

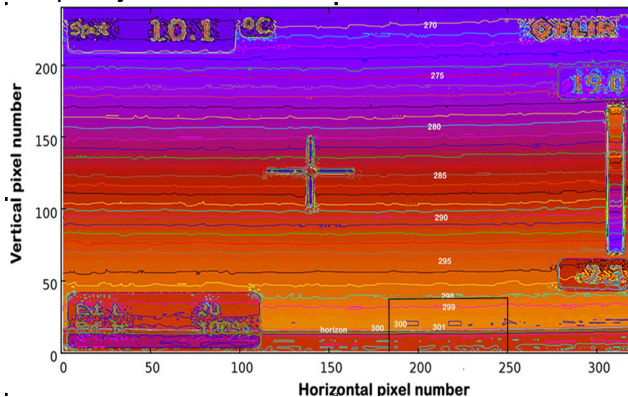
Dakota Ridge R&D

Boulder Colorado

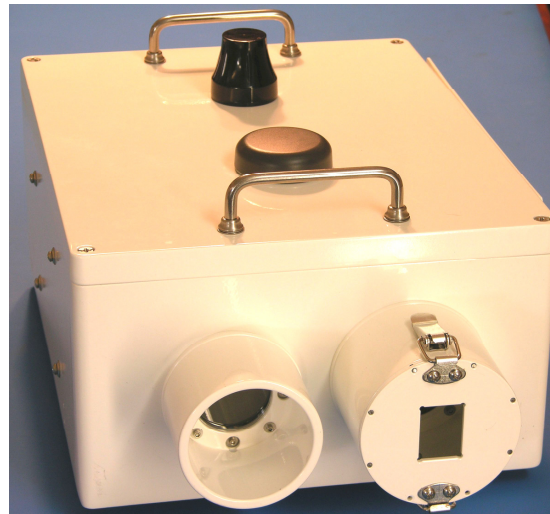
"Passive Infrared Technology for the Environmental Sciences"

Dakota Ridge is a very small LLC formed in 2013 to pursue SBIR contracts soliciting atmospheric sensing.

Current contract effort: Under ONR Phase II contract, Dakota Ridge is developing instrumentation and processing to passively and rapidly obtain high fidelity temperature, RH, and refractivity (ducting) vertical profiles of the atmosphere. We are utilizing high spatial and thermal resolution and accuracy images of the atmosphere in the heretofore unexplored LWIR waveband to capture the thermal structure of the atmosphere. This rapid-sample device also has commercial applications in present weather and weather forecasting, wind energy, and air quality. The device is shown below.



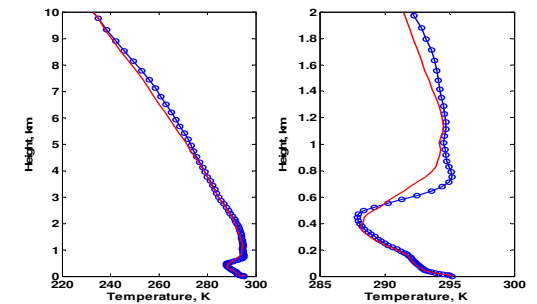
This instrument captures LWIR images of the oceanic horizon and above, and from the thermal structure obtains the thermodynamic profiles. Above is a night time LWIR image of the Persian Gulf showing the thermal gradient in the sky image.



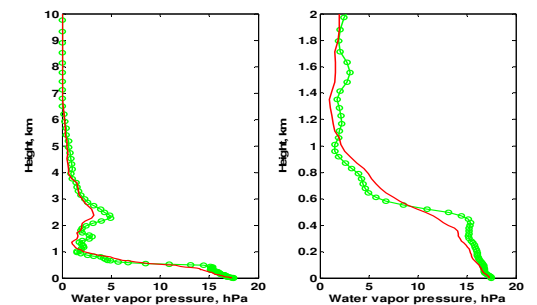
Prototype Hermetic Profiler
18 x 30 x 45cm, 17 kg, 30 watts

The small low SWAP hermetic prototype instrument of the current SBIR effort is pictured above. It is less than one cu.ft., less than 30 watts.

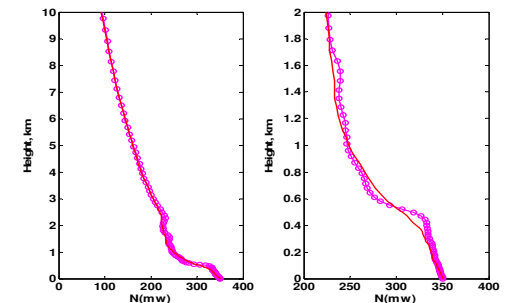
Selected modeled performance results of the passive instrument currently being developed are presented below for temperature, water vapor, and radio band refractivity profiling.



Temperature to 10 km and 2 km



Water vapor to 10 km and 2 km



X-band refractivity N to 10 km and 2 km

Note that refractivity is wavelength dependent.

This instrument allows determination of N or M in all wavebands from the water vapor and temperature profiles.

Who we are:

The combined experience in atmospheric sensing and apparatus of the four personnel in the current SBIR Phase II effort total over 60 years.



President Dr. Fredrick Solheim spent 25 years as President and VP of R&D in Radiometrics Corporation conceiving, developing, patenting, manufacturing, and

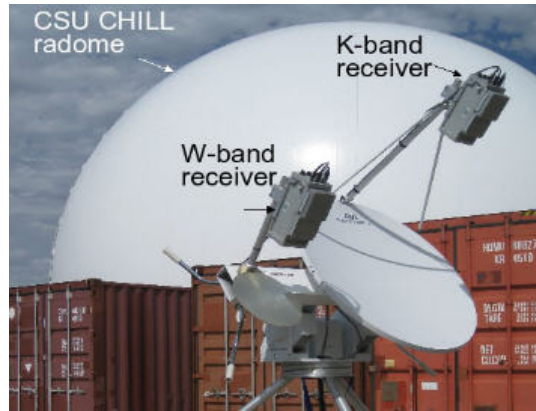
marketing passive microwave radiometers, primarily for atmospheric thermodynamic profiling.

He has an MS degree in Astrophysics and a PhD in Geophysics. He is lead inventor on 9 US and foreign patents and co-inventor on two, and was PI on five SBIR Phase II efforts. One of the patents out of a Phase II has yielded over \$40 million in commercial and military sales.

Some of his passive microwave radiometer instruments from his tenure in Radiometrics Corporation are shown below.

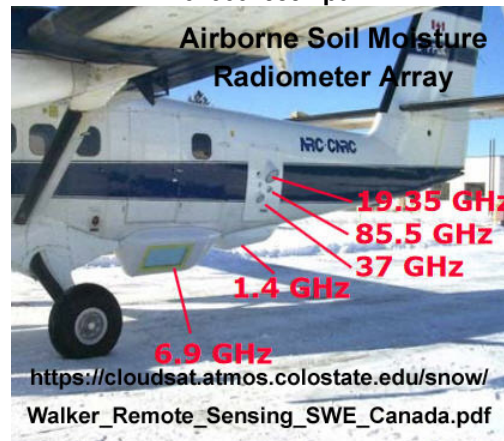


Ground-based thermodynamic profiler
www.radiometrics.com



Aircraft Icing Radiometer

<https://ntrs.nasa.gov/archive/nasa/casi.ntrs.nasa.gov/20100029594.pdf>



Airborne soil moisture radiometer array



Dr. Irisov holds a PhD from Space Research Institute, Russian Academy of Sciences and a Master of Science with honors in Engineering, from the Moscow Institute of Physics and Technology.

Irisov has over 25 years of experience in modeling and processing of data from microwave radiation and scattering from sea surface; microwave propagation in

atmospheres; sea wave generation, interaction, and dissipation, non-linear internal

wave generation and propagation. He is widely published on remote sensing of the ocean and atmosphere and has extensive experience in experimental data processing.

Irisov is proficient in a myriad of programming languages and processing tools.

David R. Hagler is a Senior mechanical engineer with extensive experience in design and test. His career experience includes many years of designing commercial and research passive microwave profilers. He is proficient with Pro/Engineer, Solid Works, Mechanical Desktop 3-D modeling and assembly, and is widely experienced in designing machined parts, mechanism design and test, system-level design and test. His other software proficiencies include Visio, Photoshop, Orcad, Pads PCB.

Optical Engineer **Robert Cormack** has 20+ years experience in developing new methods of imaging for research and industry. Cormack holds 14 patented and has a number of unpatented inventions. He has designed and modeled optical systems requiring programming extensions to optical design programs, such as 3D GRIN lenses, Extended Depth of Field systems for remote iris identification and new ideas in contact lens designs for presbyopes. Cormack has developed new and improved algorithms for image processing and noise removal.

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