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QUALITY ASSESSMENT OF DATA FROM CHRIS/PROBA

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INFO

Student ID: 3 23369248. Course: 'GEOG6038 Calibration and Validation of Earth Observation Data'. Practical 1: Quality assessment of data from CHRIS/PROBA. Student: Lemenkova P. Supervisor: Prof. Dr. E. J. Milton. Funding: Erasmus Mundus MSc Scholarship GEM-L0022/2009/EW, University of Southampton, UK. 2009.

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INTRODUCTION



Image: Vertical air photo of Thorney Island. ROI: Thorney Island, Chichester harbour (UK): unique wetland environment, a place for rare bird colonies. Monitoring this place is important for environmental management. CHRIS/PROBA image characteristics: 18 bands, 07/10/2004, 17m ground resolution.

DATA: CHRIS/PROBA IMAGE

CHRIS (*Compact High Resolution Imaging Spectrometer*): new imaging spectrometer carried on board a space platform PROBA, <http://www.chris-proba.org.uk/>. More information: Cutter M.A., Lobb D.R. Cockshott R. (2000) Compact High Resolution Imaging Spectrometer. Elsevier Science Ltd, Kent, UK. Kuusk A., Kuusk J., Lang M.. A dataset for the validation of reflectance models. Remote Sensing of Environment 113 (2009) 889–892

PROBA: *Project for On Board Autonomy*. The satellite was successfully launched in late October 2001, Shriharikota (India). Info: Bermin J. PROBA – Project for On-Board Autonomy and web: <http://earth.esa.int/missions/thirdpartymission/proba.html>

CHRIS IMAGE QUALITY

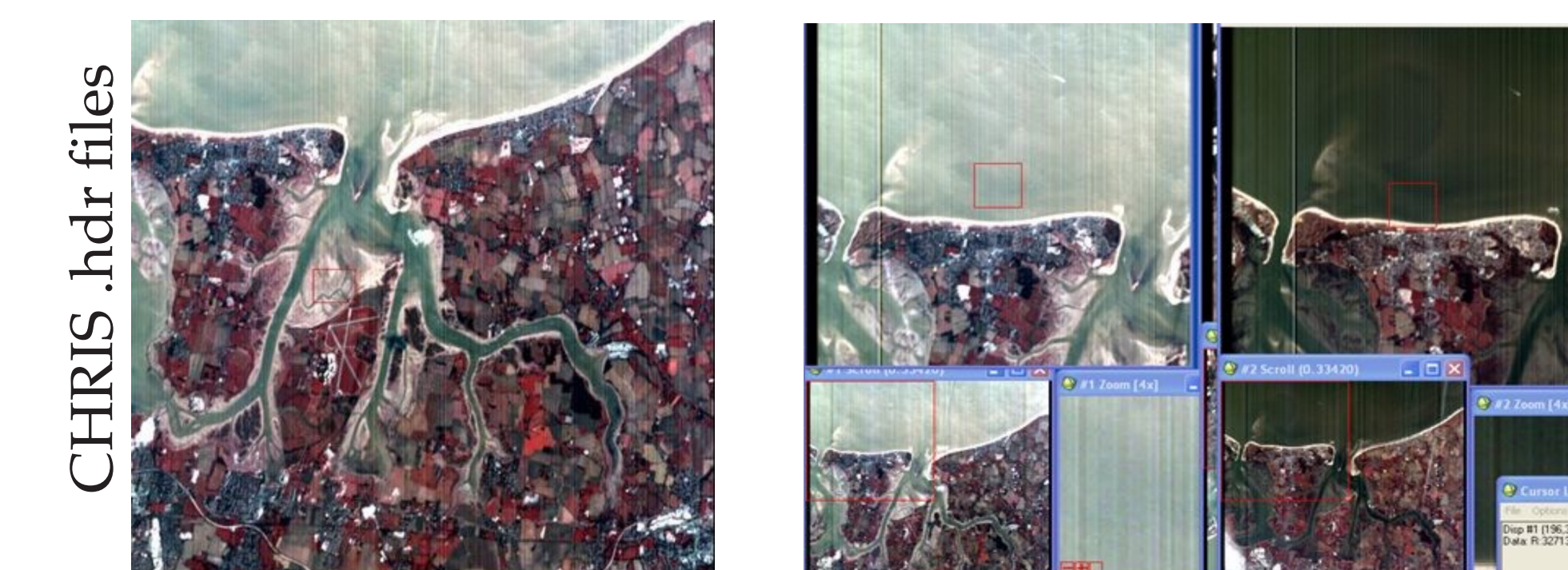
For the quality of CHRIS images .hdr files were examined:

1. CHRIS...47AO_41.hdr (taken at +36°)
2. CHRIS...47A1_41.hdr (taken at -36°)
3. CHRIS...47A2_41.hdr (taken at +55°)
4. CHRIS...47A3_41.hdr (taken at -55°)
5. CHRIS...479F_41.hdr (taken at nadir)

Images taken at the nadir are of good quality, while those at different angles have defects



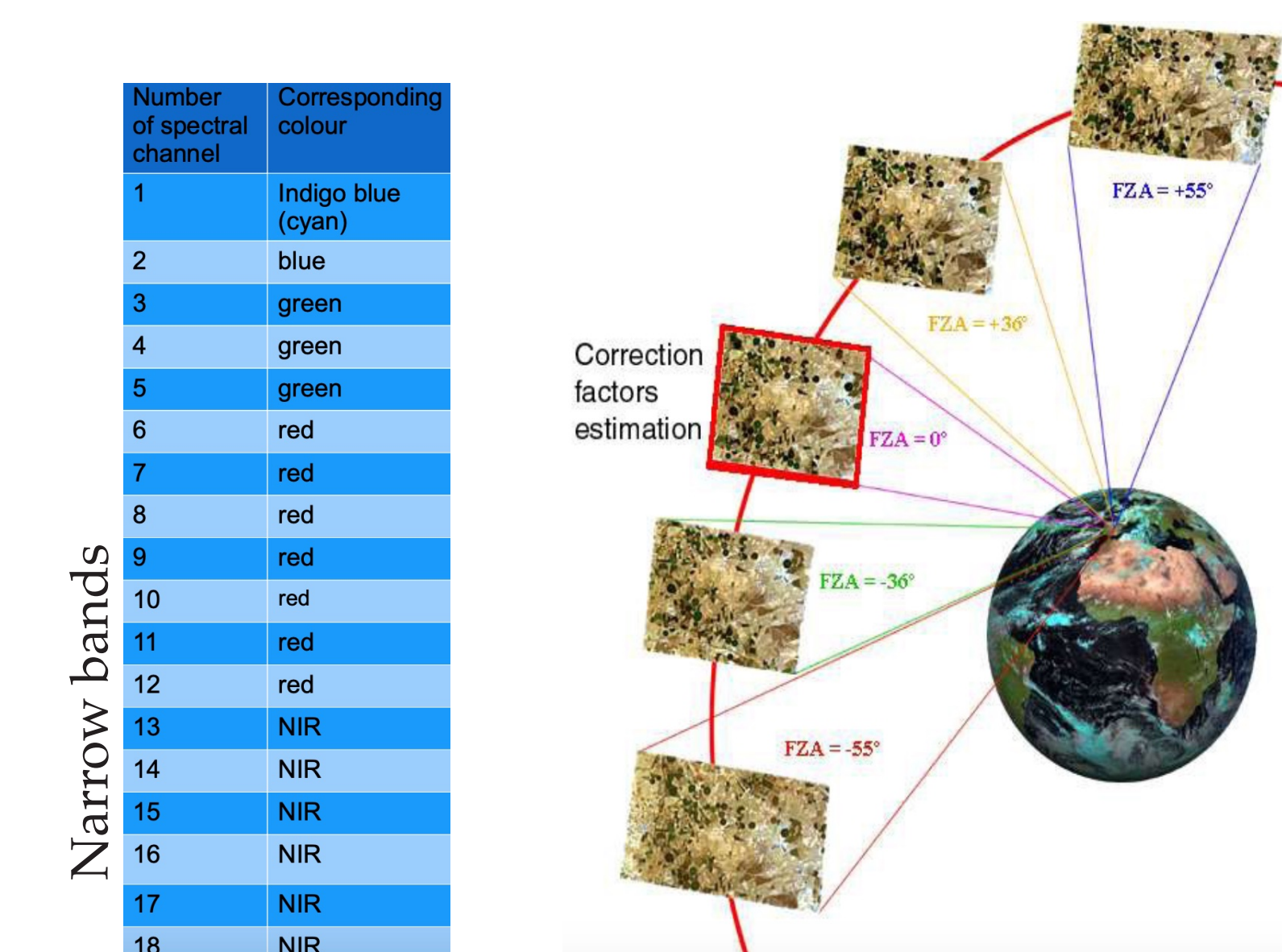
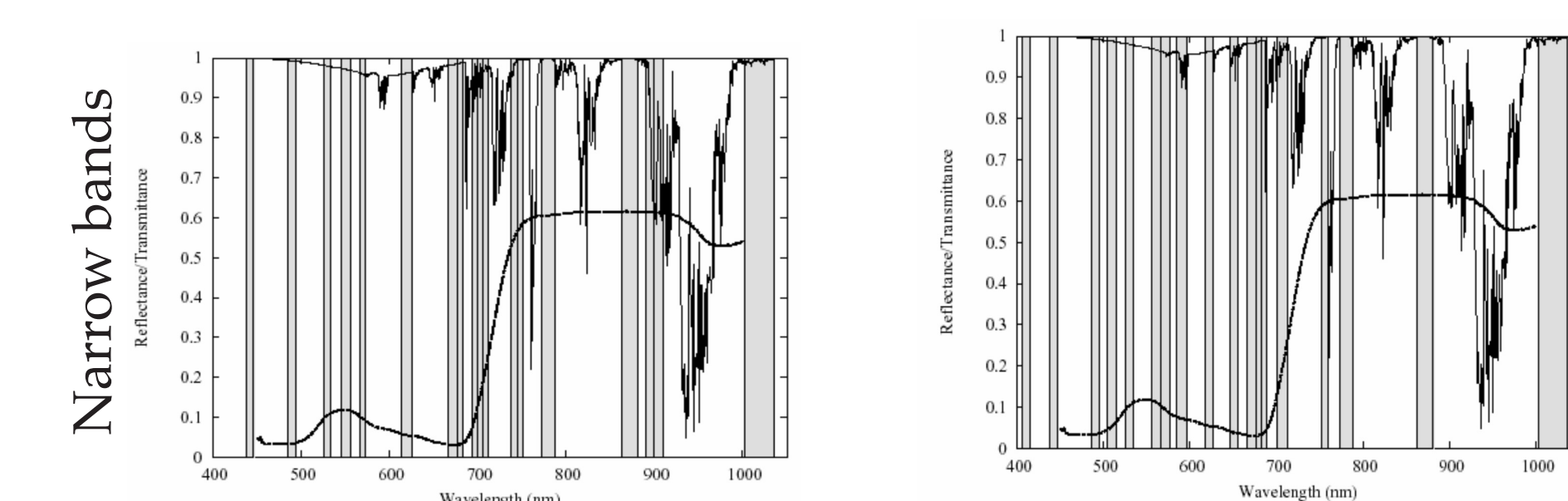
Left: Comparing images taken at +55° dgr (47A2_41) and nadir images (479F_41) right Right: Images taken at +36° dgr (47A0_41), left and nadir images (479F_41) right.



Left: Inverted Image received from bands Combination 4(R)-2(G)-1(B).

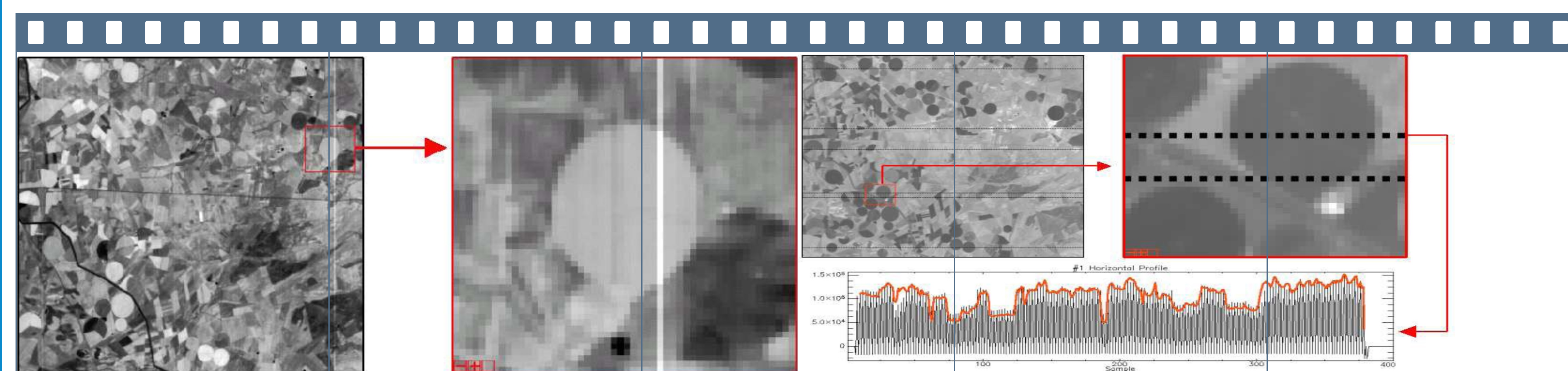
Right: Images taken at +36° and -36° (CHRIS 47A0_41 and CHRIS 47A1_41) both have inverted direction.

SPECTRAL BANDS



Narrow bands	Number of spectral channel	Corresponding colour
1	1	Indigo blue (cyan)
2	2	blue
3	3	green
4	4	green
5	5	green
6	6	red
7	7	red
8	8	red
9	9	red
10	10	red
11	11	red
12	12	red
13	13	NIR
14	14	NIR
15	15	NIR
16	16	NIR
17	17	NIR
18	18	NIR

IMAGE NOISE



2 types of noise affecting CHRIS images:

1. vertical noise (vertical stripes corrected by comparing values of neighbor pixels)
2. horizontal noise (easy to detect and correct using horizontal profile of each file)

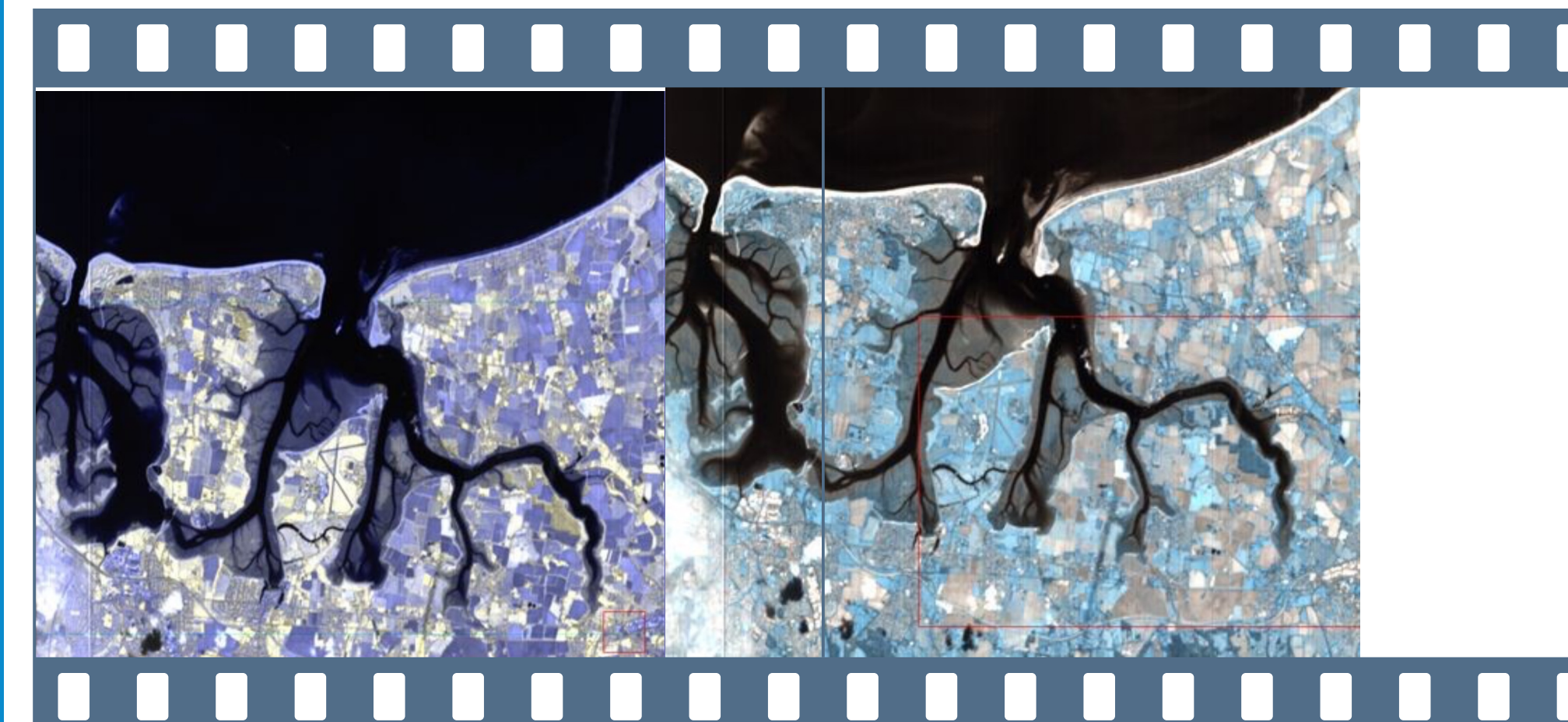
Example of vertical noises in CHRIS image (left). Image source: Garcia J.G., Moreno J. Removal of noises in CHRIS/PROBA images: Application to the Sparc Campaign Data. Correction of noises can be made through DIELMO 3D Methodology. Example of horizontal noise in CHRIS image.



CHRIS_CH_041007_479F_41 Bands_12-8-1 CHRIS_CH_041007_479F_41 Bands_7-4-1 CHRIS_CH_041007_479F_41 Bands_11-4-2 CHRIS_CH_041007_479F_41 Bands_6-5-2 CHRIS_CH_041007_479F_41 Bands_15-4-1

IMAGE INVERSION

Inverted Image, bands: Left:13-12-11. Right: 9(R)-10(G)-11(B).



Left: CHRIS Superspectral Land: Many narrow bands around the red-edge. Image source: Barnsley M.J. et al. The PROBA/CHRIS Mission: A Low-Cost Smallsat for Hyperspectral, Multi-Angle, Observations of the Earth Surface and Atmosphere. Right: CHRIS Superspectral Water: many narrow bands in visible wavelengths. Figure contrasts per frame evidence for each patch with or w/o a background model. Quality natural-colored image of wetlands: nadir-taken CHRIS image with bands combination of corresponding spectral channels. View angles in a CHRIS/PROBA acquisition.

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