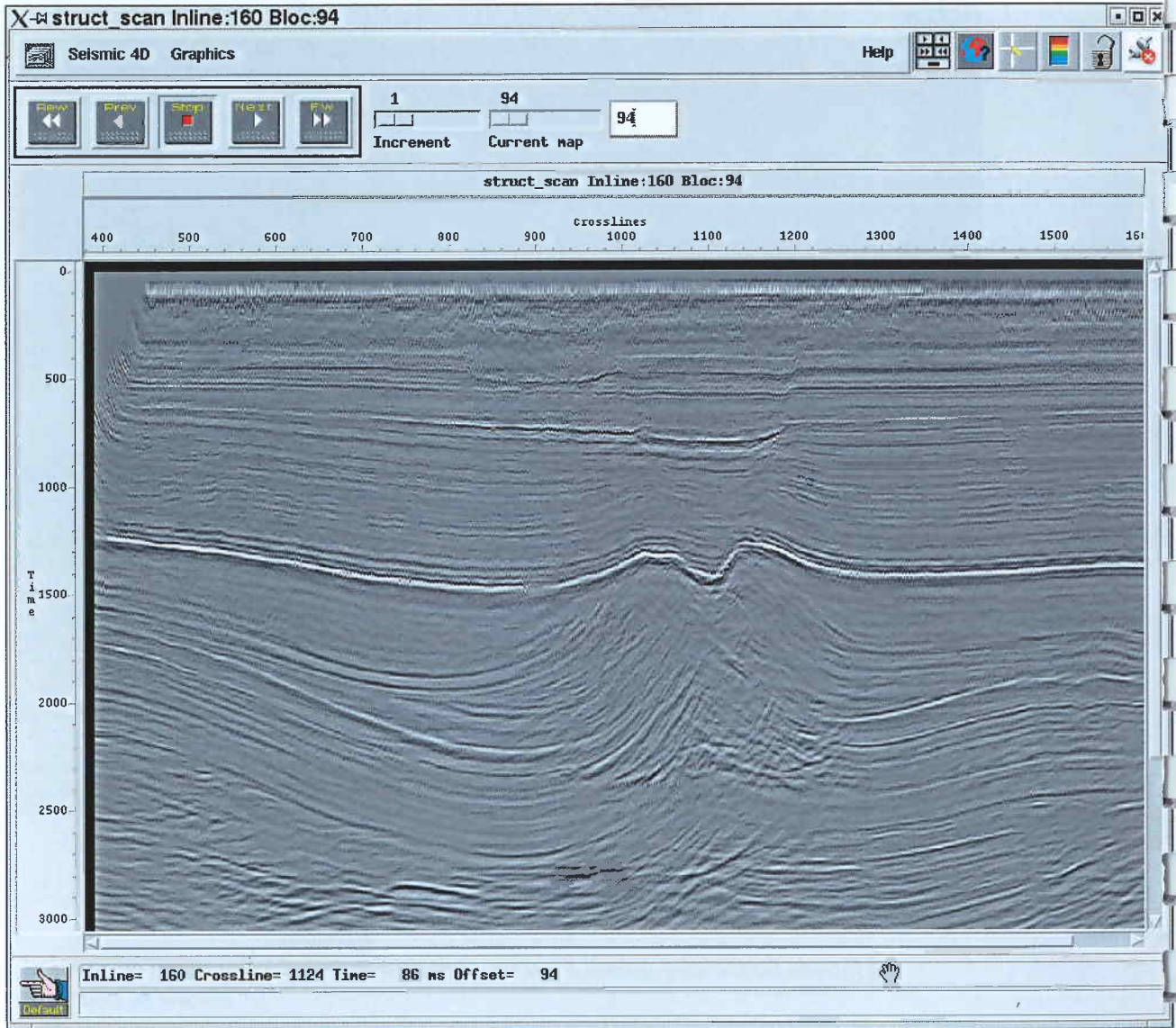
Domain definition

Domain :

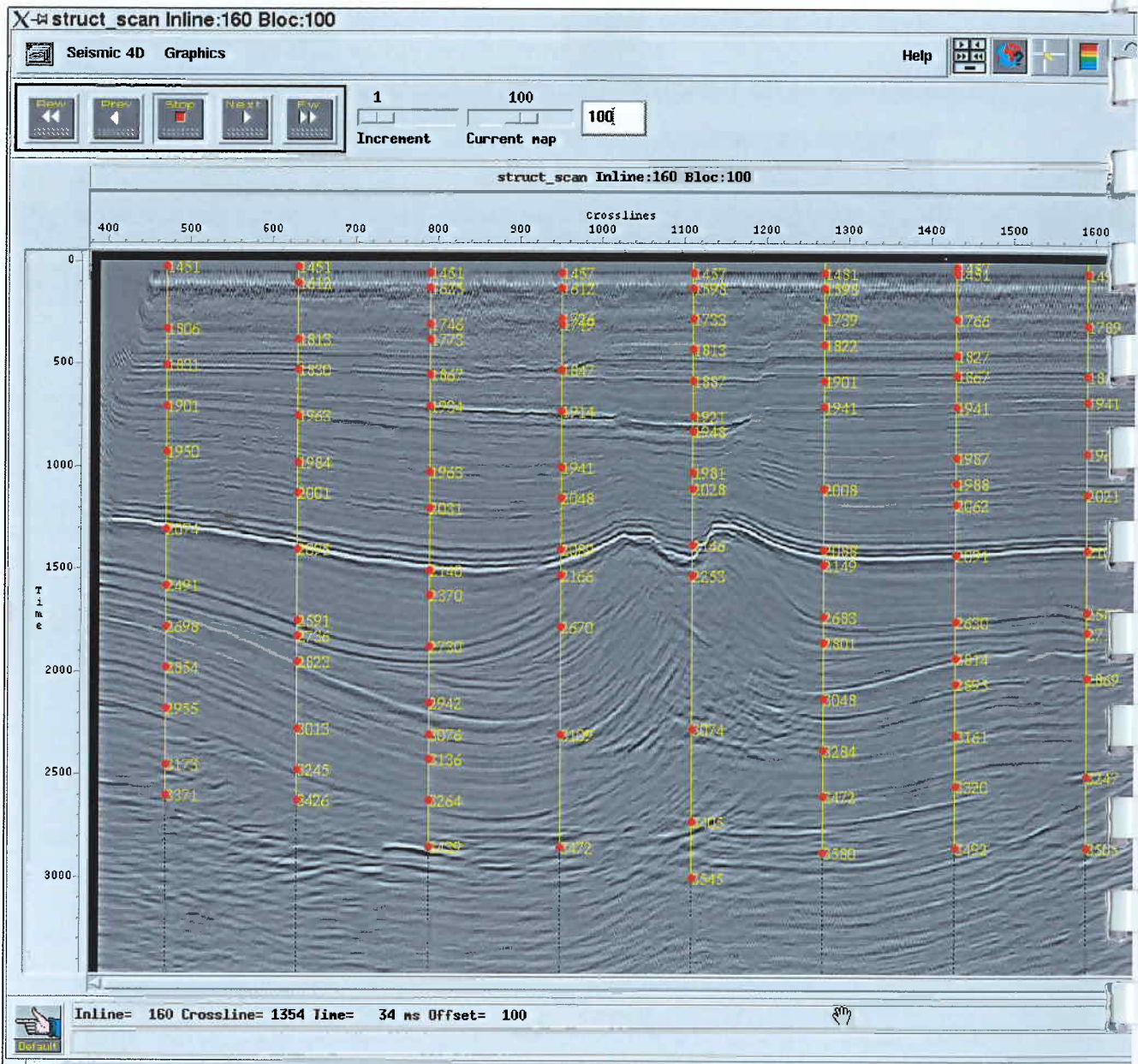
Loading Options

Using the 'transport' icon  we can now browse the scans

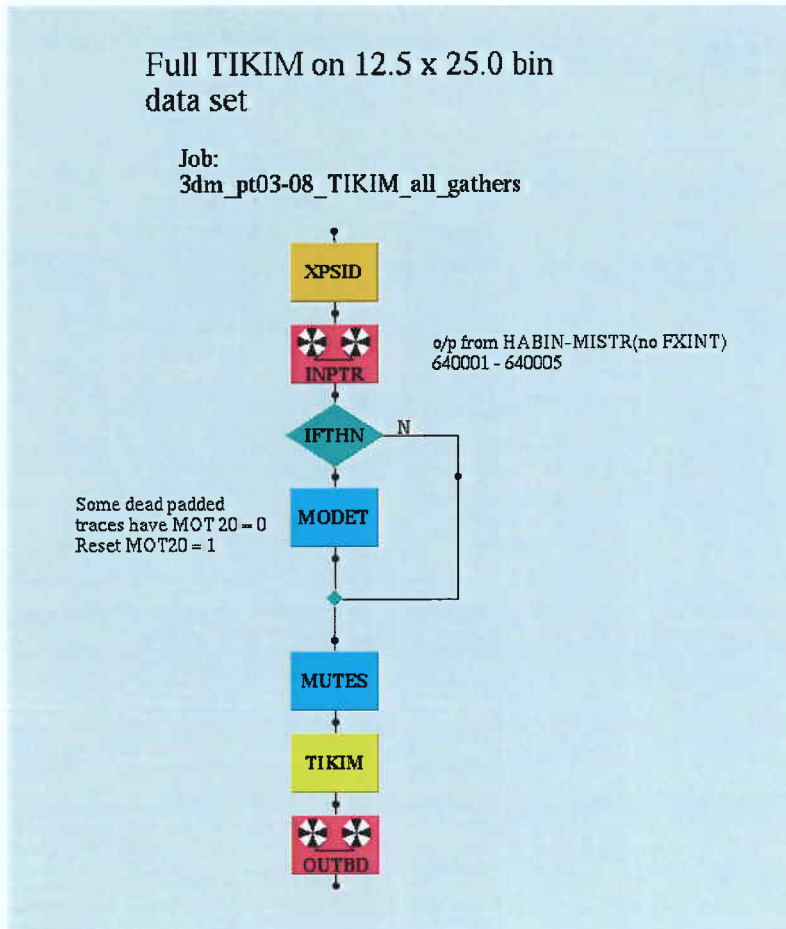
Navigation controls: Rewind, Previous, Stop, Next, Play. Increment: 1, Current nap: 94, Input field: 94.



View projections to show the locations (and picks on the 100% scan)



JOB NAME : 3dm_pt03-08_TIKIM_all_gathers.xjj
(NB: gsl file generated by xjob needs editing)



PURPOSE:

To migrate and output all the gathers of the 3D survey; the migration velocity field is the one deduced from the structural picking in Chronovista.

DESCRIPTION

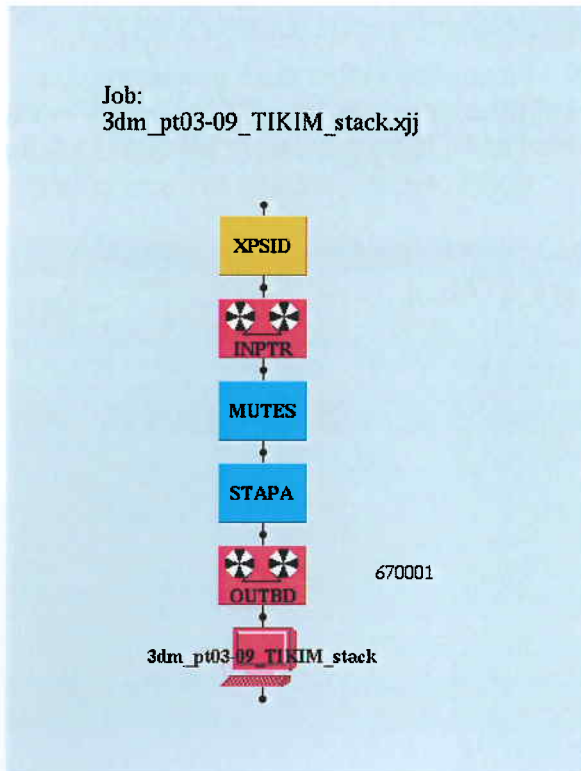
XPSID : Define the xps database ID

MUTES : application of a light mute just to save TIKIM computation time on the far offsets.

TIKIM : blank option is used that-is-to-say input, migrations and output are performed in one go because the dataset we handle is small. There is no other mute application on the gathers.

OUTBD : write the migrated NMO corrected gathers in Geocluster format 2.

JOB NAME : 3dm_pt03-09_TIKIM_stack.xjj



PURPOSE:

To stack the full 3D survey from the migration gathers produced by TIKIM; they are NMO corrected with the velocity field deduced from the structural picking; they are not muted.

Prior to stack, optionally the NMO corrections can be removed in order to carry out residual NMO determination. The mute can also be fine-tuned.

DESCRIPTION

XPSID : Define the xps database ID

INPTR : read the migrated gathers; set the Y flag at each bin.

MUTES : final post-NMO mute application.

STAPA : stacks the gathers of each bin.

OUTBD : write dataset to stage

WUNET : write the raw migrated stack to disc.
