Projeto com o Joint Research Centre
Diálogos Setoriais

Thales Sehn Körting

Background

- Paper “On the feasibility to map the settlements of Brazil with the CBERS-2B satellite”, Kemper, T., Blaes, X., Ehrlich, D., Haag, F., Pesaresi, M.
- Proceedings of the JURSE 2013, April 21-23, 2013 – São Paulo, Brazil

Mapeamento de Human Settlements

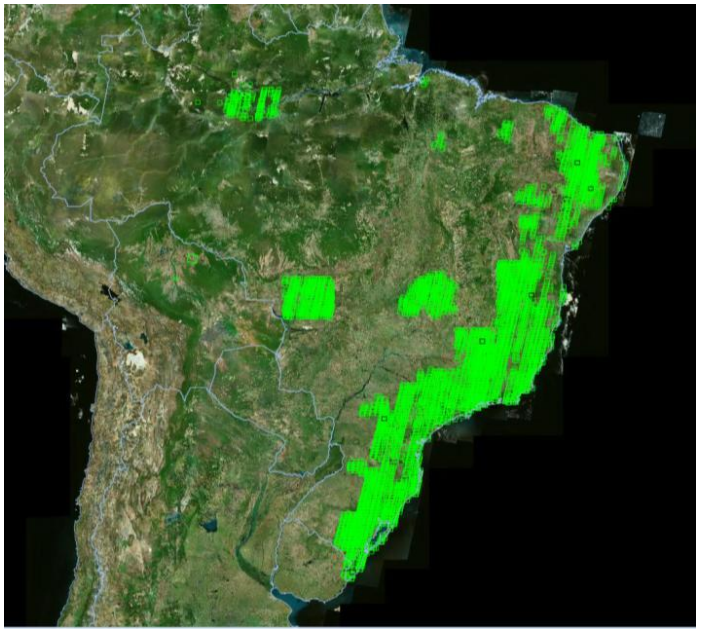
- C.D. Elvidge and M.L. Imhoff and K.E. Baugh and V.R. Hobson and I. Nelson and J. Safran "Nighttime lights of the world: 1994-95", ISPRS Journal of Photogrammetry and Remote Sensing, Vol. 56, pp. 81-99 H., 1989, pp. 200-202.
- E. Bartholome and A. Belward, "GLC2000: A new approach to global land cover mapping from earth observation data", International Journal of Remote Sensing, vol. 26, pp. 1959–1977, 2005.
- A. Schneider, M. Friedl, and D. Potere, "Monitoring urban areas globally using MODIS 500m data: new methods based on urban ecoregions", Remote Sensing of Environment, vol. 114, no. 8, pp. 1733–1746, Aug. 2010.
- J. Dobson, E. Bright, P. Coleman, R. Durfee, and B. Worley, "LandScan: A global population database for estimating populations at risk", Photogrammetric Engineering and Remote Sensing, vol. 66, no. 7, pp. 849–857, Jul. 2000.

Paper no JURSE

- *“This paper reports about an operational test to map in an automated way the settlements of Brazil using the High Resolution Panchromatic Camera (HRC) operated on board of the China–Brazil Earth Resources Satellite program (CBERS) 2B satellite.”*

Kemper et al., 2013

Global Human Settlement Layer - GHSL

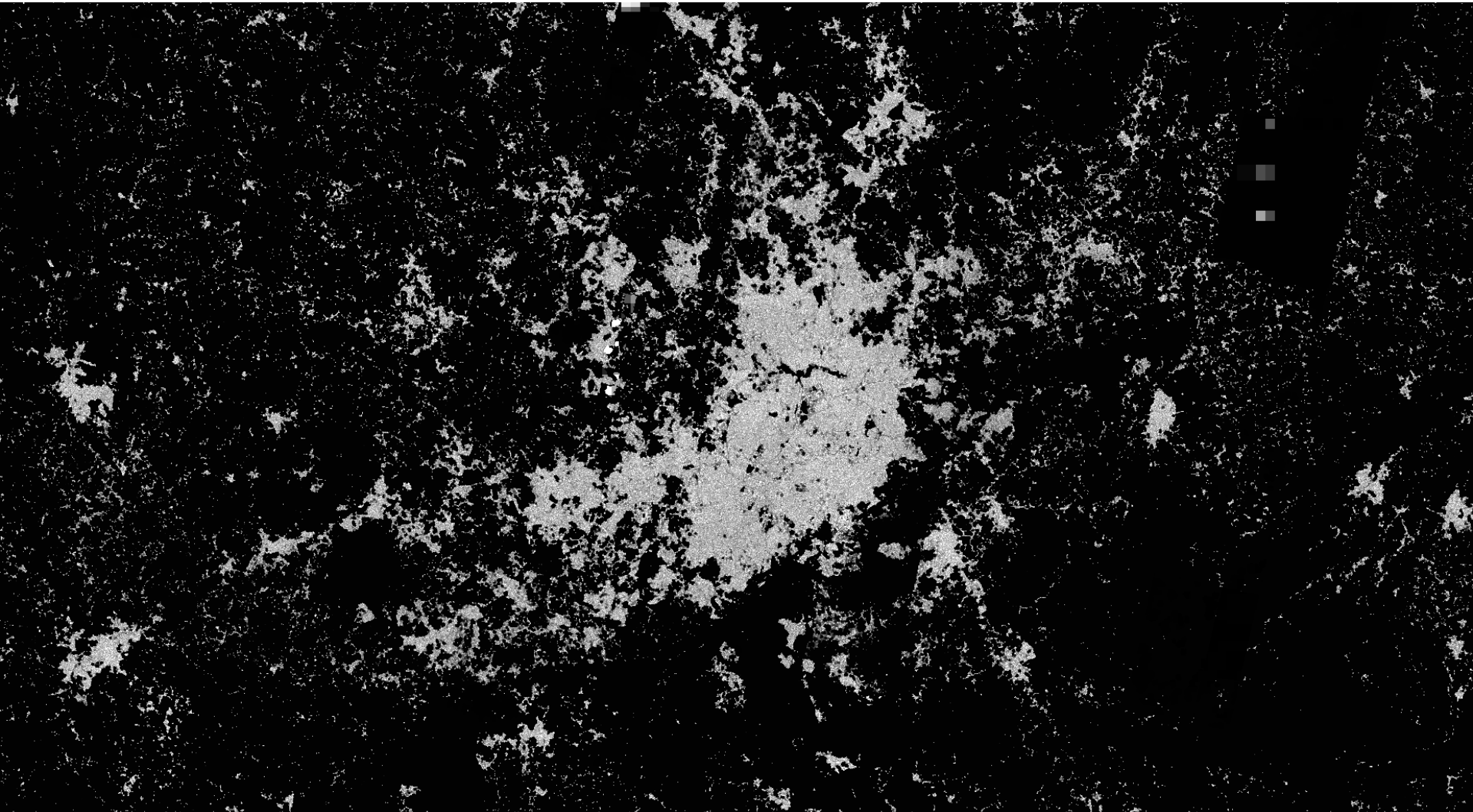


- Dados
  - 5620 single satellite scenes acquired between 2007 and 2010 by the HRC instrument
  - Geolocation of the input imagery was unreliable with the scene displacements by up to 40km
  - Out of the 5620 scenes downloaded we were able to preprocess 3314 (60 %)

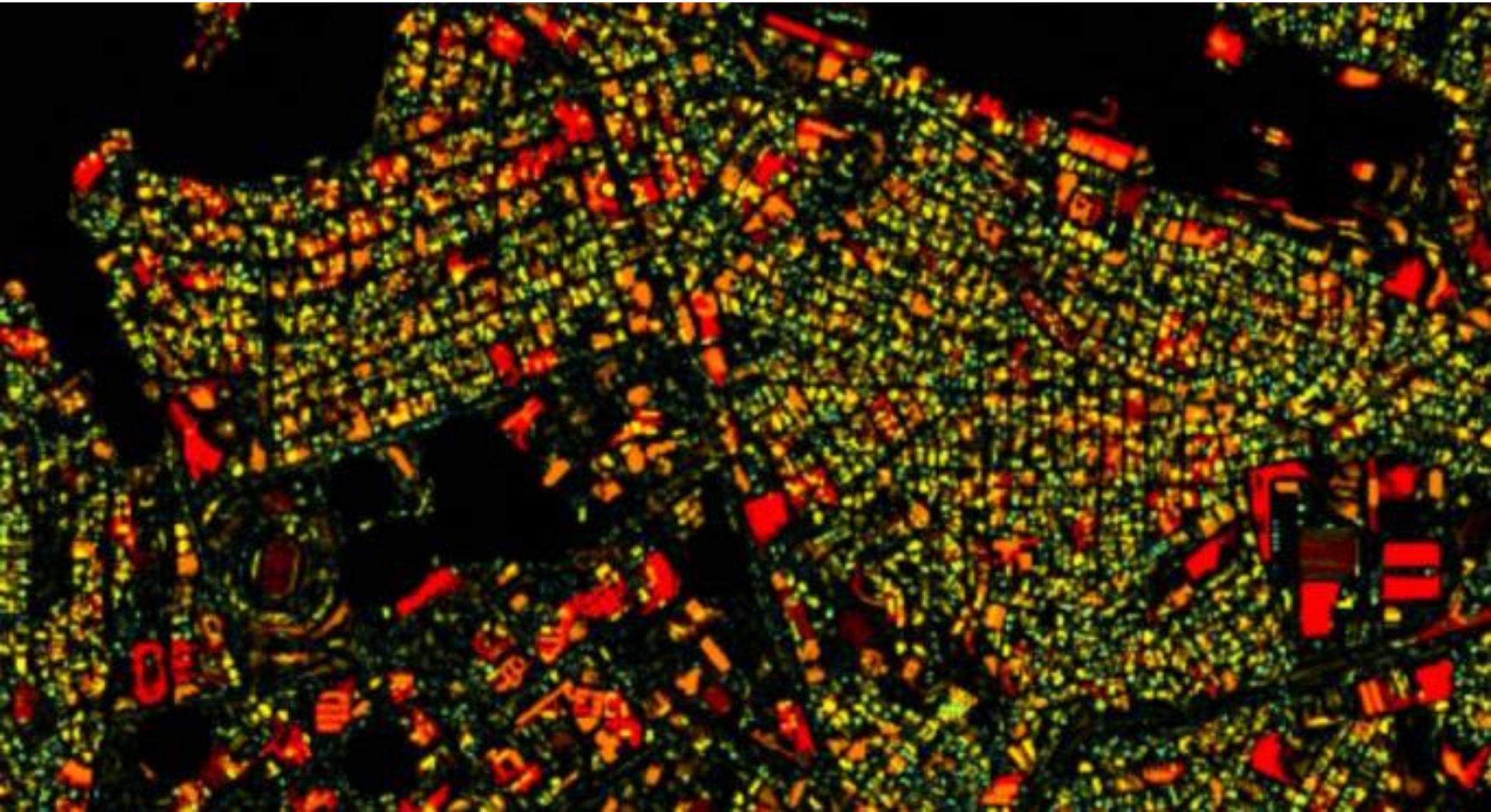
Global Human Settlement Layer - GHSL

- Atributos para classificação
  - The textural image features used in this study are derived from grey-level co-occurrence matrix (GLCM)
  - The contrast textural measures calculated using anisotropic displacement vectors are combined in a rotation-invariant image feature, called pantex

Pixel brightness is proportional to the percentage of built-up presence in the specific spatial units



The color-coding follows the blue-green-yellow-red order on increasing size of the built up structures



Colaboração INPE-JRC

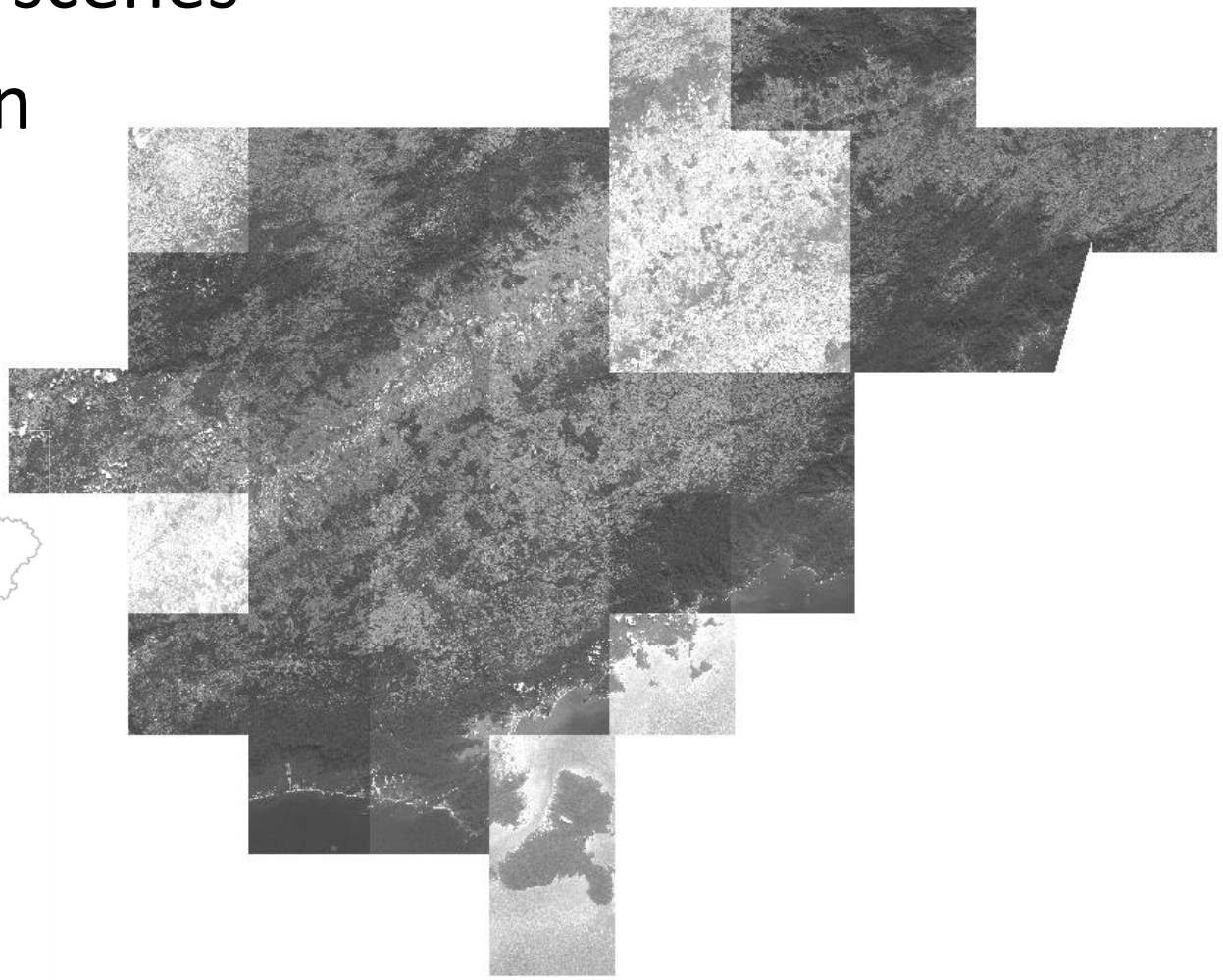
- INPE-JRC collaboration (sector dialogues project)
  - June, 2014 (Kemper @INPE)
  - September, 2014 (Körting and Souza @JRC)
- Apply GHSL in Brazil?

Test area

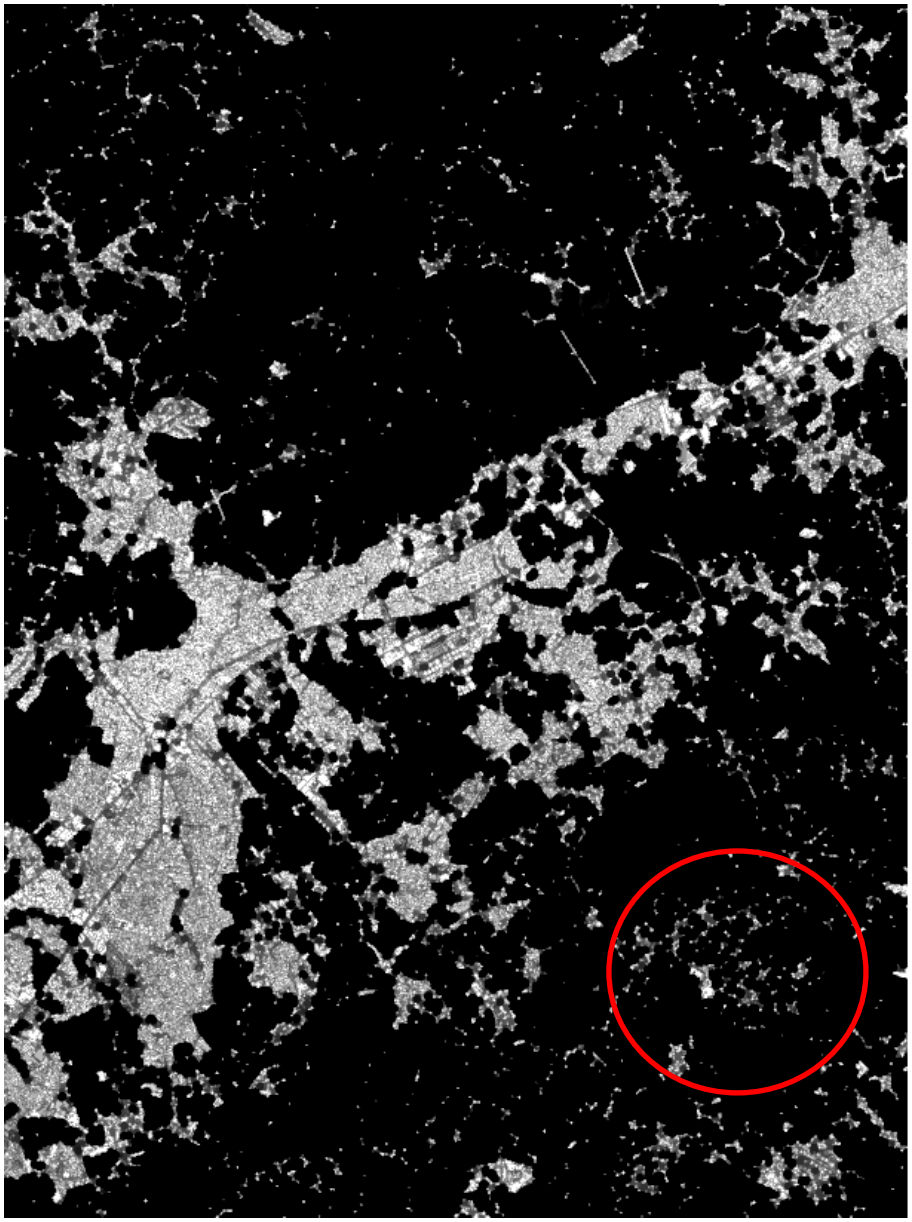
Vale do Paraíba Metropolitan Region (RMVale)

Image coverage

- 42 Rapid Eye scenes
- 5m resolution
- 5 bands

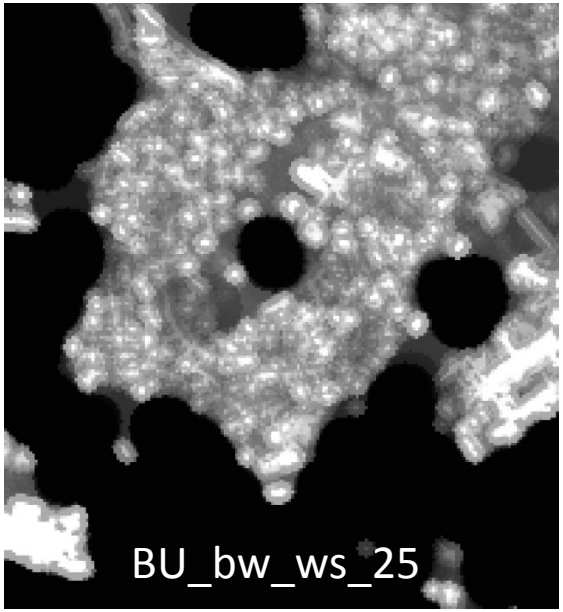


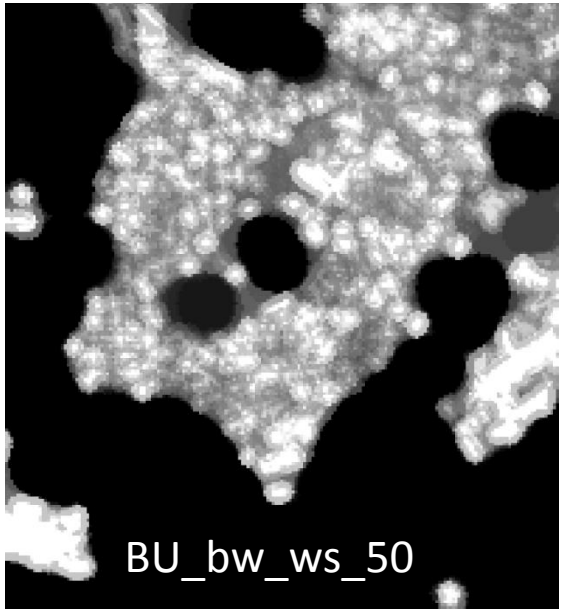
RapidEye -321

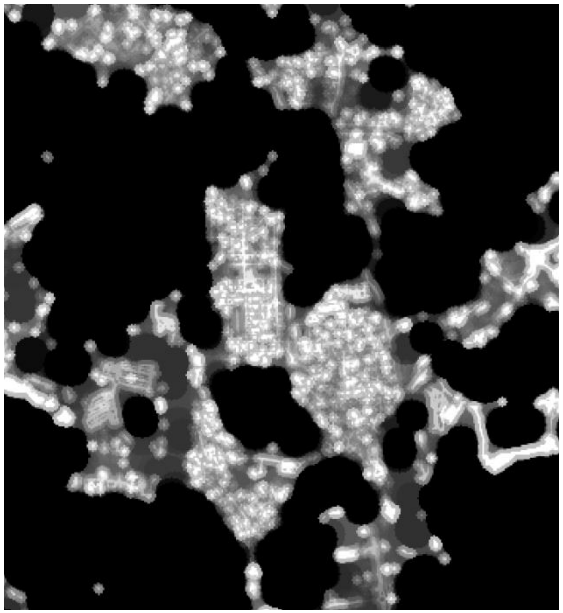


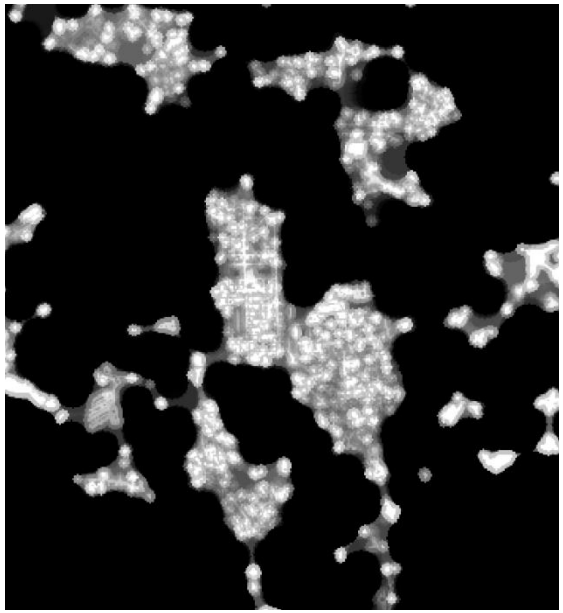
BU_bw

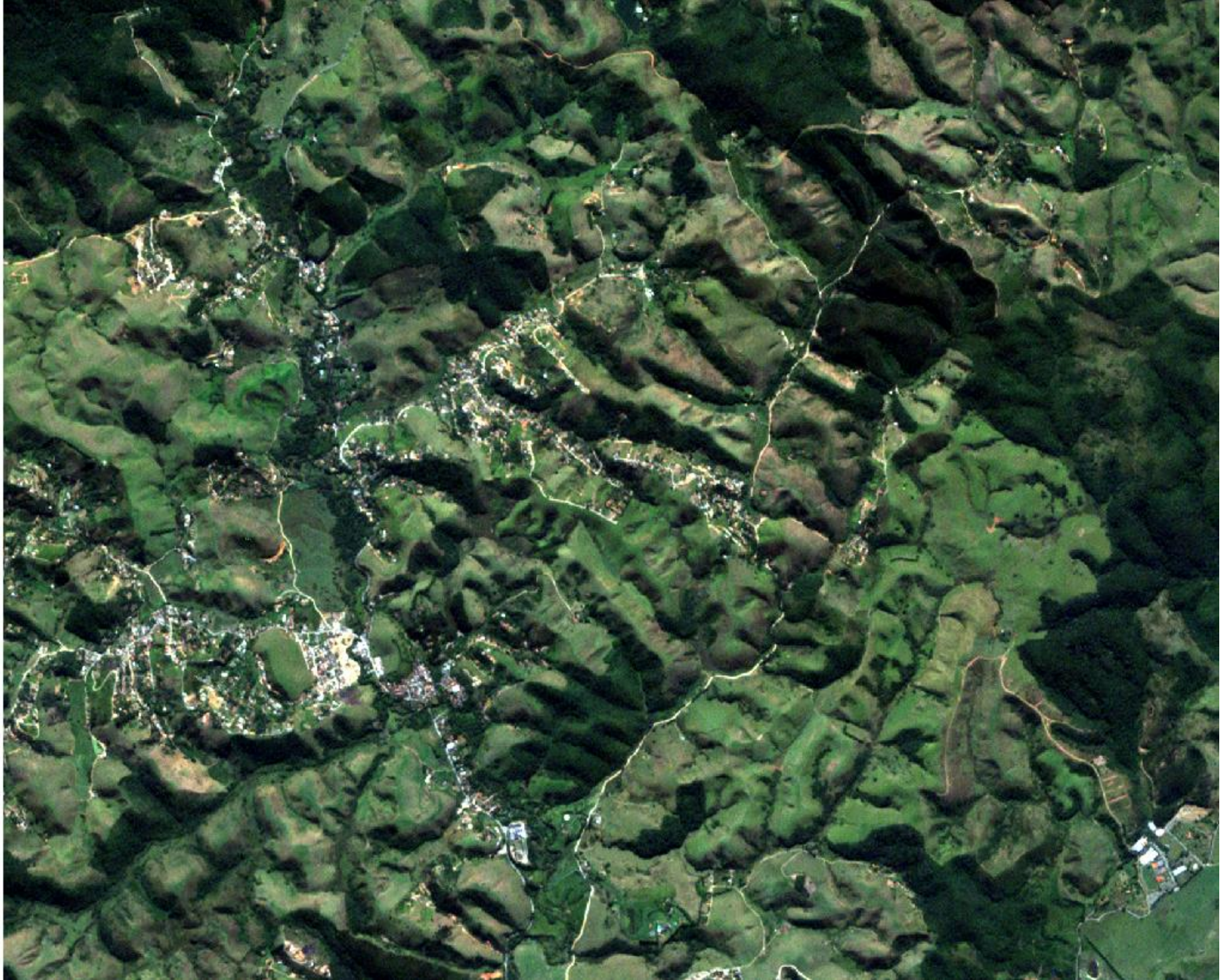
Visual evaluation – different PanTex window sizes

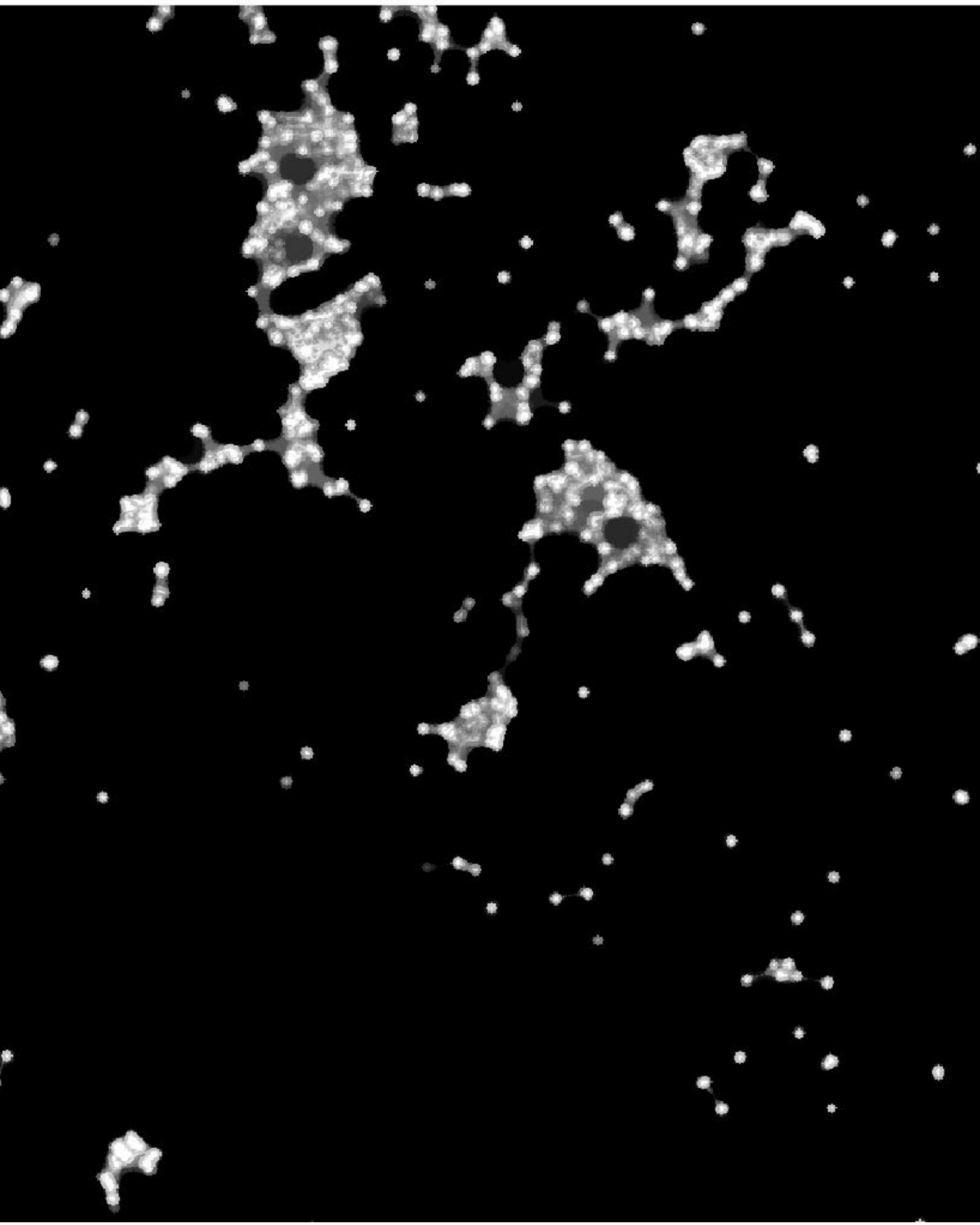




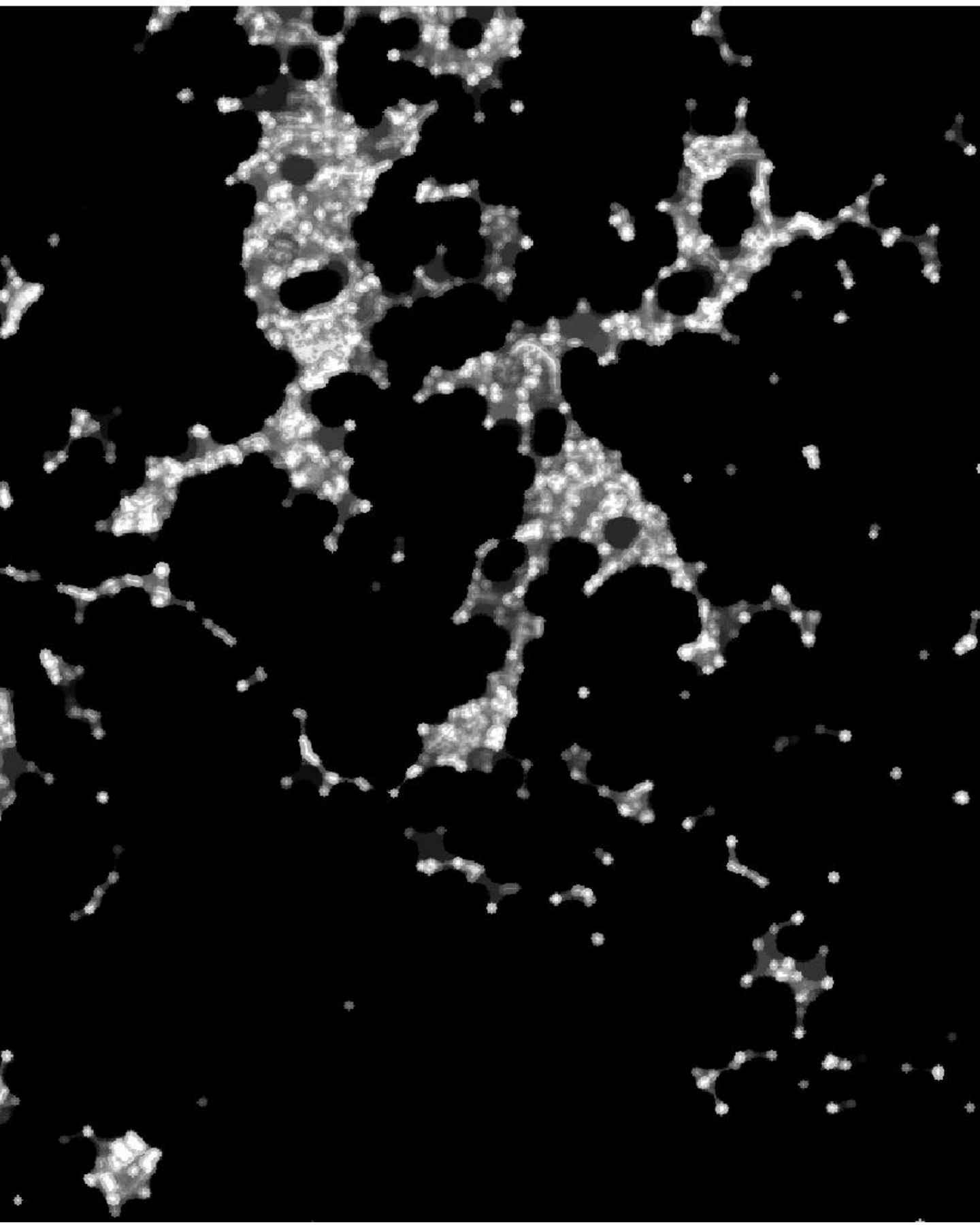






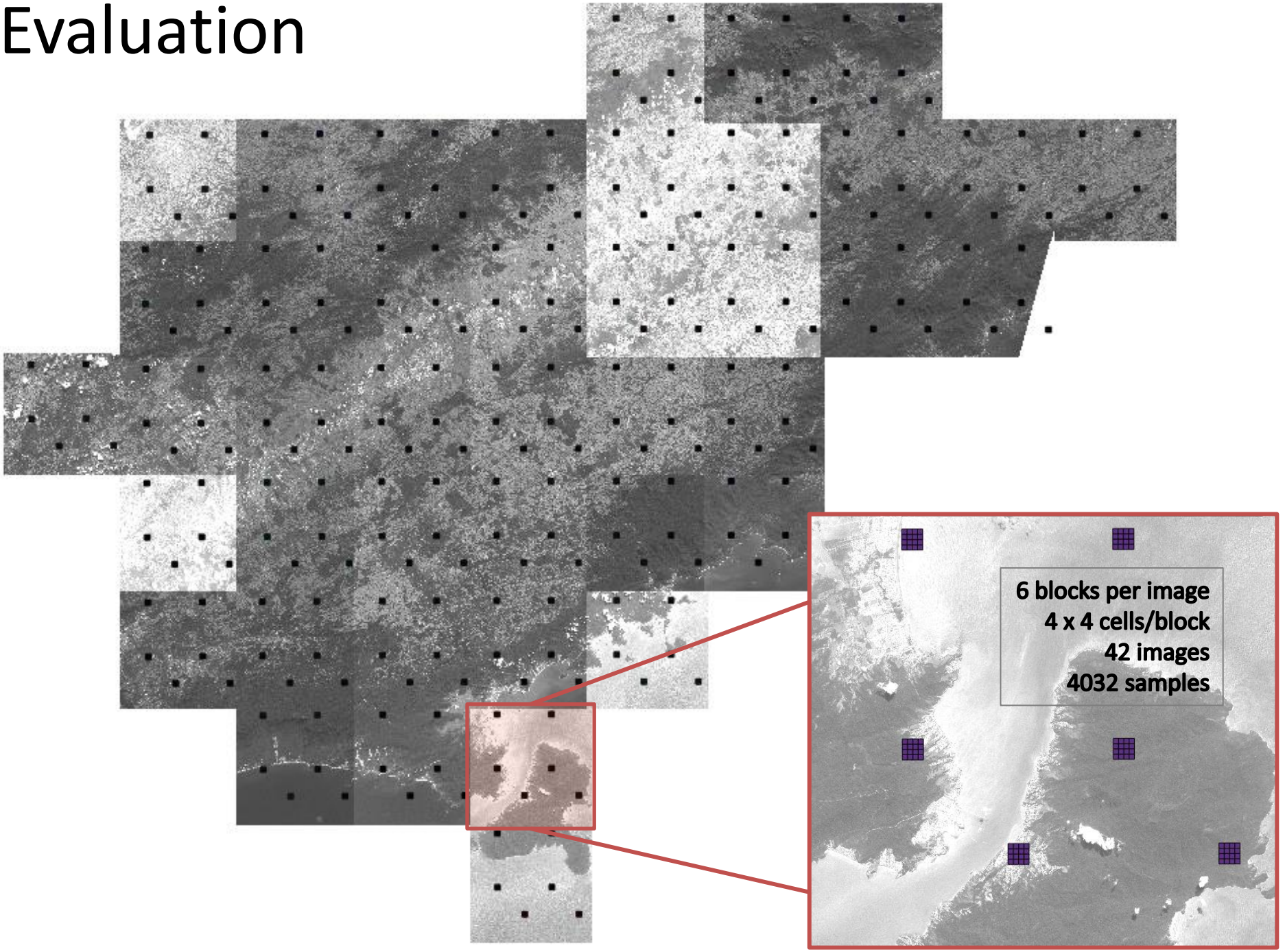


BU_bw_ws_25

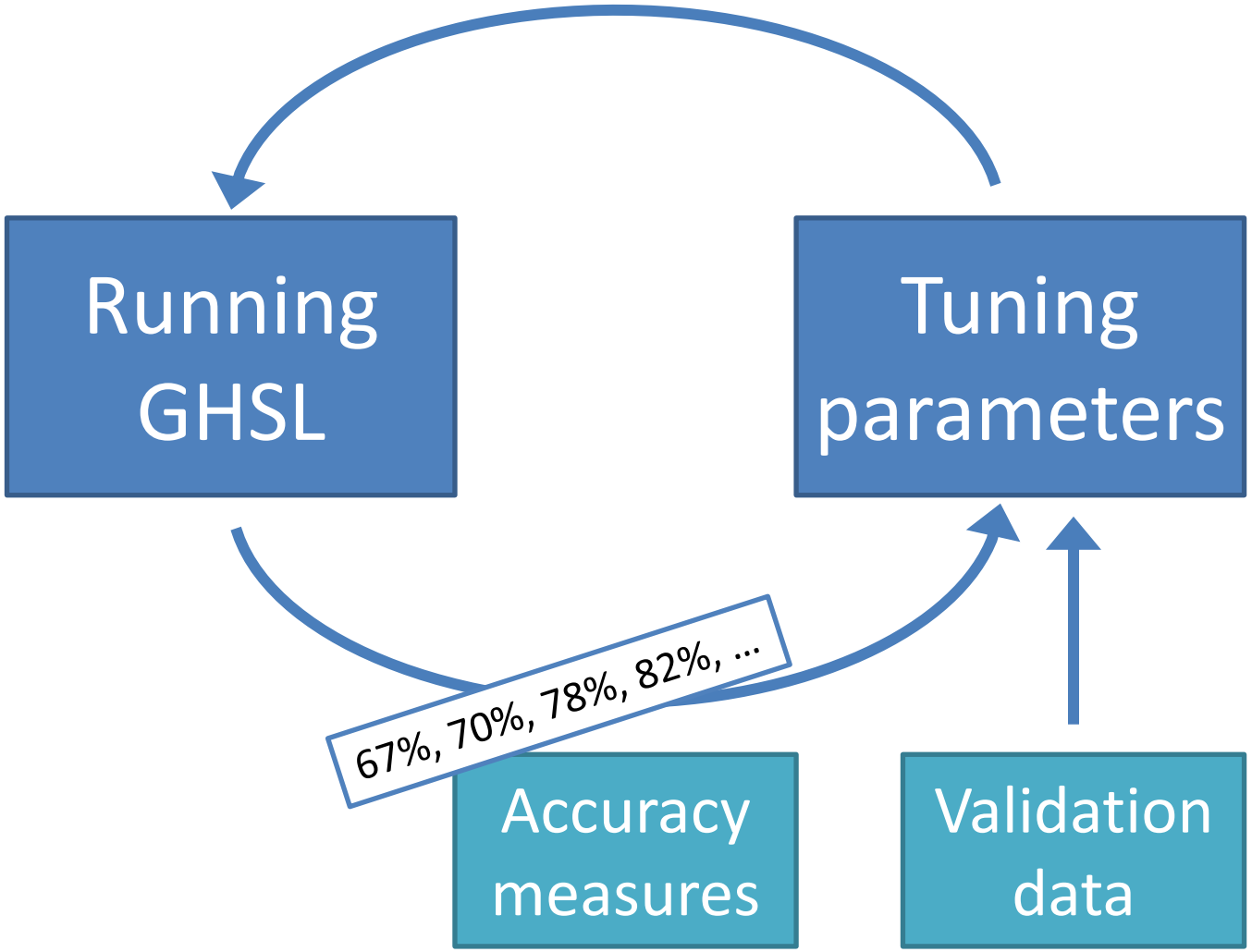


BU_bw_ws_50

Evaluation



Evaluation


Running GHSL
Tuning parameters
67%, 70%, 78%, 82%, …
Accuracy measures
Validation data

Evaluation

- Short processing time
- Tuning parameters may increase the accuracy
  - Reference data with coarse resolution
- What is the best learning strategy?
  - Landscan
  - EM
  - MODIS mean/area/ROC
  - Pantex
  - Hybrid?

Colaboração para 2015

- Brazil's entire coverage using Rapid Eye
- 20.000 images for 2012 and 2013
- 7 TB
- Para rodar o GHSL nestas imagens, poderíamos instalar o sistema e rodá-lo locamente (JRC → INPE)

Colaboração para 2015

- Imagens CBERS-4
- Preprocessamento, registro, mosaico (INPE → JRC)
- Deadline Diálogos Setoriais: 20 de Maio!

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