

mpl

micro pulse lidar solutions



Unique capabilities and exemplary performance

Sigma Space Corporation produces pioneering instrumentation in **lidar**, **laser ranging**, **attitude determination**, **spectroscopy**, and **radiometry** for remote sensing and defense applications. We also supply **optical** and **electronic subsystems**, as well as **design services** to our government customers.

As a market leader in these areas we enjoy an excellent reputation among our customers, and have become one of the fastest growing providers in the sector.

Our exemplary performance is demonstrated by the **NASA GSFC Contractor of the Year Award**, a prestigious recognition we earned in 2007.

The right instrument to accomplish your mission

Sigma Space has developed **remote sensing instruments** to measure clouds, aerosols, and wind and trace gases in the atmosphere. In 2008, we delivered the main subsystems for the first Global Hawk (an Unmanned Aerial Vehicle) science instrument, the GH Cloud Physics Lidar.

Our company is a pioneer in **photon counting mapping 3-D altimeters**. We are producing instruments currently being used in cryosphere research in Greenland and Antarctica, and in biospheric research through forest measurements. In addition, Sigma's photon counting technology is being applied in NASA's ICESat II mission.

We also produce and commercialize a number of unique **electronic products** for science and industry including ultra fast multichannel scaler boards, timing units, and space qualified protocol translation modules.



**SIGMA
SPACE**



A green company for **green** researchers

Weather and **climate research** have become the principal scientific disciplines to predict the fate of our planet in this century. Over the last decade, our company has excelled in producing some of the most sensitive and, at the same time, affordable and portable tools. We work to probe our atmosphere anywhere in the world, from ground, aircraft, or space platforms. Furthermore, our commitment to **environmental responsibility** does not end with our products. We are committed to operating as a green company, not only utilizing renewable energy sources, but also rewarding our employees for green technology utilization both in their transportation and home applications.



Advanced lidar technology at the top of the market

Micro Pulse Lidar (MPL) systems have been produced by Sigma since 2004, under license from NASA Goddard Space Flight Center*.

Our MPL is a sophisticated laser remote sensing system which provides **continuous, unattended monitoring of cloud and aerosol** profiles in the atmosphere. Based on the same principle as radar, the MPL system transmits laser pulses into the atmosphere and receives the backscattered light. These data are used to generate **atmospheric optical properties** in real time.

Continuous enhancement of product line, fast deployment, ease of use and **minimal maintenance** make our MPL an international success. Our MPL systems have been selected for the NASA global aerosol network "MPLNET". Today, all over the world, from New York to Shanghai, Antarctica to Greenland, from Alaska to Papua New Guinea, Sigma MPL systems are being used for cutting edge atmospheric and environmental research.

* Sigma is the only vendor licensed by NASA to manufacture the MPL-4B lidar systems, under U.S. Patent No. 5,241,315.



mpl top features:

customization:

we offer the MPL system with a base configuration and a variety of options to meet the application goals and deployment requirements for all users, both in stand-alone or network configurations

readiness:

the system is shipped ready for installation, complete with a computer, software and cables with the ability to run on any power source worldwide (AC 100-240V, 50/60 Hz)

low maintenance:

the unit can be operational in a matter of minutes and run autonomously 24/7

free advanced software:

a suite of multipurpose software is included with every purchase which allows turn-key data analysis and user friendly visualization tools

service:

we can perform installation and user training at the customer site upon request



Atmospheric Sensing Applications:

- > Long term measurements of **vertical aerosol distribution**
- > Monitoring of the **planetary boundary layer**
- > Tracking of **stratospheric dust from volcanoes**
- > Observation of **polar stratospheric clouds**
- > Observation of **multiple cloud layers**, better suited than ceilometers for **air traffic support**
- > Tracking of **dust or smoke plumes**
- > **Custom applications** implemented at user request



l i d a r s o l u t i o n s

| | | MPL | MiniMPL |
|-------------|----------------------|---|---|
| PERFORMANCE | range resolution | 15/30/75 m (software programmable) | 15/30/75 m (software programmable) |
| | minimum range | 150 m | 150 m |
| | accumulation time | 1 sec - 15 min | 1 sec - 15 min |
| | detection range | up to 25 km | up to 10 km |
| | polarization | optional | standard |
| | scanning | optional | optional |
| OPTICS | laser wavelength | 532 nm | 532 nm |
| | laser pulse energy | 6-10 μJ @ 2500 Hz | 3-4 μJ @ 5000 Hz |
| | eye-safety | ANSI Z136.1 2000, IEC 60825 | ANSI Z136.1 2000, IEC 60825 |
| | receiver diameter | 178 mm | 80 mm |
| | pump laser diode | fiber coupled, user replaceable | |
| | detector | fiber coupled, user replaceable | fiber coupled, user replaceable |
| DIMENSIONS | size (mm) | 300x350x850 | 380x305x480 |
| | weight (portability) | 25+2 kg (2 persons) | 16 kg (1 person) |
| DATA | operating system | Windows XP/Vista/7 | Windows XP/Vista/7 |
| | computer interface | USB | USB |
| | data transfer | LAN Ethernet | LAN Ethernet |
| ENVIRONMENT | temperature | Operating -10° to 40° C with NEMA 4 enclosure | Operating -10° to 40° C with NEMA 4 enclosure |
| | humidity | Operating 0-100% with NEMA 4 enclosure | Operating 0-100% with NEMA 4 enclosure |
| POWER | supply | 100/240V AC 50-60 Hz | 100/240V AC 50-60 Hz |
| | consumption | 500W | 350W |

Can our Lidar become even lighter?

Yes! We now offer a new product, the **MiniMPL**, which takes lidar technology to a new level of **portability, size and cost-effectiveness**.

The MiniMPL is the first lidar in the market which has **all the electronics integrated with optics in one single box**. It is contained in a 24x30x48 cm enclosure, allowing a single operator to easily manage the **16 kg** weight of the full instrument. All of these features make it ideal for fast field deployment.

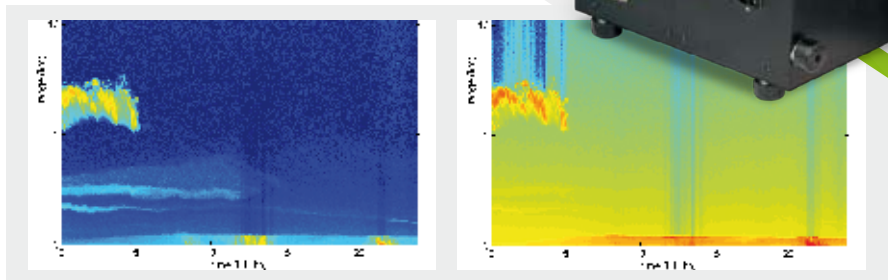
At the same time, MiniMPL inherits almost all of the attractive optical design features of MPL, like a stable optical train and a fiber-coupled detector. It is optimized for the **near range (0-5 km) of the atmosphere**, and is therefore well suited for Atmospheric Boundary Layer (ABL) measurements.

Our standard package includes **depolarization** measurement – very useful in identifying pollution aerosol with different shapes (dust pollution). An optional scanner, capable of 360 degree scanning, is ideal to create a two-dimensional aerosol/plume/pollution map of a city or urban area.



Green laser: the best solution

- > optimized for aerosol sensing
- > more sensitive to PM 2.5 particles
- > completely skin safe
- > green light visibility for easy use and early alert

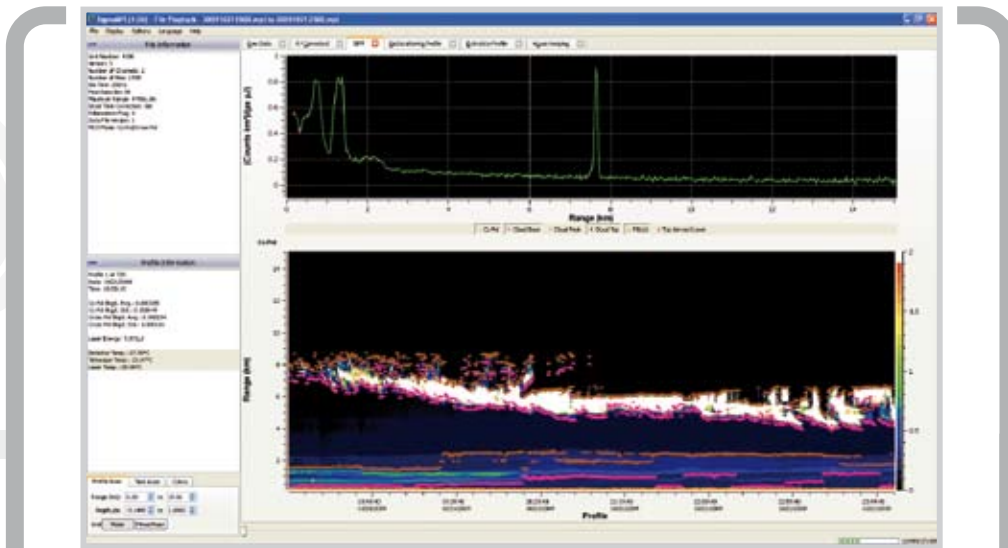


Why is polarization measurement so important?

Cross polarization measurements provide more details of the aerosol layers than co-polarization signals alone. For example, depolarization can be observed from the aerosol layer at 2-3 km, which could be ice crystals.

SigmaMPL-Software: data turned into information

We provide a **free multi purpose software** that performs **instrument control, real time data processing, data archiving** and **playback functions**, to decode the MPL's raw signal into **understandable information**. This interface is the same for both the MPL and MiniMPL, and no extra training is required if you plan to use both instruments.

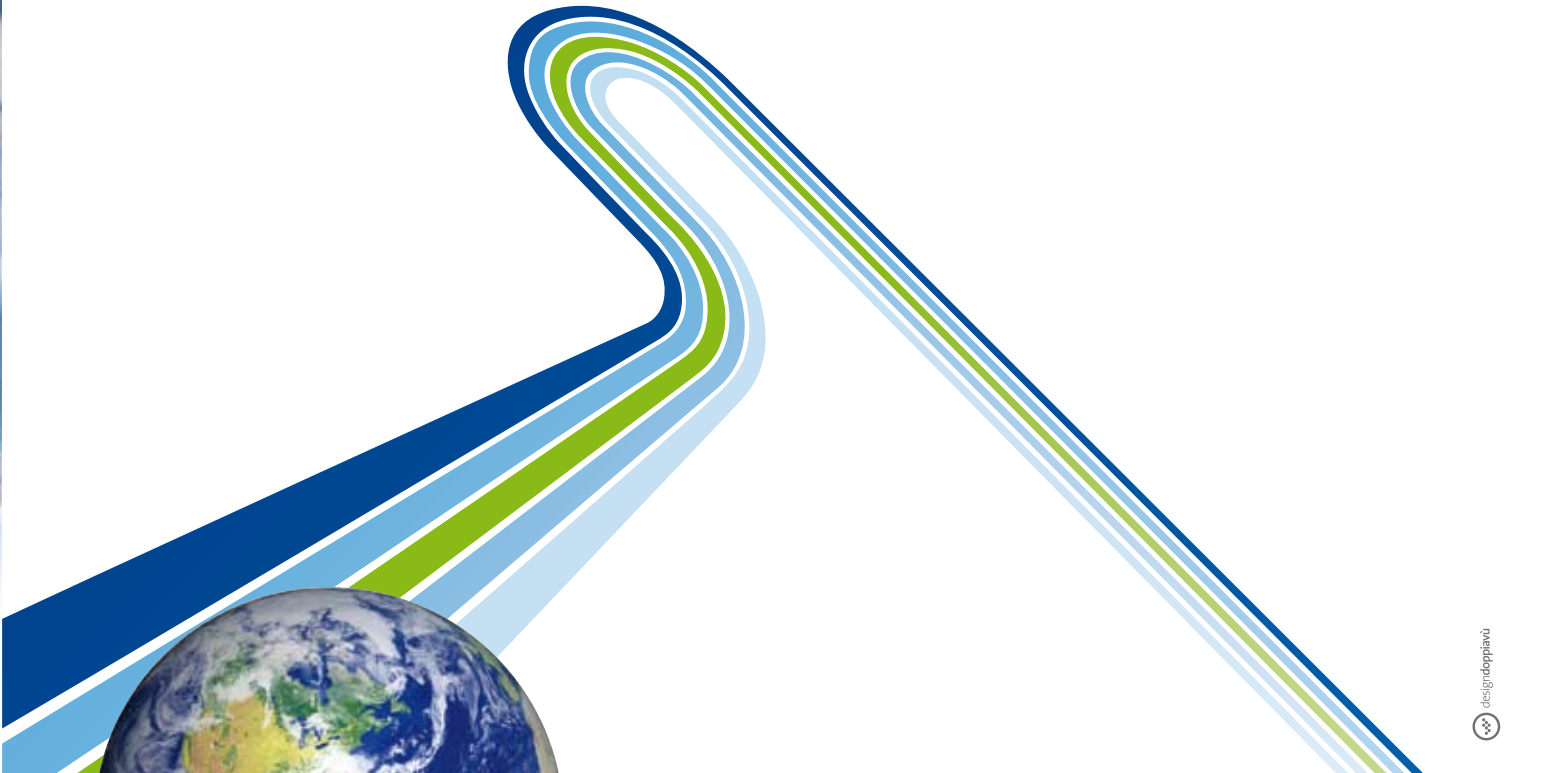


A glimpse of SigmaMPL-Software

The top left side contains the parameters of the data acquisition and the instrument itself. At the bottom left are display controls such as range of axis and line colors. The right side contains the signal-range plot (1D) and false color time history plot (2D). The user can click the tabs on the top right to switch between different level processing or even debug data. The markers which show interesting layers of the atmosphere can be turned on/off conveniently. Floating texts pops up when the mouse hovers over a detected layer.

Software Features

- Displays raw and range corrected signal graphs for **data quality monitoring**
- **Level 1:** real time Normalized Relative Backscatter (NRB) plot with cloud and Planetary Boundary Layer (PBL) detection
- **Level 2:** extinction, backscattering coefficients, Aerosol Optical Depth (AOD) and more...
- Combines days, weeks or months of data to observe long term **trends in the atmosphere**
- **Exports data and graphs compatible** with Matlab, Microsoft office or image processing software



designpoint

For all MPL inquires, please contact:
micropulse.lidar@sigmaspace.com

Sigma Space Corporation

4400 Lottsford Vista Road, Lanham, MD 20706
United States of America
Telephone: +1 301.552.6000
Fax: +1 301.552.6411
www.micropulselidar.com

