



Pierre Fabry

Chairman of ALONG-TRACK

Senior Researcher in SAR Image & Signal Processing

Technical Roles:

New Processing Approaches in Altimetry and Synergy with SAR Imagery, Production and Use of Water Masks, Team Coordinator, Technical and Management Responsible

Qualifications and experience:

Pierre Fabry's experience summarises with (more detailed further down) :

- Automated SAR image segmentation techniques that shall serve to the production and regular update of water masks.
- SAR imaging processing techniques, Geometric Doppler Prediction, Doppler Estimation.
- SAR Altimetry software development at ALONG-TRACK.
- The handling of Delay-Doppler Maps for GNSS bi-static applications.
- Organization of Scientific Events.
- ESA Project Management within large consortiums.

CV

Since June 2013, Pierre Fabry has been working on SAR altimetry and developing software tools for altimetry and image segmentation as well as preparing the set up of the new company ALONG-TRACK. He also took part to the ESA SAR Altimetry training course in October 20.14 at the lake Konstanz.

From September 2009 to May 2013 Pierre Fabry further developed his expertise as Radar Signal Processing Research Engineer at Collecte Localisation Satellite (CLS-Brest) where he :

- implemented the prototype of automated **SAR image segmentation** software (IDL programming language). The algorithm, freely available in the literature through three PhD theses, controls the evolution of an active grid by minimizing the stochastic complexity (MDL principle) of the segmented image. Application to water bodies delineation on emerged lands, pollution detection on sea surface, sea-ice and iceberg delineation.
- worked on the characterization of the ASAR **Doppler grids** errors and took part to the testing of Doppler Centroid estimators. Measurement of sea surface radial velocity (sea state and surface current) from the precise estimation of Doppler shifts in SAR data.

- managed the development of the Wind, Wave and Current platform of the Sentinel-1 Marine Collaborative Ground Segment and taking part to the definition and improvement of **Level 2 processing chains** by the study of new signal processing elements.
- Developed a tool to perform the feasibility study of Doppler Scatterometer by simulating the raw data from a Fixed Fan Beam scatterometer with Doppler preserved information and calibrated NRCS both related to the 10m wind via the use of the CDOP and CMOD GMFs. Pierre **Developped a Mini Orbit Propagator** based on a paper from Cumming during this activity.
- **co-authored a CNES patent** on the subject of GNSS Passive Bistatic Radar Study for ship detection (processing of a series of Delay-Doppler Maps).

From May 2002 to September 2009 Pierre Fabry worked as an ESA/ESTEC staff on Digital Signal Processing and System Engineering. Among other things he :

- supported the development of the **Sentinel-1 Central Electronics** up to CDR. Monitored the design and development of digital electronics modules (Chirp Generator, Instrument Control Unit, Tile Control Unit, Decimation filter and Digital I/Q Demodulation, raw SAR data compression) for Sentinel-1.
- took part to the **Advanced Concept for Radar Sounding** study: assessment and simulation of clutter suppression algorithms for a future satellite mission aimed at mapping ice thickness on the poles.
- took part to **Concurrent Design Facility studies** (for the fast modelling of candidate space-borne instruments).
- monitored the development of a **High Rate Telemetry Encryption** breadboard for the protection of Satellite Telemetry data at 600Mbps with AES cryptography.
- took part to the **standardization** of SpaceWire links, nodes, routers and networks (ECSS E50-12A) and to the SpaceWire RMAP basic transport protocol (ECSS E50-11).
- **conducted several R&D projects** for the development of SpaceWire equipment: and in particular a SpaceWire Router ASIC AT7910E: 10 ports, 200 Mbps per port in both directions, Group Adaptive Routing, router reconfiguration with RMAP, physical & logical addressing. Supervised a trainee (5 months): on the testing of SpaceWire equipment in lab. Got involved in the ESA "Security Working Group".
- **organised the 1st SpaceWire International Seminar** held in Noordwijk 4-5 Nov 2003.

From November 2001 to April 2002: R&D Signal Processing Engineer at THALES Communications (Consultant from ALTRAN TECHNOLOGIES): Assessment of adaptive array

processing techniques for the detection and parameter estimation of jammers in a military communication satellite.

In 2001: *Software Design and Development* Engineer at DASSAULT DATA SERVICES. Development of data processing tools for an automotive test bench (signal filtering, spectrum and time-frequency analysis) using C++, Active X and MATLAB. Improvement of C programs for a military multi-functions RADAR; THALES (Airsys)

In 2001, National Doctoral Degree (Ph.D.) in Signal, Image and Speech Processing from Institut National Polytechnique de Grenoble. Title of the ***PhD thesis: Source Separation Techniques Applied to Rotating Machine Vibrations***. Design and development of a ***robust to noise separator*** for rotating machine vibrations (submarine application) based on spectral covariance matrices of time delayed set of data and making use of a ***MIMO Wiener Noise Reduction*** Algorithm. Development of simulation software in MATLAB.

Relevant publications:

P.Fabry, *Elaboration d'algorithmes de traitement des niveaux de surface d'eau en preparation d'applicatifs et de services dur l'eau continentale*, Project report, CLS-CNES contract number 104603, Aug. 2011.

P.Fabry, *Détection des surfaces d'eau pour le mode haute résolution de KaRIn sur SWOT : Lot1 : Mise à jour de segmentations par contours actifs en imagerie SAR bande Ka faible incidence*, *Final Report*, CLS-CNES contract number DAJ/AR/IB/2010-6771.

P. Fabry(1), A. Recchia(2), J. de Kloe(3), A. Stoffelen(3), R. Husson(1), F. Collard(1), B. Chapron(4), A. Mouche(1), V. Enjolras(5), J. Johannessen(6), C. C. Lin(7), F. Fois(7), *Feasibility Study of Sea Surface Currents measurements with Doppler Scatterometers*, Living Planet Symposium,

Morten Wergeland Hansen, Fabrice Collard, Knut-Frode Dagestad, Johnny A. Johannessen, Pierre Fabry and Bertrand Chapron, *Retrieval of Sea Surface Range Velocities From Envisat ASAR Doppler Centroid Measurements*, IEEE TRANSACTIONS ON GEOSCIENCE AND REMOTE SENSING, issue 10, volume 49, pp 3582 – 3592, Oct. 2011

Table 3-1: CV Pierre Fabry