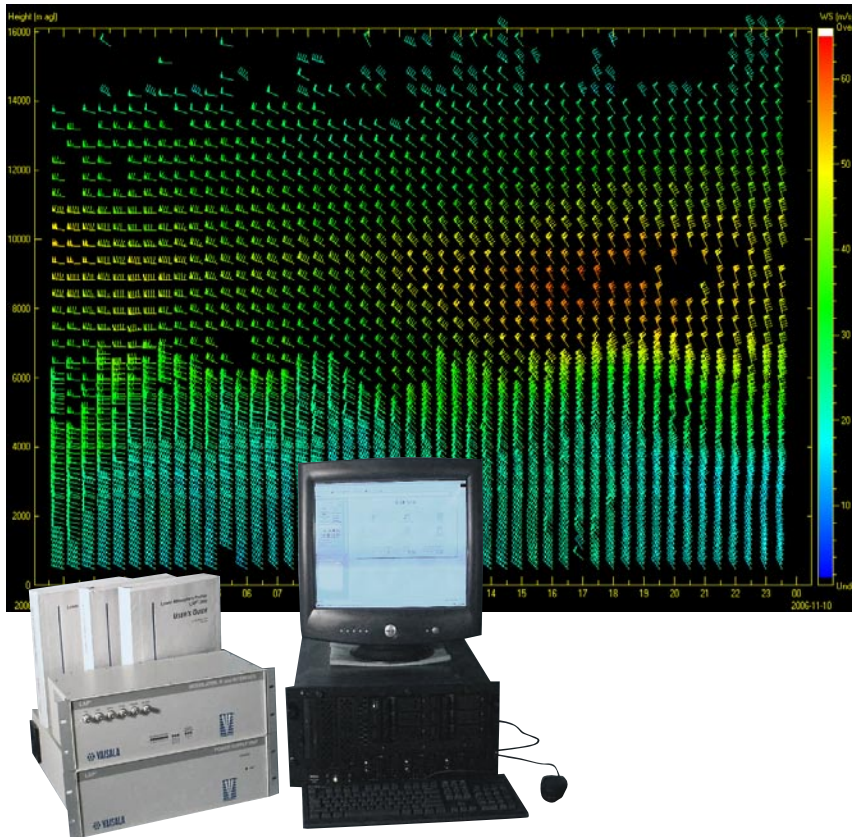


# Vaisala Wind Profiler LAP<sup>®</sup> Digital IF



## Benefits

### Hardware

- Improved dynamic range
- Built-in rejection of strong interference
- Superior image rejection
- Digital quadrature demodulation
- Improved matched filtering

### Software

- Time-series signal processing including wavelets
- Improved access to signal processing modules, algorithms and data products
- Multiple peak picking algorithms
- Real-time quality control of data products

## Digital Signal Processing improves data quality

The Digital IF receiver is a standard component of Vaisala LAP<sup>®</sup> systems or an upgrade to the existing Vaisala LAP<sup>®</sup> product family (Vaisala LAP<sup>®</sup>-3000, Vaisala LAP<sup>®</sup>-8000, Vaisala LAP<sup>®</sup>-12000 and Vaisala LAP<sup>®</sup>-16000). The upgrade is for current Vaisala LAP<sup>®</sup> owners who wish to improve the signal processing and performance of their wind profilers. This product gives better performance at operating locations with interfering ground clutter and offers superior data quality at any site.

The Vaisala LAP<sup>®</sup> Digital IF receiver is a hardware and software enhancement to the Vaisala LAP<sup>®</sup> family of radar wind profilers. The analog-to-digital signal conversion takes place at the intermediate frequency (IF) of the receiver. The new hardware and topology enables improved signal processing techniques that reduce the effects of interference and ground clutter. This allows more accurate automatic selection of the atmospheric signal.

The signal processor, radar control, and IF/modulator functions are replaced with new designs that employ modern technology, including PCI format boards for the digital signal processor and radar controller. The sampling, matched filtering and digital signal processing is performed by a PC-based processing architecture.

New algorithms are incorporated into the Vaisala LAP<sup>®</sup> signal processing software, Vaisala LAP-XM<sup>®</sup>. Among the real-time processing features are modules that provide wavelet clutter reduction, multiple peak picking, running averages of wind consensus values, structure function parameter for the index of refraction ( $C_n^2$ ) data, WMO BUFR output format data, and quality control (using the Weber-Wuertz method) of the final output. Digital receiver modernizes Vaisala LAP<sup>®</sup> systems and adds new functionality and flexibility in processing profiler radar signals into atmospheric measurements.

# Technical Data

## Vaisala LAP® family with Digital IF receiver

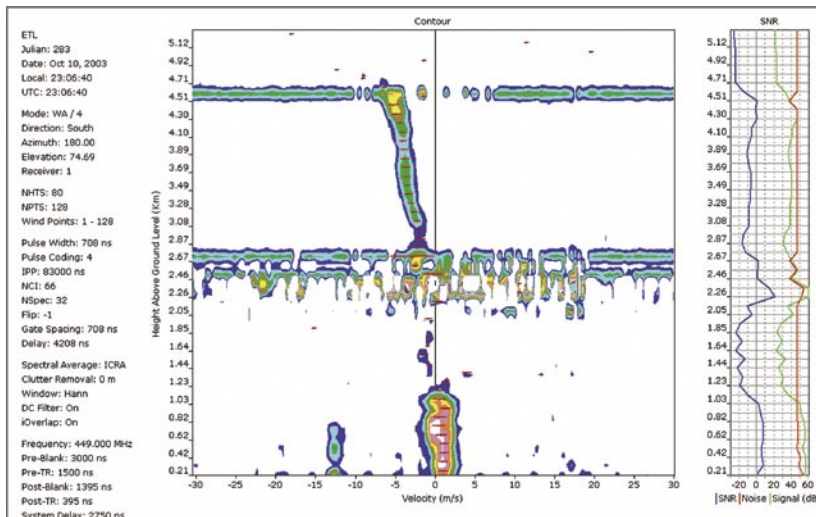
A/D rate	48 MHz
A/D bits	14 bits
Receiver sensitivity	<-130 dBm @ +3 dB Input Sensitivity
Dynamic range	≥84 dB
Number of ranges gates	1 - 255
Number of coherent integrations	1 to >1000
Spectral estimation	FFT (Fast Fourier Transform)
Number of points for spectral estimation	2 <sup>n</sup> , where n = 4 to 16

Signal processing software

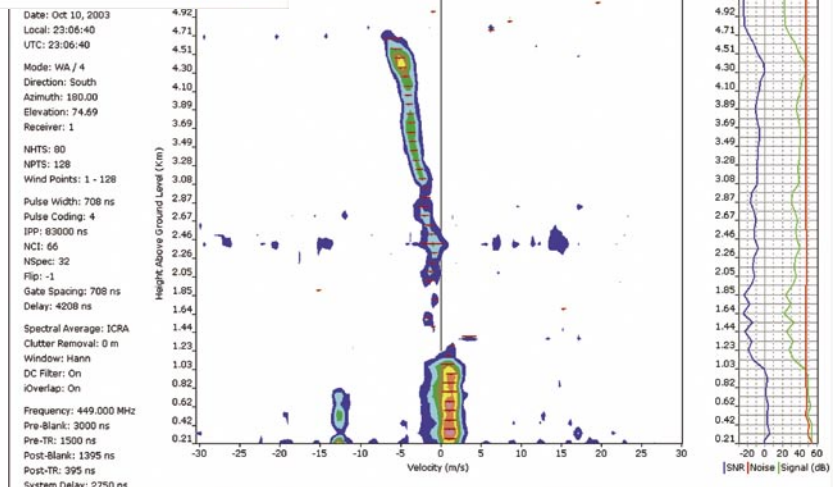
Wavelets for enhanced clutter reduction, Multiple peak picking (MPP) for improved atmospheric signal detection

Applications software  
Output data types

Real-time Weber-Wuertz QC  
Real-time C<sub>n</sub><sup>2</sup> module  
Wind speed and direction, virtual temperature, BUFR, time series, power spectra, moments (total power, SNR, noise, radial velocity)



Sample spectral data prior to wavelet clutter reduction processing.



Same sample spectral data after wavelet clutter reduction processing.



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