HydroClass™ – Superior hydrometeor classification through fuzzy logic

HydroClass™ is the world's first operational hydrometeor classification software. New for 2010 is a polarimetric quality metric removing non-meteorological data from all radar data.

HydroClass™ – Superior hydrometeor classification and data quality.

Vaisala HydroClass™ software makes use of radar observations made in both horizontal and vertical polarization. Dual polarization measurements are formatted as polarization parameters, adding to standard radar events. Combining this information allows easy identification of the types of scatterers present in the atmosphere, such as rain, hail, snow, sleet and even non-meteorological targets such as clutter, sea clutter, insects and chaff.

HydroClass™ identifies weather events in real-time, making the classifications available on real-time displays. This is an advantage over conventional methods which require full volume scans. The latency of classification may be up to 15 minutes from the start of full volume scans versus the real time output of HydroClass™. Classification results are presented by labelling each bin with the hydrometeor class that is most compatible with the observations.

Non-meteorological targets are easily distinguishable with the dual polarization data. Hydroclass™

information is used within the RVP900 signal processor for data quality control and thresholding of all radar measurements – i.e. reflectivity, radial velocity and dual polarimetric data. The technique will remove sea clutter, birds, insects, chaff, and residual ground clutter from the important meteorological data. This provides another exceptional method, along with the traditional ground clutter filters and thresholding, to guarantee the data going into the product algorithms is the finest possible.

Supreme precipitation estimation.

As in Figure 1. in the reflectivity measurement of a conventional single polarization weather radar there is usually only a high intensity of reflectivity indicating possible hail or high rainfall rates. On the other hand, a low intensity of reflectivity from birds, insects and interference also indicates rain, if reflectivity thresholds are not established. This information is crucial for accurate Quantitative Precipitation Estimates (QPE) and in the worst case could lead to erroneous flood warnings without any more accurate information.

In HydroClass™ software image as shown in the Figure 2., the ability to identify and map types of scatterers greatly enhances the power of a dual-polarization radar to see more. In addition to indication of rain, snow and sleet the locations of hail and graupel are clearly indicated with red and yellow, respectively. Also the reflectivities from the non-meteorological targets are perfectly classified and easy to filter out from the precipitation data. This is revolutionary improvement in QPE achieved with dual-polarization radar and very important for various applications.

Applications:

- Hail detection
- Lightning hazard potential forecasting
- Highway snow removal
- Airport terminal operations
- Rain/snow line demarcation
- Melting height detection
- Weather modification for hail mitigation
- Insurance industry claims verification
- Military detection of chaff
- Data quality improvement by elimination of non-meteorological targets
- Improved precipitation forecasting
- Hydrological modeling
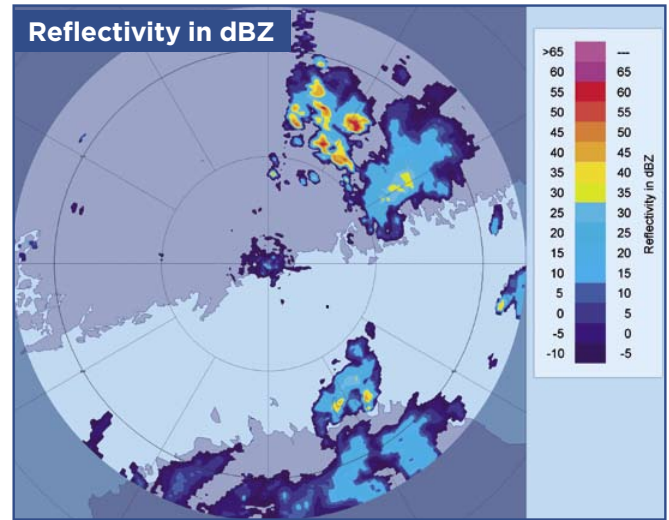- Outputs Hydrometeors or Precipitation Efficiency

Figure 1.
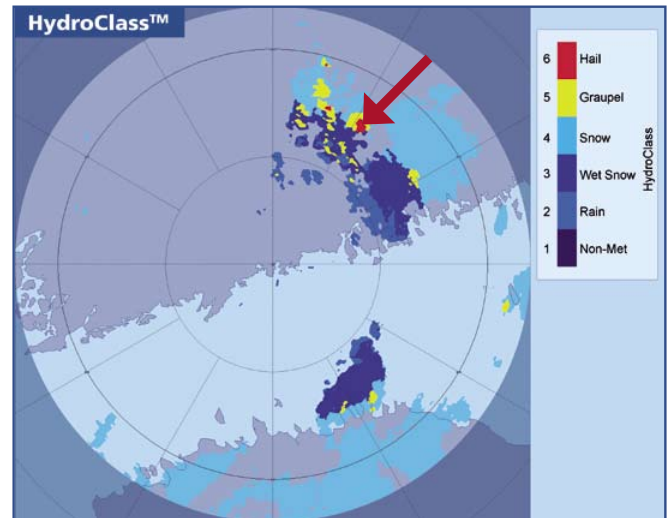*Conventional reflectivity image. (Vaisala)*

Figure 2.
HydroClass™ hydrometeor classification result in the same severe weather event. Hail and graupel are shown in red and yellow respectively. Rain, wet snow and snow are shown in blue, dark blue and light blue. Eye-witness report of the location of hail and graupel is indicated by the red arrow. (Vaisala)

VAISALA

For more information, visit www.vaisala.com or contact us at sales@vaisala.com

CE