

→ 8th ADVANCED TRAINING COURSE ON LAND REMOTE SENSING

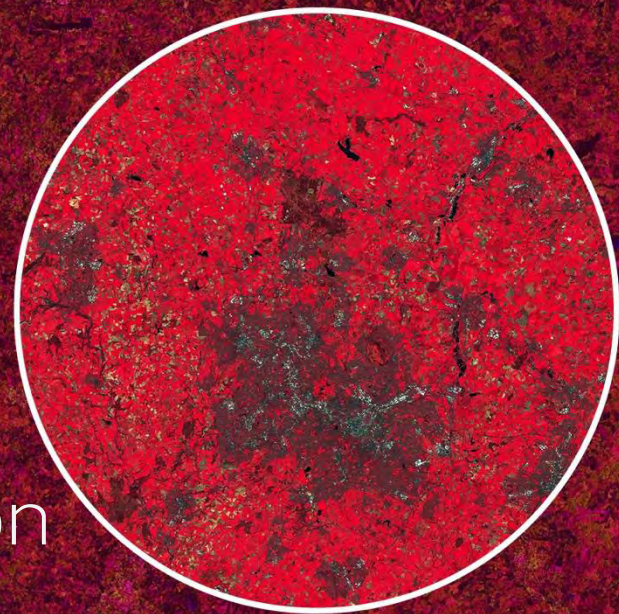
10–14 September 2018

University of Leicester | United Kingdom

Land cover land use discussion

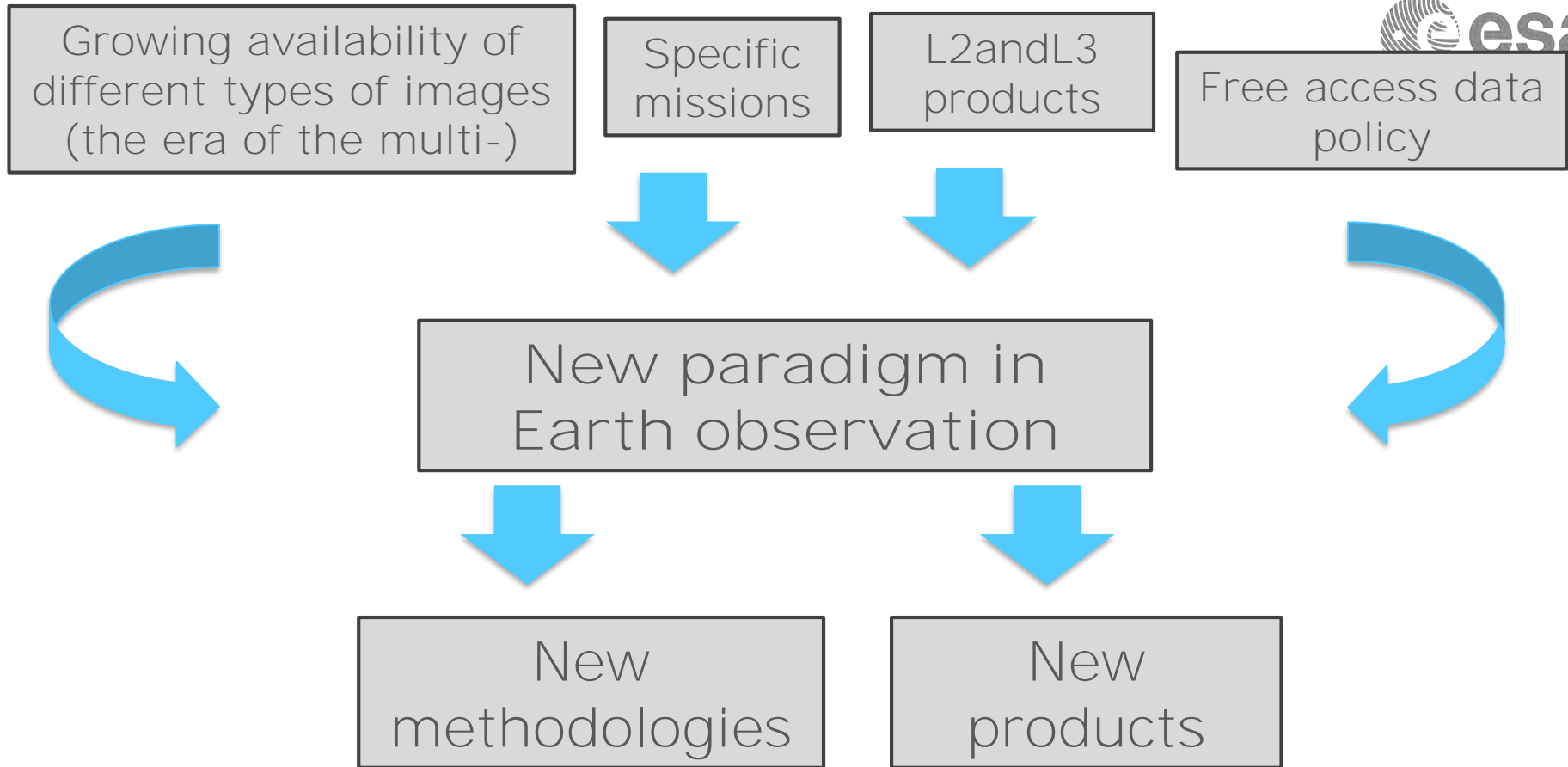
Mário Caetano, DGT and NOVA IMS

10/09/2018



The traditional LCLU maps and approaches

- The maps
 - One single map (e.g., one map every 5years or so)
 - Hard maps
 - Pixel based
- The approach
 - One or two images per year
 - Small number of bands and features
 - Supervised classifiers
 - Manual selection of training data



Challenges and Opportunities

- Data
- Mapping approaches and methods (approach, features, training, algorithms)
- New LCLU products
- Operational uses – the importance of reliability (i.e. accuracy indices)

Data

- Pre-processed data - Ground reflectance data

- **Multi...**

Multi-temporal

inter-annual time series

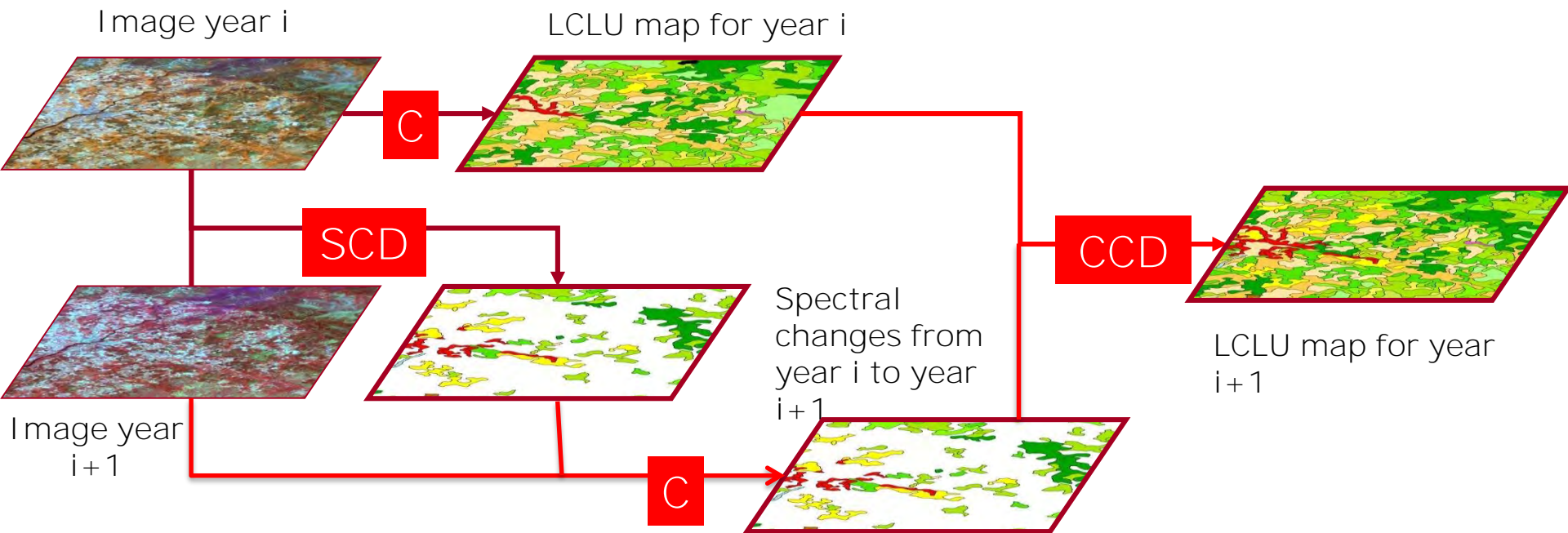
intra-annual time series

Multi-sensor

Optic and radar

Multi spatial resolution

LCLU monitoring by a temporally consistent manner



SCD Spectral Change Detection

C Image classification

CCD Class Change Detection

Mapping approaches and methods

LCLU mapping through change updating approach to guarantee spatiotemporal consistency

Supervised classification

Non-parametric classifiers (e.g.. Random forests)

On going research:

Active learning (i.e. deep learning, semi-supervised learning)

Unsupervised classifiers

novel clustering paradigms:

alternative clustering

clustering ensemble

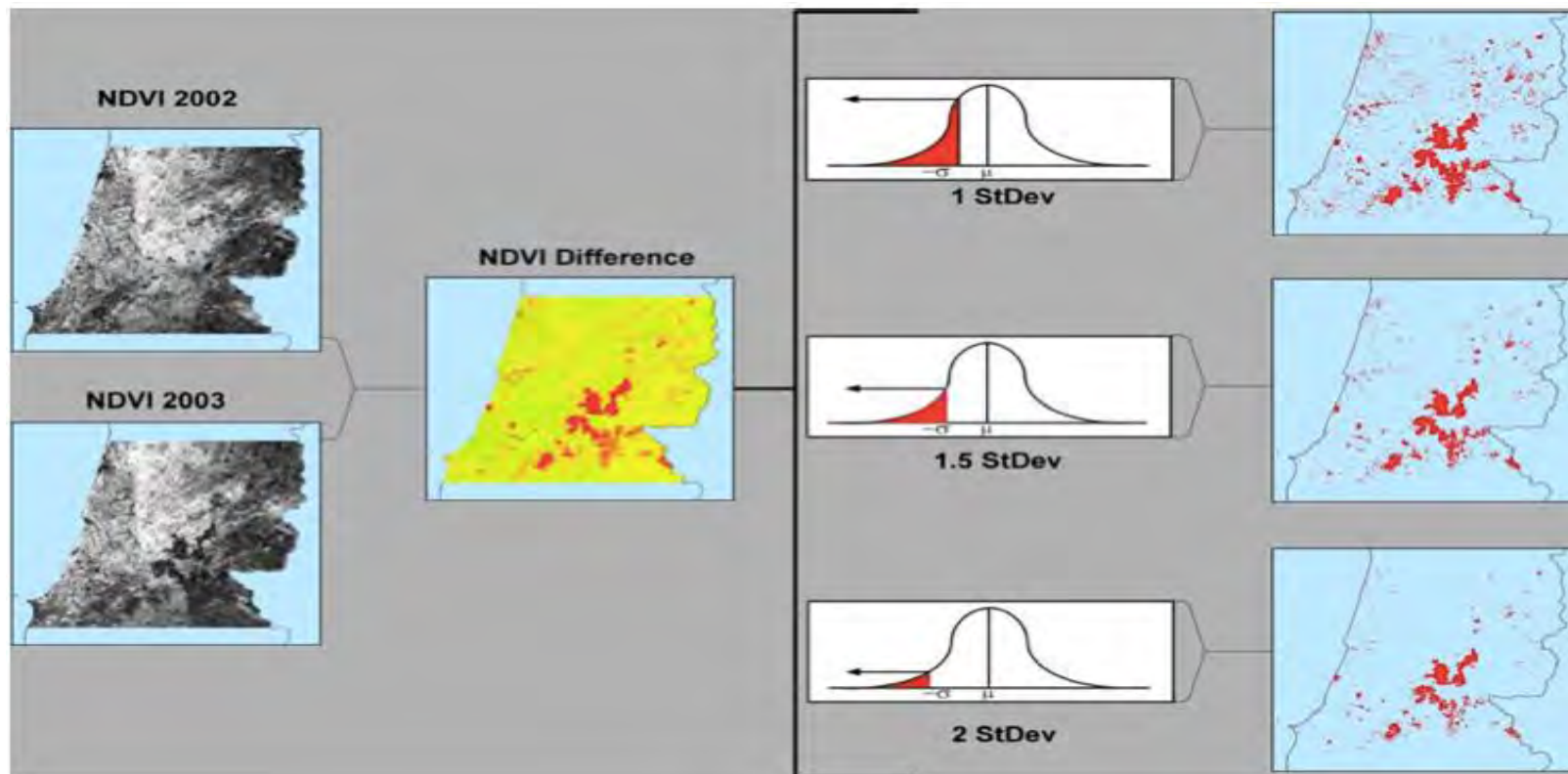
subspace clustering

Change detection

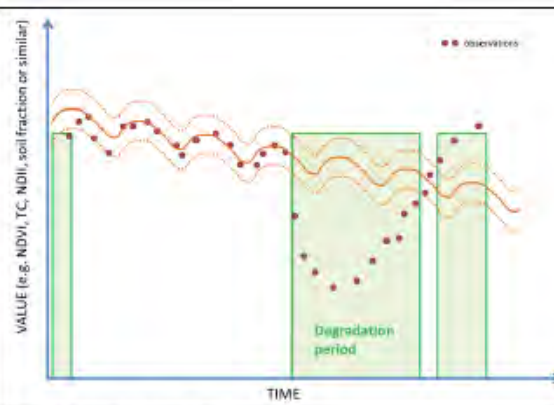
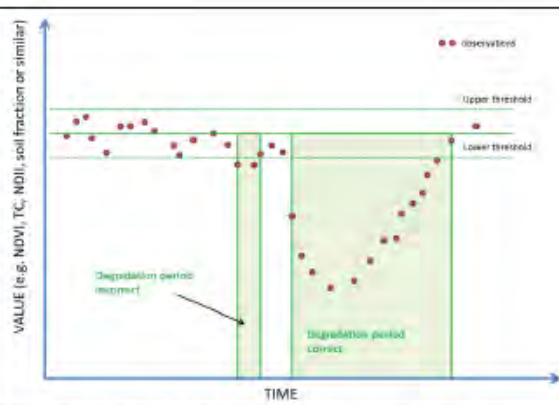
Image to image change detection

Time series analysis based change detection

NDVI image differencing

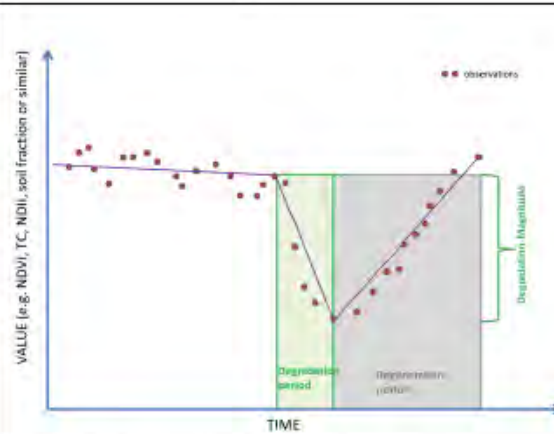
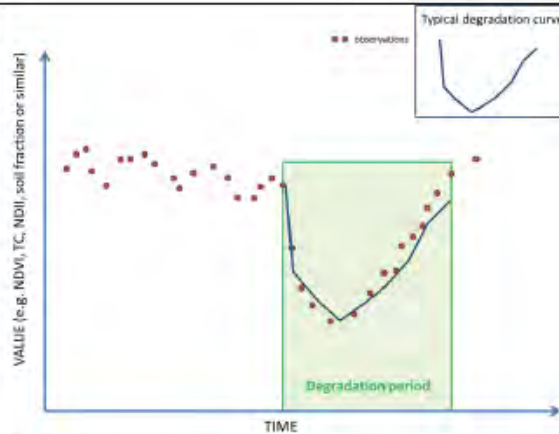


Time series analysis based change detection



a) Threshold based change detection

b) Curve fitting



c) Trajectory fitting

d) Trajectory segmentation

Hirschmugl et al., 2017

Training

- Use of existing LCLU maps for automatic definition of training data
- Active learning (semi-supervised training)

Classification features

Bands, indices, spatial features

Statistical metrics (e.g., average, minimum, maximum)

Change metrics

LCLU products



LCLU monitoring

Annual Maps

Change maps

Spatiotemporal thematic consistency

Hard and soft maps

LCLU categorical classes

Continuous variables products

LCLU maps

pixel based maps

characterizing instead of classifying

reliability maps

object based maps – polygons with attribute

