“The flexibility provided by the IMSL Library has permitted us to build a unique and flexible post-processing system, allowing us to compete head-to-head in the global weather services market.”

– Brian Peters, Senior Development Meteorologist, Metra

Quick Facts
- Weather service developing statistical post-processing system from scratch to offer more accurate forecasting
- Regression, covariance matrices, Kalman routines and optimization used from the IMSL Fortran Numerical Library running on Linux
- More accurate forecasts have allowed New Zealand’s Metra to compete in global weather services market

The Problem
In the past 10 years, the business of numerical weather prediction has seen some dramatic change. Weather forecasting using computers used to be the sole purview of large national weather services, but lower-cost, high-performance computing changed all that. "The basic concept behind numerical weather prediction has been around for decades. Up until the 1990’s, however, computing power was limited, so the process was chiefly done by large national weather services that had access to supercomputers. In the past decade there has been rapid growth in the number of smaller national weather services and private weather companies applying advanced forecasting techniques, due to the accessibility of low-cost, high-power computing," says Brian Peters of Metra, a New Zealand-based weather services company.

Metra of New Zealand is one such company that has capitalized on low-cost computing.
Brian Peters of Metra was tasked with building more robust Local Area Models (LAMs) for New Zealand by using statistical post-processing. Mr. Peters needed help with developing applications that were flexible and cost-effective but could also help him exploit unique ideas in weather forecasting.
Metra runs a 24 hour a day, 7 day a week operation, so the application had to be robust, fast, accurate and easy to integrate with their existing systems. “During the design process I looked at many different commercially available statistical analysis packages but found that most of them were too "stand-alone" and did not mesh easily with our operational environment, required too much CPU time and memory, were not flexible enough for what we wanted to achieve, did not have particular unique applications that we required, or were just too expensive,” Mr. Peters says. The IMSL Fortran Numerical Library met Mr. Peters’ list of requirements and enabled his team to concentrate on the science, rather than the coding.

The Solution

Mr. Peters uses the IMSL Fortran Library on Linux as part of the post-processing stage for developing the proprietary local area models (LAMs). Statistical post-processing gives the LAM the additional intelligence needed to generate superior forecasts. Metra runs the LAM on other machines as stand-alone processes, then refines the raw LAM output using code containing the IMSL Library algorithms to produce higher quality forecasts.

Metra uses several statistics algorithms in the IMSL Library, including regression, covariance matrices, Kalman and optimization routines. Four times a day in 6 hour blocks, post-processing of the LAM is performed concurrently on separate machines. The code utilizing the IMSL Library runs on desktop PCs. The applications process 10’s of Gigabytes of data per day.

Metra has been very successful selling their forecasts globally to energy companies, who need forecasts for the next day or two, and stock exchange traders, who are interested in 2 week forecasts. Mr. Peters has been very pleased with the IMSL Library and technical support: “We have been using the IMSL Library for five years and have had a very positive experience. Technical support has been helpful and the software has been problem free.”

Return on Investment

Using the IMSL Library has equipped Metra to offer more accurate forecasts that are tailored to the customer’s needs, distinguishing them from their competitors: “The flexibility provided by the IMSL Library has permitted us to build a unique and flexible post-processing system allowing us to compete head-to-head in the global weather services market,” says Mr. Peters.
Internally, the meteorologists writing the forecasts for the people of New Zealand benefit from having more accurate Numerical Weather Prediction (NWP) guidance. Better guidance results in more accurate forecasts that benefit the entire nation - public, commercial, transport, agriculture, marine, aviation, energy, etc.

Better, more accurate, weather forecasts aid in planning and in making critical decisions about the future. Whether it is the farmer planning to deal with a potentially damaging frost, a power plant operator trying to schedule maintenance, a fisherman planning his next trip, or a 747 pilot landing after flying across the Pacific Ocean, accurate weather forecasts assist in safety and commercial decisions throughout the nation.

World Class Products, Services, and Support
Visual Numerics has provided technical software solutions for numerical analysis and visualization for over three decades. The company's software products help users understand complex data from a variety of sources and build business-critical applications. Visual Numerics offers two product lines: the IMSL™ Numerical Libraries for powerful mathematical and statistical analysis and the PV-WAVE® visual data analysis development environment. Visual Numerics also offers customized professional services for applications that involve mathematical, statistical, or visual data analysis to meet today's business analytical needs.

The IMSL Numerical Libraries - which include the IMSL C Library, IMSL C# Library for .NET, IMSL Fortran Library and JMSL™ Library for Java™ applications - are the industry standard for numerical analysis. They deliver developers with the breadth and depth of core algorithms allowing for the rapid development of any application. Whether developing applications in C, C# for .NET Fortran, or Java, or on UNIX, Windows or Linux, the robust IMSL Libraries provide the reliable foundation and the building blocks developers need.

The PV-WAVE family of products - which includes PV-WAVE, TS-WAVE, and JWAVE - delivers engineers with the development tools to efficiently and accurately meet their visual data analysis needs. PV-WAVE solutions allow users to rapidly import, manipulate, analyze and visualize data. The PV-WAVE family also includes robust time series analysis software as well as the ability to share analysis results across the enterprise with a Java-based solution. And, unlike other products, PV-WAVE Advantage includes a sophisticated set of analysis routines based on the industry-standard IMSL Libraries.

In addition, Visual Numerics’ Professional Services combine technical expertise, decades of hands-on experience and a combination of powerful products to create the highest quality solutions possible for your visual data analysis needs.

Visual Numerics unique combination of products and services rapidly enhance ROI by delivering the highest efficiency, greatest accuracy and maximum performance.