

# Serviço Geológico do Brasil – CPRM

## Inserção de uma Malha de Pontos entre Seções Batimétricas em Reservatórios Estudo de caso: Reservatório de Ibitinga-SP

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# Assoreamento



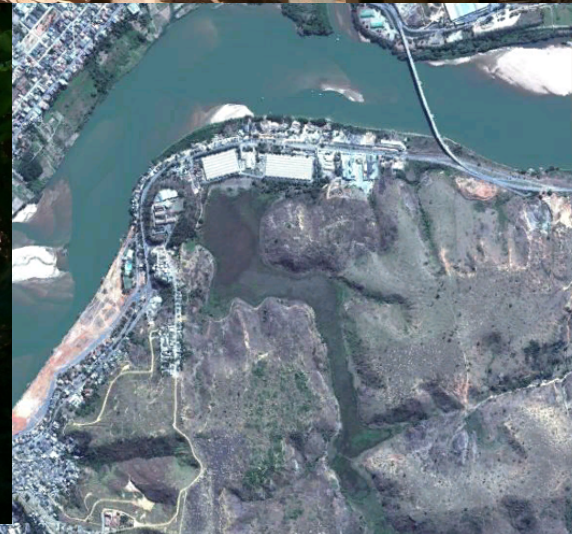
Colatina-ES – 2003



Colatina-ES – 2011



# Assoreamento





# Assoreamento

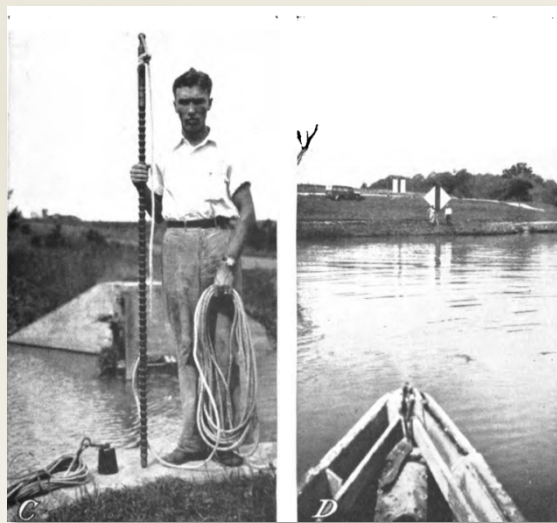
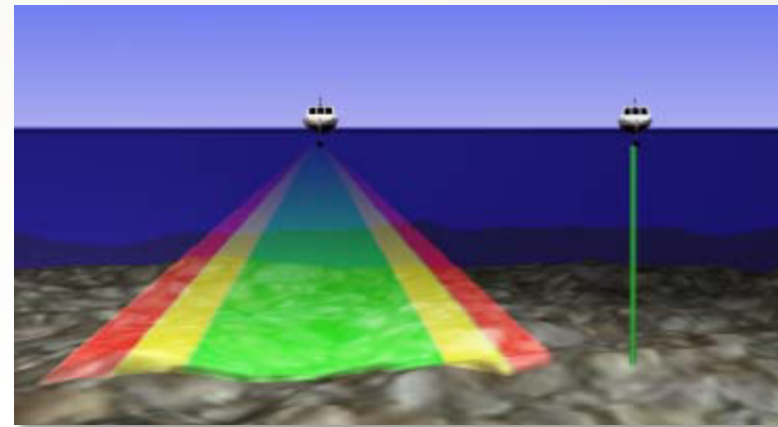
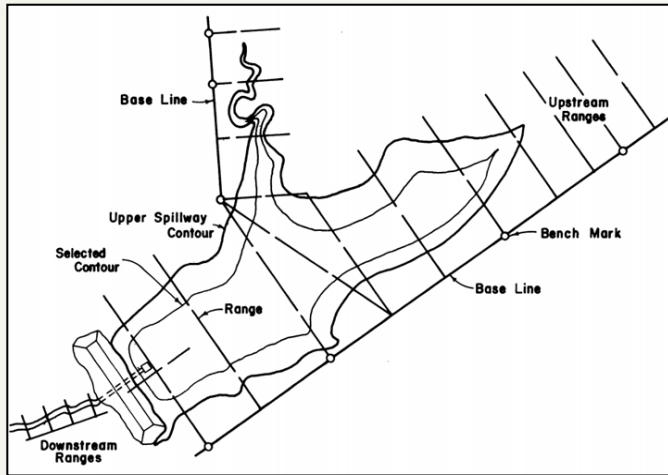
**UHE Brecha (1958)**



**UHE Mascarenhas (1974)**

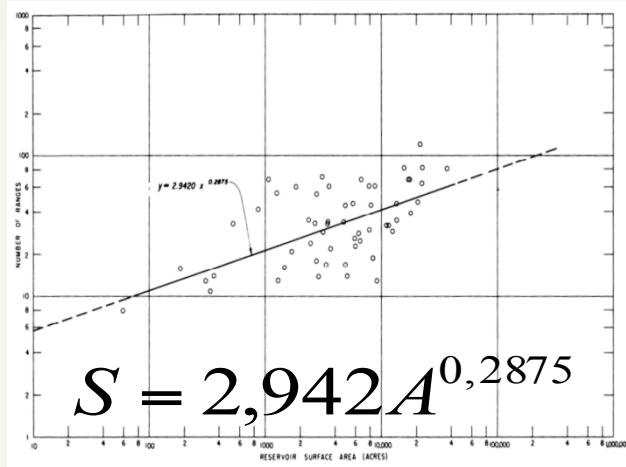


# Levantamento batimétrico





# Número de seções transversais



**BLANTON (1982)**

Escala do mapa	Distância entre seções (m)	Tipo de reservatório Observação
1 : 2.000	20	Pequeno
1 : 5.000	50	Médio
1 : 10.000	100	Médio a grande
1 : 20.000	200	Grande
1 : 25 000	250	Grande

**CARVALHO et al. (2000)**

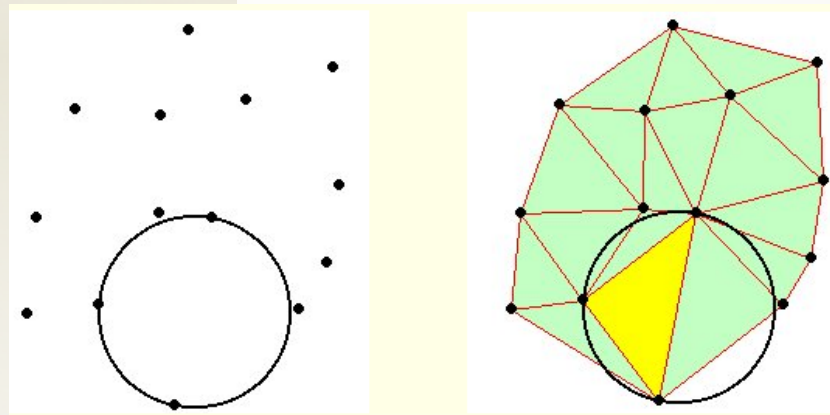
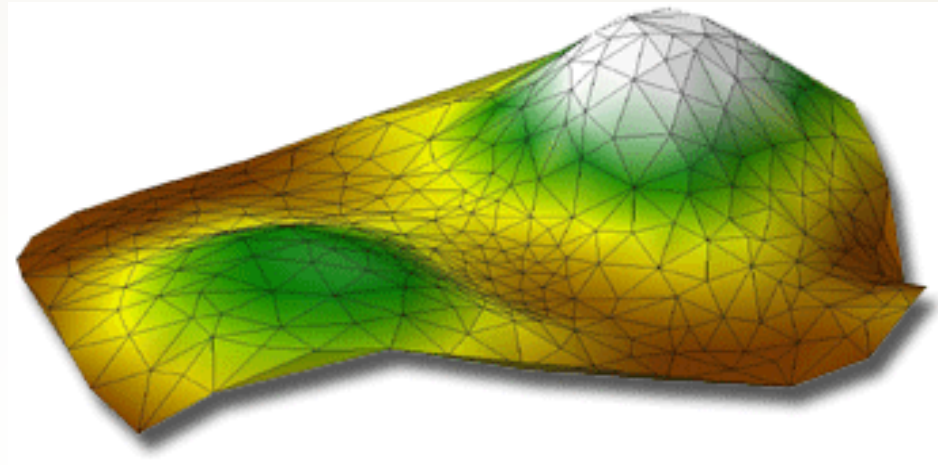
$$\text{PCH} \quad E_{ST} = \frac{0,25 A^{0,25}}{D} \quad \text{UHE} \quad E_{ST} = \frac{0,70 A^{0,35}}{D}$$

**ANA (2011)**

# Determinação do volume

## TIN - Triangulated Irregular Network

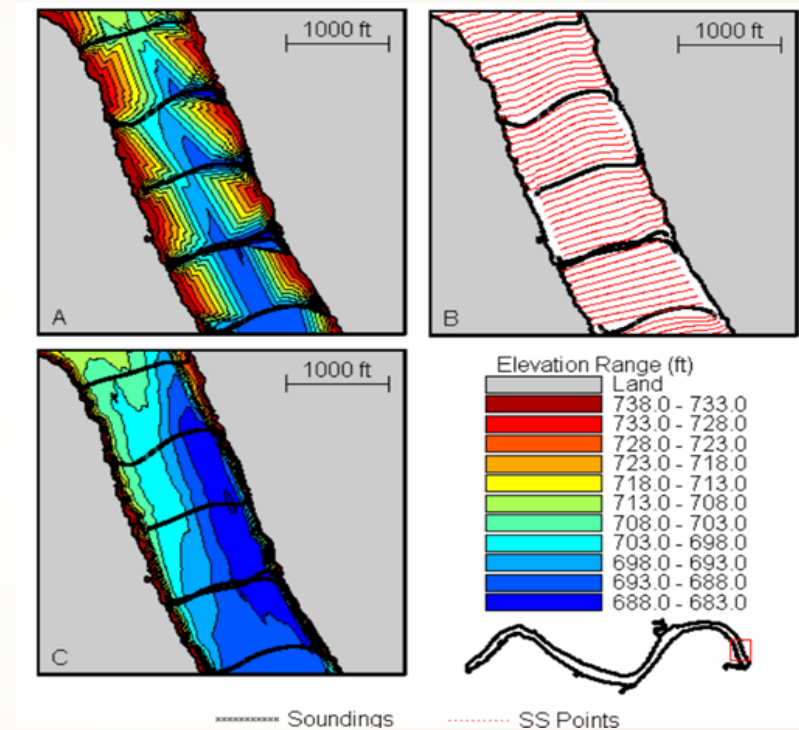
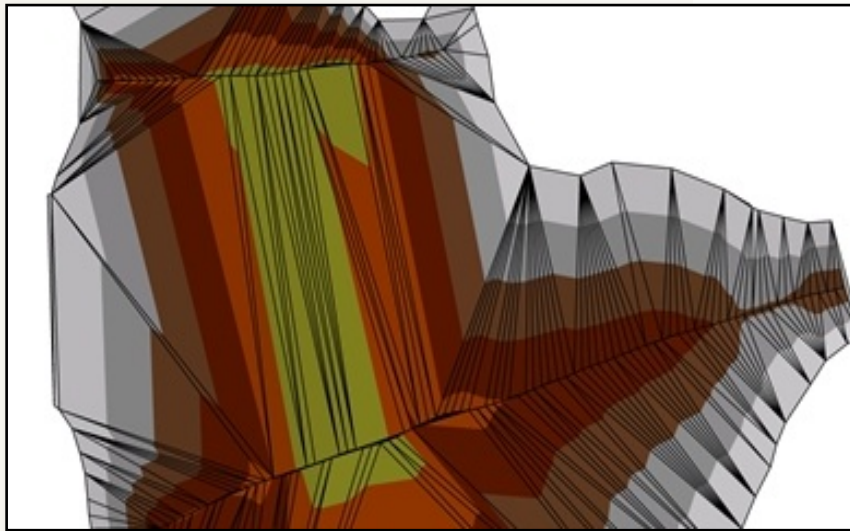
(Ferrari, 2006; Ferrari and Collins, 2006;  
Furnans and Austin, 2008; USACE, 2002;  
Wilson and Richards, 2006)



Delaunay



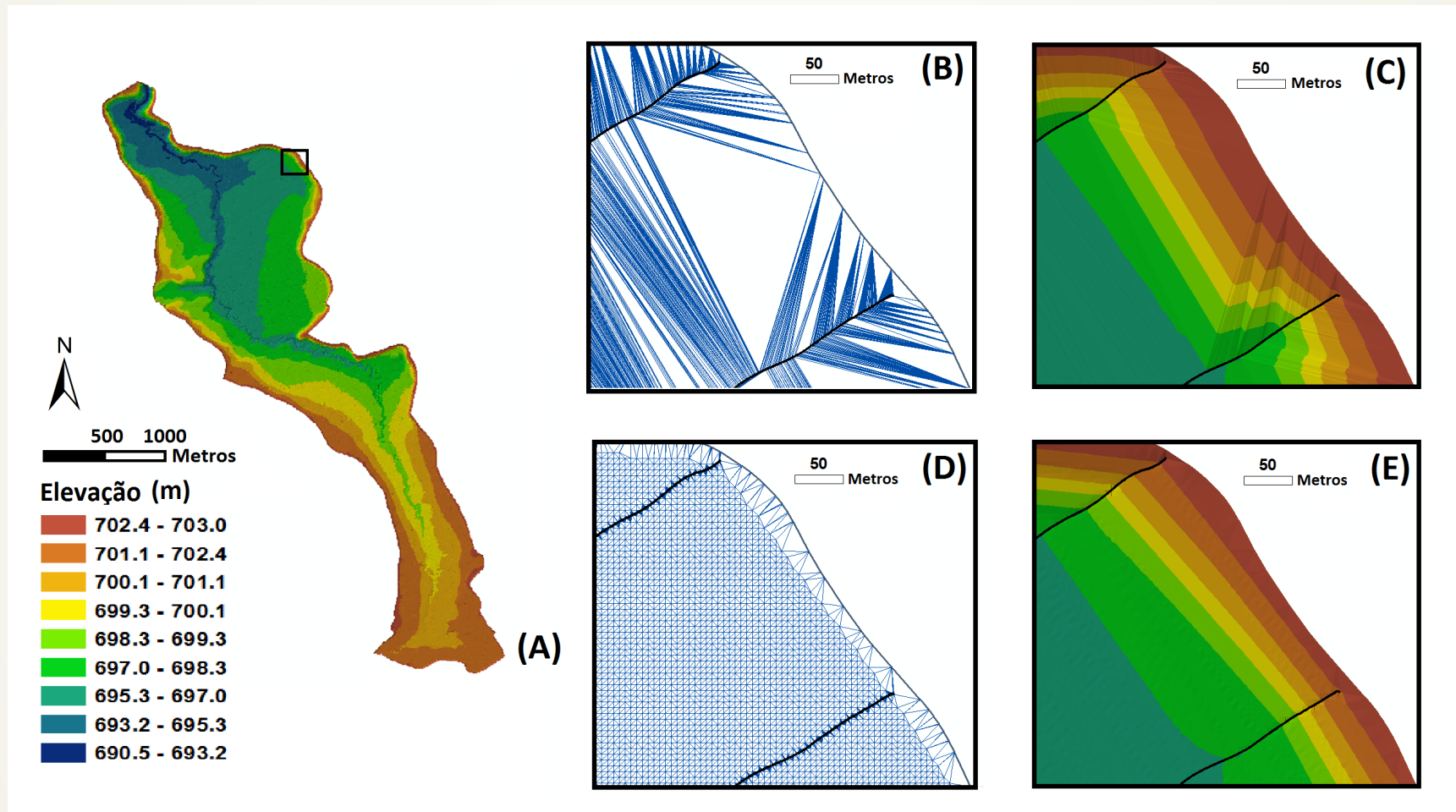
# Problemas na triangulação



FURNANS; AUSTIN (2008)

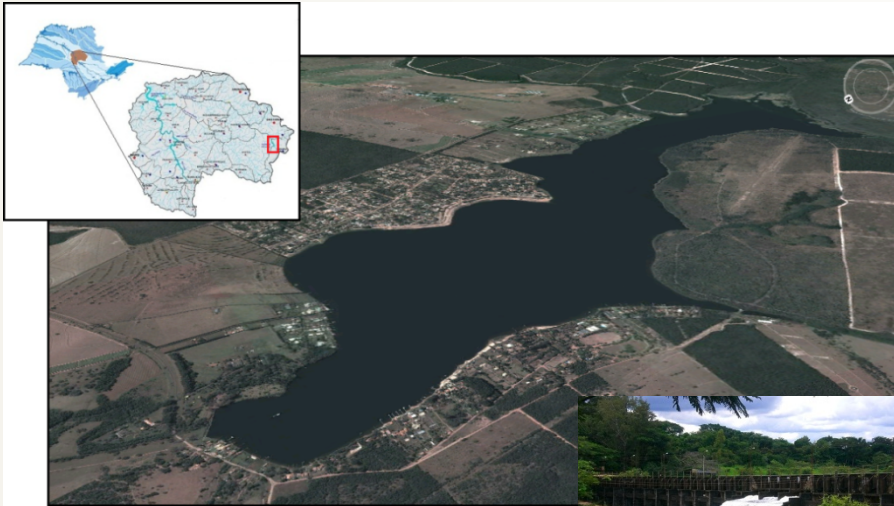


# Método IMP (Inserção de Malha de Pontos)



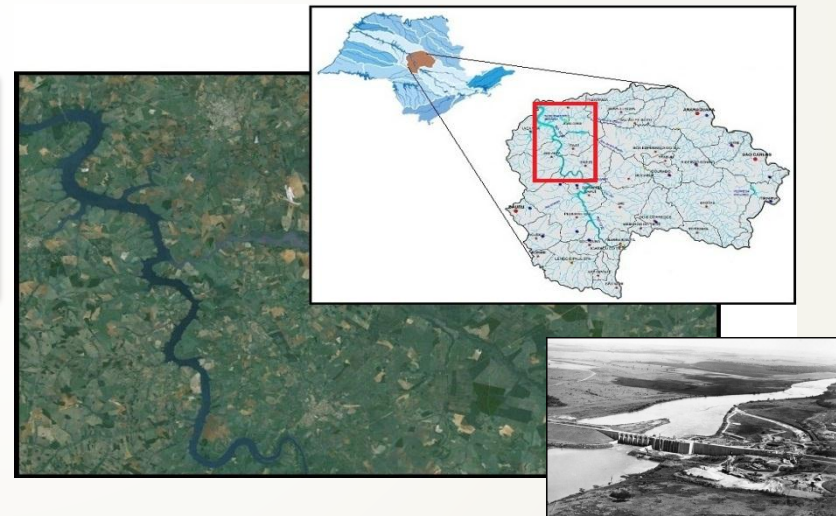


# Reservatórios



PCH Lobo

UHE Ibitinga



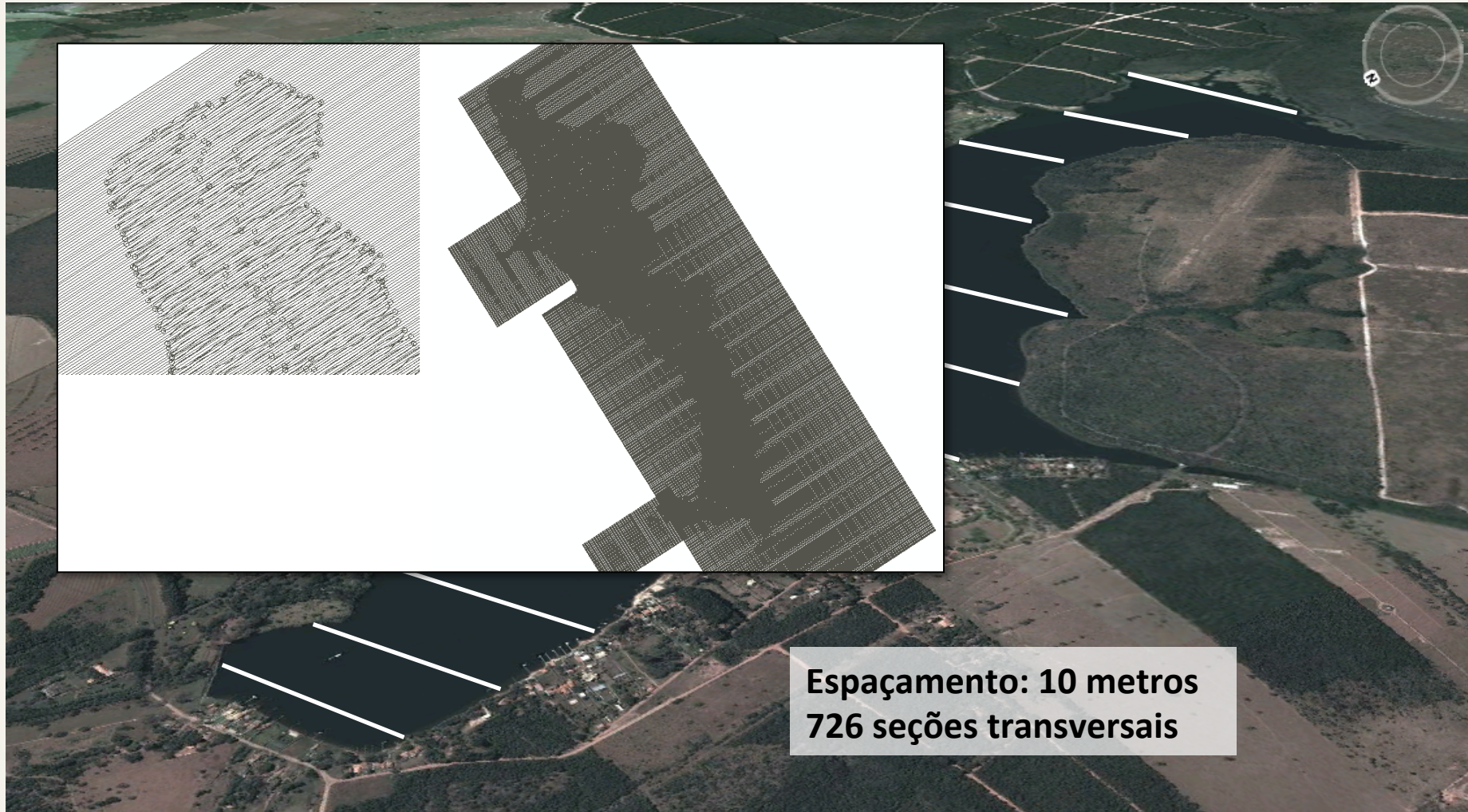


# Planejamento



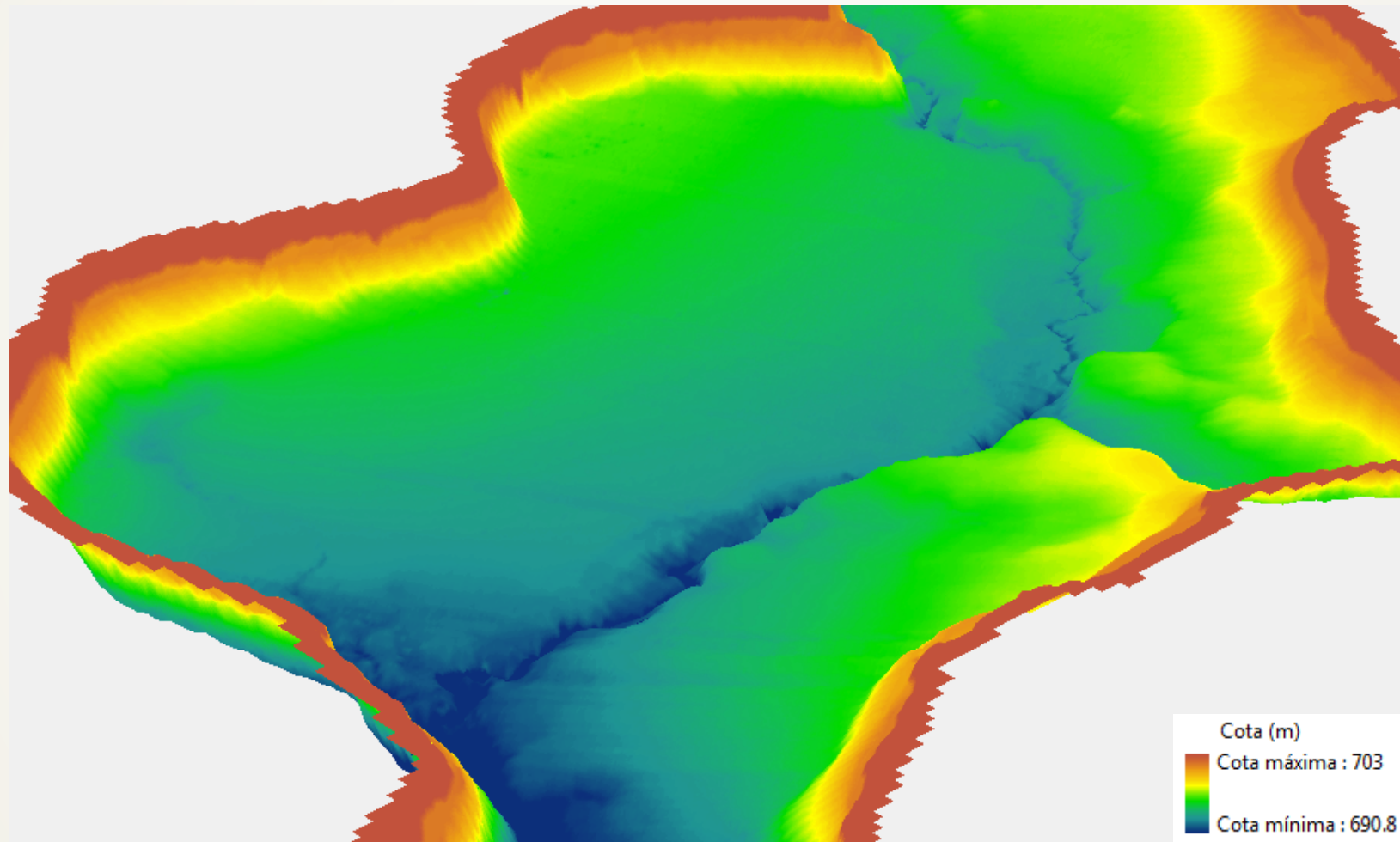


# Planejamento





# Reservatório do Lobo



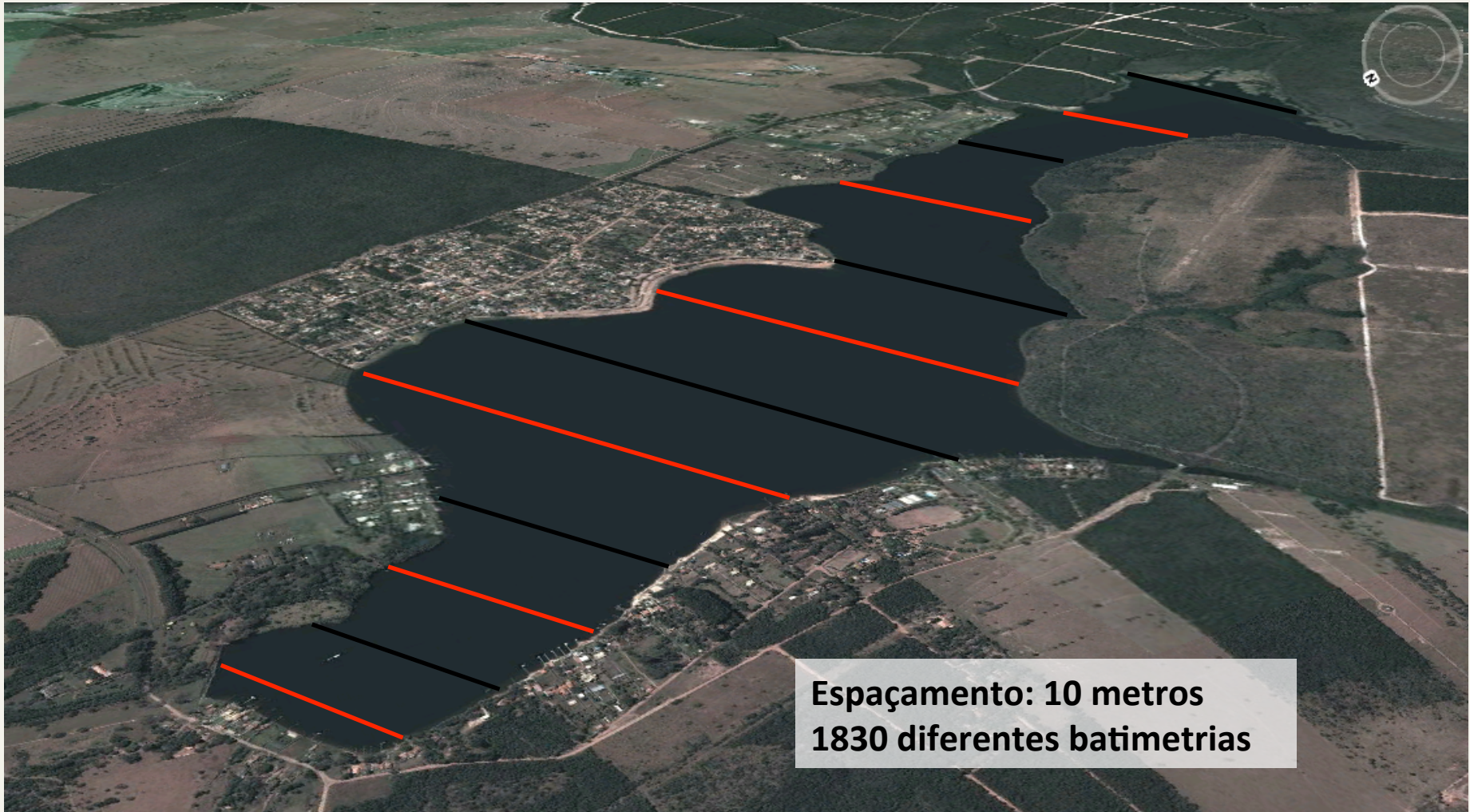


# Reservatório do Lobo



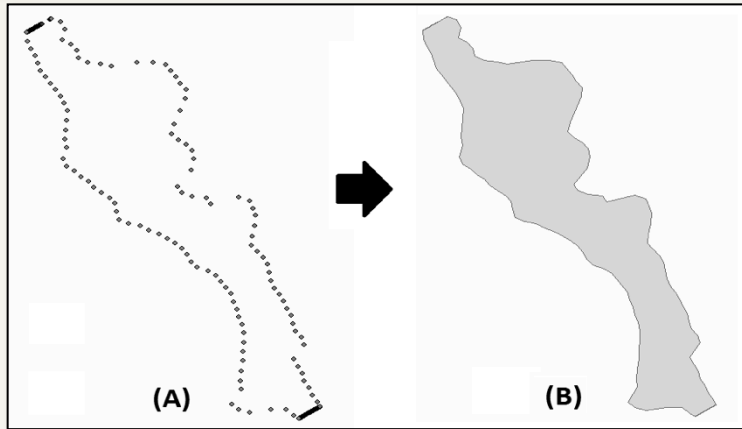


# Reservatório do Lobo

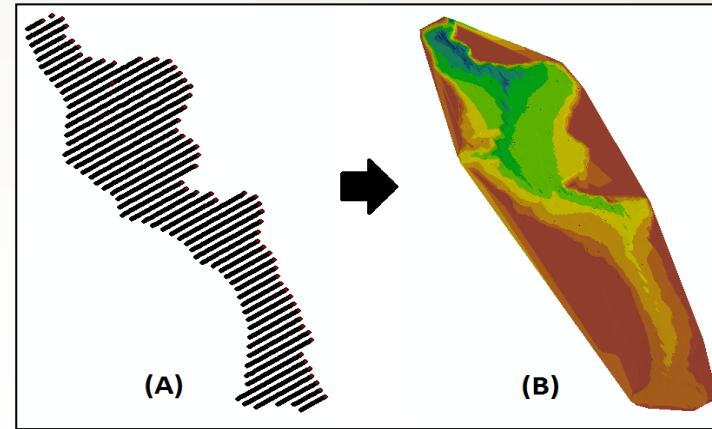




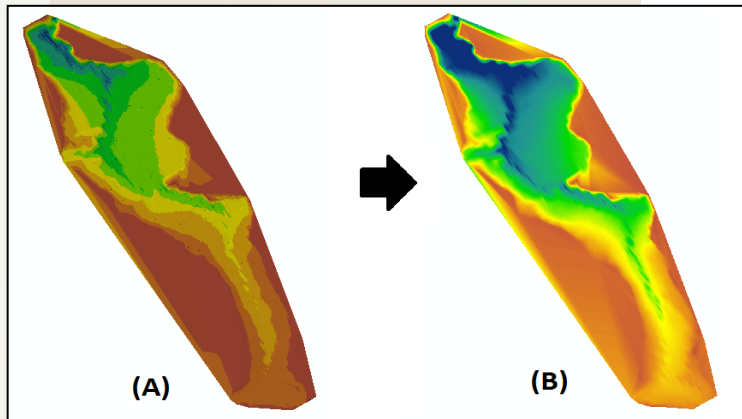
# Método IMP



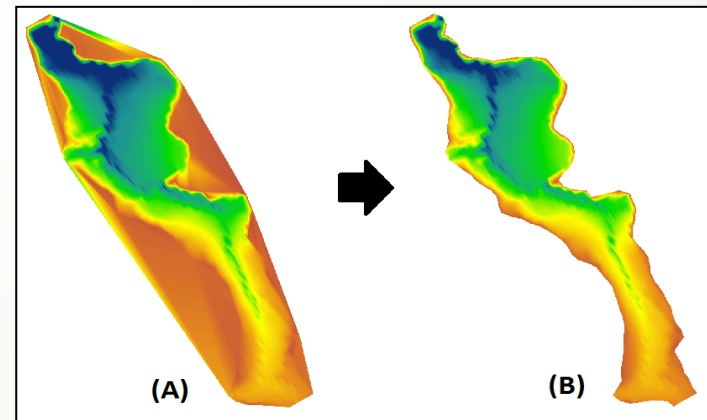
Pontos extremos → Contorno



Batimetria → TIN



TIN → Raster

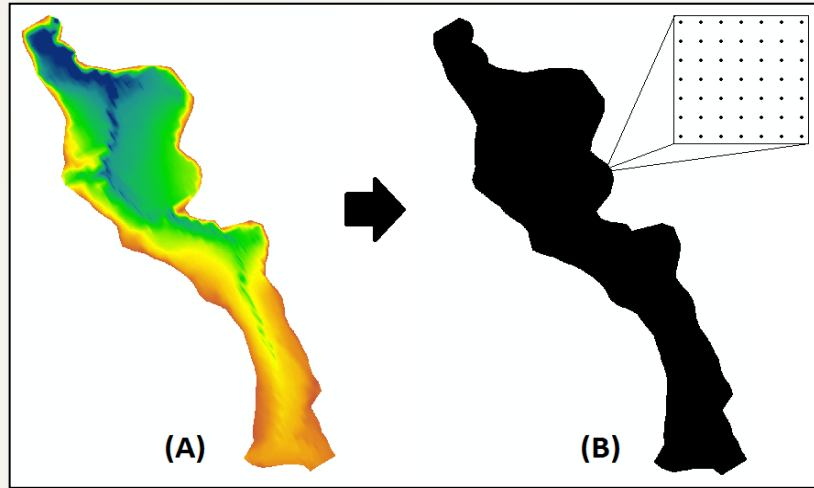


Raster e contorno → Máscara do Raster

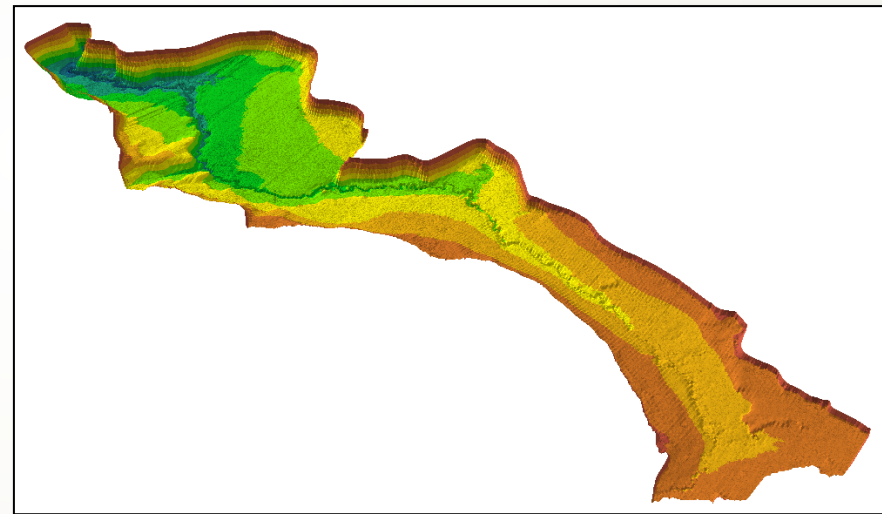




# IMP



Mascara do Raster → Malha de pontos



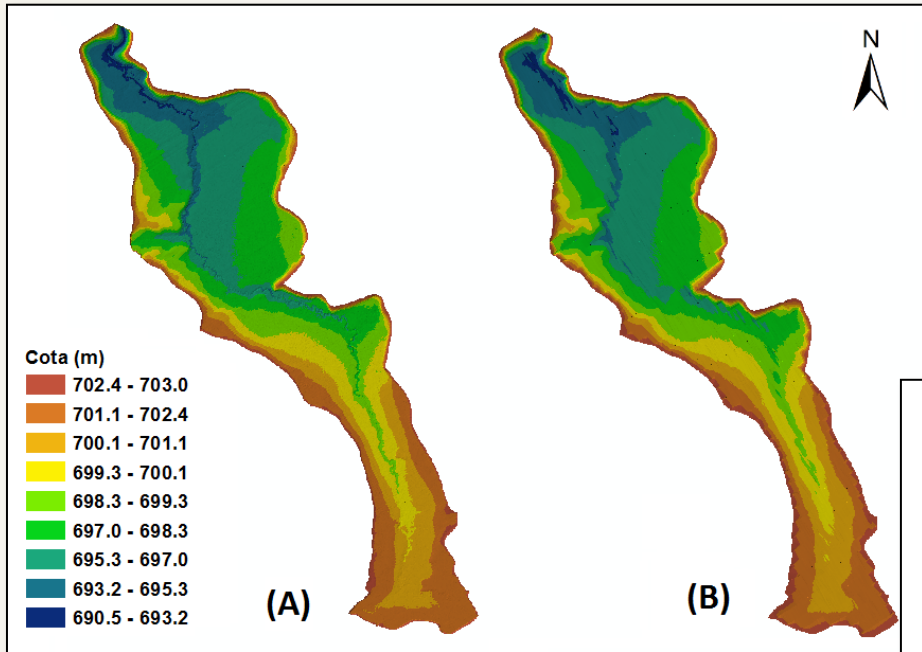
Contorno + Batimetria + Malha → TIN final



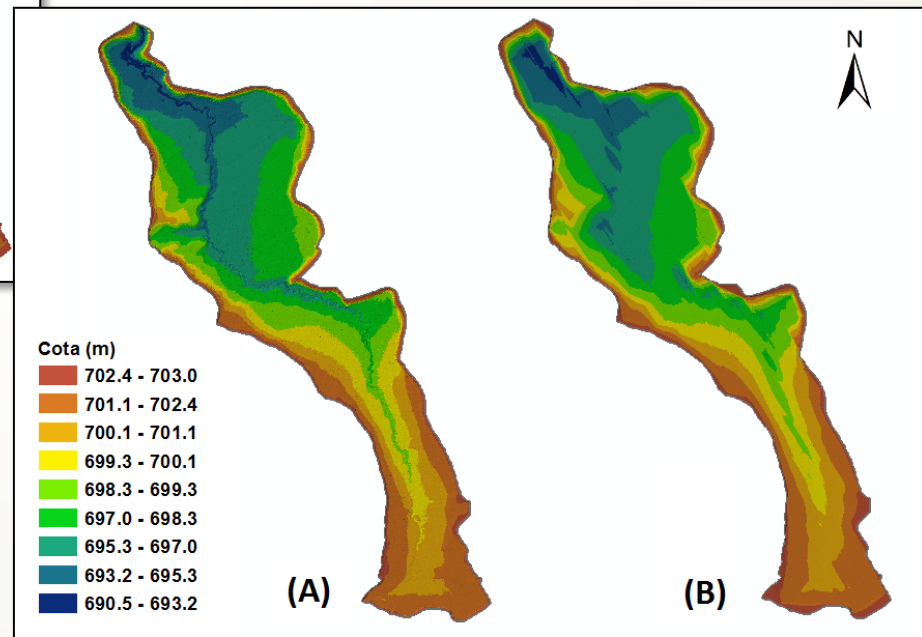
# Resultados



# Reservatório do Lobo



TIN tradicional

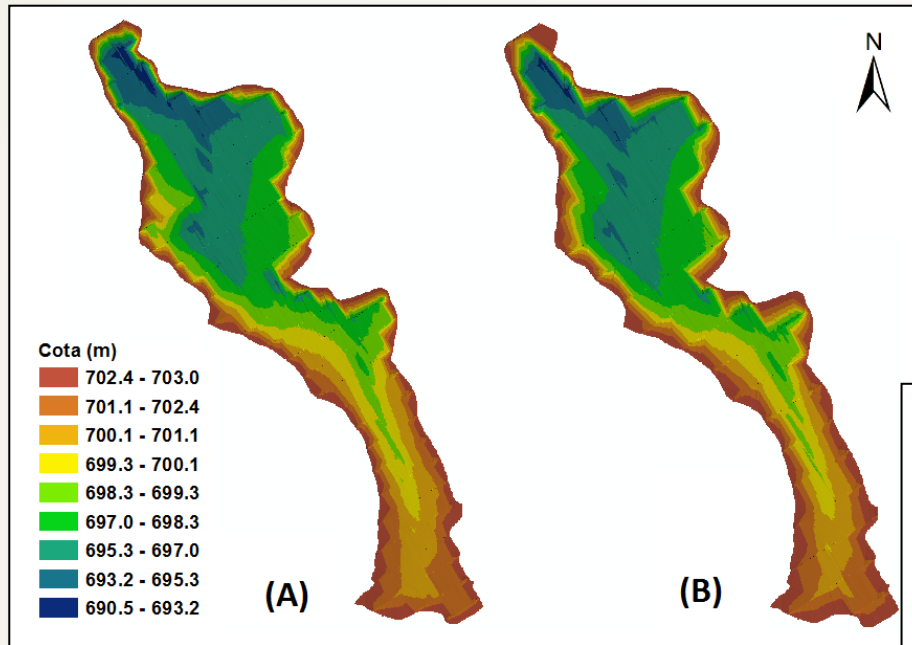


(A) 10m; (B) 100m

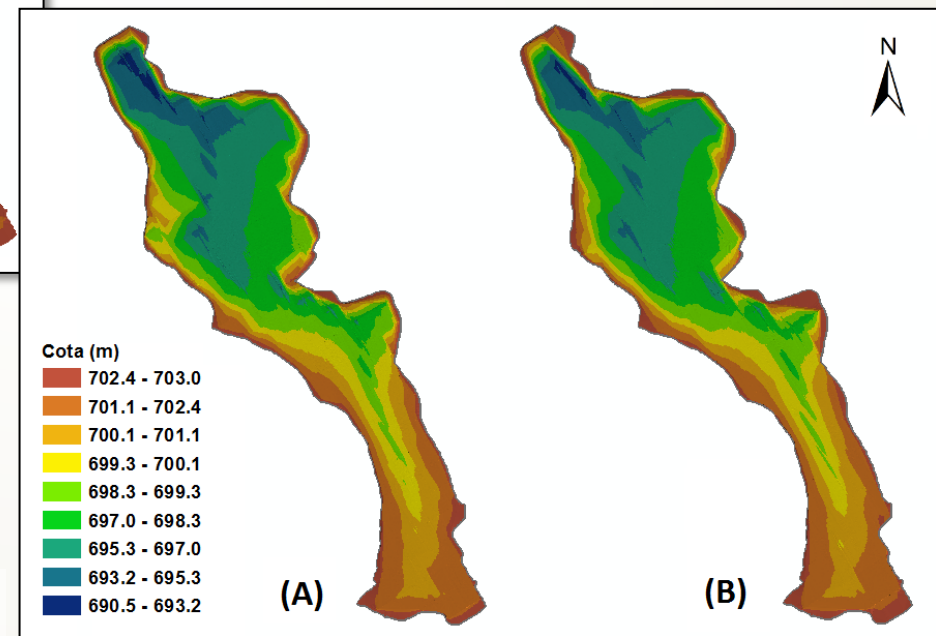
IMP



# Reservatório do Lobo



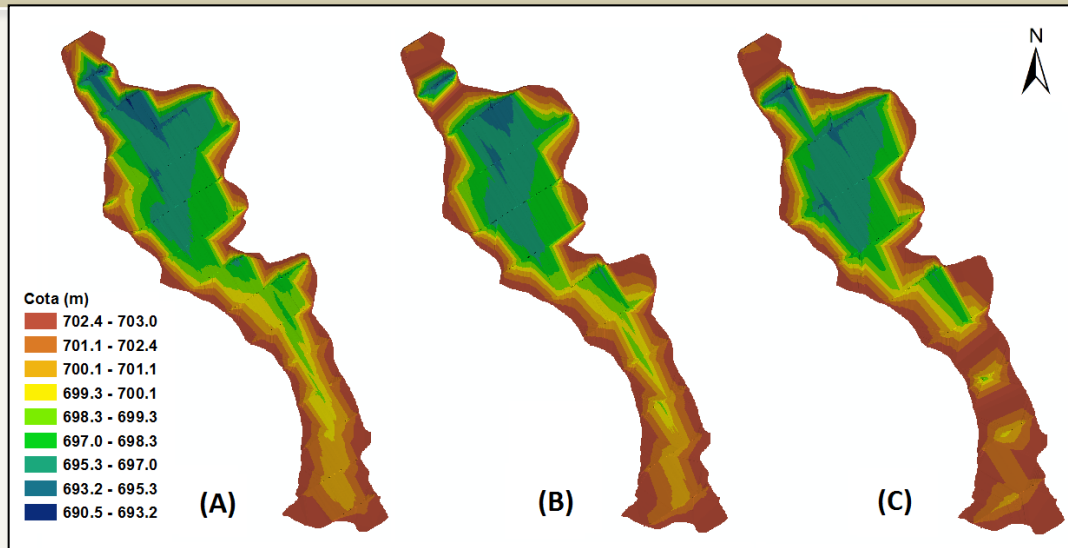
TIN tradicional



(A) 200m; (B) 300m

IMP

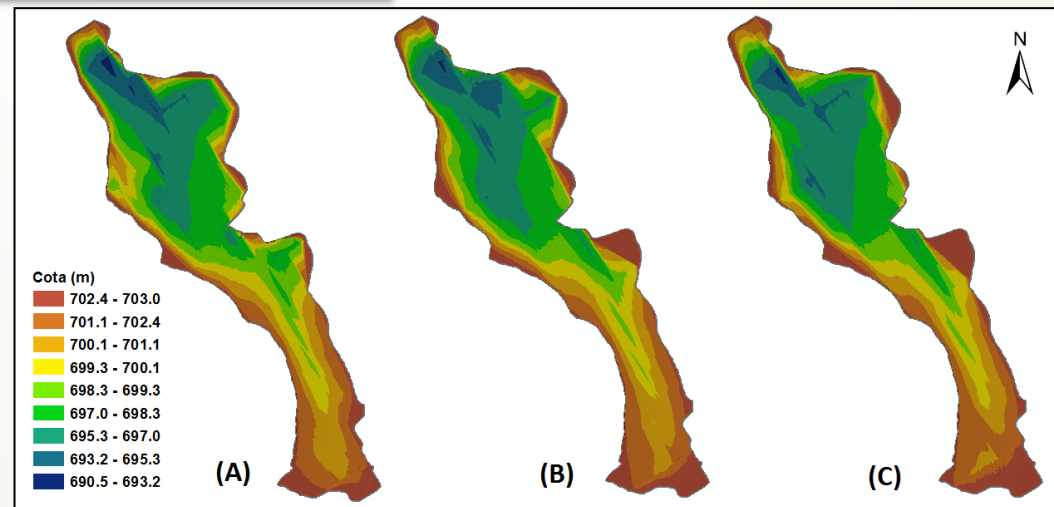
# Reservatório do Lobo



TIN tradicional

(A) 400m; (B) 500m ; (C)  
600m

IMP

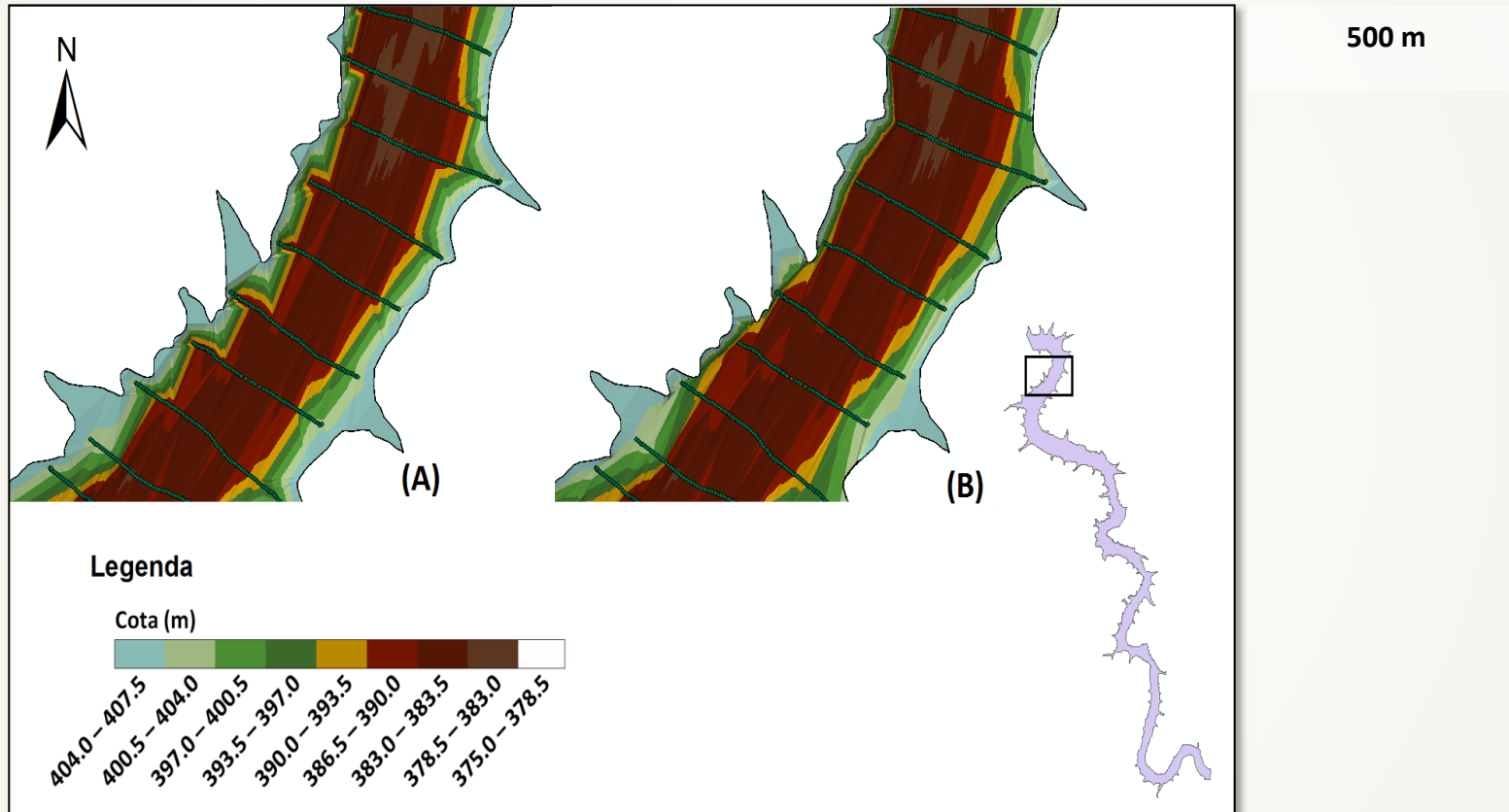


# Reservatório do Lobo

Reservatório- Distanciamento-Caso	Método TIN tradicional		Método IMP	
	Volume (m <sup>3</sup> x10 <sup>6</sup> )	Variação Volume (%)	Volume (m <sup>3</sup> x10 <sup>6</sup> )	Variação Volume (%)
Broa-10	21,43	-	21,43	-
Broa-100-1	20,86	2,64%	21,20	1,06%
Broa-200-1	19,64	8,35%	20,63	3,72%
Broa-300-1	18,29	14,62%	19,98	6,75%
Broa-400-1	16,83	21,47%	19,78	7,71%
Broa-500-1	14,85	30,72%	19,14	10,68%
Broa-600-1	13,85	35,38%	18,94	11,64%



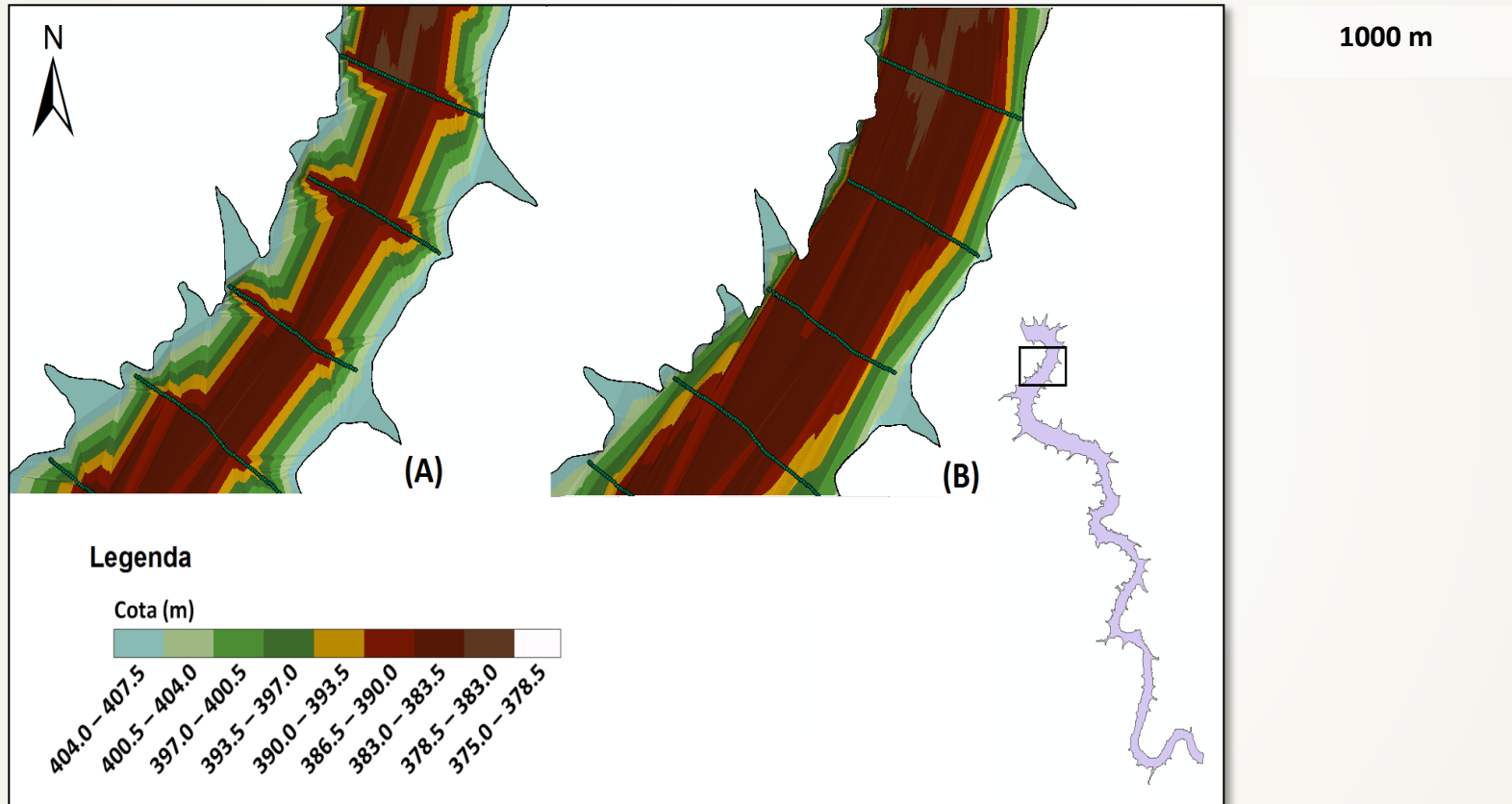
# Reservatório de Ibitinga/SP



(A) TIN trad.; (B) IMP



# Reservatório de Ibitinga/SP

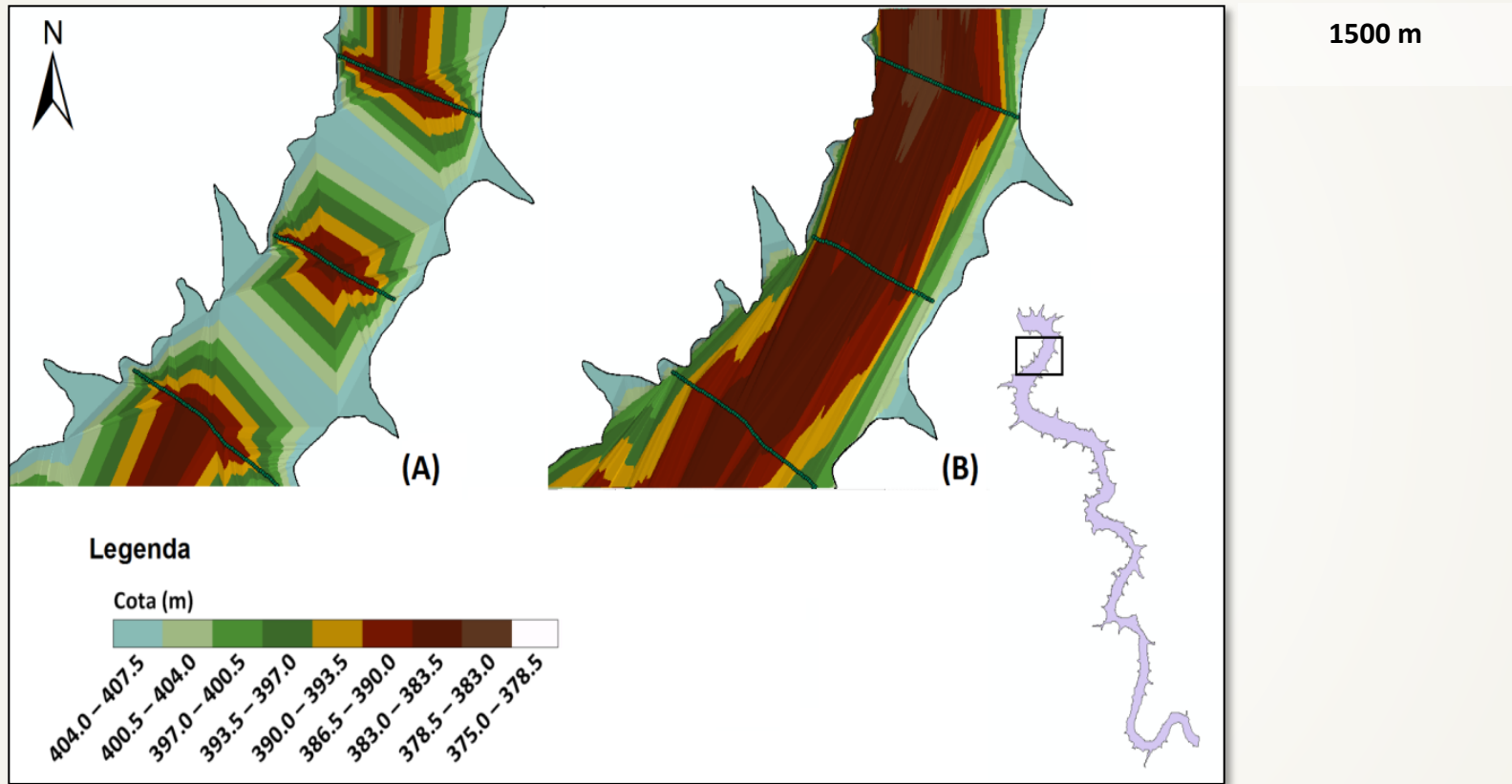


(A) TIN trad.; (B) IMP





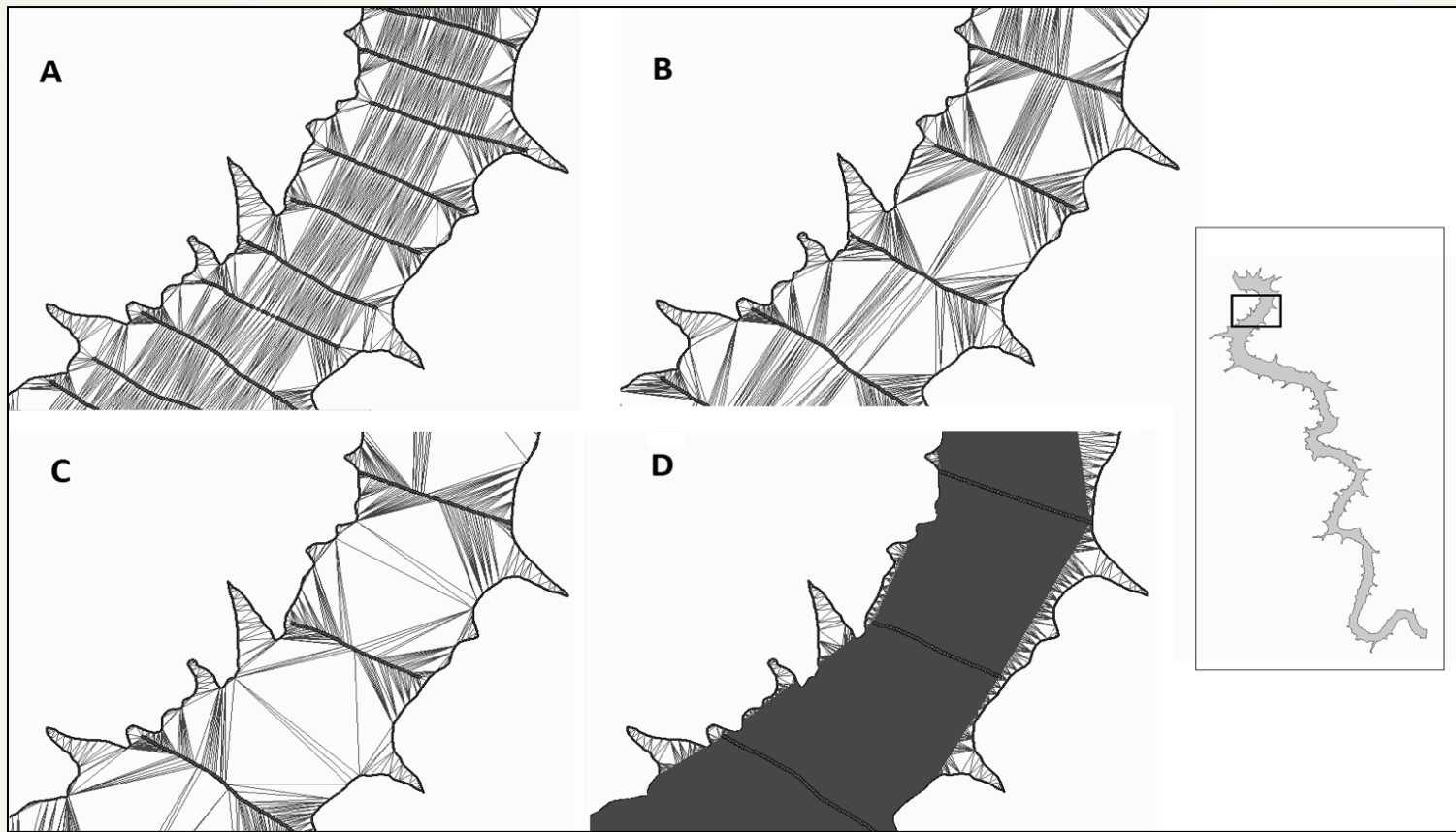
# Reservatório de Ibitinga/SP



(A) TIN trad.; (B) IMP

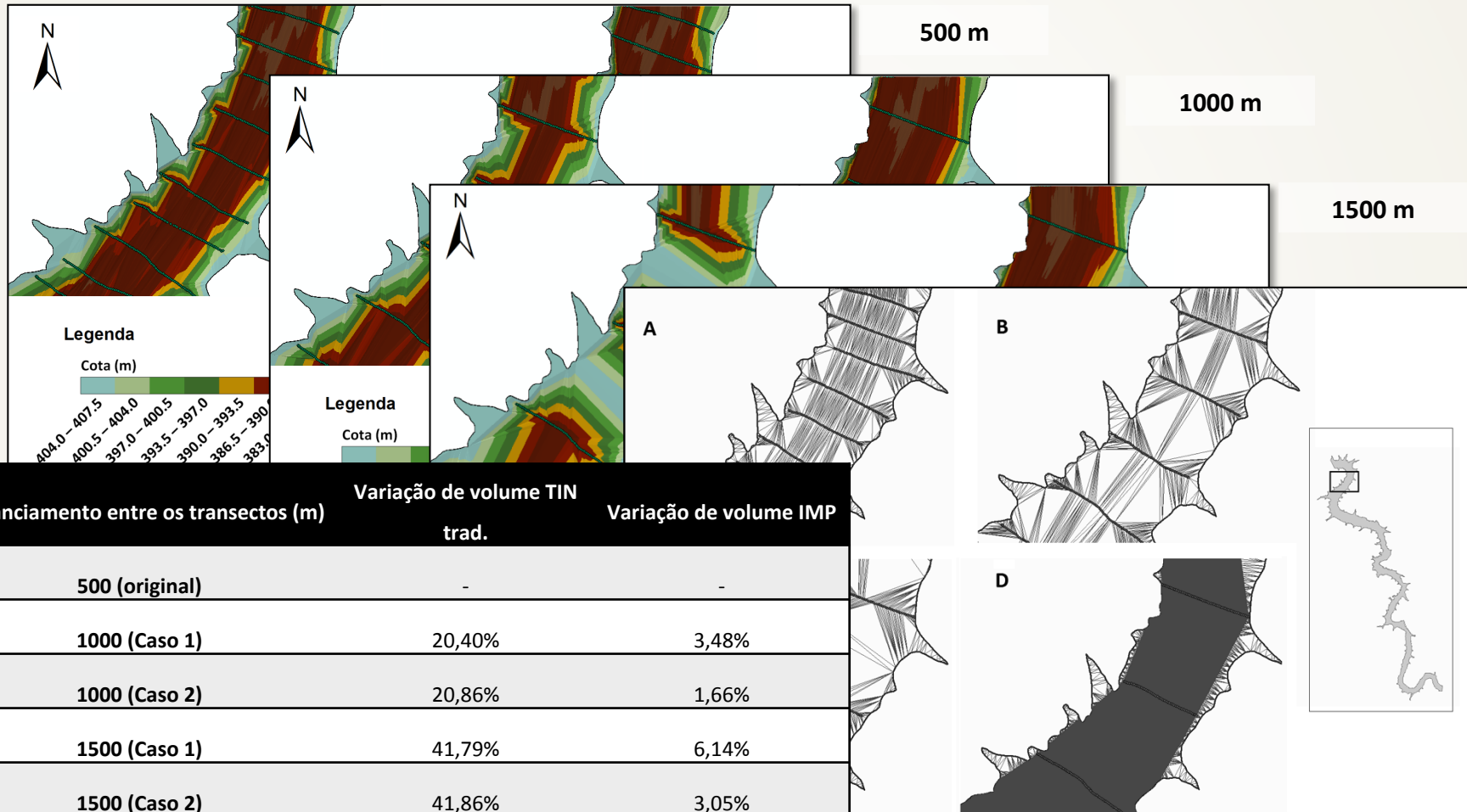


# Reservatório de Ibitinga/SP



(A) TIN trad. 500m.; (B) TIN trad. 1000m ; (C) TIN trad. 1500; (D) IMP 1500m.

# Reservatório de Ibitinga/SP





# Conclusões

- **Método IMP**
  - Resultados melhores que o TIN tradicional.

# Obrigado!

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