

III. Executive Summary (limited to one page)

The Northern Great Plains Center for People and the Environment (CP&E) at the University of North Dakota, together with other departments on campus, requests funding for the **Center of Excellence in Space Technology and Operations (STO)**. This new Center will (1) bring to North Dakota an aerospace company, **GeoOptics LLC**, which will create 25 new high-value jobs within the first 5 years, growing to 40 by 8 years; (2) significantly expand one of North Dakota's targeted areas of economic development – **Aerospace** – such that spacecraft operations can become a major area of future growth; (3) conduct research, using a fundamentally new source of data about atmospheric conditions, to improve weather forecasts and increase the competitiveness of North Dakota universities for funding opportunities; and (4) extend important benefits to people of the region and to society in general.

GeoOptics, together with their partner **Broad Reach Engineering**, is building **CICERO**, a constellation of Earth-orbiting spacecraft that will commence operations in 2011, and which will continually take atmospheric measurements in hundreds of place simultaneously around the globe. These measurements are a potent, new, yet well-demonstrated technique which dramatically improves weather forecasts and yield scientific data of unrivalled accuracy and resolution. **Should the new Center be established, GeoOptics will locate a CICERO Mission Operations and Analysis Center in Grand Forks, with UND as its academic partner, to foster joint research into new scientific or commercial uses that can arise from such a dramatic improvement in atmospheric data. Funds would pay for salaries, equipment, and operating costs for graduate students and faculty at UND in at least three departments, which will perform collaborative research with GeoOptics, and for operations of the Agricultural Camera (AgCam), a UND-built sensor soon onboard the International Space Station, which will serve as a CICERO pre-cursor training testbed. The Center of Excellence in Space Technology and Operations will introduce a new, future-oriented industry to North Dakota, and will open new avenues of research for UND faculty and students.**

Attachment 1: Budget Information and In-Kind Valuation

Center of Excellence in Space Technology and Operations Budget Plan First Five Years

	2009	2010	2011	2012	2013	Total
UND Personnel						
Faculty/Staff	92,000.00	126,000.00	165,376.00	173,646.00	40,599.00	597,621.00
Students	47,507.00	145,648.00	162,558.00	170,688.00	123,067.00	649,468.00
Fringe Benefits	31,402.00	49,451.00	62,617.00	65,749.00	22,026.00	231,245.00
Total Personnel	170,909.00	321,099.00	390,551.00	410,083.00	185,692.00	1,478,334.00
Operating Costs	30,303.00	98,809.00	195,600.00	195,600.00	176,400.00	696,712.00
Equipment	0.00	1,800,000.00	0.00	0.00	0.00	1,800,000.00
Tuition	14,000.00	44,450.00	57,373.00	60,942.00	68,189.00	244,954.00
F&A	70,424.00	122,468.00	145,652.00	152,489.00	67,232.00	558,265.00
Total Center Budget	285,636.00	2,386,826.00	789,176.00	819,114.00	497,513.00	4,778,265.00
Matching Funds - Timeline of Availability						
	2009	2010	2011	2012	2013	Total
Private Sector Match						
Cash Match	120,000.00	120,000.00	160,000.00	200,000.00	240,000.00	840,000.00
subtotal Cash Match	120,000.00	120,000.00	160,000.00	200,000.00	240,000.00	840,000.00
In-Kind		1,800,000.00				1,800,000.00
Equipment, Facilities						
In-Kind Facility Lease Cost		70,000.00	70,000.00	70,000.00	70,000.00	280,000.00
subtotal In-Kind Match	0.00	1,870,000.00	70,000.00	70,000.00	70,000.00	2,080,000.00
In-Lieu of Cash			100,000.00	100,000.00	100,000.00	300,000.00
GeoOptics Atmos. Data						
subtotal In-Lieu of Cash Match	0.00	0.00	100,000.00	100,000.00	100,000.00	300,000.00
Total Private Sector Match	120,000.00	1,990,000.00	330,000.00	370,000.00	410,000.00	3,220,000.00
F&A Match	70,424.00	122,468.00	145,652.00	152,489.00	67,232.00	558,265.00
Total Match	190,424.00	2,112,468.00	475,652.00	522,489.00	477,232.00	3,778,265.00
Total Center of Excellence Request	95,212.00	274,358.00	313,524.00	296,625.00	20,281.00	1,000,000.00

Center of Excellence in Space Technology and Operations

Budget Narrative

Salaries and fringe benefits for faculty and staff, to include summer research appointments for faculty. Some of the faculty may need to be put on overload to receive these funds. Includes funds for graduate research assistantships and for undergraduate student assistants. Also includes \$1 million of GeoOptics personnel as in-kind matching funds, which is only a portion of the total GeoOptics personnel costs over the first five years of operation.

Operating costs, including expenses for travel, including international travel; communication costs, including phone line or cell phone charges; data processing, including software and software maintenance; duplication and printing; other fees, including subscriptions and memberships; office supplies; including postage and shipping; repairs; fees, to include advertising; and other general expenses. Includes minor equipment and supplies, such as personal computers, monitors and displays, printers, networking equipment, office or laboratory furniture and equipment, and other supplies. In-kind matching operating costs from GeoOptics include rent for office space and donated datasets (radio occultation atmospheric soundings).

Equipment costs, to include fiber optics switches, data server storage and related equipment. In-kind matching equipment will include \$1.2M from GeoOptics for communications, computing, and office facilities; and \$600K from Broad Reach Engineering for communications equipment, which may include roof or ground installed tracking dish and radome, as well as telemetry screens, computers, control software, and backup systems to include auxiliary power generators and related facility modifications.

Tuition costs for in-state or out-of-state tuition waivers associated with graduate student assistantships at the master's or PhD level.

Facilities & Administrative (F & A) costs. University allocated costs for facilities and administrative expenses associated with the grant. Such costs are not allowable for this state-funded grant; thus these are matching funds provided by UND.

Matching Funds Availability Timeline

2009: GeoOptics will provide \$120,000 in cash contributions to UND to enable research activities to immediately begin using atmospheric measurement data from the prototype COSMIC systems. UND will incur F&A costs, this and all subsequent years.

2010: GeoOptics will begin leasing office space in Grand Forks, estimated at \$70,000 annually for this and subsequent years, and will invest \$1,200,000 in facilities improvements; Broad Reach Engineering will invest another \$600,000. In addition, another \$120,000 of GeoOptics cash contributions to UND will be used for match; UND F&A costs continue.

2011: As CICERO becomes operational, \$100,000 worth of atmospheric RO data will be made available to UND scientists, this year and each subsequent year. Another \$160,000 of GeoOptics cash contributions to UND will be used for match. UND F&A costs continue.

2012: In-kind facility lease and RO data donations continue. Another \$200,000 of GeoOptics cash contributions to UND will be used for match. UND F&A costs continue.

2013: In-kind and facility lease and RO data donations continue. Another \$240,000 of GeoOptics cash contributions to UND will be used for match. UND F&A costs continue.

GeoOptics Salaries Not Used For Match. During the first five years, GeoOptics is expected to spend about \$5.5 Million in total personnel costs in the Center. None of these salary costs are counted as matching funds in this proposal.

Additional Private-Sector Funds Beyond First Five Years. This proposal is for the first five years of operation of the Center of Excellence in Space Technology and Operations. GeoOptics has pledged an additional \$1.8 million in cash contributions, continuing out for a full 10 years. Although beyond the timeframe of this COE proposal, private-sector expenditures in excess of \$18 Million are expected to be incurred in years 6-10 of the Center's operation, according to the following timeline:

	2014	2015	2016	2017	2018	Total
Cash	\$ 280,000	\$ 320,000	\$ 360,000	\$ 400,000	\$ 440,000	\$ 1,800,000
In-Kind						
Personnel	\$2,242,000	\$2,754,000	\$3,310,000	\$3,476,000	\$3,650,000	\$15,432,000
RO Data	\$ 100,000	\$ 100,000	\$ 100,000	\$ 100,000	\$ 100,000	\$ 500,000
Lease	\$ 70,000	\$ 70,000	\$ 70,000	\$ 70,000	\$ 70,000	\$ 350,000
	<u>\$2,762,000</u>	<u>\$3,324,000</u>	<u>\$3,930,000</u>	<u>\$4,146,000</u>	<u>\$4,320,000</u>	<u>\$18,482,000</u>

**Center of Excellence in Space Technology and Operations
Private Sector Funds, Years 6-10**

Valuation of In-Kind Matching Funds

In-Kind, Equipment and Facility Upgrades

GeoOptics and Broad Reach Engineering will jointly make improvements to leased facilities and equip them as a CICERO Mission Operations and Analysis Center. Valuation estimates are provided by GeoOptics and Broad Reach Engineering in their respective attached Letters of Support.

In-Kind, Facility Lease Cost

GeoOptics initially requires about 3000 square feet, growing to 5-6000 square feet after about 5 years. Additional space can be at a separate location. Other requirements include access to high-speed data networks, the ability to add a roof-mounted tracking dish and radome, and to add backup generator capability if not already available. Proximity to UND is desirable.

To establish in-kind value, two locations were considered: the Center of Excellence for Life Science and Advanced Technology (COELSAT) building, and a private property at 4775 Technology Circle, both just west of the UND campus in Grand Forks.

- Based on discussions with the designated realtor, at 4775 Technology Circle, there are 3,475 square feet available at a monthly rent of \$13 per square foot, including access to common areas. Utilities are additional. Spaces are in various degrees of finish level.
- Based on discussions with the director, Kevin Cooper, the COELSAT building currently has about 2700 square feet of space available that would be suitable for GeoOptics use. Including common areas, chargeable space would amount to 3,450 square feet. Rates for the timeframe are not firmly established, but are estimated at \$19-20 sq. ft., including utilities; or about \$65-70,000 annual cost, the latter of which was used as valuation.

In-Kind, GeoOptics Personnel

None of the salary costs of GeoOptics are used for match, though we do show estimated potential values in the Timeline of Availability section. The numbers of GeoOptics employees each year are based on estimates provided by GeoOptics (see attached Letter of Support). The types of employees are based on discussions with GeoOptics and Broad Reach Engineering, and are described broadly by the latter in their attached letter. Salary estimates are based on information from Job Service North Dakota (2008 edition, Wages for ND Jobs; document available at www.ndworkforceintelligence.com) for statewide averages for North Dakota of comparable job titles and responsibilities:

- Spacecraft Controllers (Job Service Codes 51-8013 and 53-2021)
- Network and Computer Systems Administrators (Job Service Code 15-1071).
- Engineering Manager (Job Service Code 11-9041).
- Secretary (Job Service Code 43-6014).

No entries exist for spacecraft controllers; as an estimate, an average of entry-level salaries for Power Plant Operators and Air Traffic Controllers was used.

In-Lieu Of Cash, CICERO RO Data

Once CICERO becomes operational in 2011, GeoOptics will make available at no charge all radio occultation data from CICERO, for research use by UND scientists and students. GeoOptics values this contribution at \$100,000 annually (see attached Letter of Support).