HYPER-I-NET (MRTN-CT-2006-035927)

Mid-Term Review

Munich, Germany, March 9th 2009

Presenter:	Yuliya Tarabalka
Roles in the project:	ESR Researcher
	Member of HYPER-I-NET Management Board
Partner:	University of Iceland, Iceland, Partner #13 [UNIS]

Norsk Elektro Optikk AS

WAGENINGEN UR
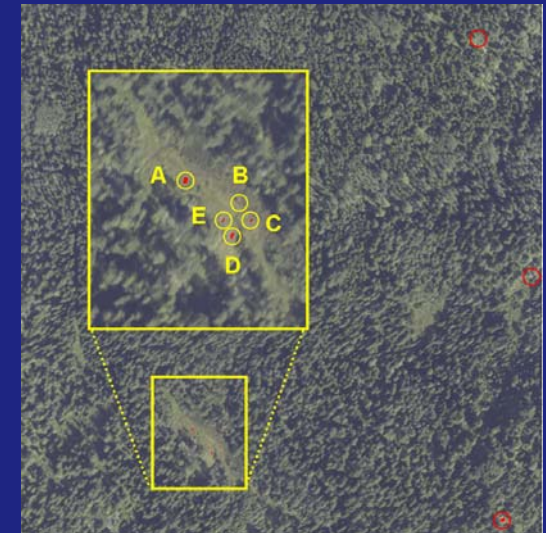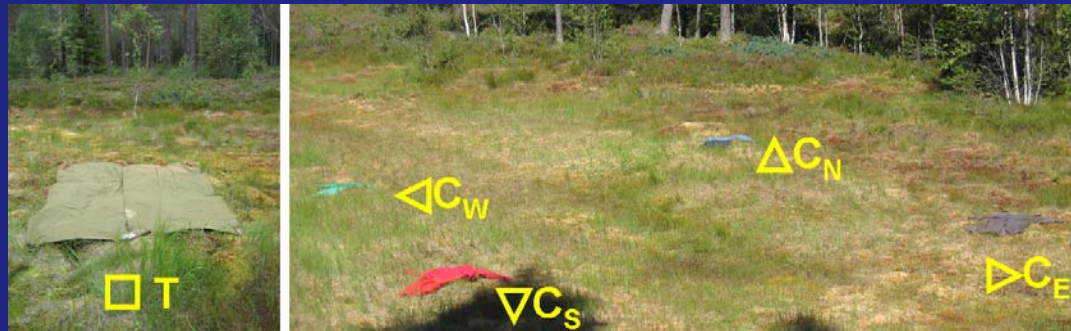For quality of life

Scientific issues

- **Job title:** Spectral-spatial classification in hyperspectral imagery

- **Research path:**

Start date	Place / Name of supervisor	Duration (months)	Short description of work
July 6, 2007	Norwegian Defence Research Establishment (FFI), Norway / Torbjørn Skauli	6	- General introduction to hyperspectral imaging (from acquisition to high-level analysis) - Participation in field trials - Research in image processing (statistical methods and parallel processing implementations)
Jan 6, 2008	University of Iceland (UNIS), Iceland / Jón Atli Benediktsson	10	- Definition and implementation of advanced algorithms for segmentation and classification of hyperspectral data - Development of new algorithms incorporating spectral and spatial information
Nov 1, 2008	Grenoble Institute of Technology (INPG), France / Jocelyn Chanussot	6	
May 1, 2009	University of Iceland (UNIS), Iceland	14	

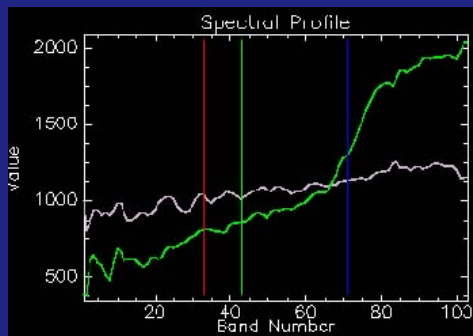## 1. Real-time anomaly detection using a graphics processor

- Publications:

  ✓ *Y. Tarabalka, T. V. Haavardsholm, I. Kåsen, and T. Skauli, "Parallel processing for normal mixture models of hyperspectral data using a graphics processor," in Proc. of IGARSS, Boston, USA, 2008, pp. II-990 – II-993.*

  ✓ *T. Skauli, I. Kåsen, T. Haavardsholm, A. Kavara, Y. Tarabalka, and Ø. Farsund, "Status of the norwegian hyperspectral technology demonstrator," in Proc. of NATO SET-130 "NATO Military sensing symposium", Orlando, Florida, USA, 2008, pp. F5–1–F5–6.*

  ✓ *Y. Tarabalka, T. V. Haavardsholm, I. Kåsen, and T. Skauli, "Real-time anomaly detection in hyperspectral images using multivariate normal mixture models and GPU processing," Journal of Real-Time Image Processing, 2008, pp. 1-14.*

2. Spectral-spatial classification of hyperspectral imagery

Spectral classification

+ Spatial info

- Publications:

  ✓ *Y. Tarabalka, J. Chanussot, J. A. Benediktsson, J. Angulo, and M. Fauvel, "Segmentation and classification of hyperspectral data using watershed," in Proc. of IGARSS '08, Boston, USA, 2008, pp. III-652 – III-655.*

  ✓ *Y. Tarabalka, J. A. Benediktsson, and J. Chanussot, "Classification of hyperspectral data using Support Vector Machines and adaptive neighborhoods," in Proc. of the 6th EARSeL SIG IS workshop, Tel Aviv, Israel, 2009.*

  ✓ *Y. Tarabalka, J. A. Benediktsson, and J. Chanussot, "Spectral-spatial classification of hyperspectral imagery based on partitional clustering techniques," accepted for publication, IEEE Trans. Geos. and Remote Sens.*

Publications

- **International journals (1 published, 1 accepted):**

  ✓ *Y. Tarabalka, J. A. Benediktsson, and J. Chanussot, "Spectral-spatial classification of hyperspectral imagery based on partitional clustering techniques," accepted for publication, IEEE Trans. Geos. and Remote Sens.*

  ✓ *Y. Tarabalka, T. V. Haavardsholm, I. Kåsen, and T. Skauli, "Real-time anomaly detection in hyperspectral images using multivariate normal mixture models and GPU processing," Journal of Real-Time Image Processing, 2008, pp. 1-14.*

- **International conferences (3 published, 1 accepted, 1 submitted):**

  ✓ *Y. Tarabalka, T. V. Haavardsholm, I. Kåsen, and T. Skauli, "Parallel processing for normal mixture models of hyperspectral data using a graphics processor," in Proc. of IGARSS, Boston, USA, 2008, pp. II-990 – II-993.*

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  ✓ *Y. Tarabalka, J. A. Benediktsson, and J. Chanussot, "Classification of hyperspectral data using Support Vector Machines and adaptive neighborhoods," in Proc. of the 6th EARSeL SIG IS workshop, Tel Aviv, Israel, 2009.*

  ✓ *Y. Tarabalka, J. Chanussot, J. A. Benediktsson, "Classification based marker selection for watershed transform of hyperspectral images," submitted to IGARSS'09, Cape Town, South Africa.*

Networking issues

1. Work and close collaboration in 3 research institutions

- FFI (Norway) + UNIS (Iceland) + INPG (France)

2. Hyperspectral data: provided by DLR, UNIPV and NEO

3. Participation in Management Board Meetings

4. Video-conferences, conferences & summer schools

5. External connections: NASA (the USA), INRIA, Paris School of Mines, ESIEE (France),…

6. Member of international scientific societies

- IEEE, IEEE Geoscience and Remote Sensing Society, IEEE Women In Engineering

Training & ToK

1. Realised training components

- 2 scientific university courses: Pattern Recognition (Norway), Digital Image Processing (Iceland)

- Introduction to Research Studies and the Scientific Community course (Iceland)

- 2 HYPER-I-NET E-Learning courses

- 3 international summer schools (Spain, France, the Netherlands)

- Norwegian and Icelandic language courses

2. Teaching

- 24 hours of practical sessions in Image Processing (France)

Training & ToK

3. Two short visits to other partners

- University of Iceland, Iceland (14-17 October 2007)

- Norsk Elektro Optikk AS, Norway (4 January 2008)

4. Participation in international conferences

- IEEE International Geoscience & Remote Sensing Symposium (IGARSS) 2007

- IGARSS 2008 (1 oral talk, 1 poster presentation, chaired a poster session)

- 6th EARSeL SIG IS workshop 2009 (1 oral talk)

Training & ToK

5. Reviewer for:

- IGARSS 2008, IGARSS 2009

- EUSIPCO 2008

- *IEEE Transactions on Geoscience and Remote Sensing*

- Journal of Real-Time Image Processing

6. Conferences committees

- Organizing Committee Member of the First IEEE GRSS Workshop on Hyperspectral Image and Signal Processing (WHISPERS), 2009, Grenoble, France

Other aspects

1. Sorting out formalities with respect to:

- Transnational mobility

- Local administrative issues

2. Situation with a salary in Iceland

Thanks

- To Torbjørn Skauli, Jón Atli Benediktsson, Jocelyn Chanussot and Antonio Plaza for their collaboration, help and support with my research work and in administrative issues!

- To my friends for everything!

- For your attention!