

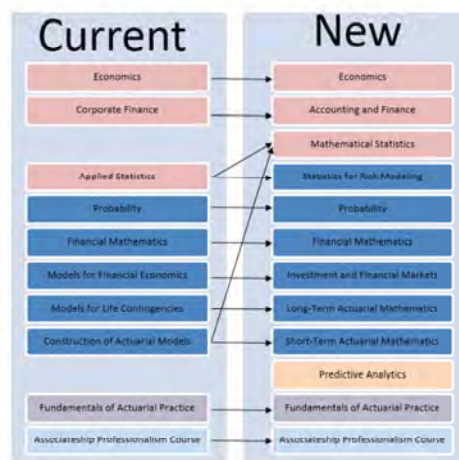
Incorporating predictive analytics in an actuarial curriculum: some preliminary experience at the Chinese University of Hong Kong

Wai-Sum Chan, PhD, FSA, CERA, FRSS
Professor of Finance
The Chinese University of Hong Kong



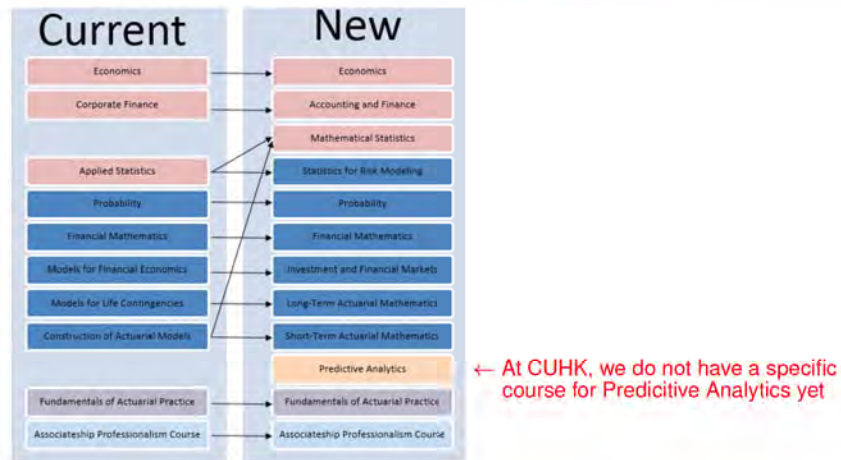
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SOA's 2018 ASA Curriculum Changes



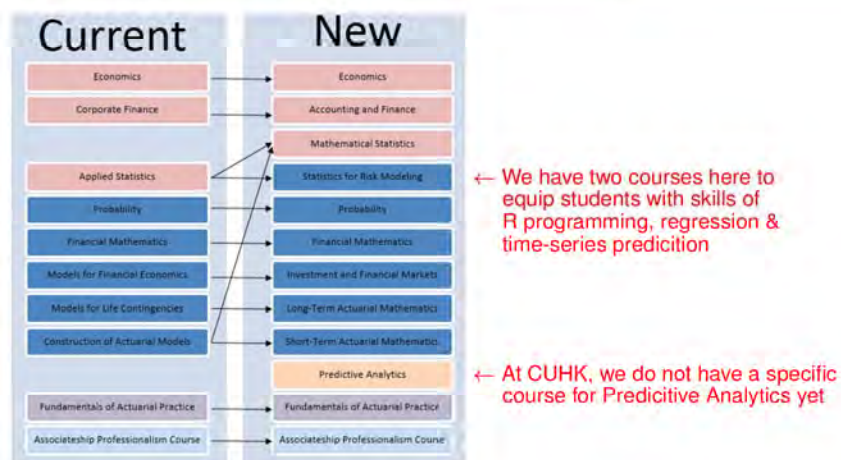
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SOA's 2018 ASA Curriculum Changes



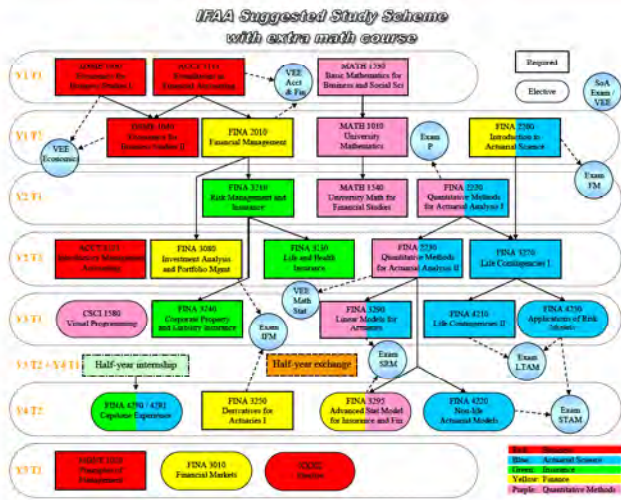
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SOA's 2018 ASA Curriculum Changes

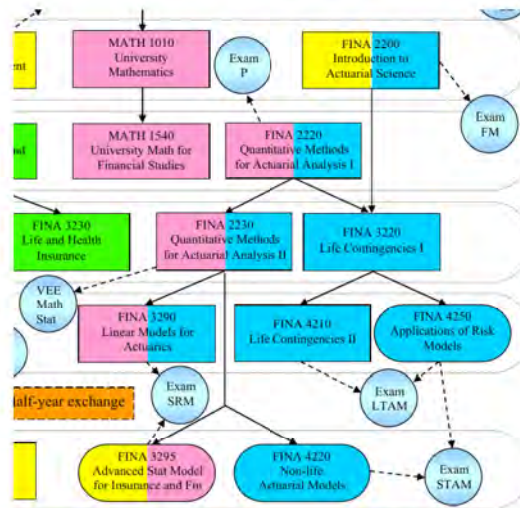


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CUHK Students' 2017 Study Plan



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A Pilot Case Study for FINA3290

- The National Data Buoy Center (NDBC) is a part of the National Oceanic and Atmospheric Administration's (NOAA) National Weather Service (NWS) of the US government.

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A Pilot Case Study for FINA3290

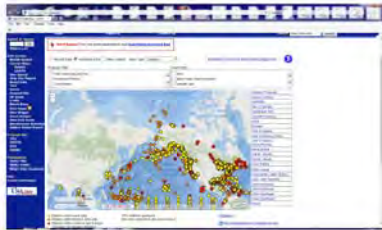
- The National Data Buoy Center (NDBC) is a part of the National Oceanic and Atmospheric Administration's (NOAA) National Weather Service (NWS) of the US government.
- NDBC deploys weather **buoys** which are instruments which **collect weather and ocean data** within the world's oceans.



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A Pilot Case Study for FINA3290

- The time-series weather data for each buoy are publicly available from the NDBC website (www.ndbc.noaa.gov).



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A Pilot Case Study for FINA3290

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- These data have been used for research (e.g., Chen, Ruf and Cleason, *Journal of Geophysical Research: Oceans*, April 2016) and teaching purposes.

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Part (A) - constructing the dataset

- Students are asked to locate the data webpage of the Weather Station buoy 46035 at 57.026 N 177.738 W from NDBC.

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- Examine the data format for each yearly data file.

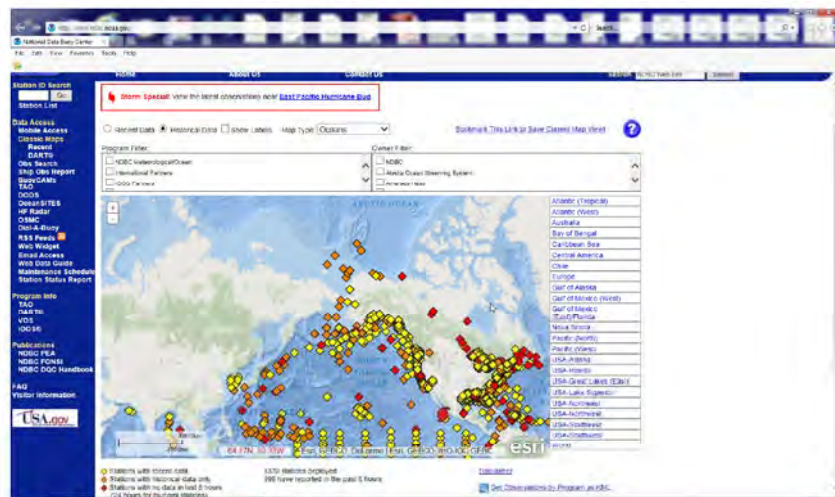
7 of 25

Part (A) - constructing the dataset

- Students are asked to locate the data webpage of the Weather Station buoy 46035 at 57.026 N 177.738 W from NDBC.
- Examine the data format for each yearly data file.
- Write an R program to extract and patch the data into two time-series of daily **Air Temperature** and **Sea Temperature** readings recorded at noon.

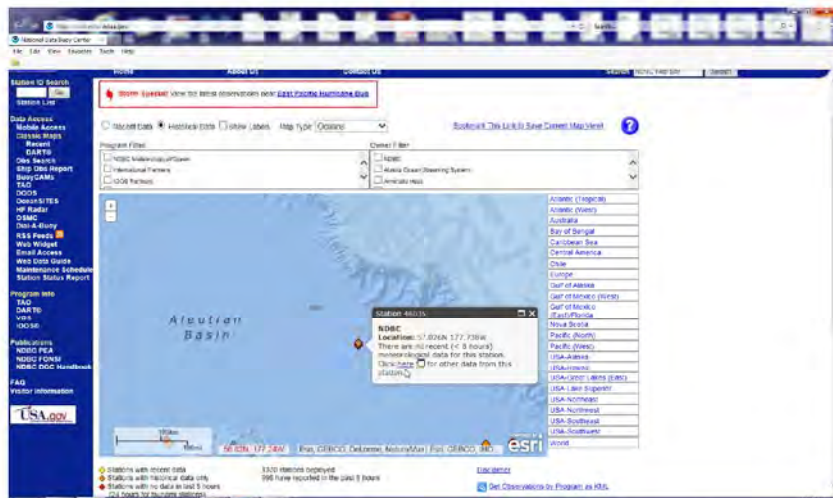
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Part (A) - constructing the dataset



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Part (A) - constructing the dataset



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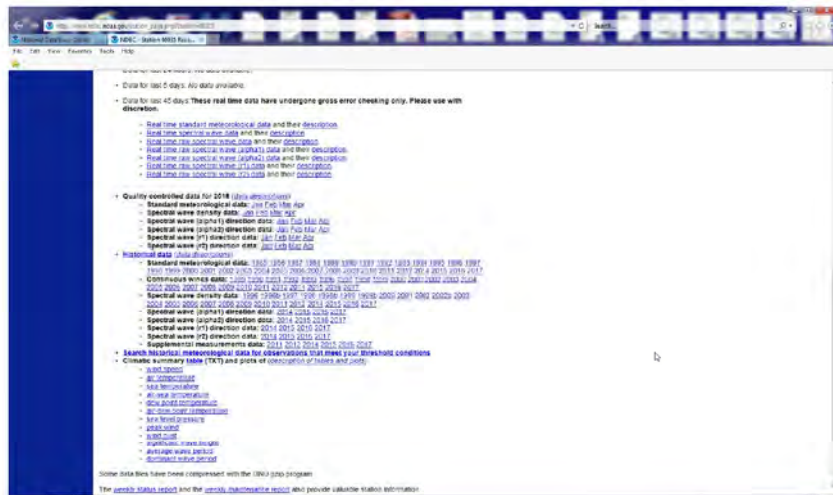


Part (A) - constructing the dataset



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Part (A) - constructing the dataset



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Part (B) - data cleaning

- Students are asked to plot and clean the data.

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Part (B) - data cleaning

- Students are asked to plot and clean the data.
- Messy data: **outliers, missing values, lost of data** – due to vandalism/stolen of data buoys

Vandalism of Data Buoy

Chung-Chu Teng, Stephen Cucullo, Shannon McArthur, Craig Kohler, Bill Burnett, Landry Bernard
NOAA's National Data Buoy Center

Data Buoy

Data buoys are floating devices, either drifting or anchored, that are deployed by governmental or recognized scientific organizations or entities for the purpose of electronically collecting and reporting environmental data and information. The U.S. National Data Buoy Center (NDBC), a unit of U.S. National Weather Service's (NWS) Office of Operational Systems (OOS) in the National Oceanic and Atmospheric Administration (NOAA), has three major real-time ocean observing data buoy networks. (1) Weather and Ocean Platform

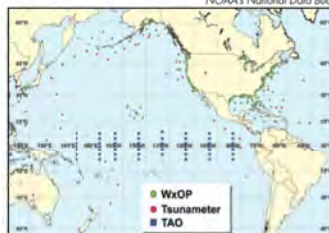
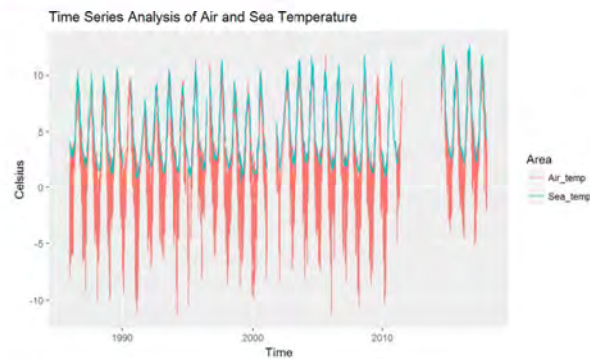


Figure 1 NDBC buoy locations

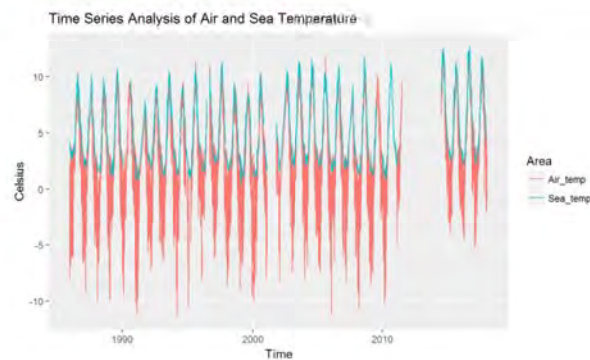
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Part (B) - data cleaning



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Part (B) - data cleaning



- Students have to research and decide on how to clean the data.

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Part (C) - the research question

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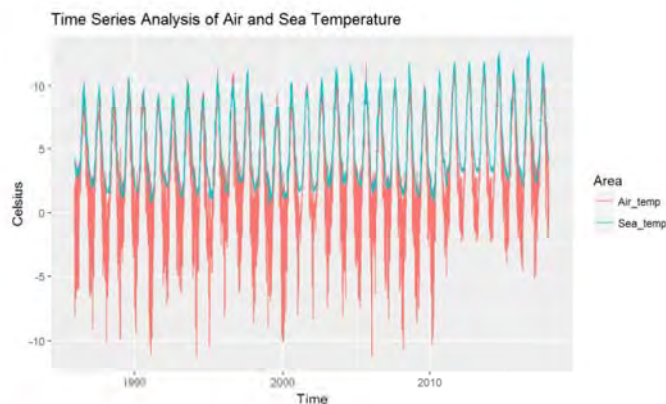
Part (C) - the research question

- Students are asked to answer the question: **Global warming - have the temperatures (both sea and air) increased over the past 30 years?**
- Students can use any statistical methods learned in this course.
- All computations have to be carried out in R.
- Two students form a team.
- Each team has to make a presentation and hand-in a final report (professionally written with proper conclusions and justifications).

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Report-1

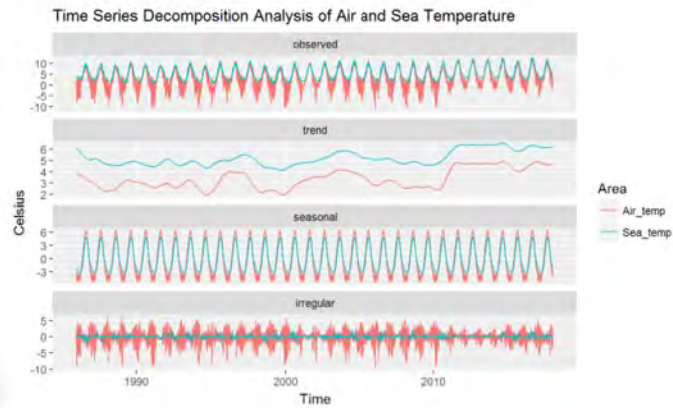
Cleaned Data



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Report-2

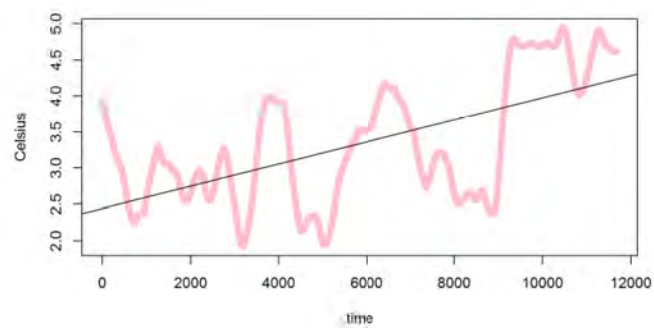
Seasonal Decomposition



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Report-3

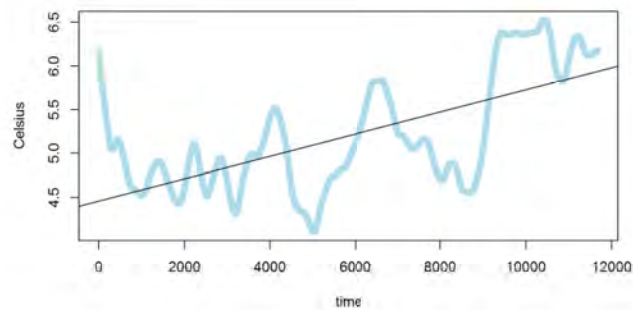
Trend: Air temperature



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Report-4

Trend: Sea temperature



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Report-5

Robustness Check

To check whether sampling affected our evaluation of temperature change, lets conduct simple robustness check when temperature = 0:00, 6:00,18:00 and compare with 12:00.

```
##          tau      sl S      D      varS
## Air.Time_0 0.3382657 0 23083382 68240392 177205149696
## Air.Time_6 0.3505084 0 23918828 68240392 177205149696
## Air.Time_12 0.3590287 0 24500260 68240392 177205149696
## Air.Time_18 0.3716339 0 25360442 68240392 177205149696

##          tau      sl S      D      varS
## Sea.Time_0 0.3823255 0 26090036 68240384 177205149696
## Sea.Time_6 0.3794484 0 25893702 68240384 177205149696
## Sea.Time_12 0.3917121 0 26730546 68240384 177205149696
## Sea.Time_18 0.393610 0 26860232 68240384 177205149696
```

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Remarks

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Remarks

- Students are forced to get familiar with R programming.
- Students generally like the case study, but complained the heavy workload and unclear instructions.
- Most students **indulged** too much in the R coding part of the project, without a good understanding of the statistical methods they used.
- Students need more training in report writing.

Other Issues: (I) Plagiarism



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Other Issues: (II) Academic Honesty



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Other Issues: (II) Academic Honesty

The screenshot shows a web browser window with the URL www.fanyiw.com/2019/12/02/1414/. The page has a navigation bar with the word "程序" (Program) in a green box, followed by links for "首页" (Home), "编程语言" (Programming Language), "数据库" (Database), "网络开发" (Web Development), "Algorithm算法", "移动开发" (Mobile Development), "系统相关" (System Related), "金融设计" (Financial Design), "人工智能" (Artificial Intelligence), and "其他" (Other). Below the navigation bar, there is a section titled "代做Python程序、代做Data Acquisition, Cleaning, Organizing and Exploring". The main content area contains the following text:

Assignment 5 - Data Acquisition, Cleaning, Organizing.

This is the final project for the TidyVerse section of the course. There are two parts to this assignment. In both parts, your job is to obtain data, clean and organize it, and explore it. Then, produce a slide presentation and a Shiny application about what you have learned.

Part 1 (50%)

Find the website for NOAA Weather Station buoy 48035 at 57.026 N 177.738 W in the NOAA National Data Buoy Center.

Read, Clean, and organize the data to produce a time series composed of 30 years of daily Air Temperature and Sea Temperature readings recorded at noon for the time zone of Station 48035.

On the right side, there is a "联系我们" (Contact Us) section with the following information:

1. QQ: 99515681
2. 邮箱: 99515681@qq.com
3. 工作日: 8:00-23:00
4. 微信: codinghip

Below the contact information, there is a list of services with dates:

- 6.06-15
- 9. Python代写与数据图 Turtle Graphics Le... 2019-06-15
- 10. Python代写帮数桥、数据图程序并办非代码、Ed ucational Co 2019-06-15

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Other Issues: (II) Academic Honesty

The screenshot shows the ScholarAnswer website. The navigation bar includes "HOME", "ASSIGNMENT HELP", "PROJECT HELP", and "WRITING SERVICES". The main banner features the text "WELCOME!" and "IMAGINE YOUR ANSWERS". Below the banner, there is a section titled "Society of Actuaries-SOA Homework Help!". The text in this section reads:

Have any problems with your Society of Actuaries - SOA homework or you don't have the single time to complete your Society of Actuaries - SOA assignments?

Get your Society of Actuaries - SOA assignments done in just 3 simple steps:

1. Submit Society of Actuaries (SOA) assignment below
2. Click on the order page to order

On the right side, there is a "How it works?" section with three steps:

- Step 1: Submit your homework
- Step 2: Get an expert system on-line that email to phone
- Step 3: Clean your detailed homework solution

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THANK YOU!

