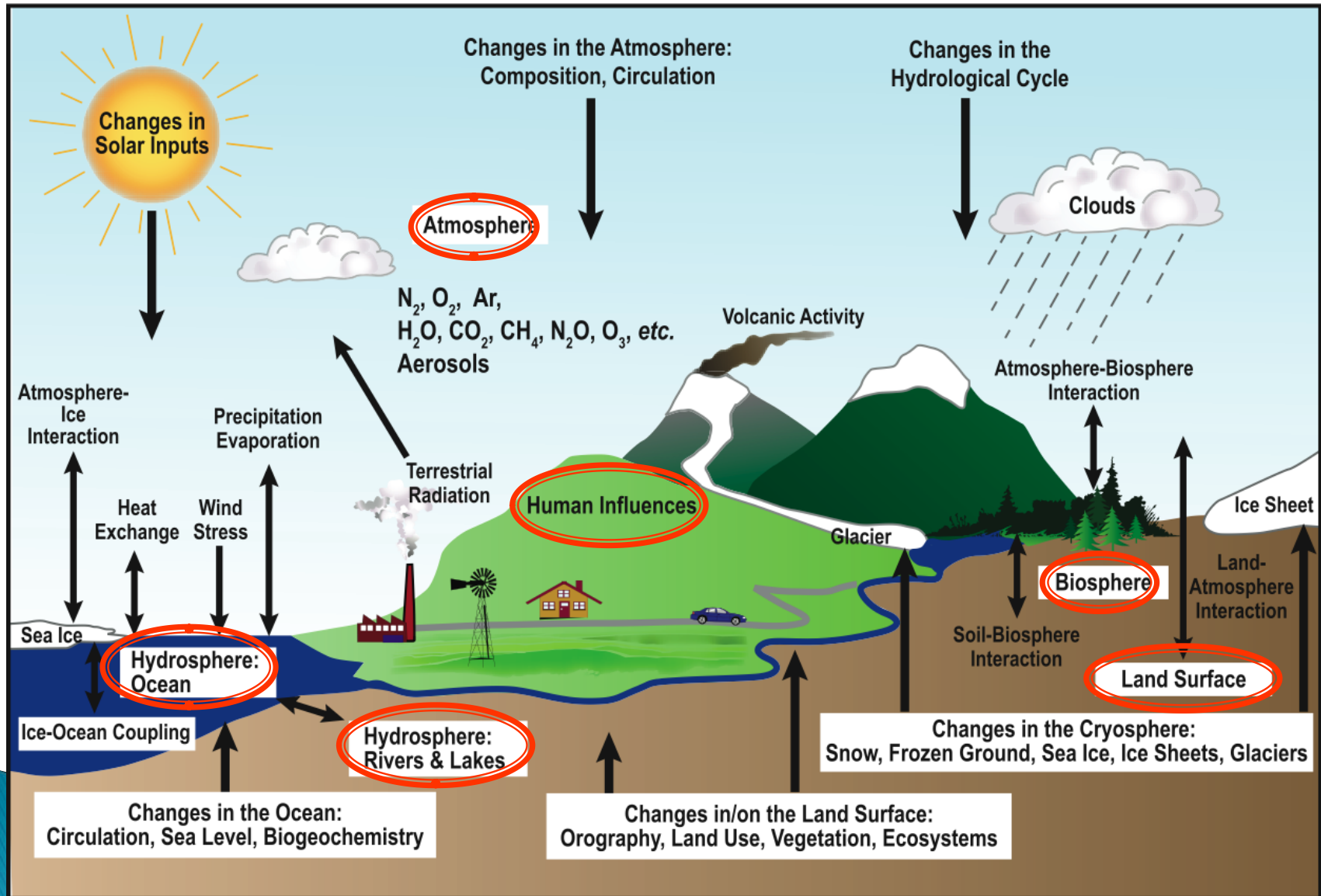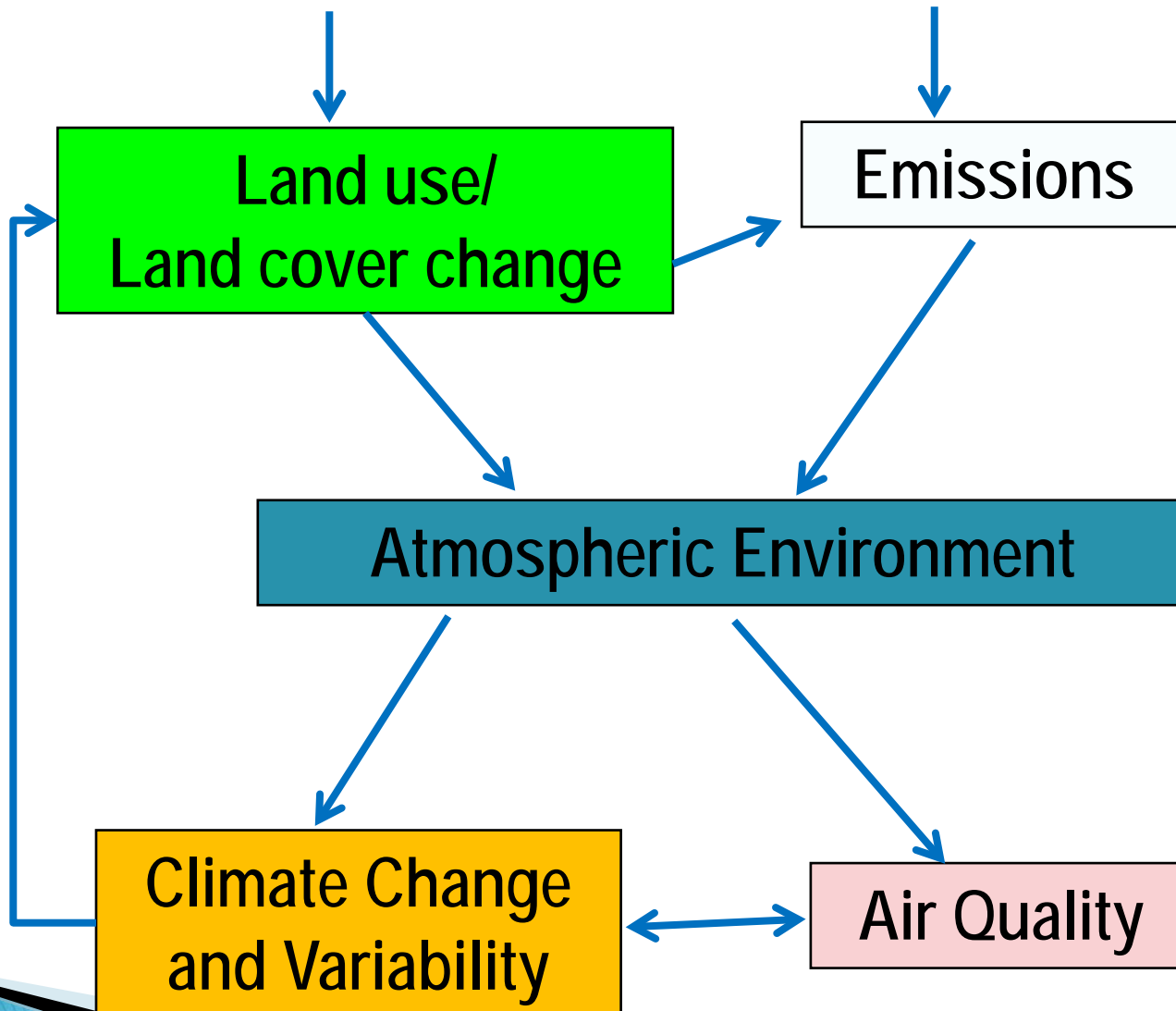# Environmental Science Research Agenda

Atmosphere: Climate, Land Cover and Air Pollution
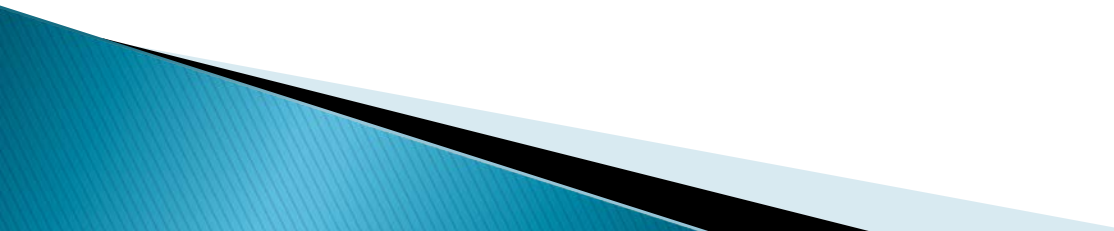
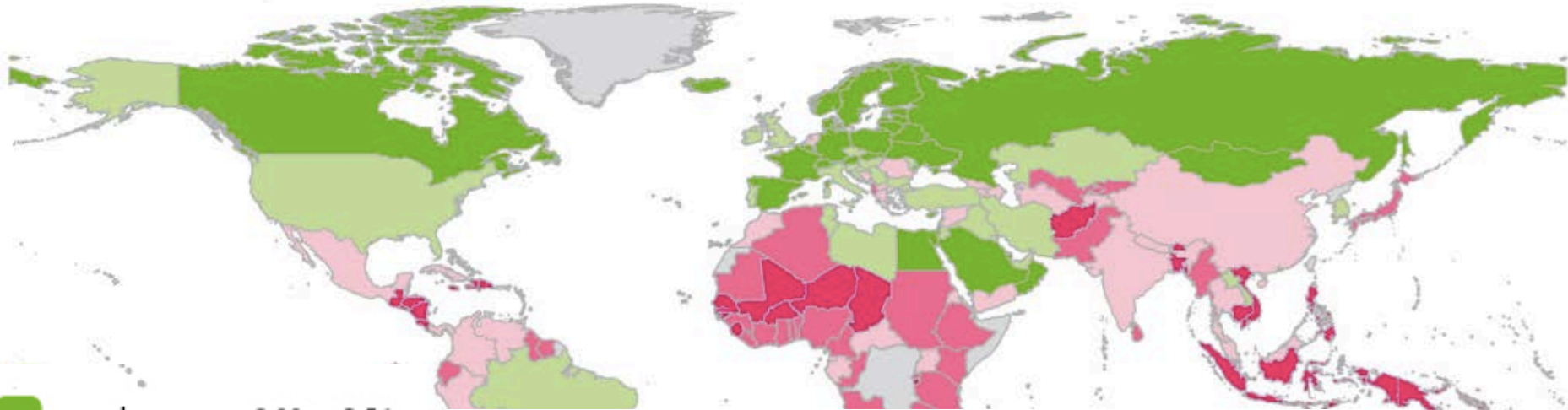# The climate system (IPCC, 2007)

Anthropogenic or **Human** Activities

Major issues

- Atmospheric extreme events
- Air quality/aerosols in relation to health and climate change
- Land cover/land use and relationship with atmosphere
- Greenhouse gas emissions

Atmospheric extreme events

WorldRiskIndex

WorldRiskIndex as the result of exposure and vulnerability

very low	0.00 – 3.56	
low	3.57 – 5.80	
medium	5.81 – 7.71	
high	7.72 – 11.13	
very high	11.14 – 32.00	
no data available		

WorldRiskIndex

Rank	Country	Risk (%)
1	Vanuatu	32.00
2	Tonga	29.08
3	Philippines	24.32
4	Solomon Islands	23.51
5	Guatemala	20.88

World Risk Report, 2011

Philippines 3rd on UN disaster risk index

By Kristine L. Alave
Philippine Daily Inquirer
8:22 pm | Friday, October 7th, 2011

MANILA, Philippines—The Philippines ranked third on the list of most vulnerable countries to change, a study by a United Nations agency warned.

The report by the United Nations University's Institute for Environment and Human Security a German Alliance Development Works said the top 10 countries facing the highest risk are: Va Tonga, the Philippines, the Solomon Islands, Guatemala, Bangladesh, Timor-Leste, Costa Ri Cambodia and El Salvador.

Climate, air quality and health
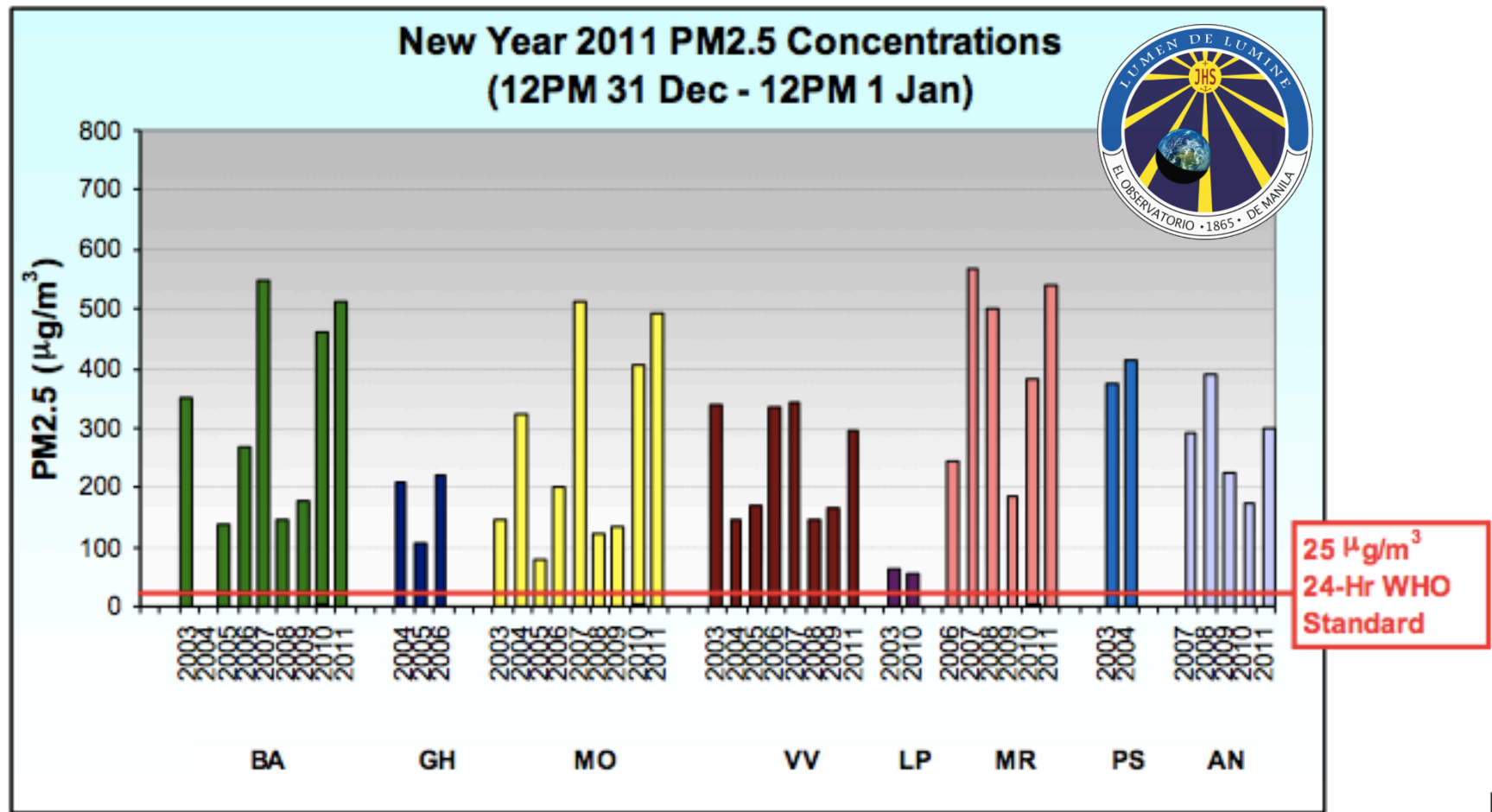
BA: Barangka,
GH: Greenhills
MO: Manila Observatory
VV: Valle Verde 5

LP: BF Almanza, Las Pinas City
MR: Nangka, Marikina City
PS: Chason Southville, Pasig
AN: Oro Vista Royale, Antipolo City

Slide courtesy of Manila Observatory

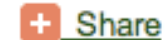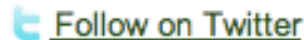🖨 Print   📧 Email   🐦 Follow on Twitter   ➕ Share

Amount of Dust, Pollen Matters for Precipitation in Clouds, Climate Change, Colorado State University Atmospheric Scientists Reveal

Note to Reporters: Photos are available with the news release at http://www.news.colostate.edu/ or at http://www.flickr.com/photos/coloradostateuniversity.

FORT COLLINS - Large numbers of dust and pollen particles in the atmosphere may make your nose twitch, but when lifted to the heights where clouds form they can lead directly to greater precipitation in some clouds, Colorado State University atmospheric scientists have discovered.

Formation of ice crystals is necessary for precipitation formation in many clouds, and the numbers of crystals formed is linked to the abundance of larger aerosol particles in the atmosphere, according to a study led by Paul DeMott and Anthony Prenni, research scientists in the Atmospheric Science department at Colorado State, appearing in this week's issue of the Proceedings of the National Academy of Sciences.

Special particles called ice nuclei – with both natural and human sources - serve as catalysts to form ice in clouds. Precipitation falling as rain has its

Paul DeMott, research scientist in Atmospheric Chemistry

Land cover and climate

Performing your original search, **land cover change affects climate pitman**, in *Science* will retrieve 5 results.

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REPORTS

The Importance of Land–Cover Change in Simulating Future Climates

Johannes J. Feddema,[1]* Keith W. Oleson,[2] Gordon B. Bonan,[2] Linda O. Mearns,[2] Lawrence E. Buja,[2] Gerald A. Meehl,[2] Warren M. Washington[2]

Adding the effects of changes in land cover to the A2 and B1 transient climate simulations described in the Special Report on Emissions Scenarios (SRES) by the Intergovernmental Panel on Climate Change leads to significantly different regional climates in 2100 as compared with climates resulting from atmospheric SRES forcings alone. Agricultural expansion in the A2 scenario results in significant additional warming over the Amazon and cooling of the upper air column and nearby oceans. These and other influences on the Hadley and monsoon circulations affect extratropical climates. Agricultural expansion in the mid-latitudes produces cooling and decreases in the mean daily temperature range over many areas. The A2 scenario results in more significant change, often of opposite sign, than does the B1 scenario.

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Greenhouse gas emissions

The New York Times

Energy & Environment

California Sets Up Statewide Network to Monitor Global-Warming Gases

By TODD WOODY
Published: February 2, 2010

SAN FRANCISCO — California is preparing to introduce the first statewide system of monitoring devices to detect global-warming emissions, installing them on towers throughout the state.

Enlarge This Image

Picarro

Matthew Sweeney, a Picarro technician, running tests on a gas analyzer.

The monitoring network, which is expected to grow, will initially focus on pinpointing the sources and concentrations of methane, a potent contributor to climate change. The California plan is an early example of the kind of system that may be needed in many places as countries develop plans to limit their emissions of greenhouse gases.
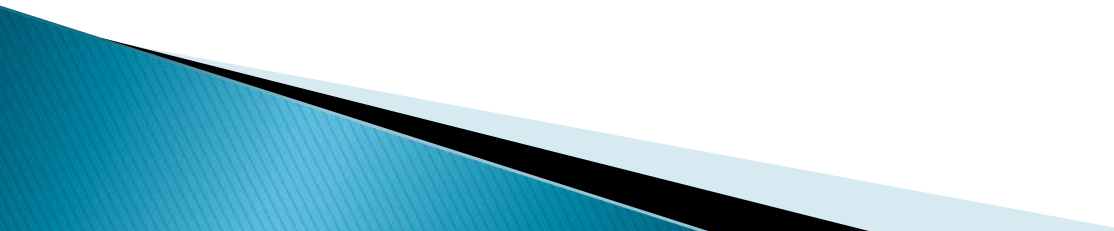
"The air resources board uses computer modeling to estimate greenhouse gas emissions in the state. The first task of the new network will be to see if actual concentrations of methane match those estimates."
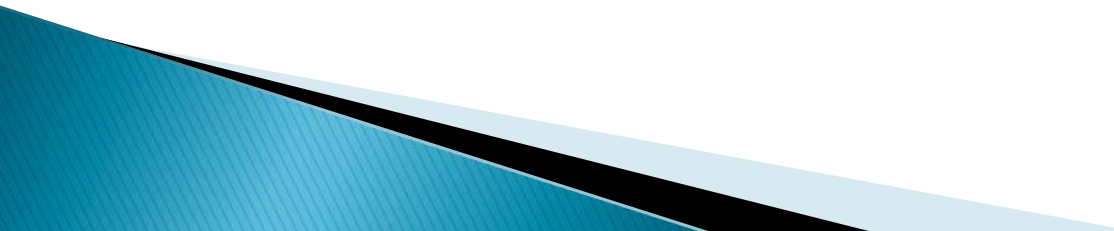
Research issues

▸ Characterize the extent of climate change and variability in the Philippine context at different temporal and spatial scales that are relevant to risks, hazards, and natural catastrophes for disaster risk reduction and management (DRRM).

- Climate change impact assessment

- Methodology development

- Technology generation

▸ Improve regional weather and climate research for forecasting and warning.

- Atmospheric and weather forecasting modeling

- Air quality and dispersion modeling

- Biosphere-atmosphere modeling

▸ Assess the efficiency in the monitoring and mitigation techniques of greenhouse gas (GHG) emissions, particulate matter ($PM_{2.5}$) and aerosols.

- Remotely sensed or In situ (sun photometers, lidar, weather stations, xrf (pnri), portable air samplers (MO)

Data and information needs

- Climate/meteorological data
- High resolution topographic data
- Satellite information
- Baseline information
- Data sharing arrangements; data exchange

Gaps and needs

- Capacity building

- Data access, mechanism of collecting/collating/sharing of data, and data continuity

- Development of methodologies that can be shared with local government

- Linkages among partner institutions local and abroad

- Monitoring and modeling capability (equipment, computational power and infrastructure)

Maraming salamat po!

Magandang umaga