

Sylvie Roussel

Interviewed by Gerry Downey

Please tell me about your background.

I am about to turn 40(!), thus I feel it might be a little too early to make a bio... but well, here goes. I was born and raised in south of France and come from a family of teachers, grape growers and winemakers.

Were you always interested in science—how did you choose science as a career path?—education (university) details including scholarships, awards etc.

When I entered the Agricultural Engineering School of SupAgroMontpellier, I was expected to become an oenologist! But being a big fan of science fiction, I discovered that I loved robotics and mathematics too much to follow this path. Therefore, I studied for and obtained a Master's Degree in Agricultural Engineering and then a second one in Robotics before beginning a PhD in chemometrics at Cemagref, under the direction of Pr. Véronique Bellon-Maurel.

Where have you worked since your primary degree?

During my PhD, I mainly worked with data coming from so-called electronic noses and spectrometers (UV and FT-IR). My main achievements were to apply the Bayesian framework to perform multi-sensor fusion in order to combine the multivariate data coming from several instruments. I implemented many preprocessing and multivariate processing techniques for discrimination purposes, including genetic algorithms and Artificial Neural Networks—which were brand new at the time, 15 years ago! The main applied goal was to authenticate grape varieties based on must measurements.

How did you begin to work with NIR? What figures have influenced the direction of your work?

I jumped into the NIR world when I moved to the USA, thanks to Pr. Charles Hurburgh. I obtained a postdoctoral research fellowship at the Grain Quality Laboratory of Iowa State University. As the chemometrician of an agriculture laboratory which contained tens of NIR spectrometers and analysed around 20,000 samples of corn and soybeans per year, I had the chance

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to discover several chemometric issues on crop applications! Among them, I could specifically mention the generation of global calibration models for proximate analysis of bulk grains using ANNs on large databases, model transfer within NIR networks, model robustness towards spectroscopic noise, GMO screening, or NIR embedded on combine harvesters.

What is the major focus of your current work, what do you believe to be the greatest challenges yet to be faced?

On coming back to France, I founded my own chemometrics consulting company in 2003—Ondalys. Our services are aimed at helping companies to improve the quality control of their products and processes in a wide range of fields including agriculture, food, pharmaceutical (PAT) or petrochemistry. We provide advanced chemometric analyses of various types of multivariate data, among them NIR, FT-IR, fluorescence, mass spectroscopy etc. as well as discrete process data or sensory profile data. Our main areas of expertise are related to robust calibration approaches for designing, maintaining and transferring models using, for instance, orthogonal methods or noise simulation. Our cooperation with academic chemometricians is precious for us, like the one we have with Jean-Michel Roger (Cemagref). Quite a lot of issues are still to be explored in the areas of model robustness, preprocessing and a more reliable estimation of prediction validity per sample. We are also working on the combination of sensor data with multi-sensor fusion techniques as well as multi-block exploratory analyses of data coming from different sources (field, raw material, process, end-products), which are typically "French school" methods. Multi-block predictive analysis is another chemometrics challenge to be met.

More recently, with Fabien Chauchard, we founded the INDATECH Company, which is dedicated to the design of innovative optical sensors based on spatially-resolved spectroscopy. Thanks to our patented SAM-Spec[®] technology, we are able to separate the absorption and scattering (μA and μS) information in the vis-NIR spectroscopic signal. This enables more accurate



assessment of physical characteristics and chemical composition of powders, granular or heterogeneous solid products or turbid liquids. The challenge of fully exploiting scattering signals is still to be faced in NIR spectroscopy.

Finally, when you are not working, how do you relax?

But I don't work 24 hours a day! I still have some time for looking after my family, husband and two sons (4 and 9... it takes some energy!). I love travelling, scuba diving or Hobie cat sailing, and also playing volleyball, and dancing salsa.

Thank you Sylvie!



Sylvie sailing her Hobie cat.