

Image processing using PHOTOMOD (2A Kanopus-V images)

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17th International Scientific and Technical Conference
FROM IMAGERY TO DIGITAL REALITY:
Earth Remote Sensing & Photogrammetry
16-18 of October 2017, Israel



Coverage of Russian Federation
(Resurs-P, 2013-2016 years)

2013
август

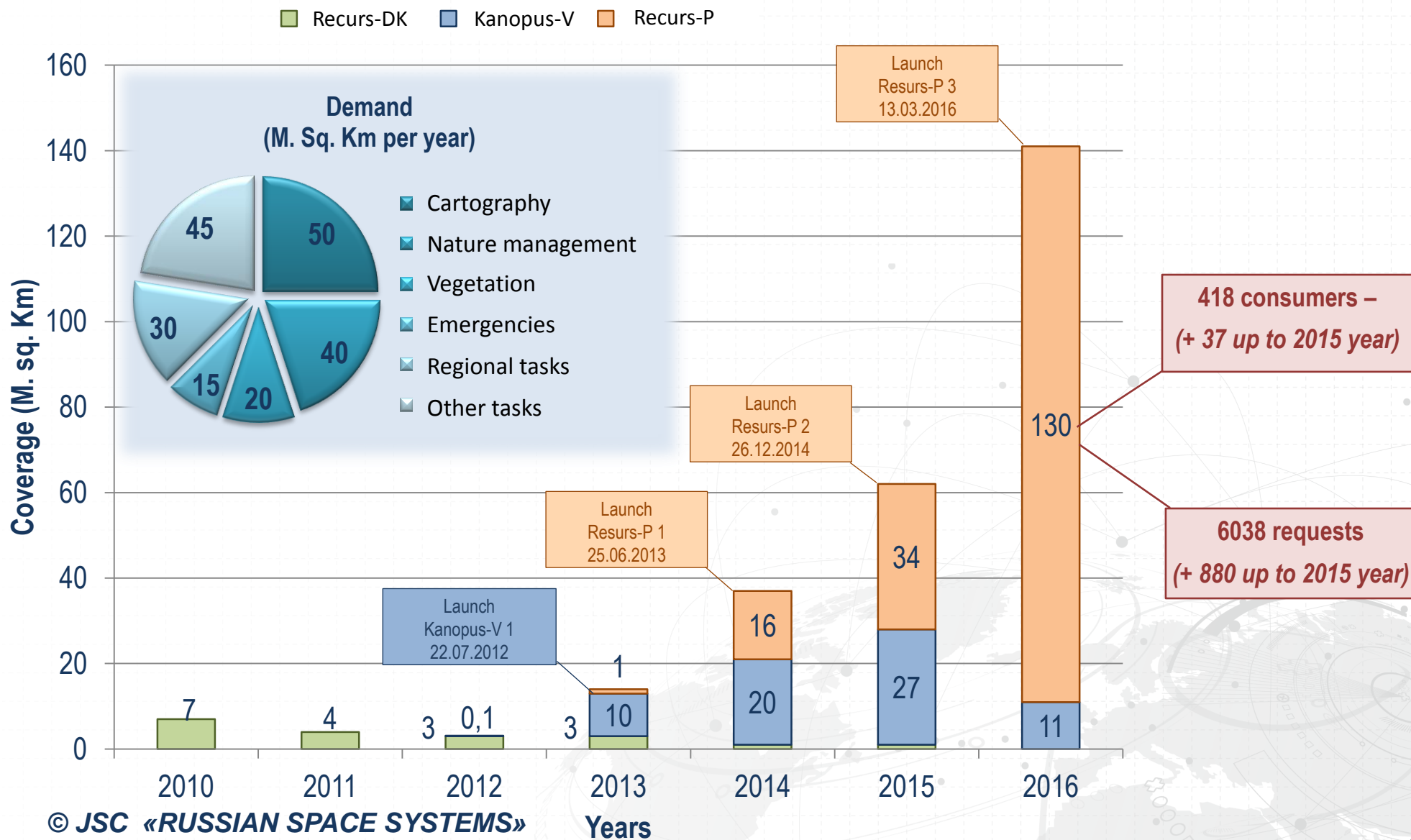


Coverage of Russian Federation
(Kanopus-V, 2013-2016 years)

2012
сентябрь







CADASTRE

CARTOGRAPHY

CITY PLANNING

GEOLOGY

ECOLOGY

**TECHNOGENIC
ACCIDENTS**

FIREPLACES

FLOODS

CONSUMERS:



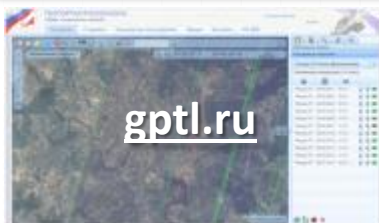
Geospatial data

User data

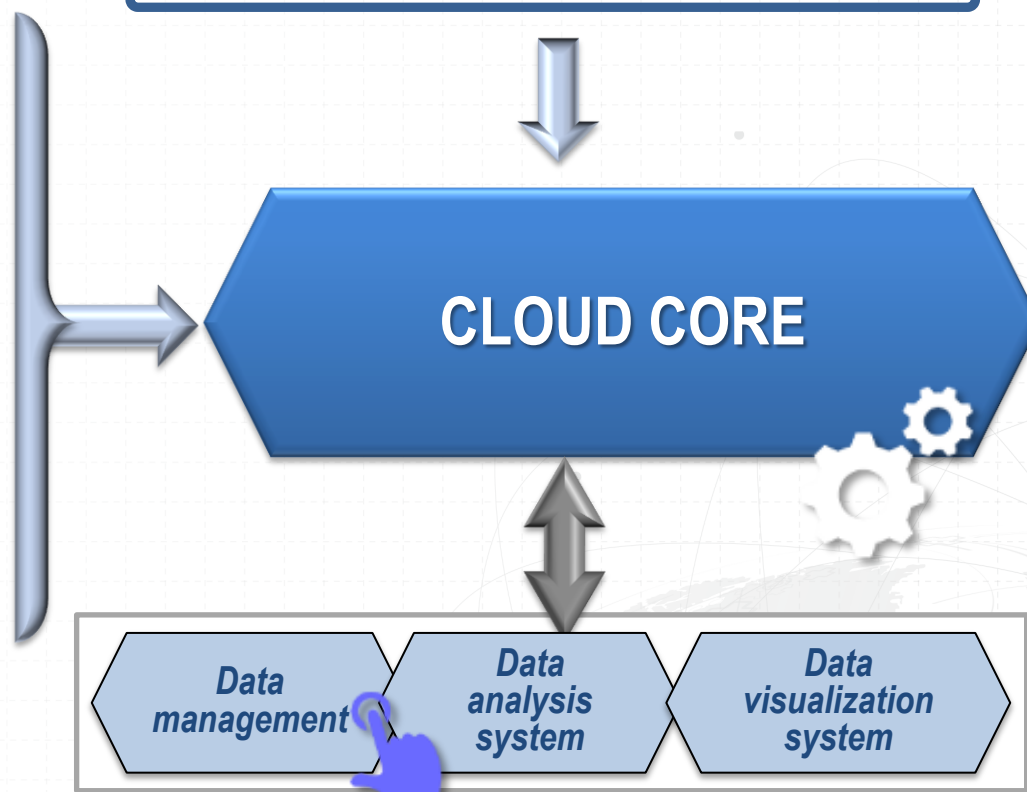
Skills



Geoportal of Roscosmos

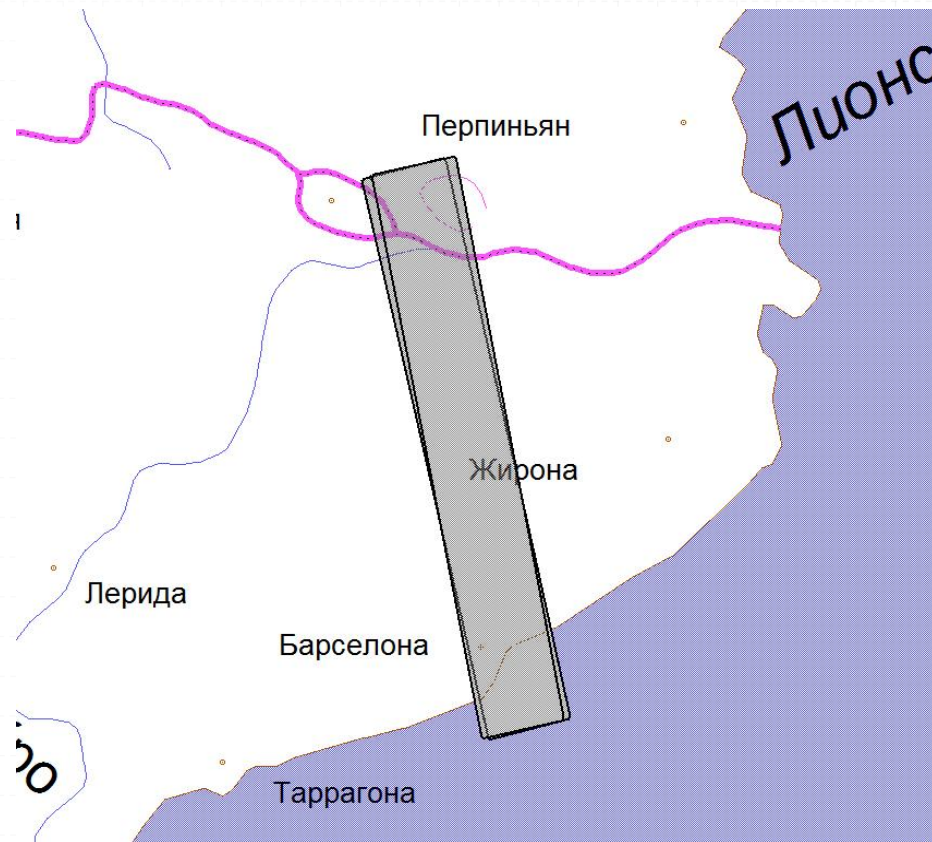


Database of basic products

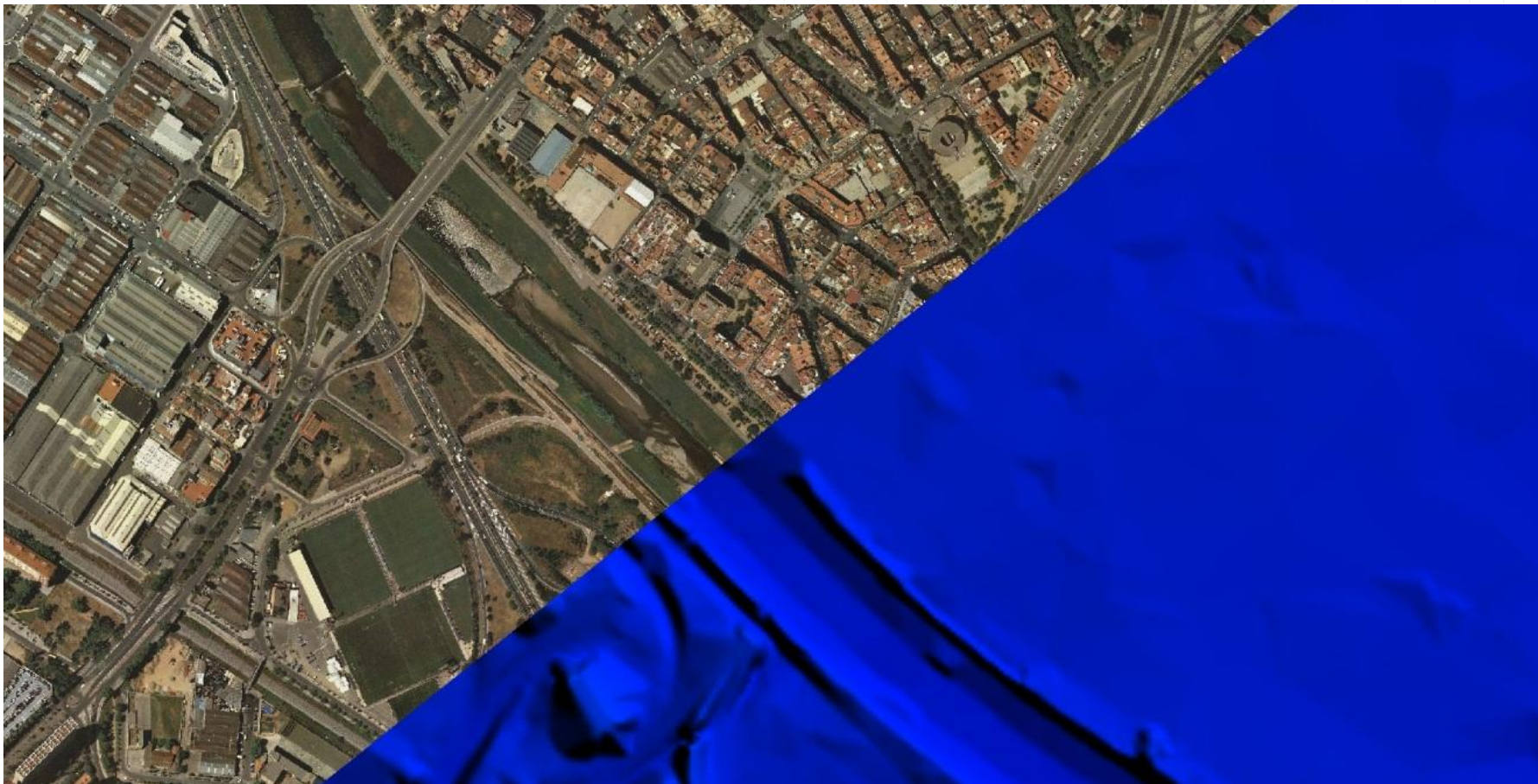


INPUT DATA:

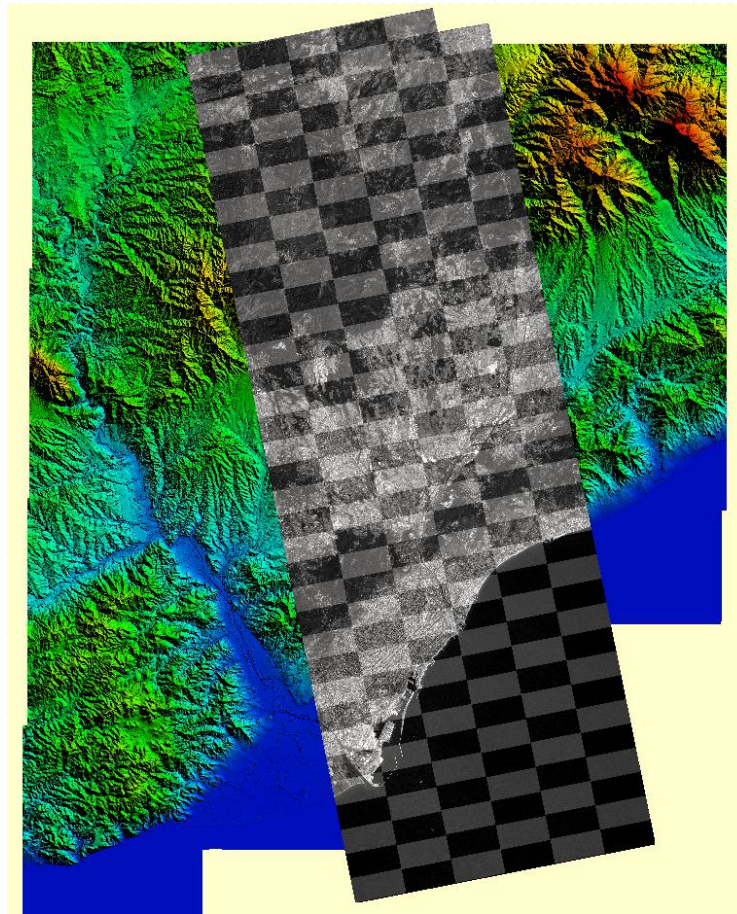
- ✓ Two overlap images (lvl. 2A Kanopus-V, convergence angle = 26 deg)
- ✓ Control and check data (25 cm ortho, 5 m grid size DTM – lidar data)



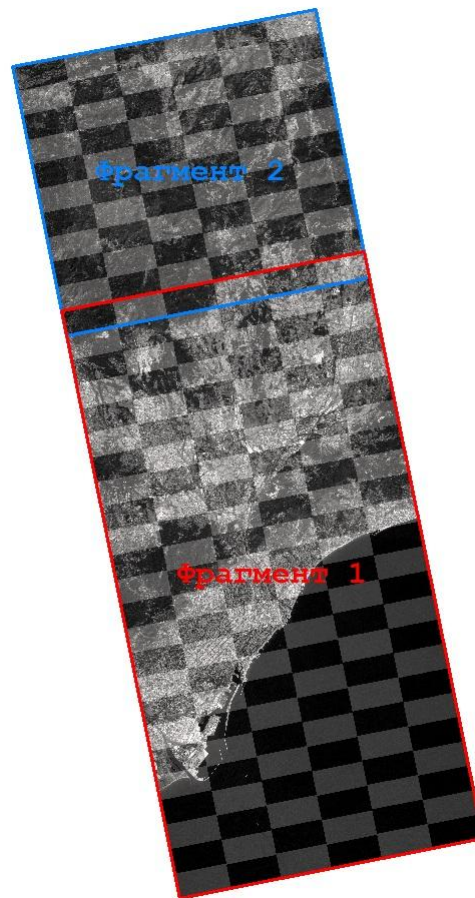
Images



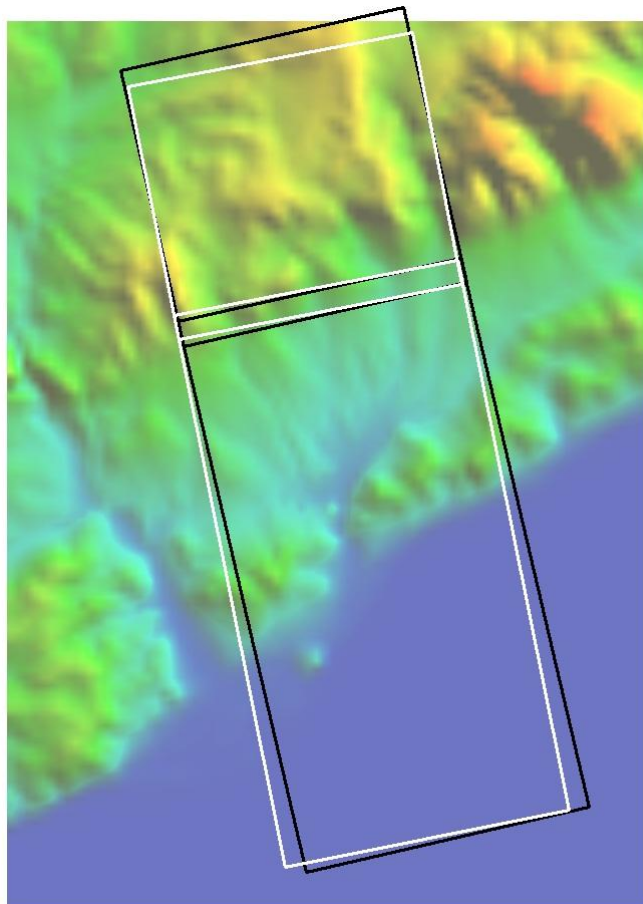
Control and check data



Raw data – microframes



Creating product level 2A



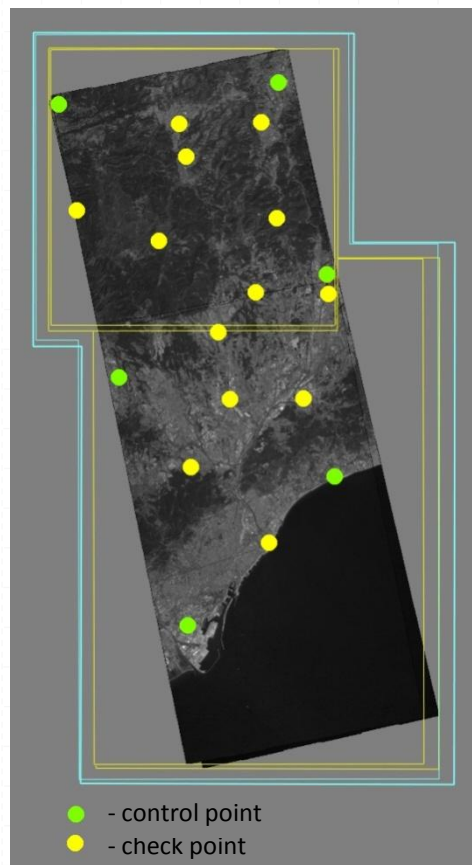
2A lvl images

Accuracy

Creating 2A lvl image

	<i>RMS X</i>	<i>RMS Y</i>
fr1_kv1_05315_05308_02_3np2_08	0.036	0.084
fr2_kv1_05315_05308_02_3np2_08	0.047	0.106
fr1_kv1_05832_05825_01_3np2_08	0.052	0.077
fr2_kv1_05832_05825_01_3np2_08	0.067	0.091

Stereopair creating



Stereopair creating

Block adjustment. Control points.

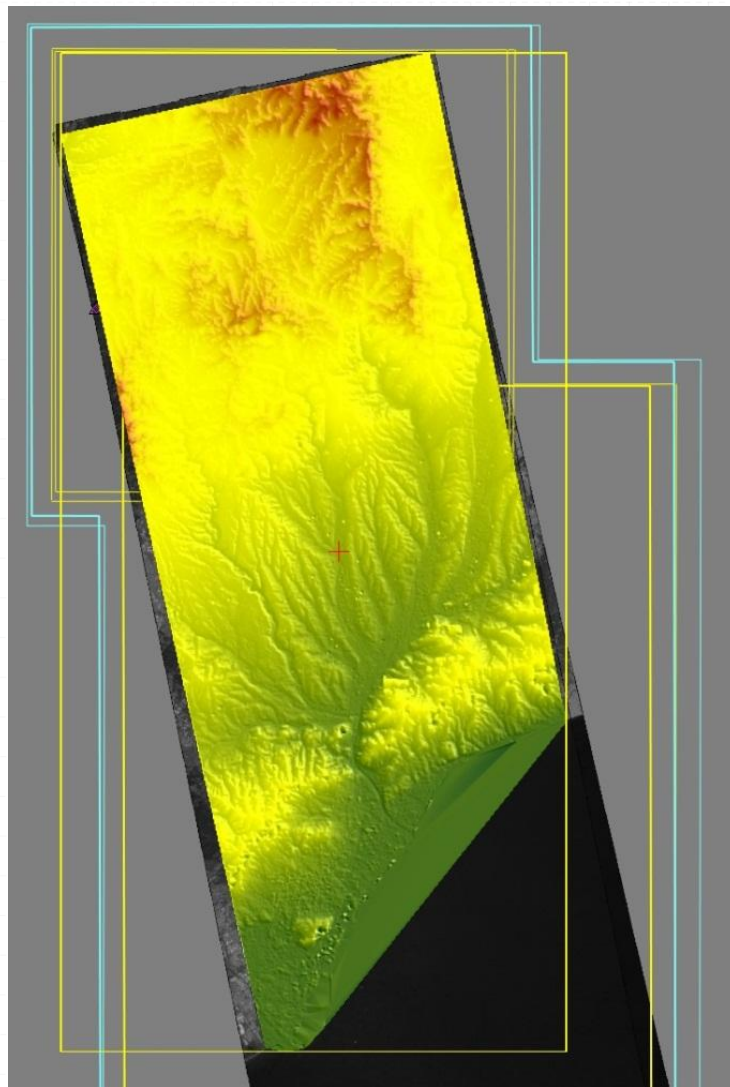
Point number	dX, m	dY, m	dZ, m	dS, m
2	0.278	-0.694	2.067	0.748
2139	-0.276	1.520	-2.549	1.545
2142	0.895	-0.301	-0.831	0.944
2151	-1.271	-1.508	2.242	1.972
2153	1.293	0.614	-0.990	1.431
2154	-1.280	1.026	-2.100	1.641
RMS	0.990	1.048	1.909	1.441
MAX	1.293	1.520	2.549	1.972

Stereopair creating

Block adjustment. Check points.

Point number	dX, m	dY, m	dZ, m	dS, m
1	2.359	-2.263	-0.405	3.269
2140	-1.906	-1.925	-1.960	2.709
2144	-2.914	-2.282	-1.395	3.701
2145	-1.953	-2.440	0.013	3.126
2146	-0.806	1.049	4.714	1.323
2149	-1.684	-0.397	0.763	1.730
2152	1.005	-1.783	2.716	2.047
2155	-0.697	-1.244	0.735	1.426
2156	-2.756	-1.395	4.454	3.089
2157	-2.227	-3.856	2.613	4.453
2158	-0.162	-0.075	0.019	0.178
2159	0.938	-1.783	2.766	2.014
57	-1.993	-2.198	4.578	2.967
RMS	1.838	1.977	2.660	2.699
MAX	2.914	3.856	4.714	4.453

DTM creating



DTM accuracy

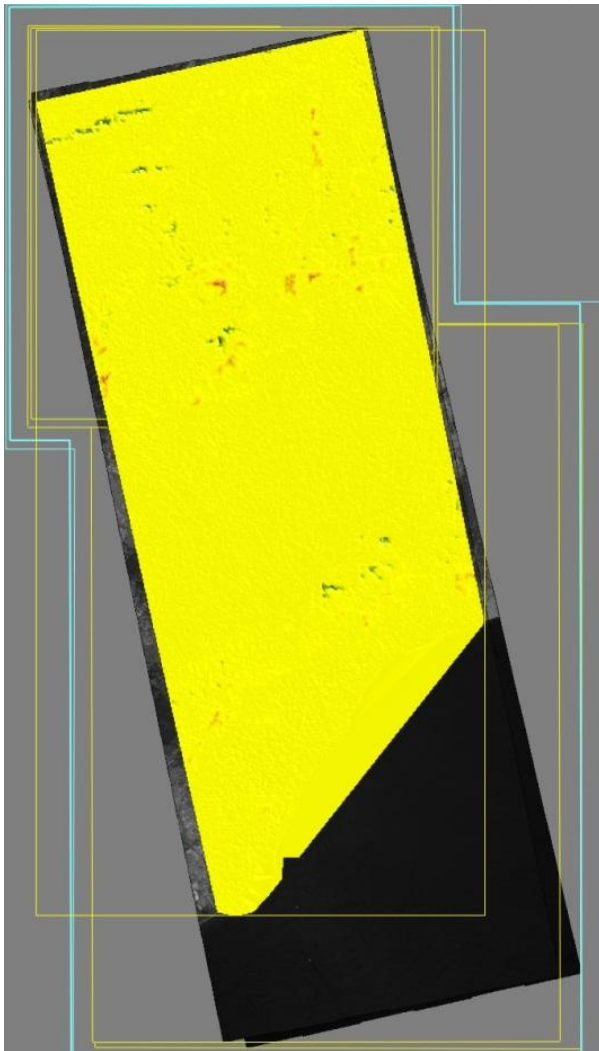
Point number	Point type	Height, meters	Deviation, meters
2139	control	4.304	2.400
2142	control	19.158	-0.495
2151	control	298.614	-1.934
2153	control	286.398	1.458
2154	control	594.348	3.001
2	control	229.082	-1.593
2140	check	7.171	2.763
2144	check	85.145	2.762
2145	check	81.757	-2.621
2146	check	249.930	-5.196
2149	check	685.720	1.200
2152	check	776.236	19.443
2155	check	643.457	0.363
2156	check	743.520	5.049
2157	check	203.890	-3.434
2158	check	190.870	-2.339
2159	check	82.131	-2.479
2139	check	571.249	1.014

RMS: 5.282
MAX: 19.443

Point 2152 not included:

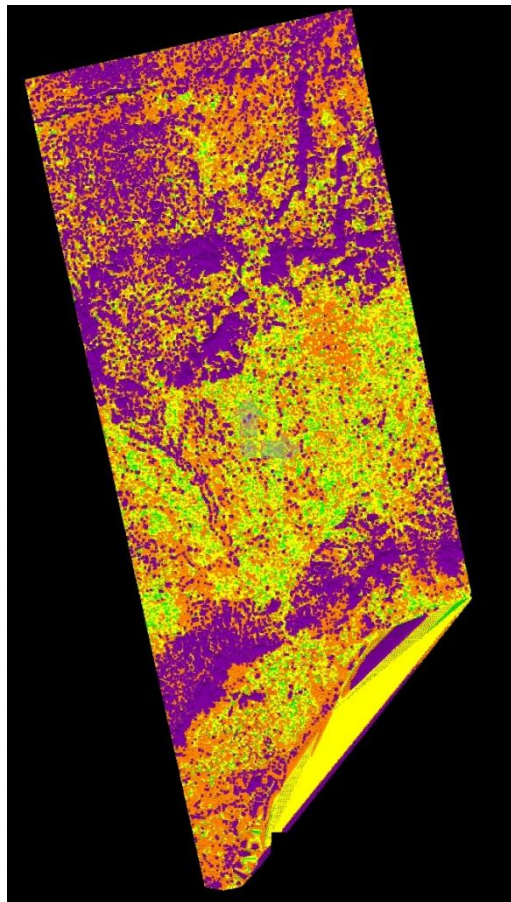
RMS: 2.701
MAX: -5.196

DTM accuracy



Difference model

DTM accuracy



Difference model

Deviation by range

Range, meters	Color	Number of points	%	%+%
0 – 0.5	Green	3 768 045	7,5	7,5
0.5 – 2.5 (<1 pix)	Yellow	15 666 251	31,1	38,6
2.5 – 7.5 (1-3pix)	Orange	19 175 030	38,1	76,7
> 7.5 (>3 пикс)	Purple	11 711 838	23,3	100

Results:

2A lvl images (Kanopus-V) can be used as input data for photogrammetric processing for creating various geoinformation products, including DEM and orthos.

THANK YOU FOR ATTENTION!

