



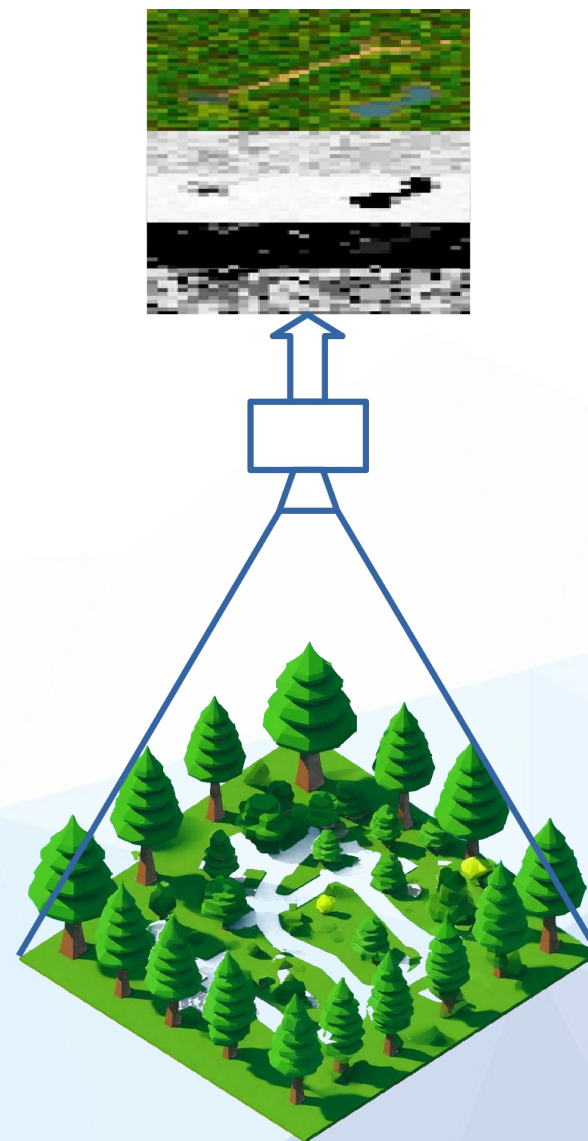
СЕВЕРНЫЙ (АРКТИЧЕСКИЙ)
ФЕДЕРАЛЬНЫЙ УНИВЕРСИТЕТ
ИМЕНИ М.В. ЛОМОНОСОВА

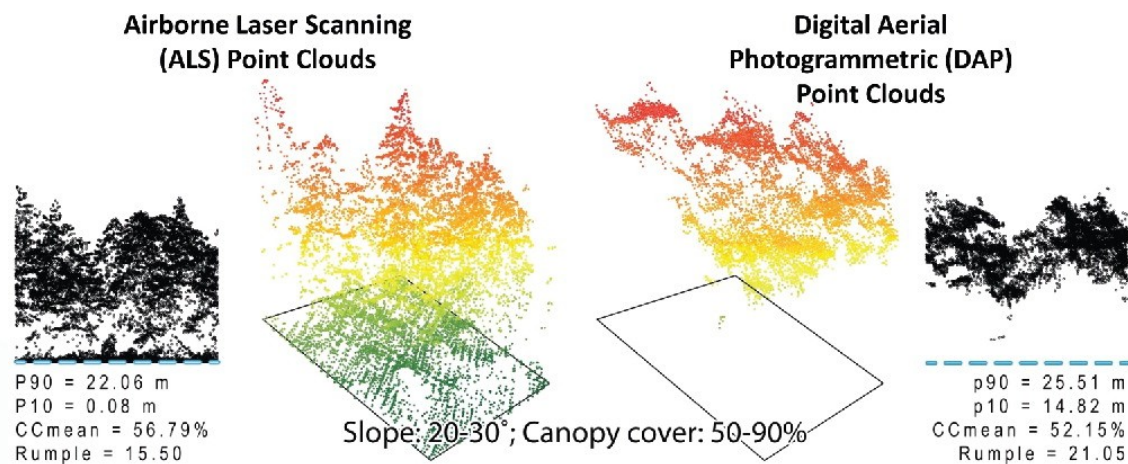
Satellite Image Super-resolution with Collateral Data Integration

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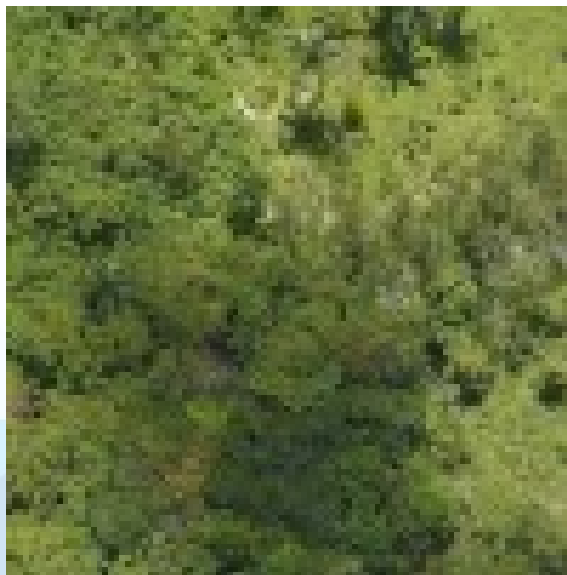
Березовский В. В.
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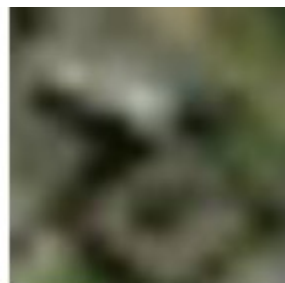
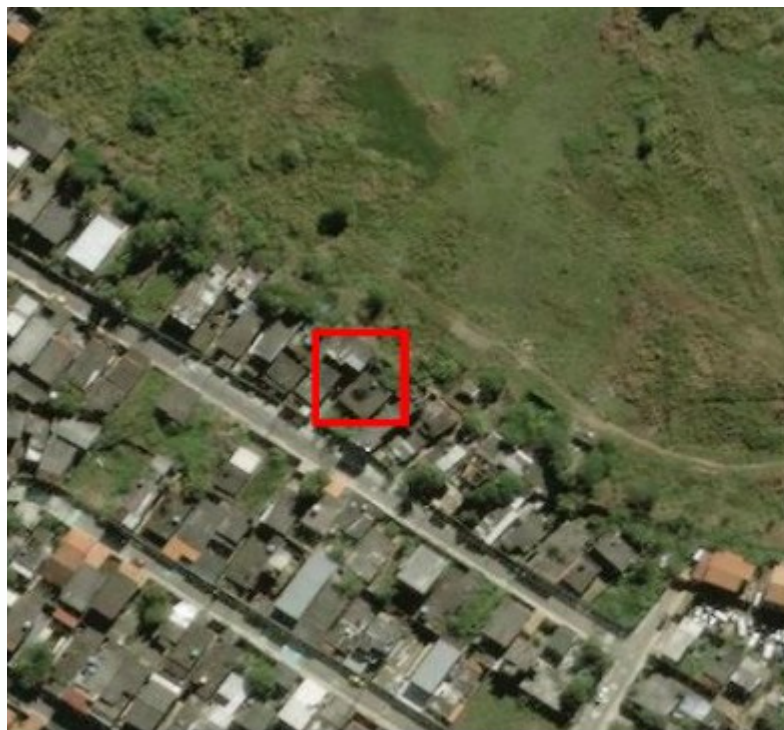
- ⋮ Постановка проблемы
- ⋮ Предметная область
- ⋮ Методика супер-разрешения
- ⋮ GISSRGAN
- ⋮ UGISSRGAN
- ⋮ Проверка адекватности



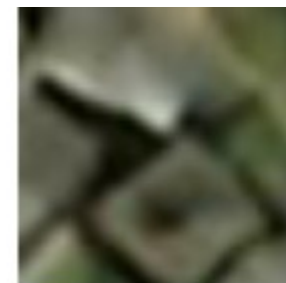


Цель исследования: повысить достоверность идентификации крон деревьев на спутниковых снимках лесных территорий за счет разработки методов супер-разрешения

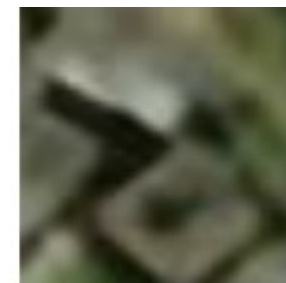




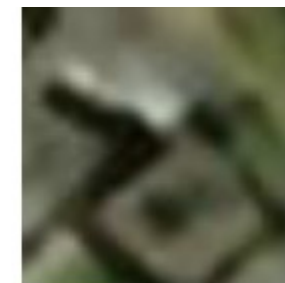
Bicubic



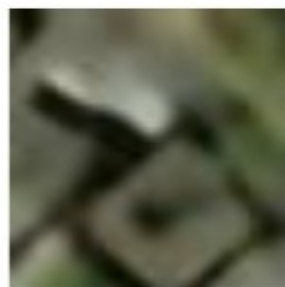
SelfExSR



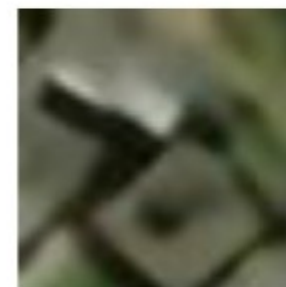
SRCNN



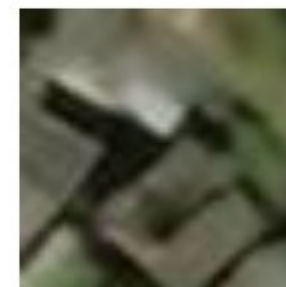
LapSRN



VISR



SRResnet



MRNN

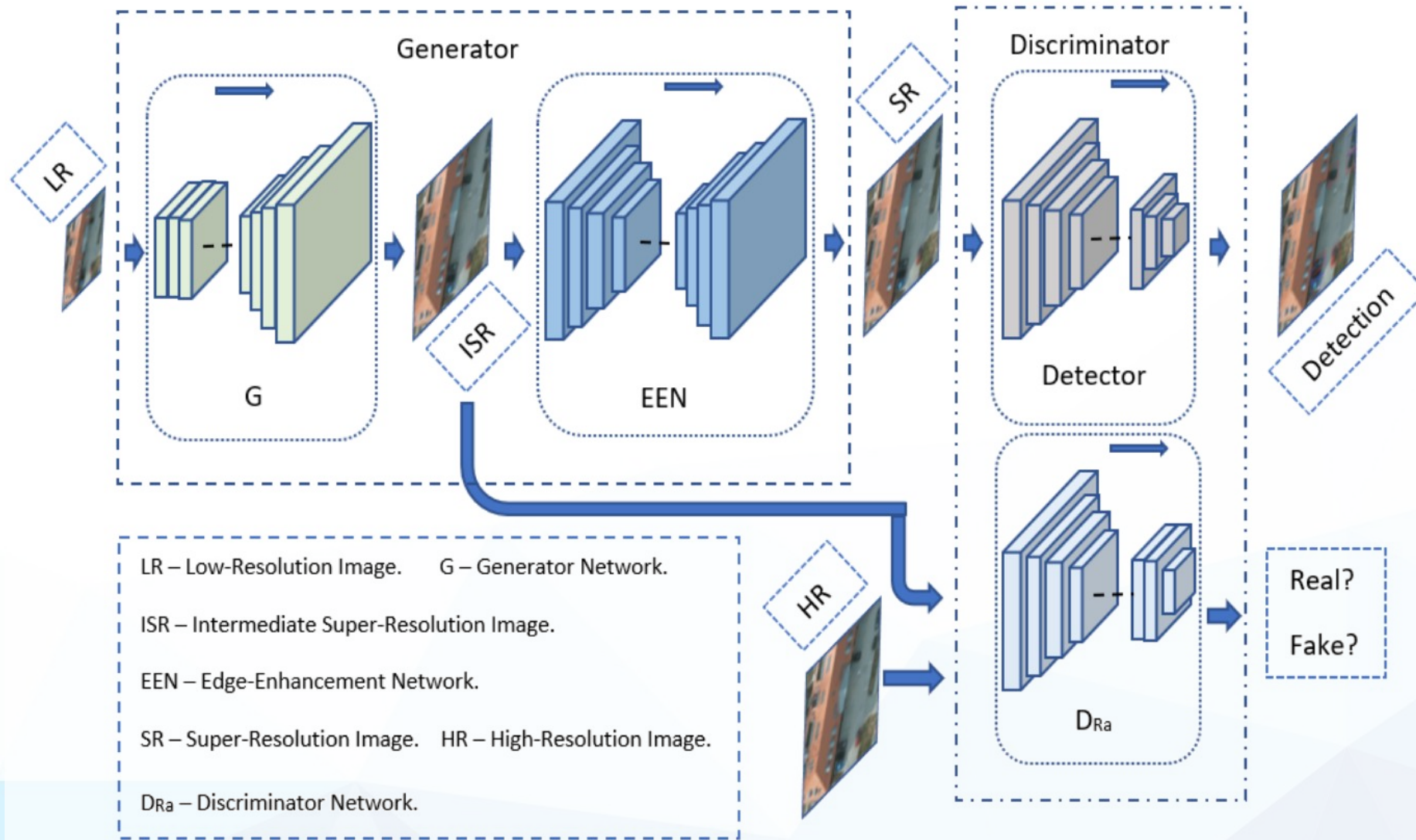


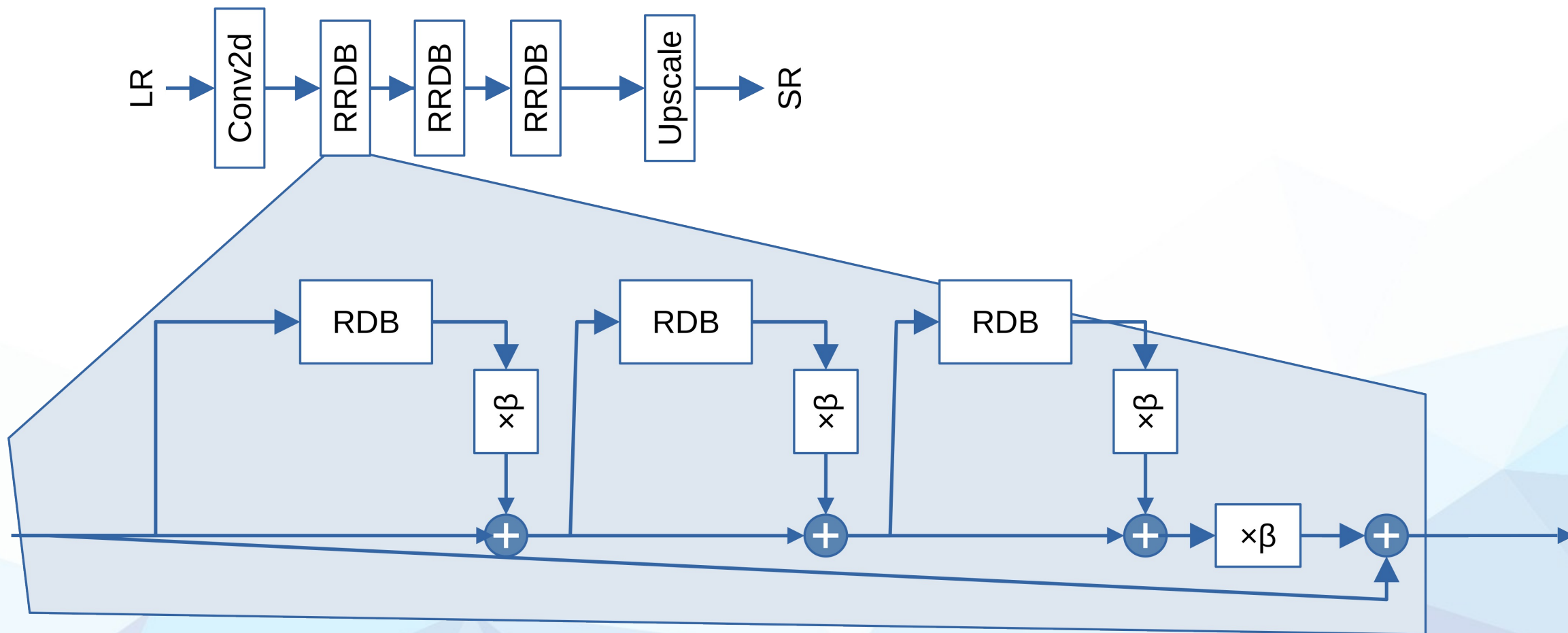
HR

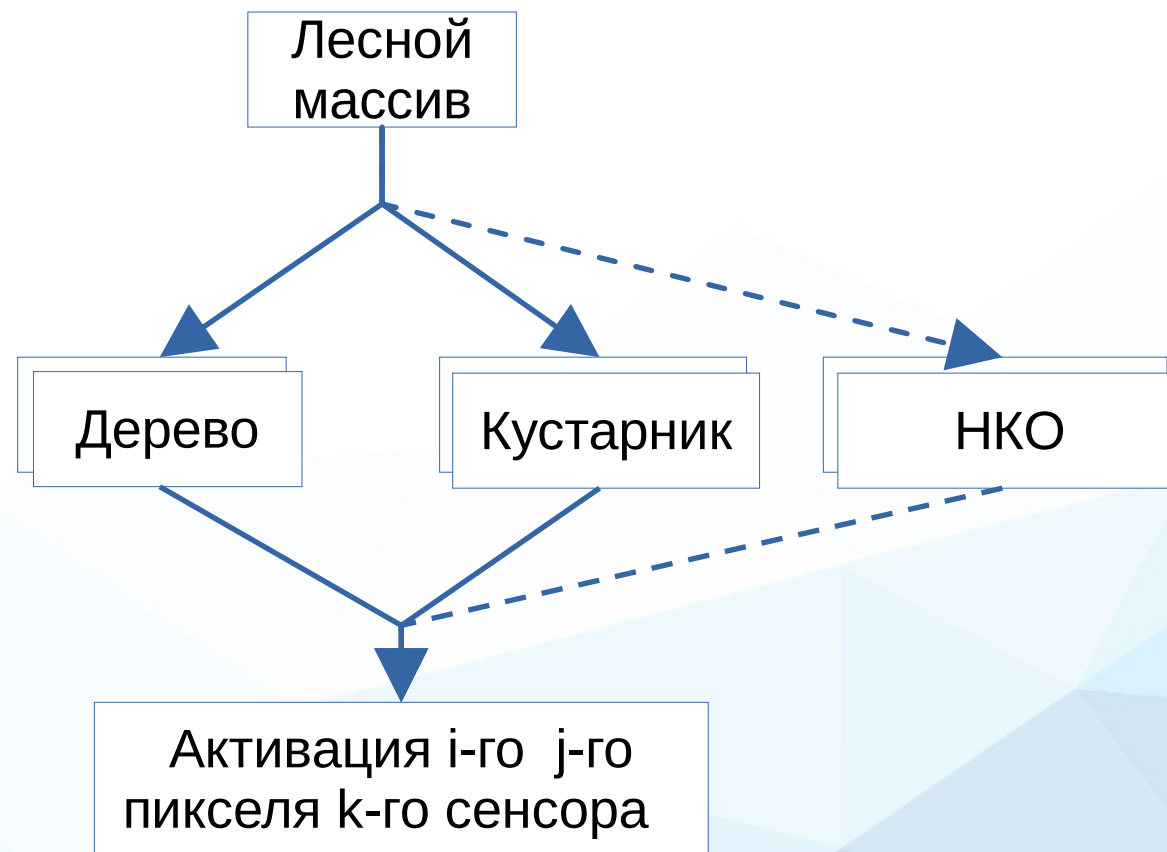
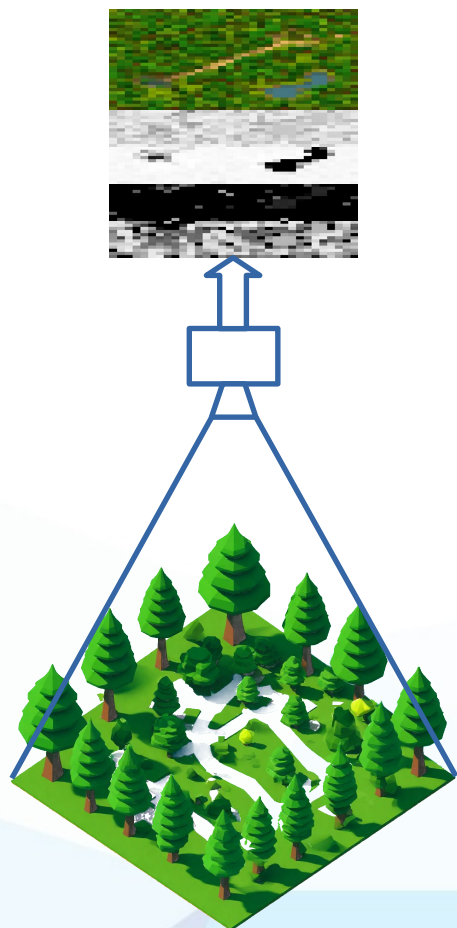
Tao Lu et al. Satellite Image Super-Resolution via Multi-Scale Residual Deep Neural Network

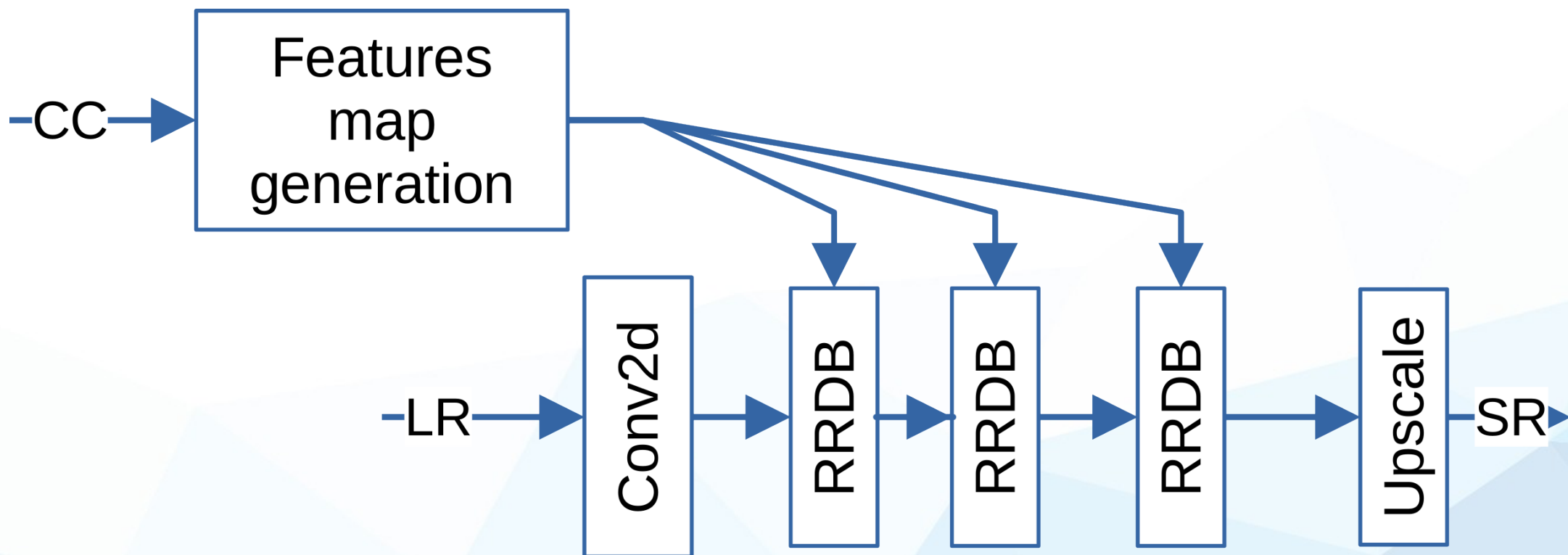
Ground truth (PSNR/SSIM)	SRGAN (31.647/0.935)	ESRGAN (31.877/0.927)	EEGAN (31.902/0.930)	EESRGAN (31.894/0.921)	Ours (31.904/0.938)
					
	(31.643/0.904)	(31.787/0.899)	(31.902/0.912)	(32.003/0.901)	(32.014/0.889)
					
	(32.768/0.912)	(32.877/0.920)	(32.769/0.878)	(32.915/0.913)	(32.770/0.911)

T.-J. Liu et al. Satellite Image Super-Resolution by 2D RRDB and Edge-Enhanced Generative Adversarial Network









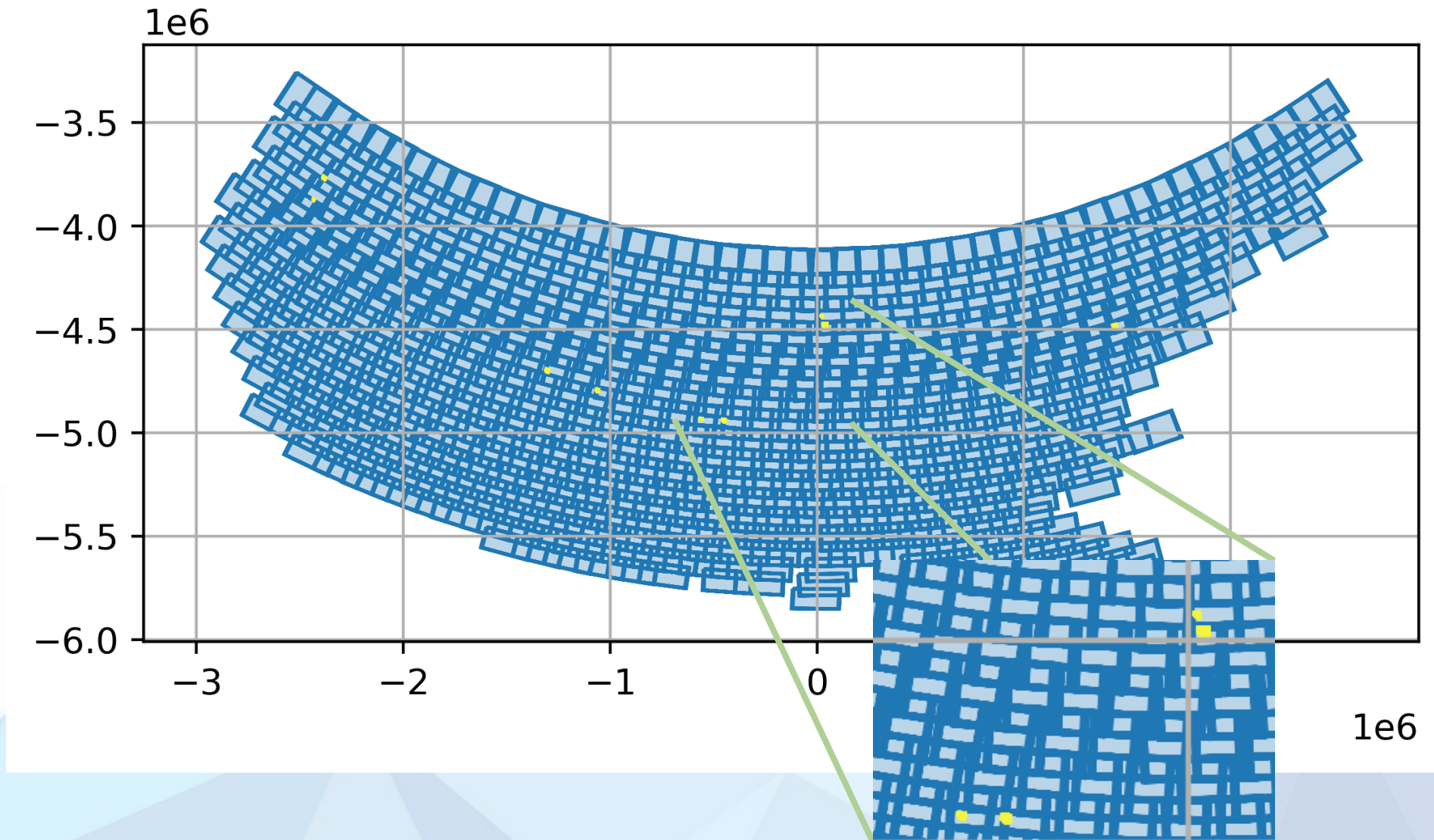
- : NEON: High-resolution orthorectified camera imagery mosaic
- : USGS EROS Archive – Aerial Photography – High Resolution Orthoimagery
- : USGS EROS Archive – Landsat Archives – Landsat 7 ETM Plus Collection 2 Level-2 Science Products
- : USGS EROS Archive – Landsat Archives – Landsat 8-9 OLI/TIRS Collection 2 Level-2 Science Products



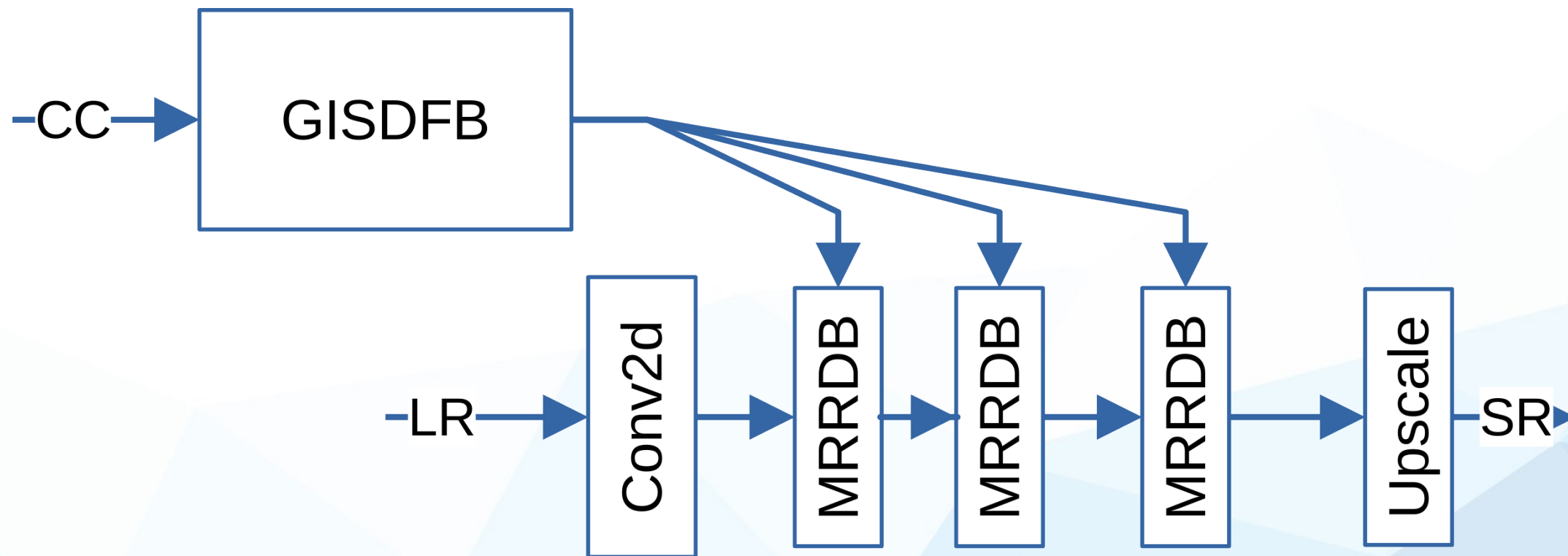
(a)

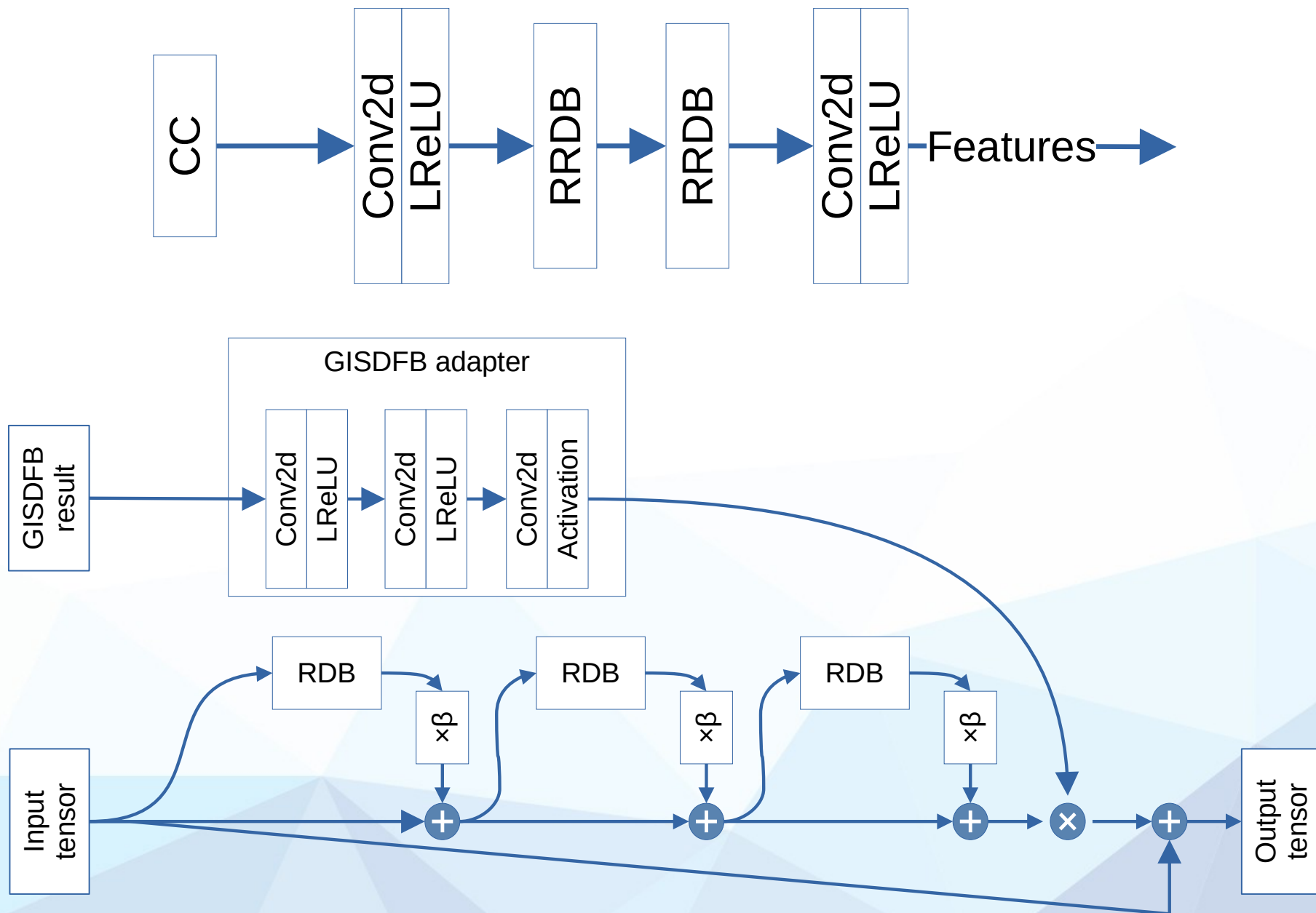


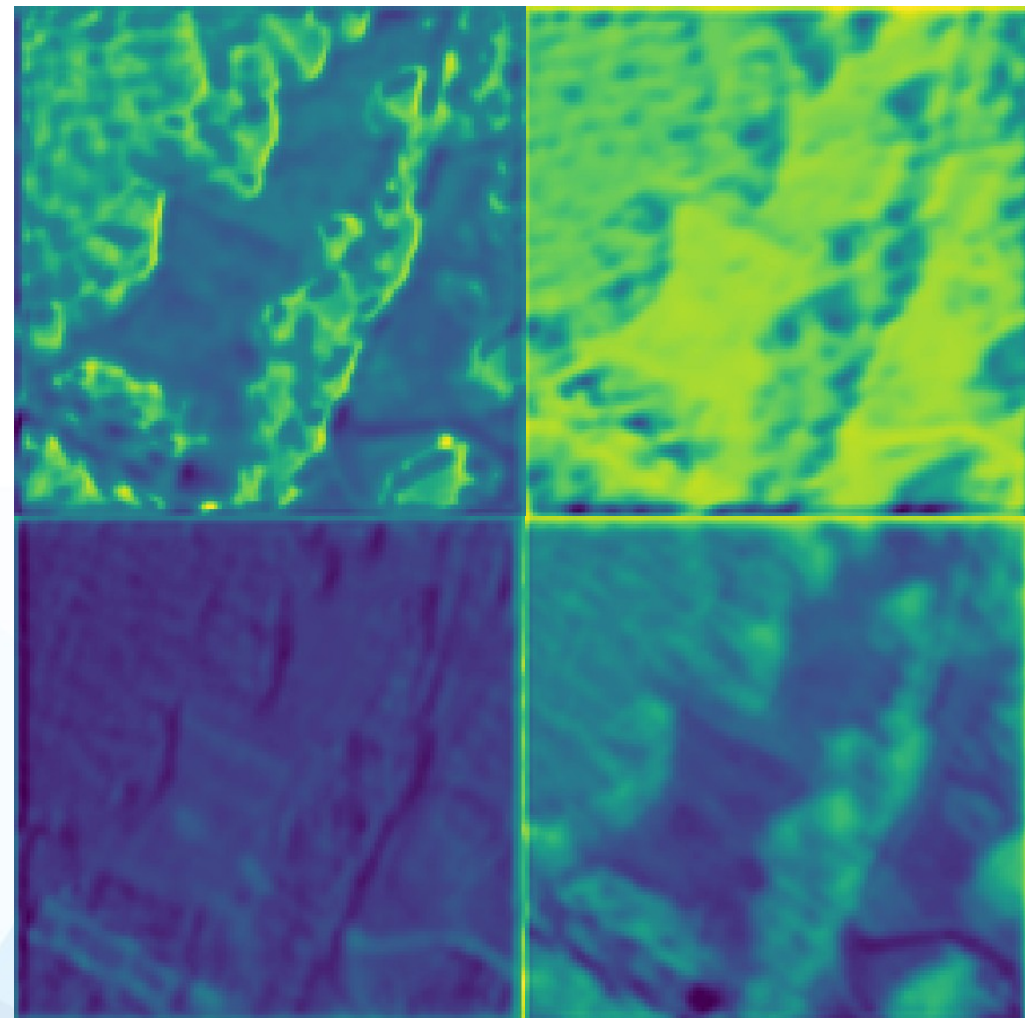
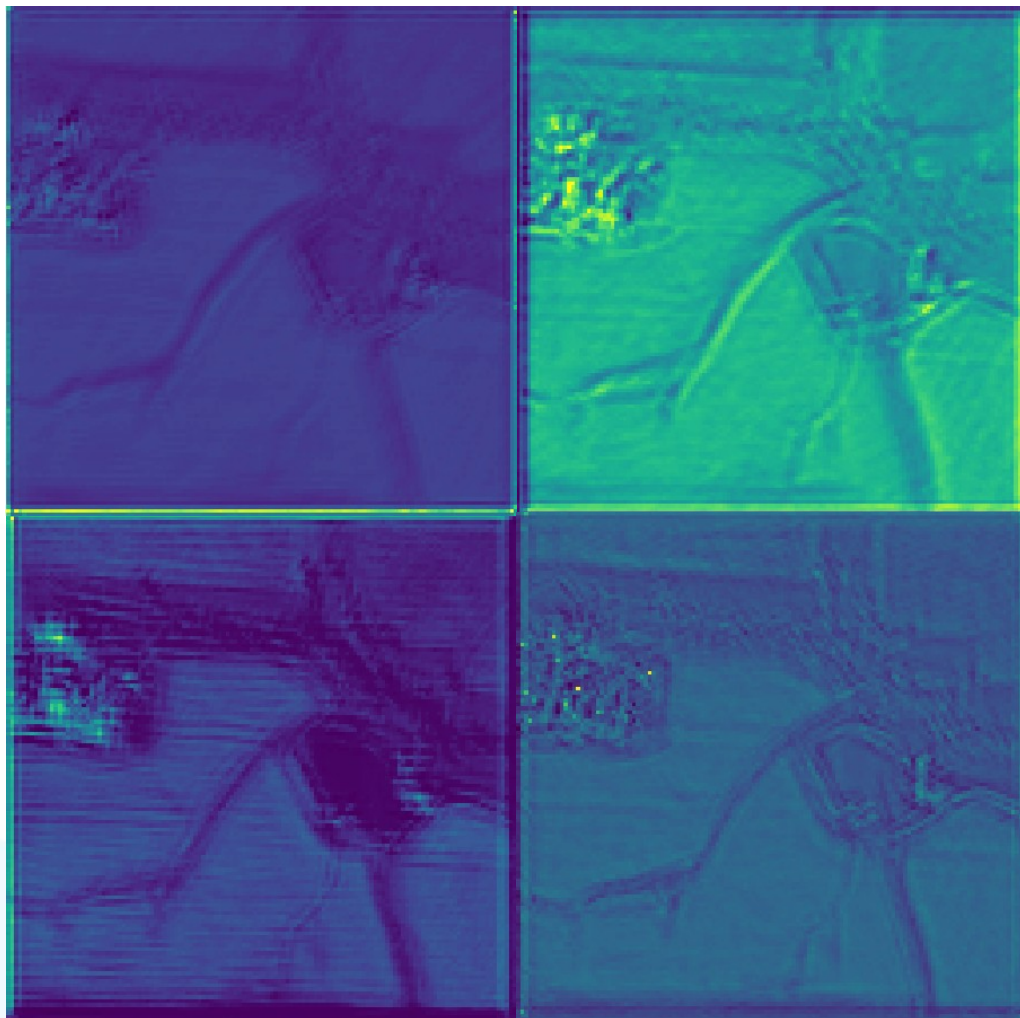
(b)



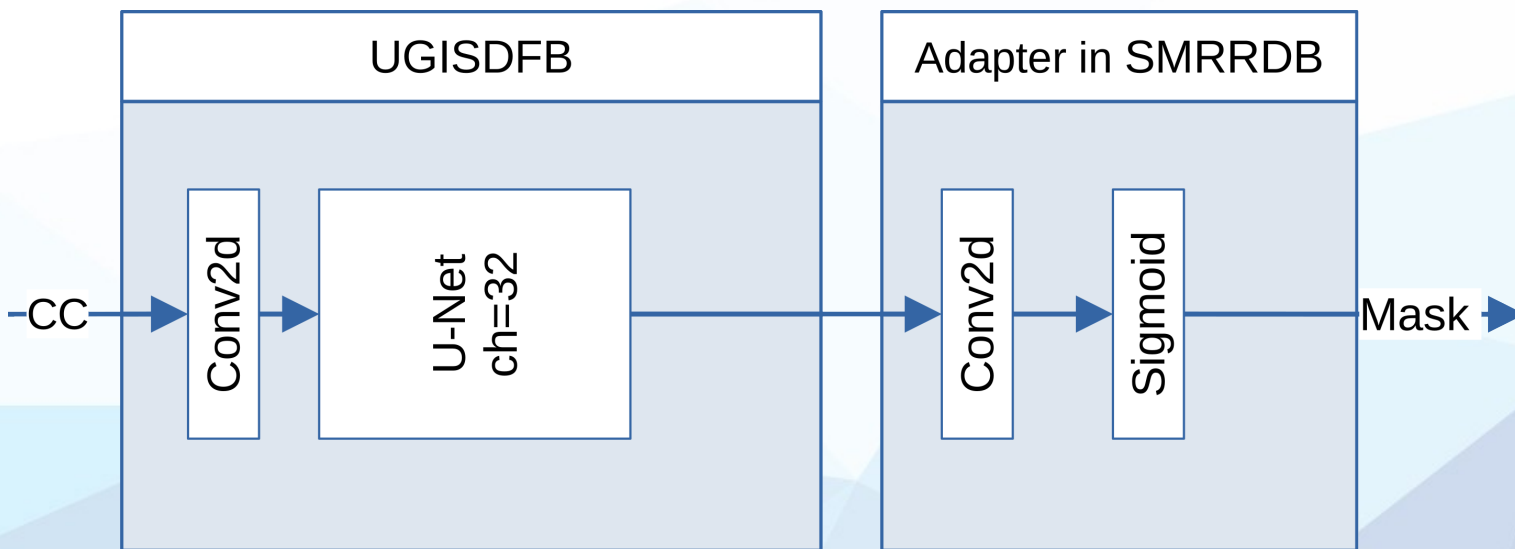
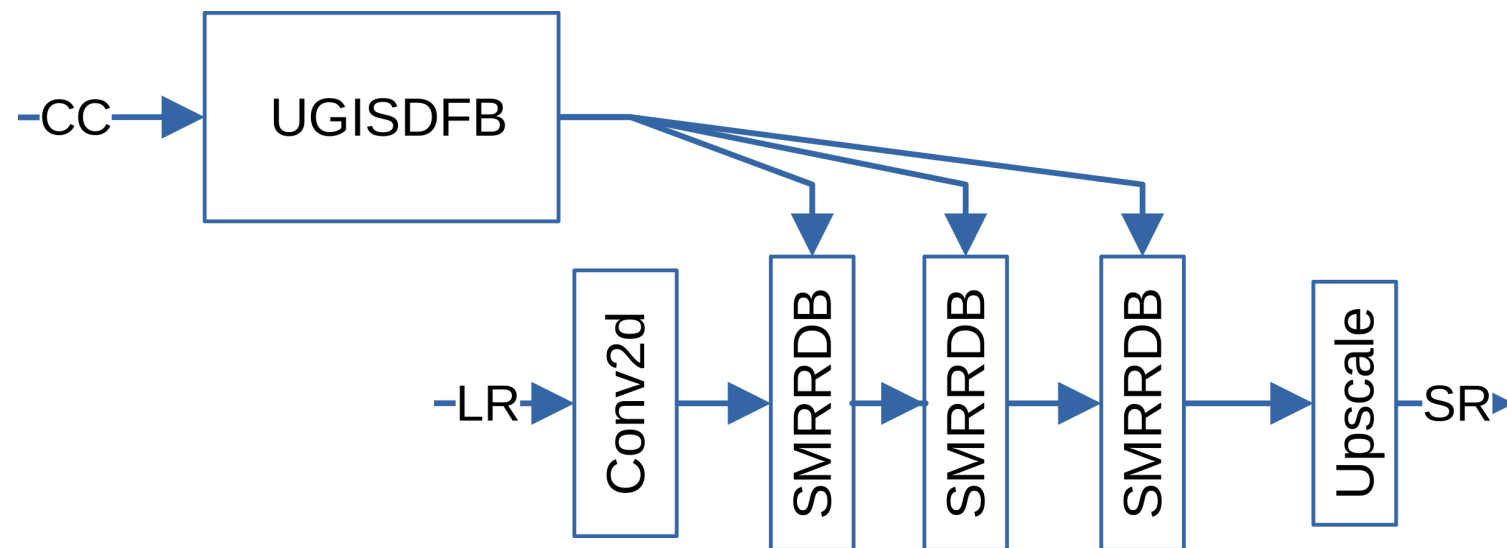


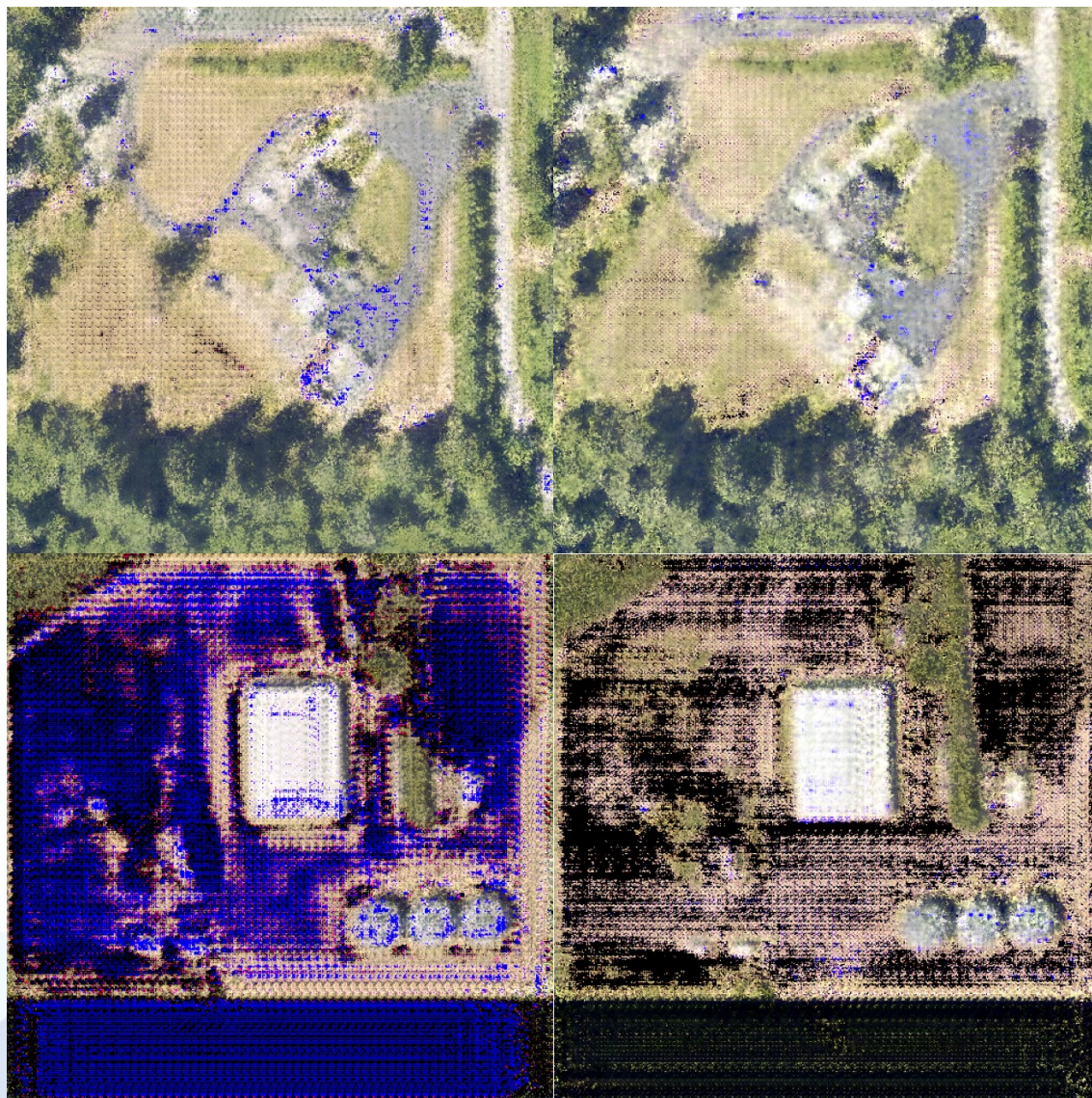






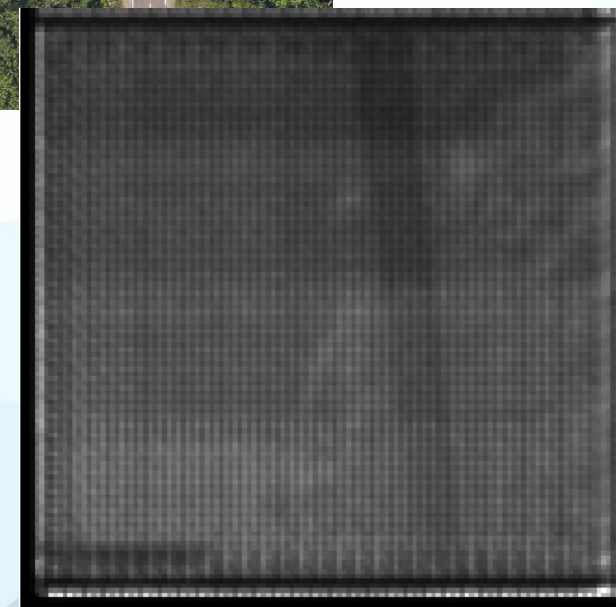
Модель	блоков	ch	RRDB в GISDFB	LR в CC	Landsat 7 в CC	Landsat 8-9 в CC	PSNR	SSIM
ESRGAN	20	96	-	-	-	-	29.169	0.600
GISSRGAN	20	96	-	+	-	+	27.473	0.344
GISSRGAN	20	96	+	+	-	+	29.980	0.613
GISSRGAN	20	96	+	-	-	+	30.188	0.590
GISSRGAN	20	96	+	+	-	-	29.180	0.600
GISSRGAN	20	96	+	-	+	-	29.642	0.602





ESRGAN 400k

UGISSRGAN 600k



UGISSRGAN L89+LR

Блок обработки СС	Базовый блок	СС данные	PSNR	SSIM
GISDFB	MRRDB	Landsat 8-9 + LR	21.5950	0.3876
GISDFB	UMRRDB	Landsat 8-9 + LR	23.1025	0.3682
UGISDFB	SMRRDB	Landsat 8-9 + LR	25.8669	0.4223
UGISDFB	MRRDB	Landsat 8-9 + LR	22.0525	0.4062
UGISDFB	UMRRDB	Landsat 8-9 + LR	22.6271	0.3866
отсутствует	RRDB	Landsat 8-9 + LR	21.6363	0.3605

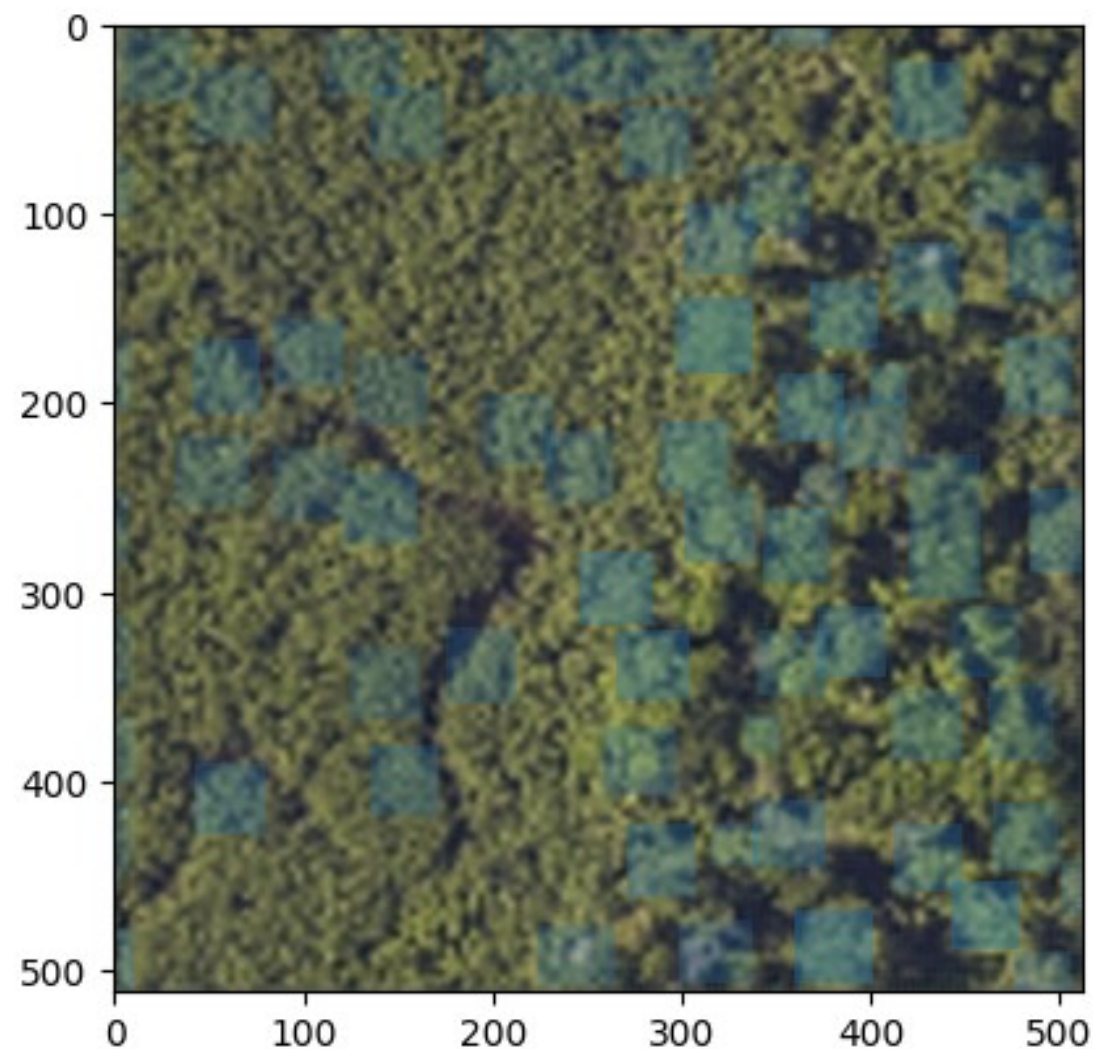
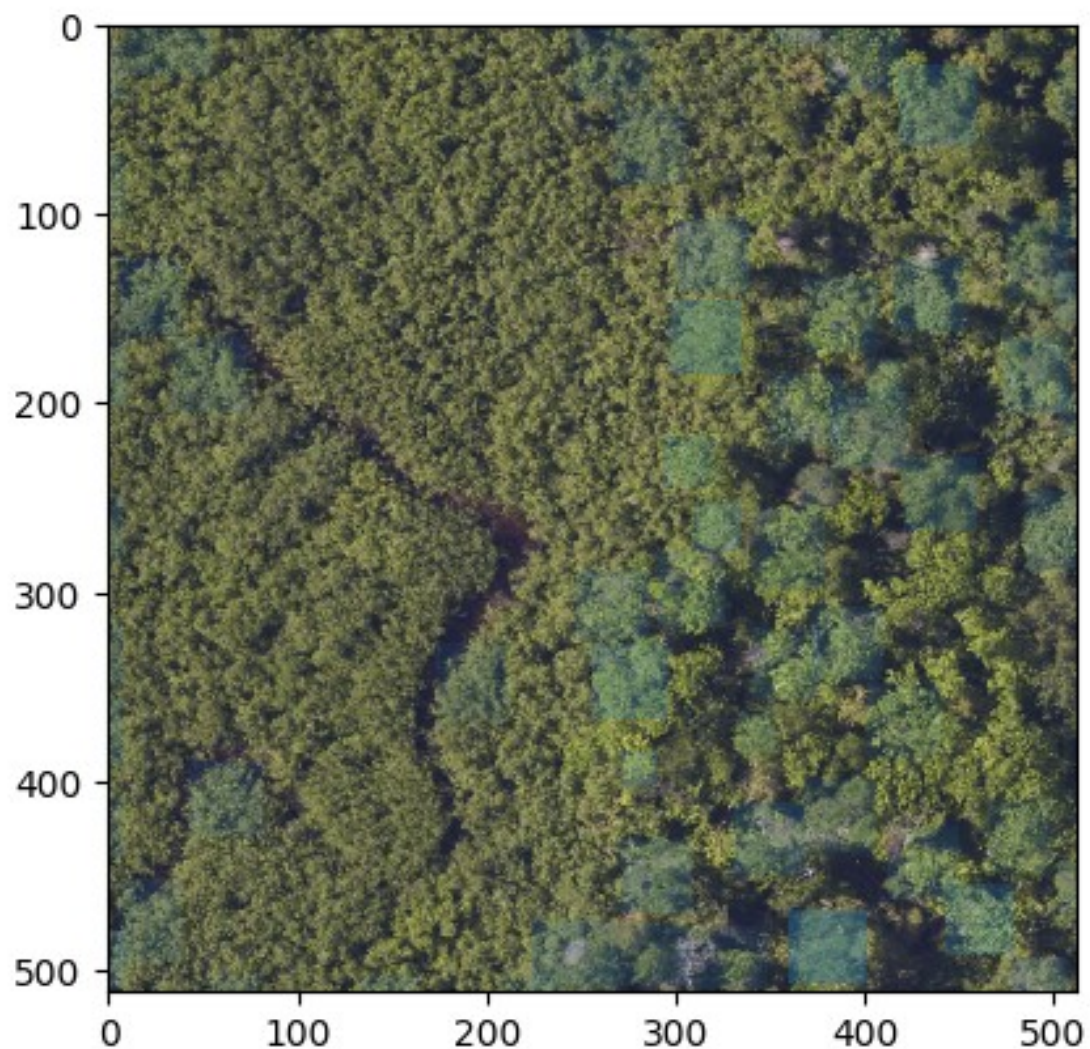
RRDB

GISDFB + MRRDB

UGISDFB + SMRRDB

UGISDFB + UMRRDB

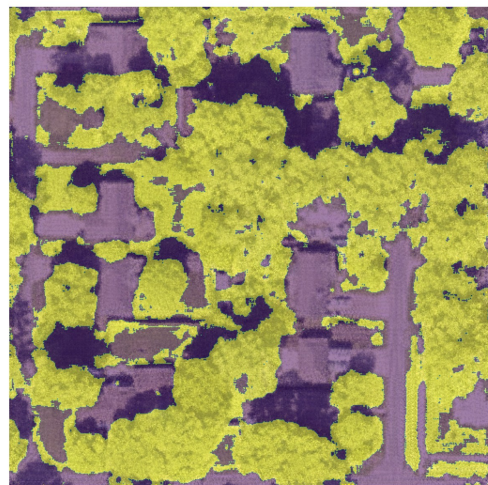




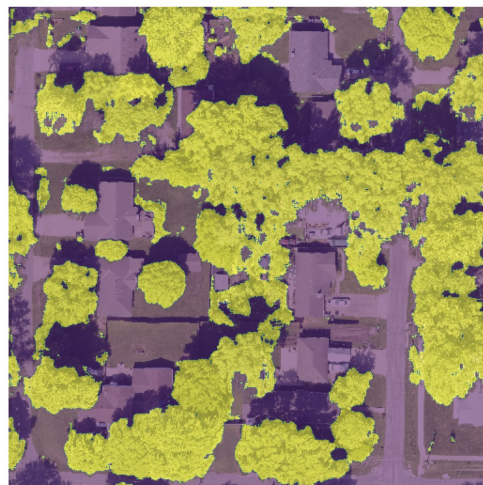


Метрика	UGISSRGAN	ESRGAN
Precision	0.9416	0.8569
Recall	0.9301	0.8565
M-score	0.8794	0.7494
F1-score	0.9358	0.8567

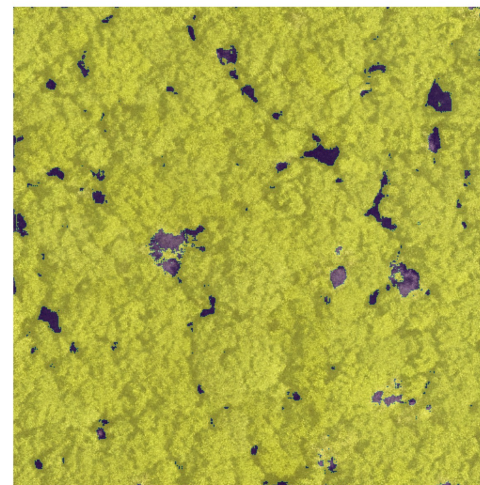
UGISDFB + SMRRDB



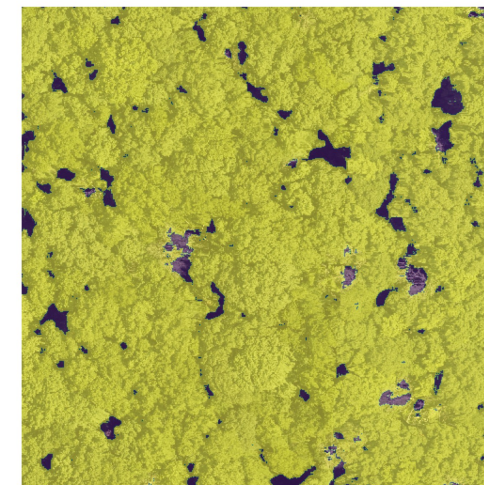
HR



UGISDFB + SMRRDB



HR





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Satellite Image Super-resolution with Collateral Data Integration

Спасибо за внимание!

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