

# Residential population estimation using a remote sensing derived impervious surface approach

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População Espaço e Ambiente – SER -347

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## Contextualização

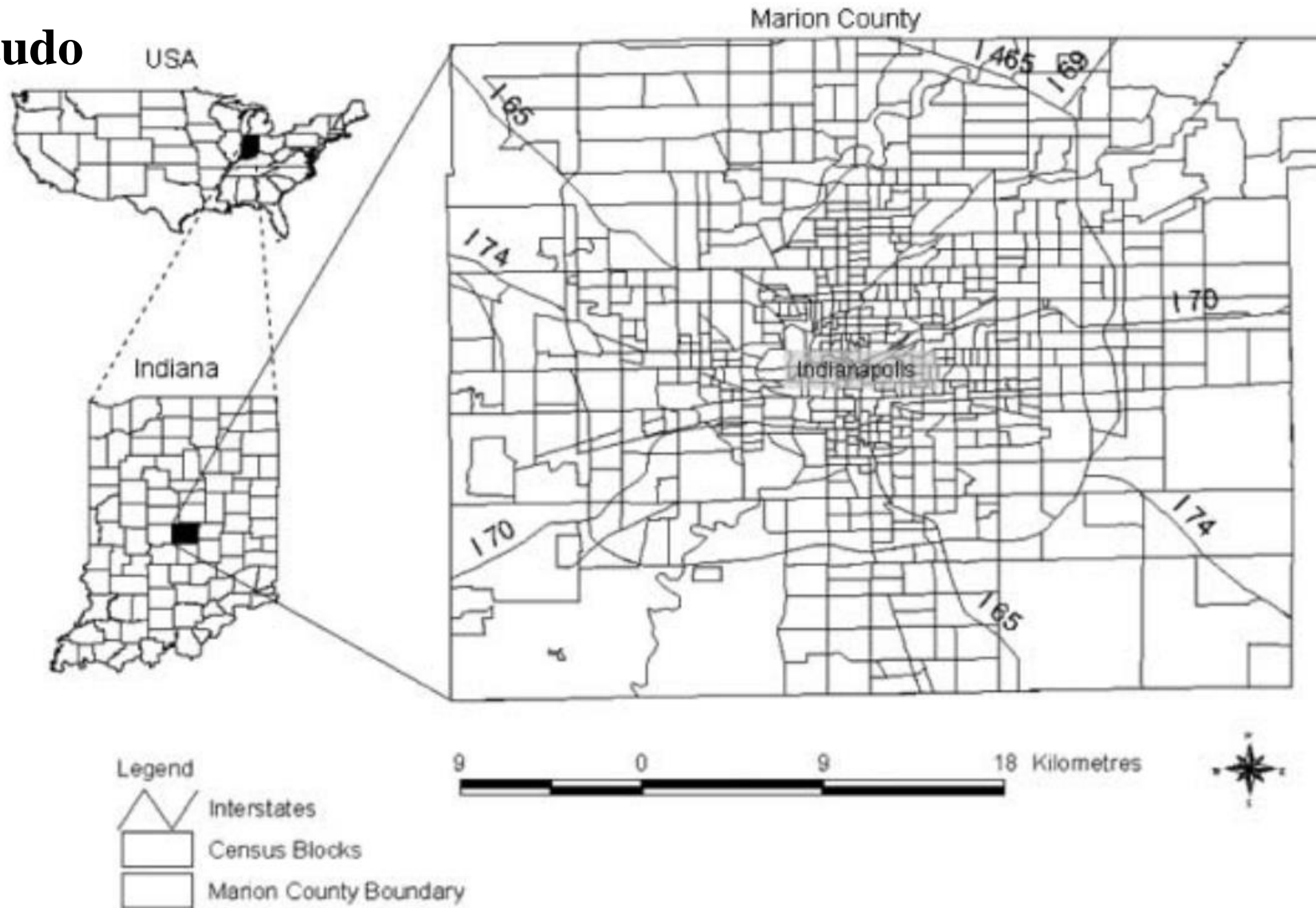
- Dados demográficos necessários para desenvolvimento de políticas públicas;
- Planejamento Urbano;
- Ausência de dados censitários anuais.

## Objetivo

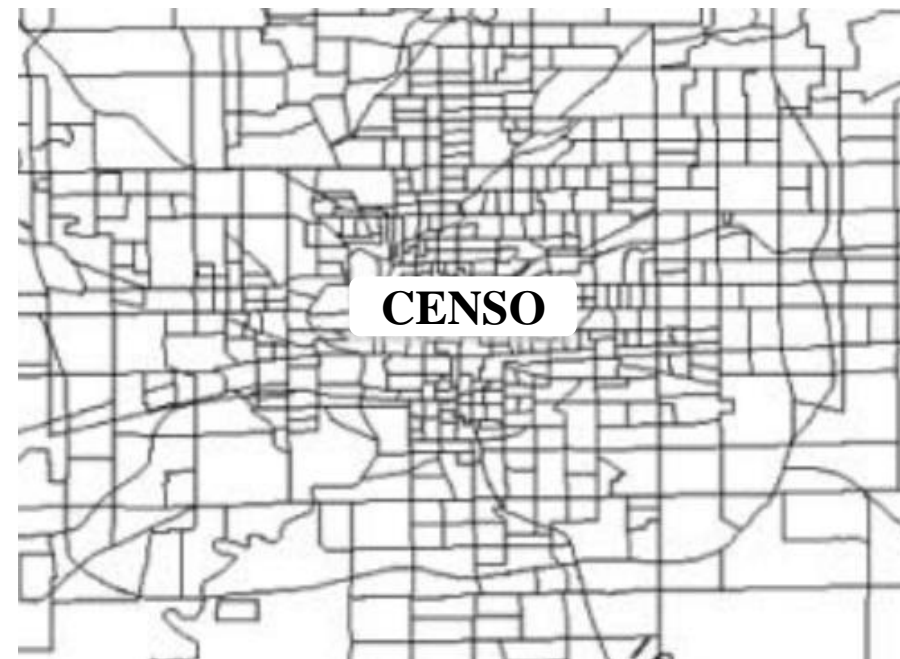
Este estudo teve como objetivo estimar a população residencial no condado de Marion, Indiana, EUA, usando um método de superfície impermeável derivada de sensoriamento remoto, e comparar a sua eficácia com a da abordagem baseada em classe residencial.

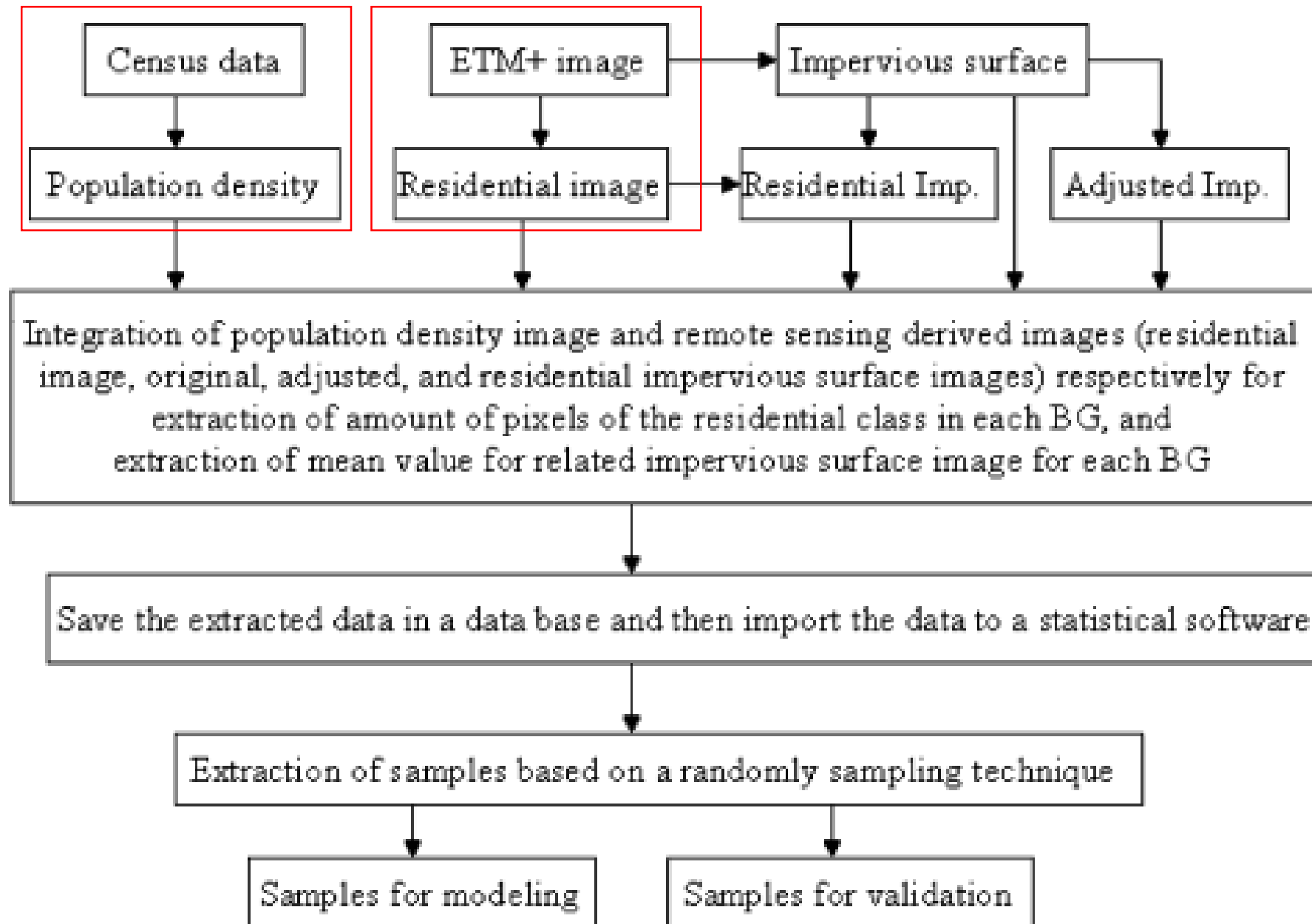


# Área de estudo

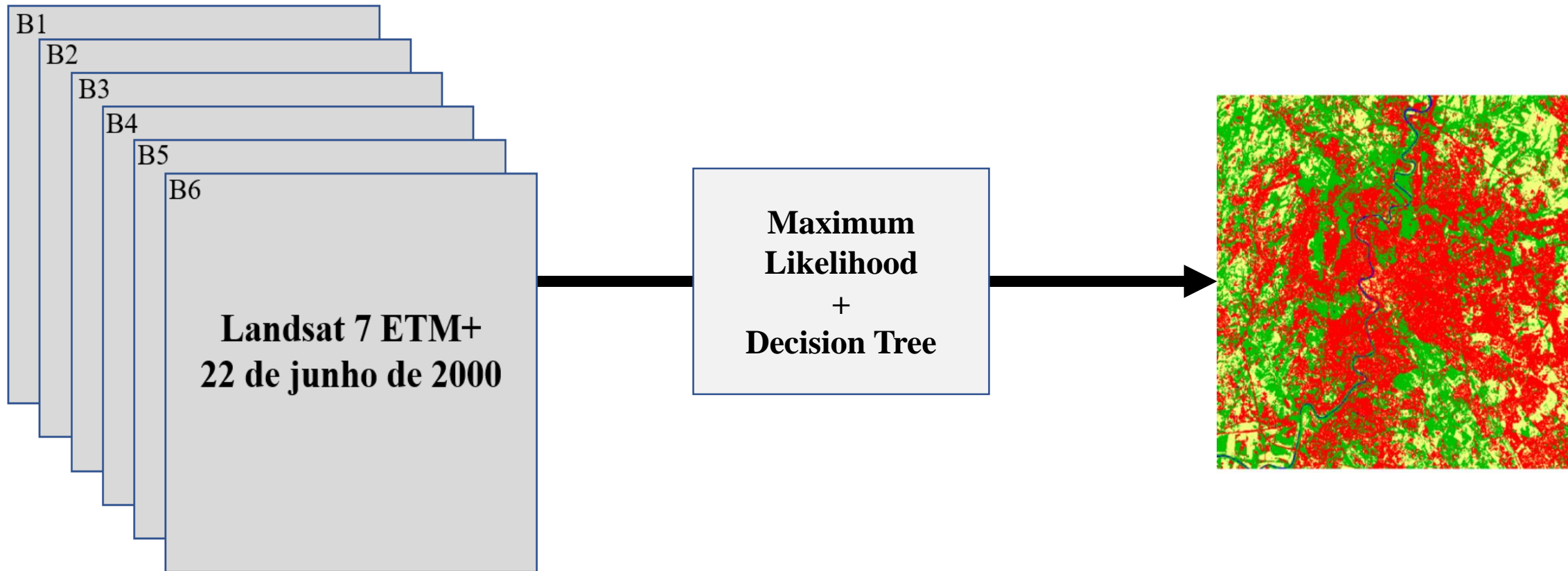


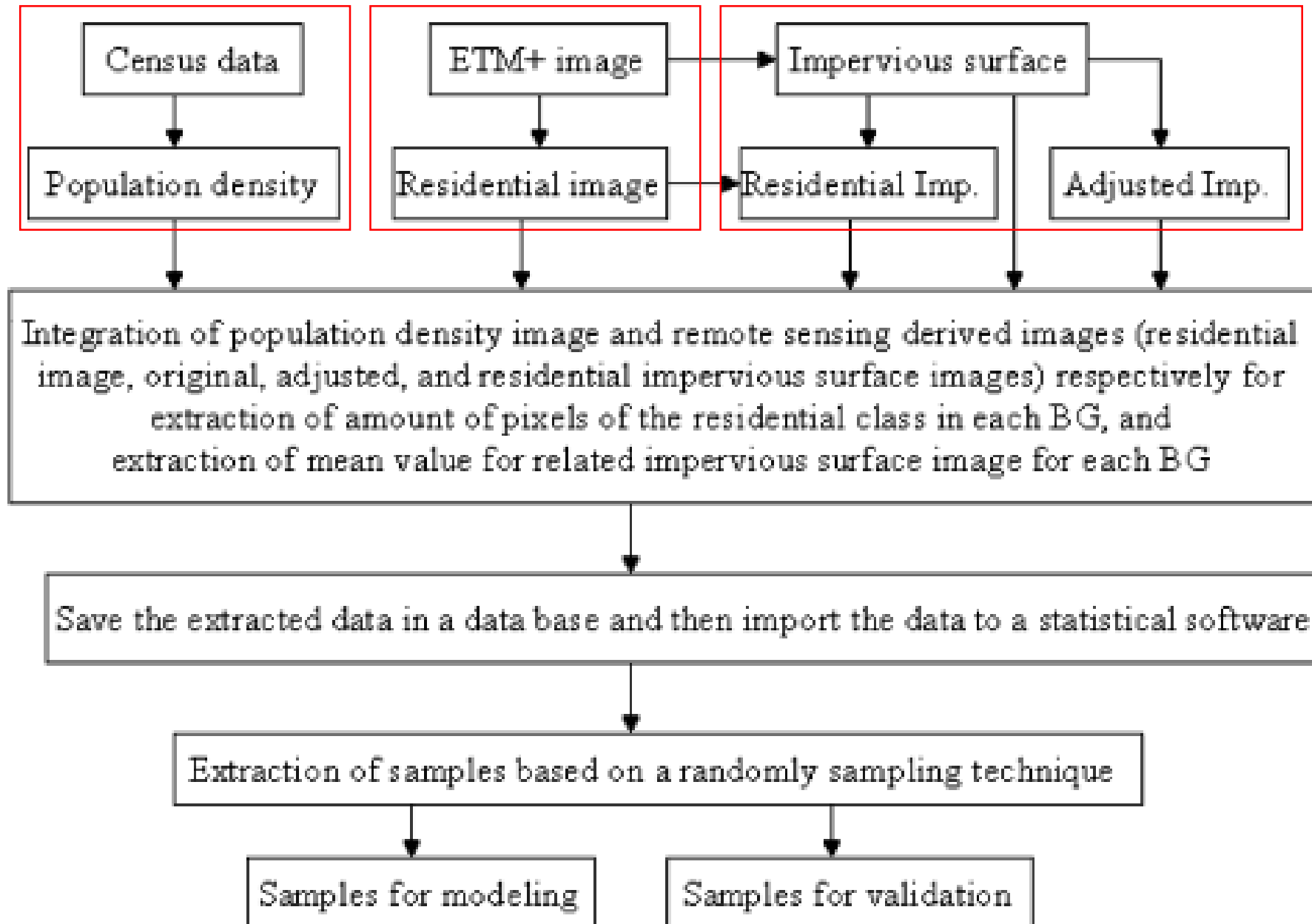
# Dados



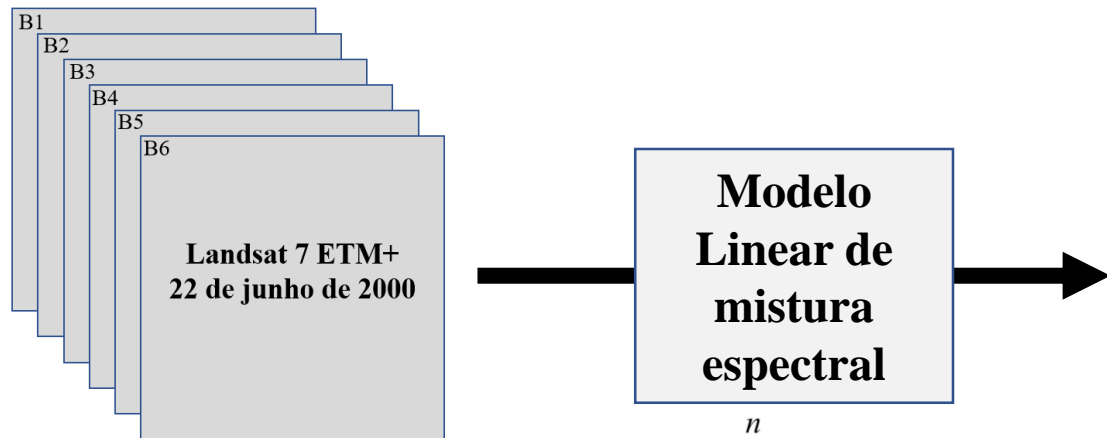


# Classificação – Áreas residenciais

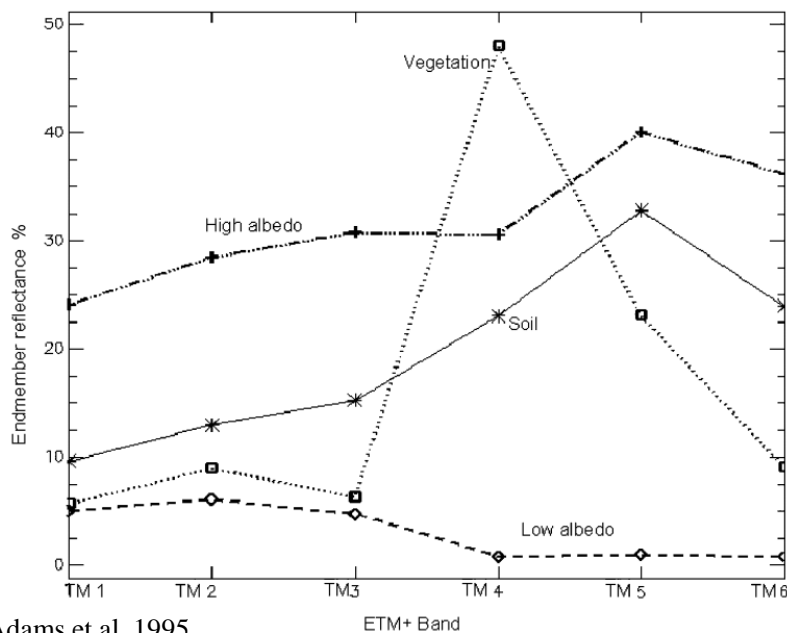




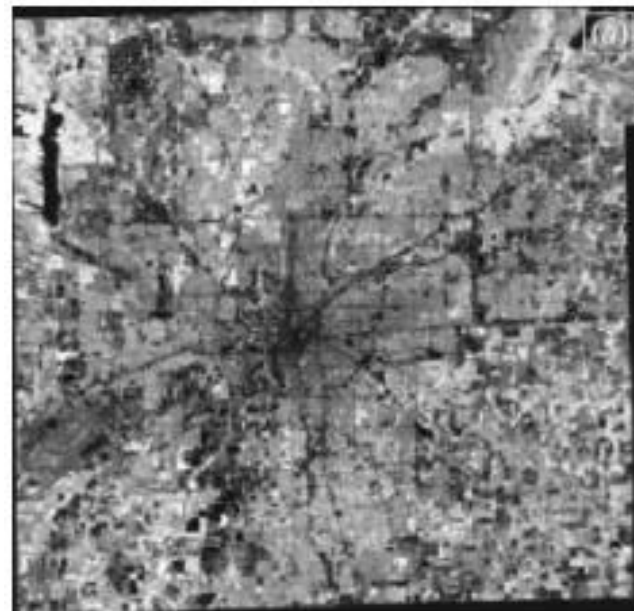
# Classificação – Superfícies impermeáveis



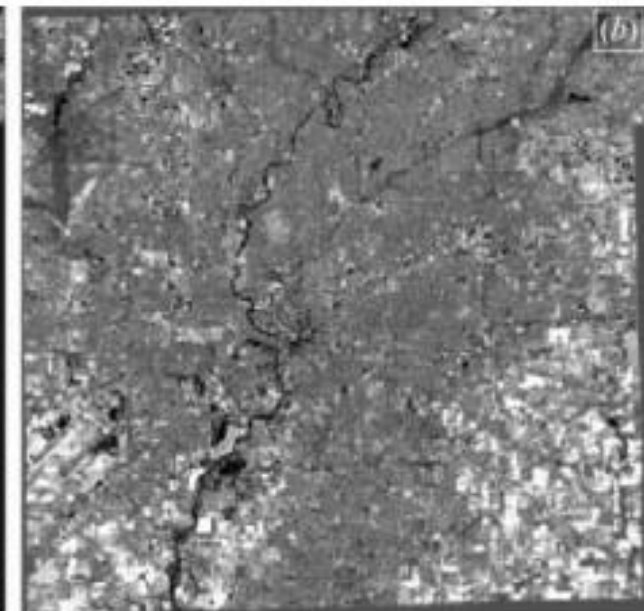
$$R_{il} = \sum_{k=1}^n f_{kl} R_{ik} + \varepsilon_{il}$$



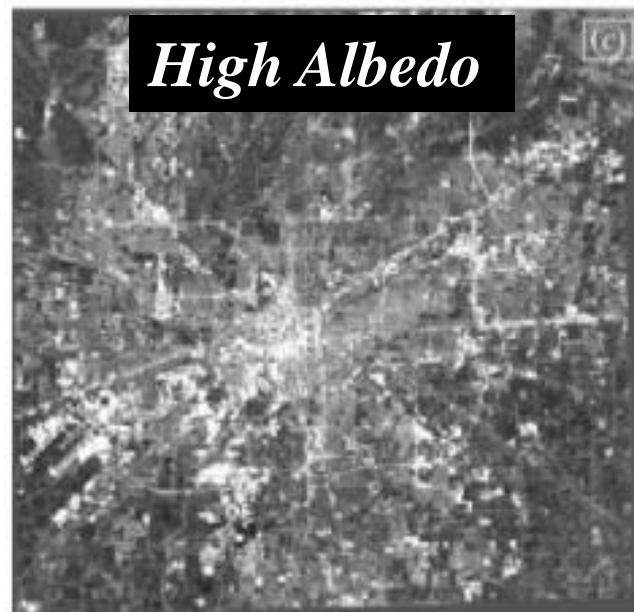
## Vegetação



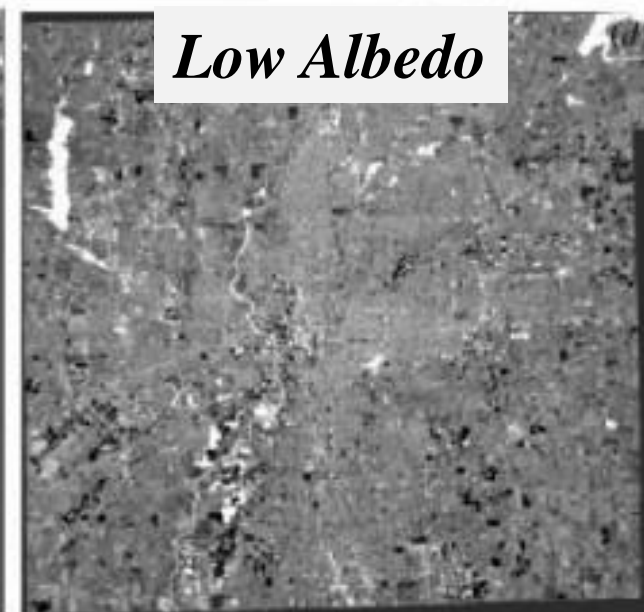
## Solo



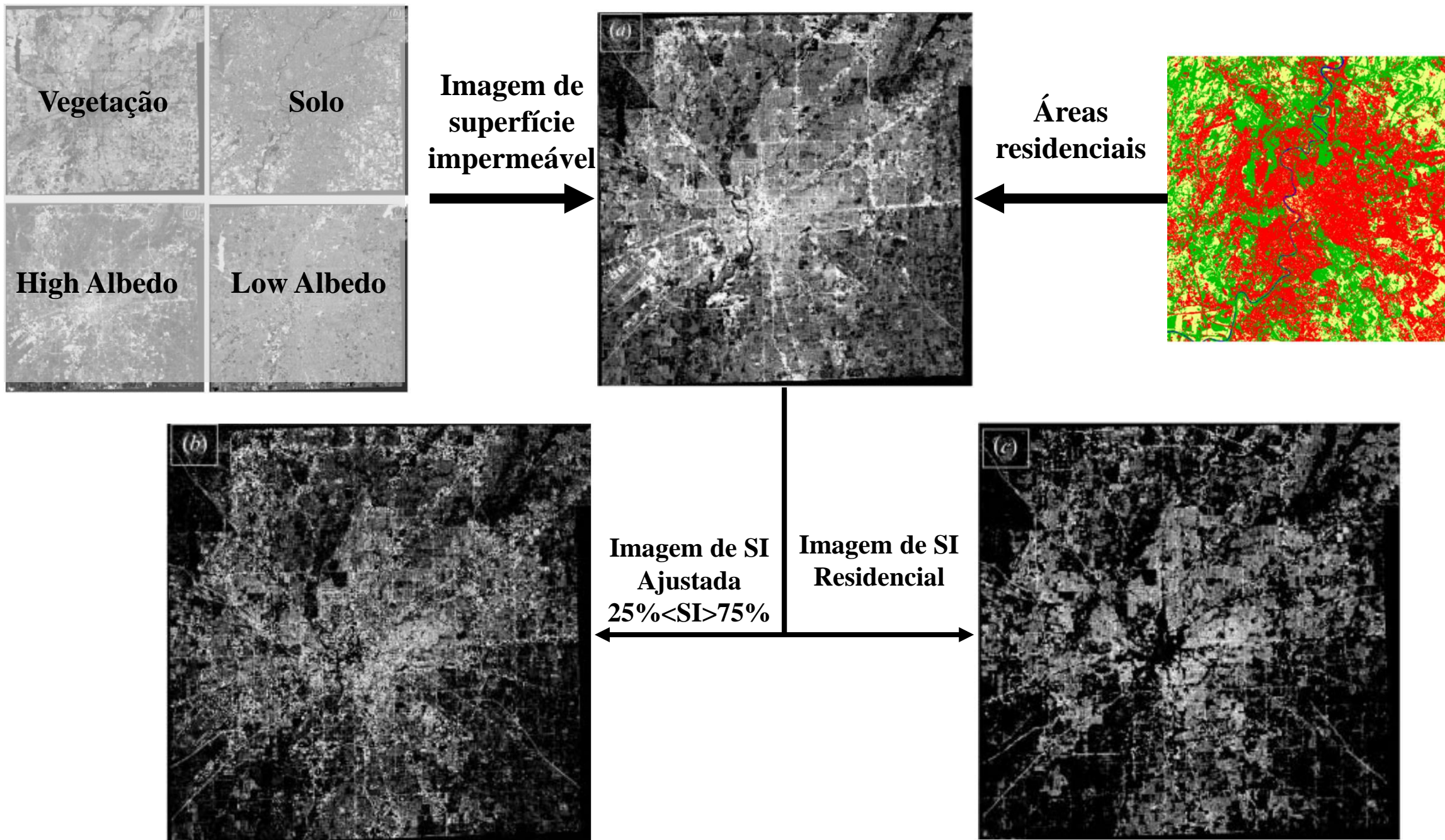
## High Albedo

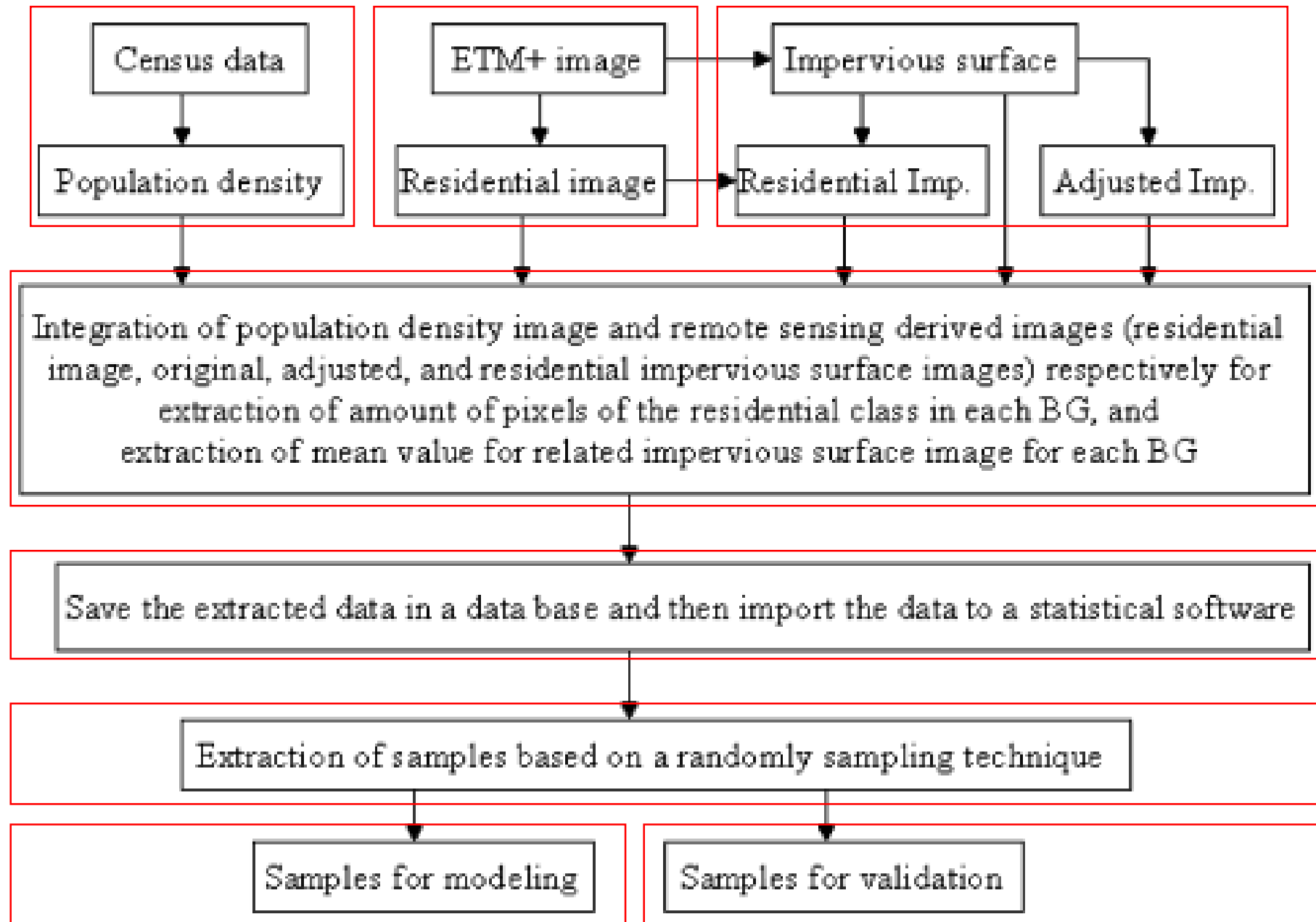


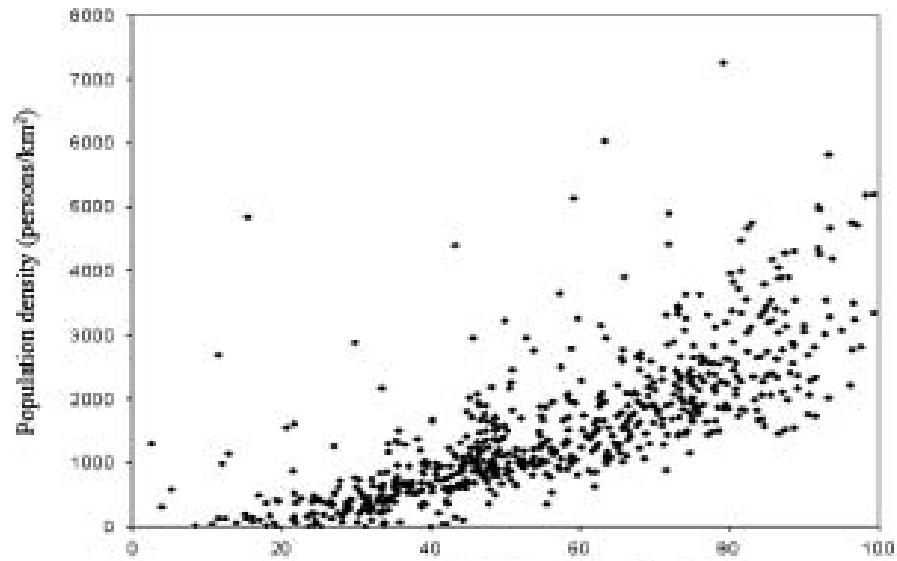
## Low Albedo



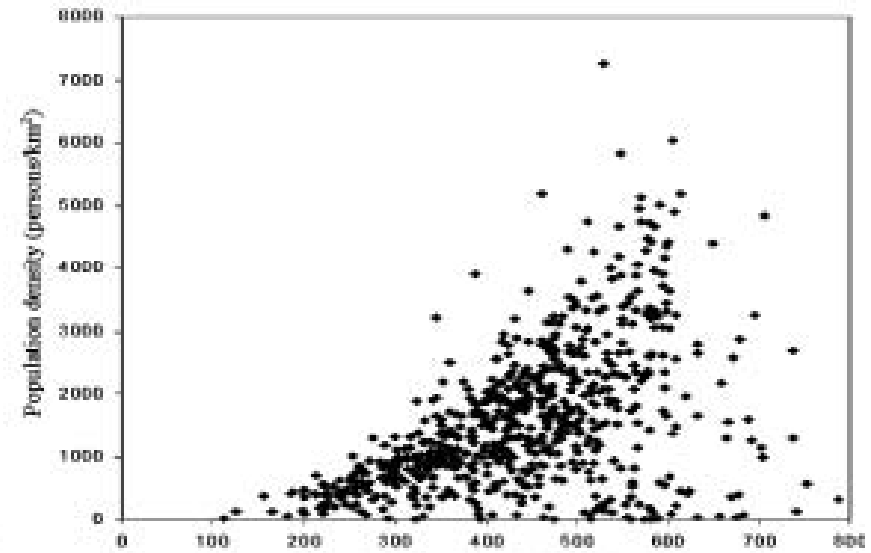




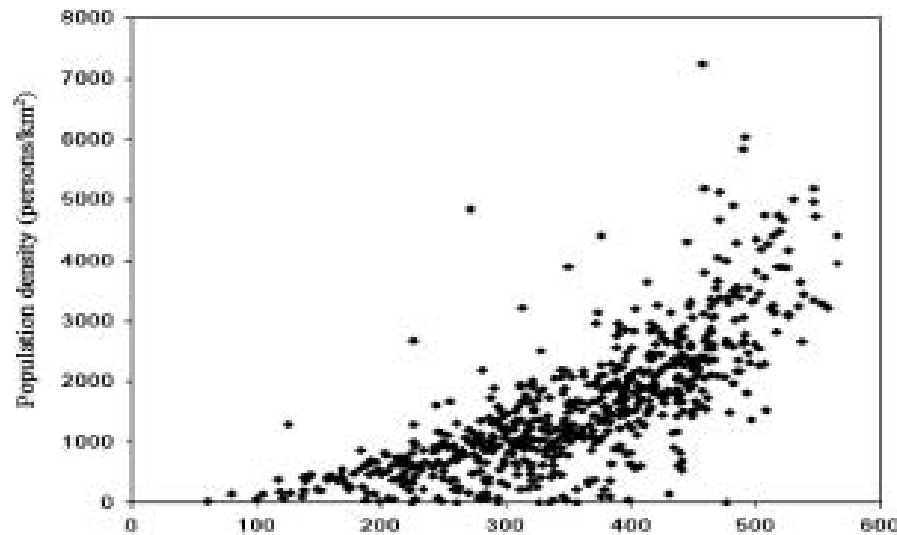




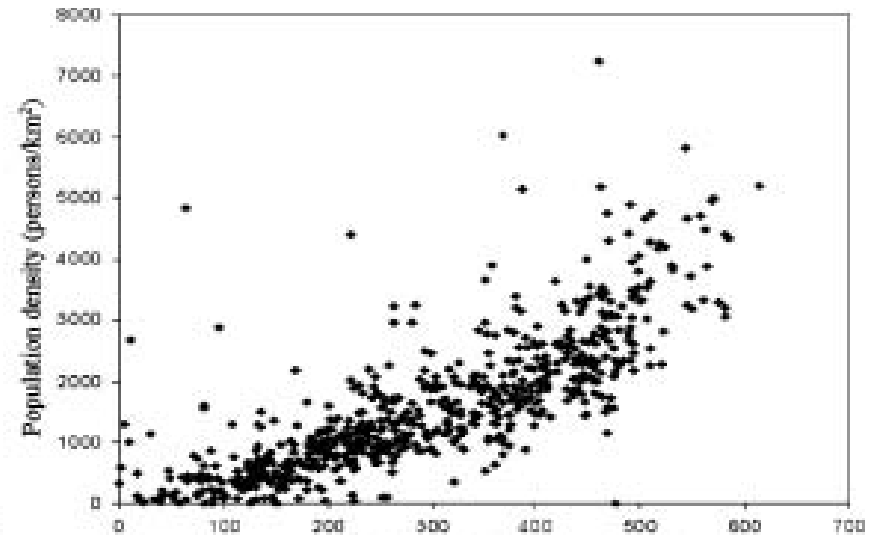
Percentual de área residencial no BG  
(a)



Superfície impermeável (x1000)  
(b)

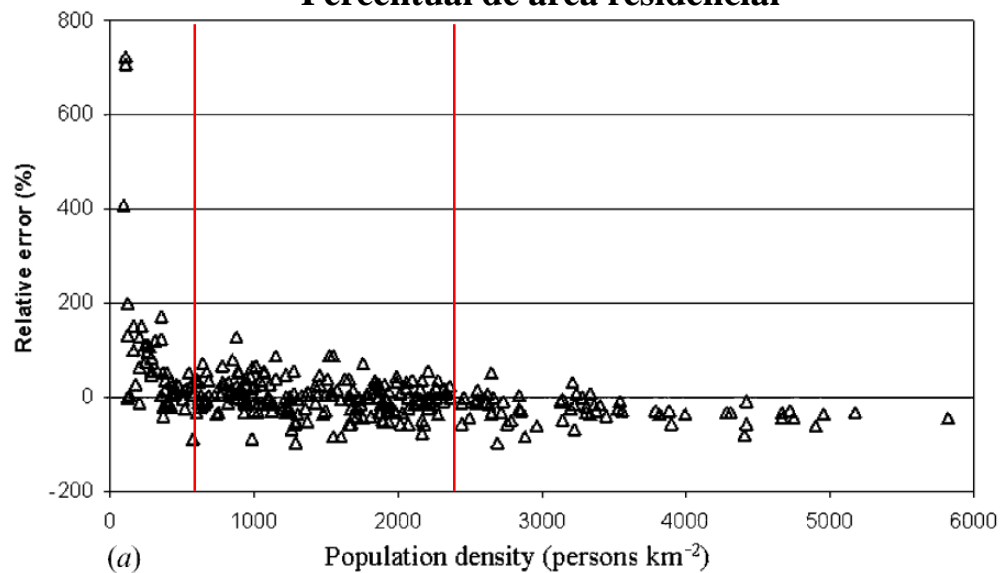


Superfície impermeável ajustada (x1000)  
(c)

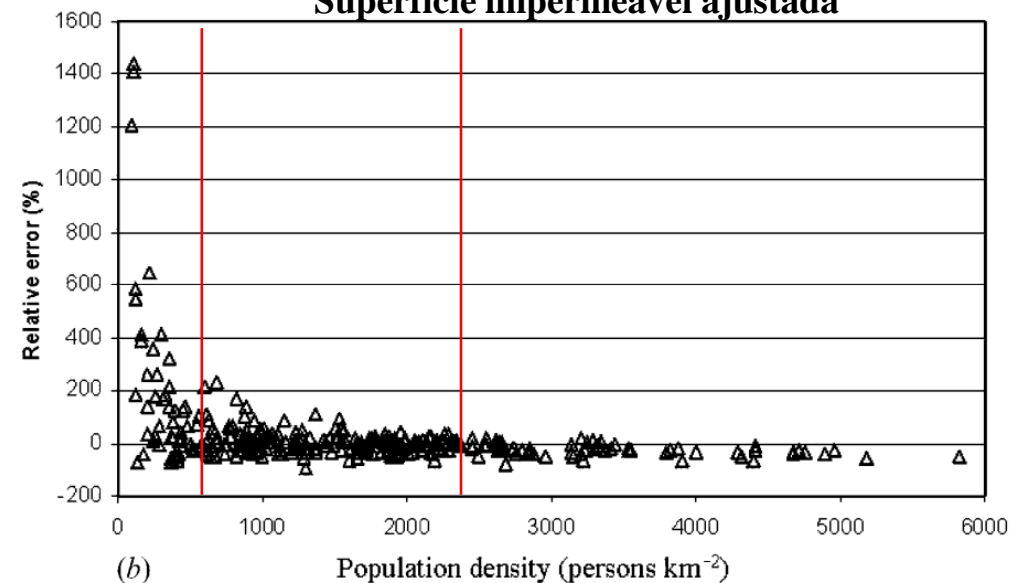


Superfície impermeável residencial (x1000)  
(d)

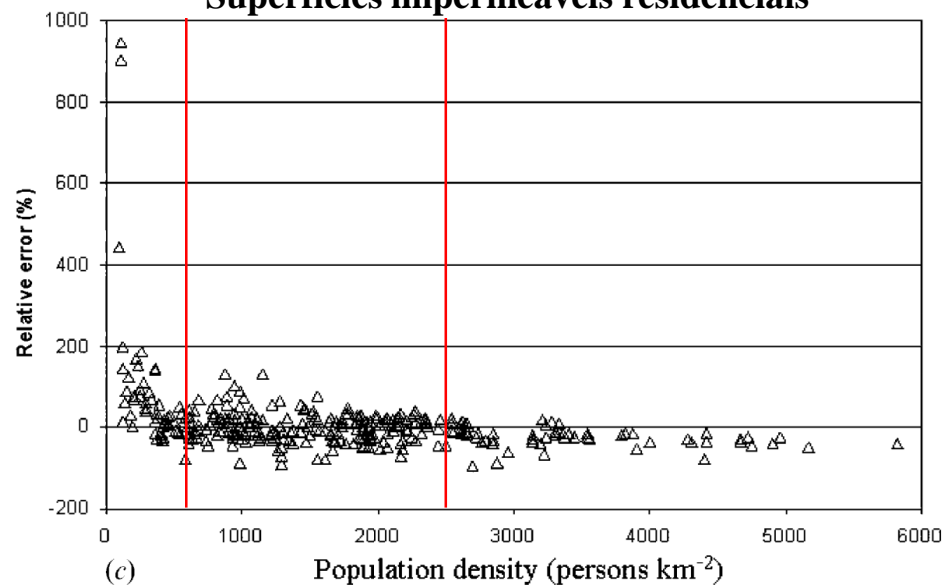
Percentual de área residencial



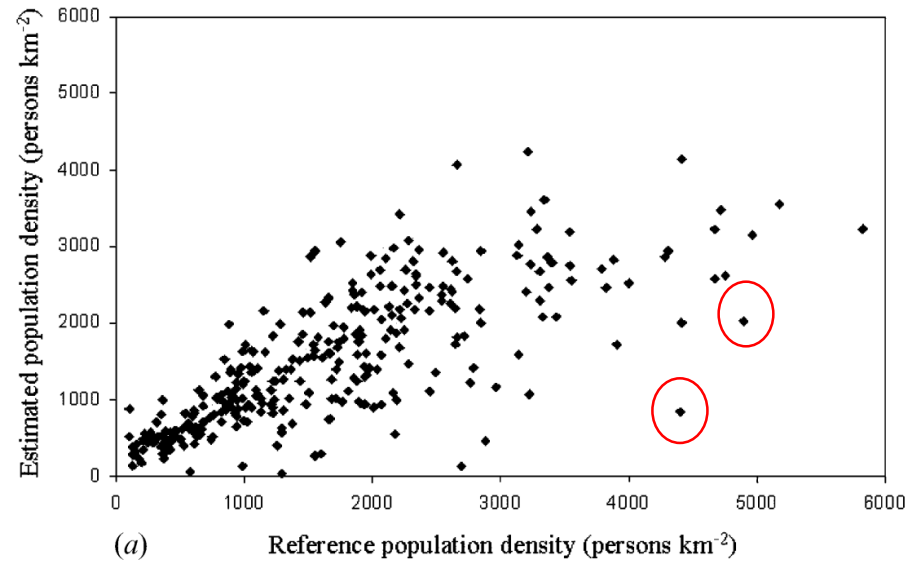
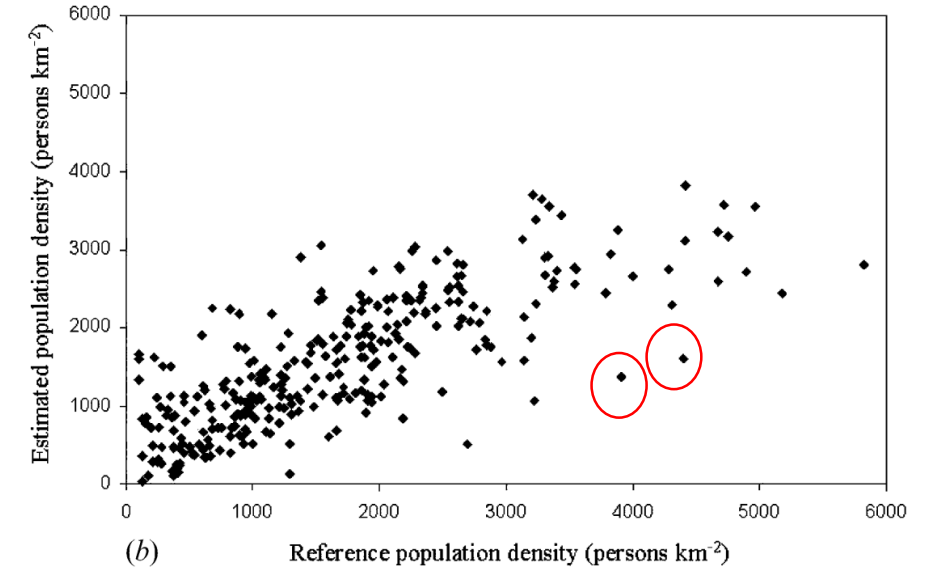
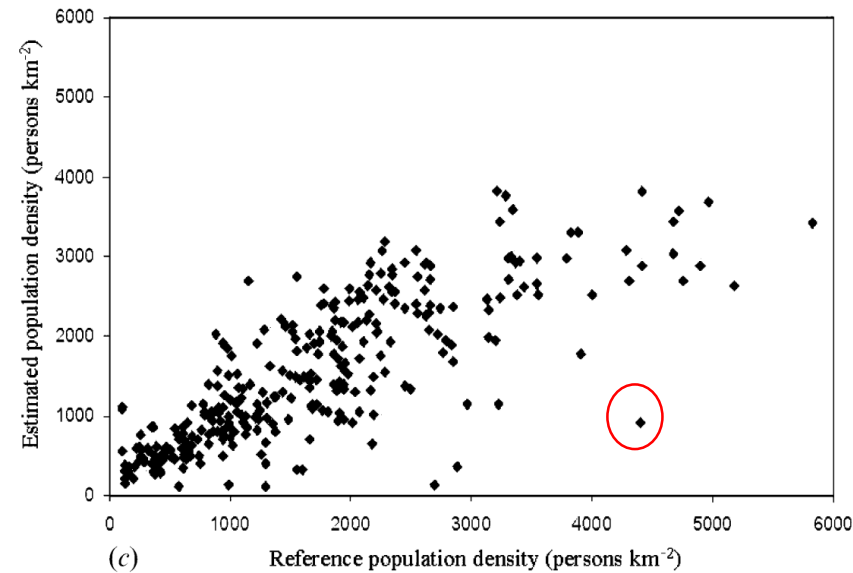
Superfície impermeável ajustada



Superfícies impermeáveis residenciais



Method	Independent variable	Regression model	$R^2$	MRE	MdRE	Error
Resid	Resid_P	$\text{Sqrt\_PD}=4.865+0.557 \times \text{Resid\_P}$	0.776	39.16	26.25	-1.97
Imp_surf	adjIMP	$\text{Sqrt\_PD}=-3.201+0.115 \times \text{adjIMP}$	0.782	58.89	24.49	1.87
Resid_Imp	Resid_IMP	$\text{Sqrt\_PD}=10.674+0.088 \times \text{Resid\_IMP}$	0.821	38.04	23.13	-0.97

**Percentual de área residencial****Superfície impermeável ajustada****Superfícies impermeáveis residenciais**

# Conclusão

- Principal vantagem das SI é a estabilidade, não é alterada por fatores exógenos;
- Modelo de SI residenciais obteve melhores estimativas;
- Modelo superestima áreas com densidades baixas ( $<500$  hab/km<sup>2</sup>);
- Subestima áreas com altas densidades ( $>2500$  hab/km<sup>2</sup>);
- Não funciona em áreas habitacionais verticalizadas.

## Que pena

- Discussão misturada com a conclusão;
- Conclusão demasiadamente longa com muitas referências;
- Não explorou outros tipos de modelagens.

## Que bom

- MLME eficiente na classificação de áreas impermeabilizadas;
- Resultados da modelagem satisfatórios.

## Que tal?

- Utilização de imagens de alta resolução espacial;
- Utilizar LiDAR para estimar a população em áreas verticalizadas;
- Utilizar o volume populacional como variável dependente;
- Testar outros tipos de modelos (GWR).



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**APPLICATIONS PAPER**

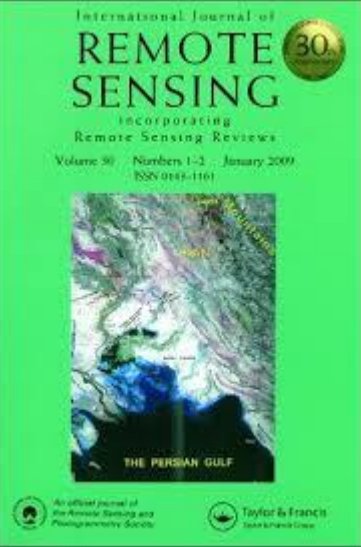
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