SYLLABUS

FINANCE 659: Environmental Finance and Weather Derivatives

Summer Session 2013 — 1:30 – 4:00 PM MWF
Professor: Steven Businger — Office Hours: by appointment
Email: businger@hawaii.edu — Office HIG 334, Phone 6-2569

Learning Outcomes

During the first block of this class, Dr. Businger will provide some basic background, setting the stage for understanding the general circulation, a global perspective on high-impact weather events, planetary scale phenomena (el niño), seasonal and inter-seasonal variability, and climate prediction. Next past climates, global warming, and climate policy will be covered. During this first block there will also be lectures heat waves, and the impact of air pollution. Economic considerations will be discussed, e.g., impacts of these various events on health, mortality, costs to society, the insurance industry, and impacts to air travel, shipping, trucking, agriculture, and the economic repercussions of policy choices will be touched on. Weather briefings of current atmospheric state will be used to introduce the art and science of weather forecasting and will help clarify the material presented during lecture.

Lecture Topic Outline

1a Introduction and Some Basics
- Purpose and goals of this block
- The scientific method and weather and climate prediction
- What atmospheric scientists do
- Background – some basics

1b Introduction and Global Winds
- Global winds – the general circulation
- Polar and subtropical jet streams

2a High Impact Weather
- Planetary Waves and High Impact Weather
- Dynamics of planetary Rossby waves
- Planetary wave trains

2b Seasonal and Inter-Annual Climate Variability
- Ocean circulations – response to winds
- El Niño, La Niña, ENSO cycle
- Links between El Niño and planetary waves
- Multi decadal SST oscillations – NAO, AMO, AO, and PDO

3a Introduction and Past climate
- Past climates, ice ages, climate change

3b Evidence for Global warming: the current situation
- Understanding climate science
- What is the observational evidence for global warming? Just the facts
- What are the impacts of global warming?
- The human factor

4a Global warming: looking ahead
- Modeling climate change

4b Global Warming and Policy

Stabilizing CO_2 emissions
Population dynamics and economic development
Cap and trade vs a carbon tax at the source

5a Drought and Heat Waves

Health impacts of heat waves
Dust bowl – exacerbating factors
Climate change and future heat waves and droughts

5b Air Pollution

Brief History
The boundary layer
Anthropogenic Pollution
Conditions that promote air pollution episodes
Acid Rain
Ozone Hole
Volcanic smog or "vog"

Reference Text

Atmospheric Science: An Introductory Survey, Wallace and Hobbs, 2006.
Meteorology Today, C. D. Ahrens, 2013

Grading for this Block

Observation Lab	~20%
Block Exam – Open Notes	~80%