BioEarth

Biosphere-relevant earth system model

2014 Atmospheric Issues Stakeholder Workshop Summary Report

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In February 2014 the BioEarth project's communication and extension working group convened a stakeholder advisory workshop focused on atmospheric issues in order to build understanding among research team members of how the BioEarth integrated earth systems model might produce outputs that are relevant to the needs of decision-makers concerned with air quality in the Columbia River Basin. The workshop, held in Seattle, brought together a group of 14 stakeholders and 5 BioEarth researchers. This series of issue-based stakeholder workshops is a step toward greater information sharing and collaboration among university-based environmental modelers and stakeholders who can provide guidance and feedback to the modeling team and potentially use model results.

The workshop was designed to gain insight about 3 key questions:

1. What are stakeholders' most pressing concerns about current issues and future changes?
2. What information would aid in making better decisions?
3. How can the modeling approach be refined and scenarios be developed to produce outputs that are relevant to stakeholders' concerns?

I. Stakeholders represented at the workshops

55 individuals were identified and invited, 16 stakeholders were expected the attend the workshop, and a total of 14 were able to attend (3 federal government, 5 state government, 1 tribal government, 4 local government)

Academic/science (1 individual): WSU Dryland Research Station

Federal Government (3 individuals): EPA, NPS

State Government (5 individuals): Washington Ecology, Idaho DEQ, Oregon DEQ, Idaho Public Health

Tribal Government (1 individual): Nez Perce Air Quality Manager

Local Government (4 individuals): Spokane Clean Air Agency, Whatcom County Conservation District, Puget Sound Clean Air Agency

Groups not represented at the stakeholder workshop, but recommended for future inclusion by attending stakeholders: NGOs, industry representatives from industries with air quality impacts, transportation planners, WA Health department, land managers who do prescribed burning or deal with wildfires, grass seed producers and wheat farmers and other producers who burn seasonally, livestock operations.

Citation: Allen, E., Kruger, C., Stephens, J. and Yorgey, G. (2014). *BioEarth Atmospheric Issues Stakeholder Advisory Workshop Synthesis Report*. Washington State University.

II. Dominant regional issues of interest and concern

Social, economic, policy changes:

- Impacts of air quality on chronic illness (chronic obstructive pulmonary disease, etc.)
- Conversion of diesel to electric motors
- Incentive programs to replace old wood stoves
- Impacts of possible policy changes on the ability to meet air quality standards (e.g. as a result of adding ammonia to EPA criteria pollutants list or more stringent ozone standards)
- Limitations on resources for regulatory agencies, which restrict the ability to develop strategies to comply with current air quality standards and address climate change impacts.

Environmental issues:

- Concerns about the effect of long term changes (e.g. climate change, transport of pollutants from Asia) on the ability to meet air quality standards
- Continuing improvements in understanding of sources/formation of ozone and PM 2.5, transport of ammonium nitrate, ultrafine particulate matter (smaller than PM2.5)
- Visibility impacts from haze
- Ocean acidification as a result of SOx and NOx
- Water quality impacts from mercury, N deposition and other toxics
- Odor impacts from dairies

Management and decision-making:

- Direct and indirect impacts of biofuel production (e.g. from slash piles in forestry, oilseeds, or anaerobic digestion) on air quality issues
- Impacts of prescribed burning on air quality and fire cycle
- Impacts of tillage and other agricultural management practices on agricultural dust
- Trade-offs between managing for criteria pollutants (PM10, PM2.5) and other factors (greenhouse gasses, etc.)

III. Information that may aid decision-makers

Model Scope: For model results to be broadly relevant, representing seasonal trends in criteria pollutants, long-term air quality trends and worst-case scenarios for the regional is important. Modelers should strive to address different impacts of dry and wet N transport, feedbacks between agricultural practices and air quality, visibility and health, and climate change impacts on air quality, forests and wildfire.

Model Time Frame: Often times phenomena (N deposition, etc.) need to be understood on a monthly or seasonal time scale, but longer range projections are needed for planning and management. Local planning agencies may need to focus most on near-term projections (~2 years), but regulatory recognize the need to think about long-term trends and worst-case scenarios.

Model Geographic Scale: Climate change impacts on air quality at a fine spatial scale are of interest (agencies lack the tools to do this fine spatial scale analysis), the dominant issues of concern are highly variable across the study region, most decision making and regulatory power is at the local/ individual level, but the sources of concerns facing the region are often global in scale (e.g. coal fired power plants in India and China).

IV. Scenarios to Explore:

- Understand “worst case scenario” impacts of factors beyond regional control (e.g. climate change, transport of pollutants from Asia) on ability to meet air quality standards in this region.
- Model a change from cropland to urban area (or from one crop to another, for example the shift in Whatcom County from grass crops to raspberries). What are the implications for air and water quality?
- Model crop shifting, such as increased grape production in Washington, which leads to shifts in pesticides and herbicides. Which new pollutants become risks?
- Explore connections between populations and pollution: understand the demographics of populations most affected by air pollutants.
- Assess impacts of changes in water availability on wildfire. Compare smoke-related air quality impacts from wildfires versus air quality impacts of aggressive thinning and assess whether health risk costs offset the cost for treatment for forests.
- Impacts slash pile burning on air and water quality and soil nutrients.
- Impacts of biofuel production and tillage practices on agricultural dust: Washington State has a mandate for 4% biofuel, but crops like camolina and canola leave less residue and thus dust is more of an issue.
- Model a shift to public transportation with reduced auto pollution: How would it impact overall regional air quality?
- GHG reduction modeling: it's problematic to model best management practices; instead modelers can assess impacts of a percentage reduction in regional or global GHG emissions.
- Determine N critical loads for the high-elevation plant and aquatic communities in western Oregon and Washington and for grasslands in the Columbia Basin.
- Assess impacts of global change (e.g. rising temperatures, changes in snowpack, timing of spring run-off) on the distribution of agricultural and forested zones.

V. Reflections on Communication:

- Information needs accessible in the right "voice" for professionals who use research results in policy decision making and for specialists who adapt and communicate scientific information for the general public
- Having a single resource for meta-analysis covering various air and water quality issues could be helpful—managers want to see research conducted at different institutions and in different sectors synthesized in one place
- Online adjustable models (gaming models) may be an interesting tool to explore
- It’s not the typically the quantity or quality of information that needs to be developed. Often the issue is organization and easy accessibility of information—especially for users who do not have direct access to a university library’s online content
- More examples of potential model products would be appreciated to help stakeholders understand the possible utility of the model
- Maps and graphics are often the most compelling way to present modeling results—and can be especially powerful for air quality and atmospheric issues, where there is often nothing easily visible to the public
- Webinars and fact sheets are generally very well received by the air quality management and decision-making community

Additional findings from the atmospheric issues workshop session are available from the BioEarth Communication team, including a spreadsheet of actionable recommendations prepared for the research team. We greatly appreciate the time and energy that BioEarth researchers and stakeholders have invested in the workshop process, and feel that the questions raised and perspectives shared at the stakeholder advisory workshops have been extremely valuable in guiding the research team’s approach to model development.

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