

## **A community survey on an initiative to create a land-atmosphere interface sensor array facility**

**13 June 2007**

Dear Colleague,

Thank you for taking the time to give us your input on the development goals of a potential new community resource – the Networked Environmental Sensor Array Facility (NESAF).

In recent years many geoscientific and related sciences groups (atmospheric science, ecology, hydrology, biogeosciences, atmospheric chemistry, soil science, agricultural and forest meteorology, and others) have described a research need for in-situ land-atmosphere interface measurements on larger scales and with greater resolution than are possible with current NSF facilities (see attachments). This limitation has hindered scientific progress within and among the disciplines and we are exploring the development of a facility that would reasonably address the need.

We have outlined a prototype in-situ facility called the *Networked Environmental Sensor Array Facility (NESAF)*. It would use emerging and existing technology, and include development and miniaturization of sensors to create an easily deployable (essentially wireless, lightweight, low-power, off-the-grid, easily interfaced) tower-based sensor network. The goal of this facility is to enable practical, affordable deployment of 100 or more such towers with a total of several thousand sensors, and to make it possible to deploy from several months up to a few years.

Our current Integrated Surface Flux Facility utilizes many of the required sensors but (ISFF; <http://www.eol.ucar.edu/rtf/facilities/isff/isff.html>) would be prohibitively time consuming to deploy as such an extensive network and over long time scales. Remote sensing and satellite data would supplement but currently cannot replace the scientific need for this in-situ equipment for a variety of reasons, including the need for, 1) continuous, closely-time-stamped measurements, 2) detailed measurements in heterogeneous or complex terrain, 3) flux measurements and 4) correlated and comprehensive atmospheric, soil and canopy measurements.

Please see the attached documents for more detailed information and figures describing a potential NESAF.

Again, thank you for your time and effort in completing this short survey. Please contact me with any questions.

Sincerely,

Greg Poulos

*In-situ Sensing Facility scientist, on behalf of EOL and NCAR*

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## Survey Questions (please return to nesaf@eol.ucar.edu)

1. What scientific question(s) would you address using such a facility? (please include references, if available)

2. Please rank and specify the measured variables that should be included.

<u>Rank</u>	<u>Variable</u>	<u>Height(s)</u>	<u># locations/spacing</u>	<u>Data rate</u>	<u>Accuracy</u>
-------------	-----------------	------------------	----------------------------	------------------	-----------------

- |       |                    |  |  |  |  |
|-------|--------------------|--|--|--|--|
| _____ | Pressure           |  |  |  |  |
| _____ | Rain               |  |  |  |  |
| _____ | Snow depth         |  |  |  |  |
| _____ | Snow water         |  |  |  |  |
| _____ | Wind spd/dir       |  |  |  |  |
| _____ | Temperature        |  |  |  |  |
| _____ | Humidity           |  |  |  |  |
| _____ | Chemical           |  |  |  |  |
| _____ | CO2                |  |  |  |  |
| _____ | O3                 |  |  |  |  |
| _____ | CH4                |  |  |  |  |
| _____ | _____              |  |  |  |  |
| _____ | _____              |  |  |  |  |
| _____ | _____              |  |  |  |  |
| _____ | Momentum flux      |  |  |  |  |
| _____ | Sensible heat flux |  |  |  |  |
| _____ | Latent heat flux   |  |  |  |  |
| _____ | Chemical flux      |  |  |  |  |
| _____ | Radiation          |  |  |  |  |
| _____ | Net                |  |  |  |  |
| _____ | Visible            |  |  |  |  |
| _____ | IR                 |  |  |  |  |
| _____ | PAR                |  |  |  |  |
| _____ | Direct             |  |  |  |  |
| _____ | Diffuse            |  |  |  |  |
| _____ | _____              |  |  |  |  |
| _____ | LAI                |  |  |  |  |
| _____ | Soil               |  |  |  |  |
| _____ | Temperature        |  |  |  |  |
| _____ | Moisture           |  |  |  |  |
| _____ | Heat flux          |  |  |  |  |
| _____ | Heat capacity      |  |  |  |  |
| _____ | CO2                |  |  |  |  |
| _____ | O2                 |  |  |  |  |
| _____ | PH                 |  |  |  |  |
| _____ | _____              |  |  |  |  |
| _____ | Web camera         |  |  |  |  |
| _____ | Other _____        |  |  |  |  |
| _____ | _____              |  |  |  |  |
| _____ | _____              |  |  |  |  |
| _____ | _____              |  |  |  |  |

3. What spacing *between towers* would you require? How would you group towers?

4. Would your university or institution be interested in proposing the development (or joint development) of miniaturized, wireless, low-power, lightweight sensors that could be integrated into the concept system? If so, what instrument type(s)?

5. Please add any additional suggestions or comments.