SMS 303: Integrative Marine Sciences III

- Instructor: E. Boss, TA: L. Brothers

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- 4 weeks & topics: waves, tides, mixing and Coriollis.

Change in plan – Coriollis moved to the last week of semester to accommodate a colleague that will be out of town.

- Expectations: participation, question asking, and homework (can be done in group, handed in individually)

- www.marine.maine.edu/~eboss/classes

- **Tides**
  - A collaborative exercise with computers in class.

Short introduction:

- Tides are forced waves (what is the forcing?).

- Both external and internal modes exist.

- Earth rotation affects tidal propagation.

Navy global tide model:
http://ocean.colorado.edu/~kantha/Tides2D/Global/

Harmonic analysis:
From Wikipedia, the free encyclopedia.

Harmonic analysis is the branch of mathematics which studies the representation of functions or signals as the *superposition* of basic waves. It investigates and generalizes the notions of Fourier series and Fourier transforms. The basic waves are called "harmonics", hence the name "harmonic analysis."

Any signal (e.g. tide) can be decomposed into a unique combination of sine and cosine functions. Once we have done it to a long enough signal we can use it to *predict* how that signal will evolve in the future.

Remember: $A\sin\{2\pi(t/T)\}+B\cos\{2\pi(t/T)\}=C\sin\{2\pi(t/T)+\phi\}$

Tide predicting machines (http://co-ops.nos.noaa.gov/predma3.html):
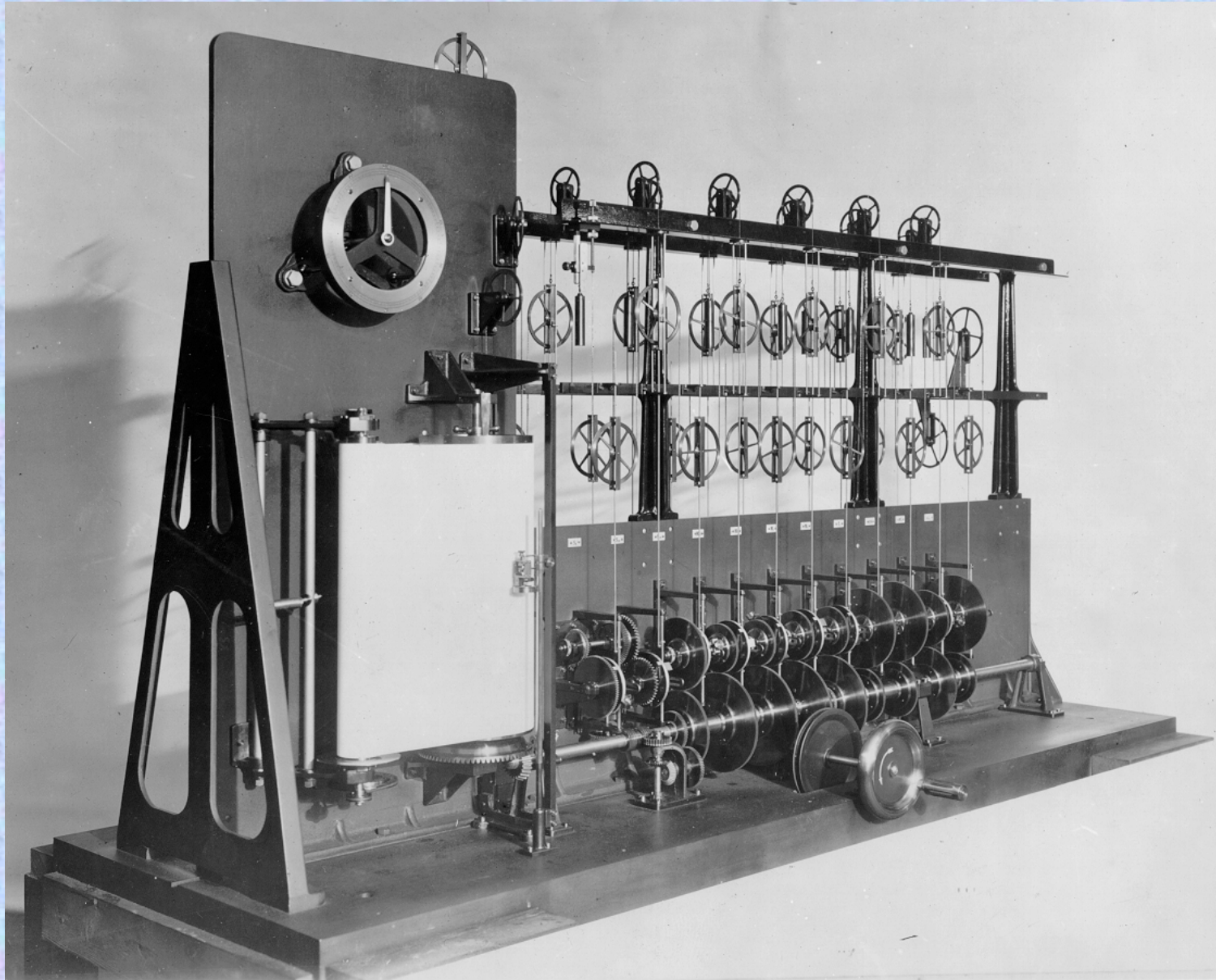
In-class exercise, Using WebTide software:
(available freely at: http://www.mar.dfo-mpo.gc.ca/science/ocean/coastal_hydrodynamics/WebTide/webtide.html)

Today we will study together the characteristics of the tides in the Gulf of Maine.

1. Overview of software.

2. Obtaining the tidal amplitudes or currents at a given location.

3. Analysing the contribution of different tidal components.

4. Comparing the tidal amplitudes at two locations (where is the amplitude higher?).

5. Comparing tidal phases at two locations (which one leads?).

During each part of this lab, one group (chosen randomly) will be asked to present their results for discussion.

Xue et al., 2000, JPO
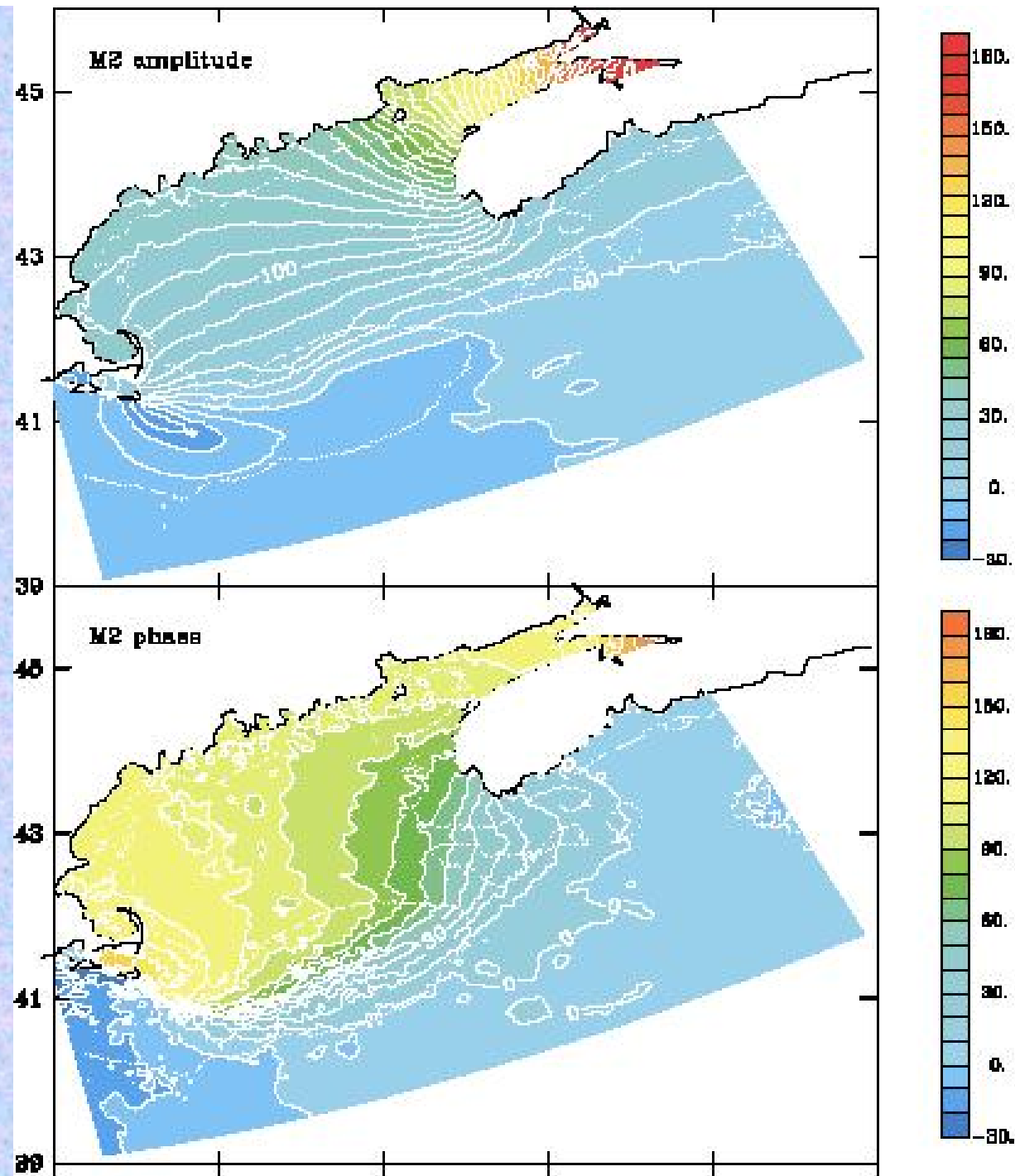
Contrast what you found for the GOM with two focus regions:
II. Penobscot river, from North Haven to Bangor