Chapter: Image Preparation

1. Data Description

Downloaded are 3 Aster 1b-images of different dates and quality. The 1b processing level means that radiometric correction and band-to-band co-registration are done. We require at present only the first 3 bands with a resolution of 15 m. The images are:

Date	Filename
14 Feb 2002	AST_L1B_003_02142002104020_03012002083518.hdf
8 Sep 2002	AST_L1B_003_09082002105227_10012002110040.hdf
31 May 2003	AST_L1B_00305312003104522_06212003111041.hdf



Data set: ASTER L1B REGISTERED RADIANCE AT THE SENSOR V003 Granule: SC:AST_L1B.003:2006040239 Acquired: on 2002-02-14 10:40:202 Center lat/lon: 52.29° Lat, 6.83° Lon



Data set: ASTER L1B REGISTERED RADIANCE AT THE SENSOR V003 Granule: SC:AST_L1B.003:2008260357 Acquired: on 2002-09-08 10:52:272 Center lat/lon: 52.37° Lat, 7.00° Lon



Data set: ASTER L1B REGISTERED RADIANCE AT THE SENSOR V003 Granule: SC:AST_L1B.003:2014368149 Acquired: on 2003-05-31 10:45:222 Center lat/lon: 52.09° Lat, 6.73° Lon

2. Data Import

Aster 1b-images can be imported using ILWIS, PCI, IDL/ENVI, and ERDAS. Considering that at a later stage we **must** export prepared images to the MrSIDformat and that this can only be done in ERDAS and ArcGIS, this tutorial is fully based on the use of ERDAS for image processing. To import your images, follow after opening Erdas version 6.0, the following steps:

Step-1

 Import C Export Type: ASTER EOS HDF Format 	Select the Erdas Import- Export routine.
Media: File *	Select Media and data type.
ast_l1b_0030531200310452 ast_l1b_0030531200310452 522_06212003111041.hdf 4020_03012002083518.hdf 4020_03012002083518.hdf 5227_10012002110040.hdf 5227_10012002110040.hdf 5227_10012002110040.hdf	Select on the left and right the proper directories. Select the required *.HDF files.
🔄 mobile-gis 💽	Press ok.
OK Close Data View Help	

Note: the data import procedure will differ, not only for the sensor, but also for the processing level products and data providers.....a full guidance is not possible!!

Step-2

		Platform:	AM-1		
	lı	nstrument:	ASTER		
	Proc	luct Type:	ASTL1B		
	0)ata Field:	VNIR_Swa	ath	
No Columns:	4200	No Rows	: 4980	No Layers:	3
Corr	ection				
Previo	ous Image			Next Image	

Make sure the first 3 bands are selected; using "next image" othe bands (total of 14) can be selected.

Select correction.

Step-3

- Write Transform to Image	OK OK
	Cancel
Vrite GCP File	Help
041.gcc 🔀	

Select "write GCP file"; this file will contain 121 satellite position based ground control points.

Select ok, and select ok.

An *.img file and a *.gcp file are now prepared.

3. Image Geo-referencing

We will use the satellite position based ground control points to geo-reference our image to the projection system required. We will perform pixel resampling using the UTM coordinate system with the WGS-84 spheroid and datum and a pixel size of 15m.

Step-1

Go to the Erdas Viewer and open the prepared *.img file. You should get something as shown below.



Notes:

The pixels are imported using their original values; a conversion to "radiance" values was possible during the import routine for those who require such values.

The bottom left shows only column and row of the cursor location...not yet the actual geo-position.

Optional: Press 🗈 to see the image meta-data.

Select: Raster - Geometric Correction.

Step-2

Select Geometric Model	We will use the 2^{nd} polynomial as geometric model. Then select the tab "Projection".	
Affine Camera DPPDB IKONOS NITF RPC QuickBird RPC Landsat Polynomial Rubber Sheeting Open Existing Model Use Existing Calibration	Polynomial Model Properties (No File) Parameters Transformation Polynomial Order: 	Apply Reset Save Save As Close Help

🚜 Polynomial Model Properties (No Fil	le)		Select "A	Add/Change	•
Parameters Transformation Projection		Apply	Projectio	on" (1).	
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Projection: Unknown		Save	below.	ers as shown	1
Spheroid:			D I		
Zone Number:			the scree	to return to en shown at	1
Datum:			the left (2).	
Map Units: Other		Help	Then sel	ect "Set	
Add/Change Projection		tat de	Projectio	on from GC	Р
Set Projection from GSP Tool.			tool" (3)		
			Select th	e proper	
Status: Model has no solution.	1		*.gcp fil	e. 2	
		1.	Select "(Current"	
Dista Da Suis et	V		(=UTM)	(4).	a
Standard Custom	-			×	L
Projection Tupe			 1		
Soberoid Name:	WGS 84			Save	2 0
3 Datum Name:	WGS 84			Delete	
UTM Zone:	32			Rename	
NORTH or SOUTH:	North		•	Cancel	
GCP Tool Reference Setup	×			Help	
Collect Reference Points From:					
C Existing Viewer	祝 Reference M	ap Projection Op	tions		×
C Image Layer (New Viewer)	Options New	Current			ОК
C Vector Layer (New Viewer)	Sel	• t Reference Map Pro	jection To:	1	Cancel
C Annotation Layer (New Viewer)		Set the Reference	Projection		Help
© GCP File (.gcc)	□ New	to the New Project	tion and		
C ASGN File		Reproject the Exi	sting Points.		
C Digitizing Tablet (Current Configuration)		Keep the Referer	ce Projection		
C Digitizing Tablet (New Configuration)	Current	as the Current Pro	jection and		
C Keuboard Onlu	N	, Reproject the Ne	A Points.		
		Note: the origi	nal GCP's	are in lat-	
Cancel	Help	long (WGS84).	Erdas con	<i>iverts them</i>	
		or whatever yo	u have spe	cified in	
		"Projection Cl	hooser", e.	g the local	
	_	projection syst	em!!		

Part of your screen will then contain the following content; press the button to (re-) calculate the model solution.

💋 Yiewer	*#1 : ast_l1b_00		4200	321040		83518.img (:ASTER	🛛 🗆 🎽 🌆 Polyr	iomial Model Prop	erties (No			_	
File Utilit	y View AOI Ra	ister I	Help				Parame	eters Transformation	Projection	1		Appl	
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5 6		5° (5)	E				Sphero	id: WGS 84				Save	As
5 "65 "	8 18 18 18	ぎ 借	- E	7 H.H.	Hanger # 33		Zone N	lumber: 32					
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CP #255 #	er oer oer o	野蝦	P 期	감백당	# 25 P # 25 P # 66	points !							
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2	GCP # 2			1	498.0	0.000	330745.242	5833173.891	Control	0.000	-0.000	0.000	
3	GCP # 3			1	996.00	0.000	337996.412	5831379.055	Control	0.000	-0.000	0.000	
4	GCP # 4				1494.0	0.000	⁷³ 345247.582	5829584.220	Control	0.000	-0.000	0.000	
5	GCP # 5			1	1992.0	0.000	352498.751	5827789.384	Control	0.000	-0.000	0.000	
6	GCP # 6				2490.0	0.000	359749.921	5825994.548	Control	0.000	-0.000	0.000	
7	GCP # 7			1	2988.0	0.000	367001.091	5824199.712	Control	0.000	-0.000	0.000	
8	GCP # 8			Ú.	3486.0	0.000	374252.260	5822404.877	Control	0.000	-0.000	0.000	
9	GCP # 9			1	3984.0	0.000	381503.430	5820610.041	Control	0.000	-0.000	0.000	-
•													•

MResample

X

Resample Method:

The resulting model error is: Control Point Error: (X) 0.0000 (Y) 0.0000 (Total) 0.0000.

We are now ready to resample the image. To do so press the icon shown below and provide the required image details as that dealt no need to

details as shown. Close all windows	aster_14feb2002.img				
that dealt with georeferencing; there is	Output Map Information:				
no need to save "the model".	Projection: UTM				
Geo Correction Tools	Units: meters				
	Number rows: 5274 Number columns: 5844				
	Output Corners:				
	ULX: 308355.000000 A LRX: 395997.000000 A				
Display Resample Image Dialog	ULY: 5834969.000000 + LRY: 5755877.000000				
	From Inquire Box				
	Output Cell Sizes:				
	X: 15.000000 Y: 15.000000 Nominal				
	Recalculate Output Defaults 🔽 Ignore Zero in Stats.				
	OK Batch Cancel Help				
	Perform the Resampling				

Output File: (*.img)

4. Prepare a sub-image

The results of the above produced (when loaded in a viewer) the following:



Note that in the leftbottom corner, the actual position of the cursor is now shown.

Select "Utility" and "Inquire Box". Enlarge the box so that it covers the area you want to use for preparation of the sub-image.

Do **not** close the "Inquire Box"!!

Now, using the main ERDAS menubar, select "data preparation" and then "subset image".

🚧 ERDA	S IMAGINE 8.6		
Session	Main Tools Utilities Help		
	Start IMAGINE Viewer	Data Preparation	×
	Import/Export Data Preparation	Create New Image	
	Map Compos	Create Surface	1
	Image Interpreter Image Catalog	Subset Image	
	Image Classification	Image Geometric Correction	1
	Spatial Modeler Vector	Mosaic Images	
	Radar	Unsupervised Classification	1
	Virtual GIS OrthoBASE	Reproject Images	
	Stereo Analyst	Recalculate Elevation Values	
		Make RPF TOC	1
		Close Help	

Subset Input	File: (*.img)		Outpu	t File: (*.img)	×	Select the input and define the
aster_31may200	3.img	aster_3	1may03_	enschede.img		output files.
Coordinate Type	: Subset Definition:			From Inquire	Box	Press "from Inquire Box" to
Map	Two Corners	C Four Co	rners	ŀ	75	copy the area-of
C File	ULX: 35121	1.00	LR X:	359341.00	÷	interest from the viewer Note
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Number of Input I	ayers: 3	🔽 Ignor	e Zeroir	Output Stats.		results in your viewer!!
Select Layers:	1:3					
Use a comma for using a ":" (i.e. 2:	separated list(i.e. 1,3, 5).	5) or enter ran	iges			
ОК	Batch	A01	Canc	el He	ip	
Retrieve the coord	dinates from the View	er Inquire Box				

Note: for the following export routine, your sub-image must be smaller than 50 MB!!

5. Export to MrSid format

🚧 Import/	'Export		×	Maya anage margita tha
	C Imp	port 📀 Export		Erdas Import-Export
Туре:	MrSID		• *	following settings:
Media:	File		MrSID Compress	×
Input File: (*	.img)	Output File	Input File: c:	/debie/mobile-gis/aster_31may03_enschede.img
aster_31ma	ay03_enschede.i	aster_31	Output File: c:	/debie/mobile-gis/aster_31may03_enschede.sid
ast_11b		04(Compress Bands:	Single 📀 RGB
aster_1	_003_090820021) 4feb2002.img	002		Layers to Colors:
aster_3	1may03_ensched 1mav2003.ima		Red: 3 Green:	2 Blue: 1
🔄 mobile	-gis	💌 🖾 mobi	Compression I	Ratio: 20.00
ОК	Close	Data V	Number of Pyramid L	evels: 3
Proceed to sp	pecisic Import/Exp	ort application	(With 3 pyramid levels, the s	mallest level will be 67 x 58)
The result	ing file (show	n below) is	🔲 Orient image to map sys	tem.
only 48 Kl was 884 K	B. The origina Bwhat a "	al sub-image saving"!!	☑ Stretch image based up	on contrast table or statistics.
Georeferei	nce data are s	till there!!	Advanced Options	
			OK Ba	atch Cancel Help

Image degradation is practically "nil"!!



6. Image Shift Correction

Once GPS data are collected or if proper topographic information is available, prepared image files must be checked on their geographic correctness. Especially the above Aster-import routine is known to produce images that are sometimes 100m off the actual coordinates. As example, the imported image is shown below with the topographic road map on top....a clear shift can be observed. Using the utility "Pixel Info", a series of wrong versus proper coordinates can be explored (copied to MS-Excel), to calculate the X-Y shift that must be applied to move the image.



Use "Image Info" and then "Edit – Change Map Info" to modify the upper left image coordinate as calculated in Ms-Excel. Close the image and open it again to see results.

A AL	ImageInto (ast	er_31mayU3_enschede.img)
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THATT	🖨 🗋 🖨 Σ	
	General Projection	Histogram Pixel data
HE S	File Info:	La Map Info
2 - C		Las Upper Left X: 351211.00000000 + Pixel Size X: 15.00000000000 +
AL.	Layer Info:	BI Upper Left Y: 5790655.0000000 Pixel Size Y: [15.00000000000]
Xan		Cor Units: meters
出招	Statistics Info:	Projection: UTM
	ordusiles mile.	Las Cancel Help
Alexa		Upper Left X: 351211.0 Upper Left Y: 5790655.0
2- 1 the top of	Map Info:	Lower Right X: 359341.0 Lower Right Y: 5783695.0
S. Annals	🗐 (File)	Pixel Size X: 15.0 Pixel Size Y: 15.0
1		Unit: meters Geo. Model: Map Info
Close Arrange Laye		Projection: UTM, Zone 32
	Projection Info:	Spheroid: WGS 84
		Datum: WGS 84