# SIO 210 Data Projects

Project mentor: Jim Swift, Research Oceanographer, SIO (jswift@ucsd.edu; 858-534-3387; DSDW Room #50 - use DSDW entrance in the breezeway separating the north and south halves of DSDW)

- learn about the ocean by examining data; <u>no prior knowledge of ocean data analysis required</u>
- it is not difficult to construct a project related to your interests (with Jim's help)
- guidance is always available
- most students use Java OceanAtlas – a free interactive data exploration and plotting application for Macs and PCs - Jim can supply it and get you started
- non-judgmental - the point is to examine and learn from data rather than regurgitate published results
- the easiest data to use for projects are large-scale data (the open oceans); we can sometimes relate the larger scales to smaller-scales (e.g., coastal)
- these are solo projects or for students working in pairs (more is expected from pairs)

Plan to meet with Jim <u>as soon as possible</u> and then touch base as needed to discuss your progress. Jim can help you choose a project, find data, and work out an analytic approach.

We will use water column data collected from research ships - temperature, salinity, dissolved oxygen, and other substances such as CFCs and ocean carbon related parameters. These data - "hydrographic data" - underlie the property maps and cross-sections of the oceans shown in class, which in turn help to illuminate the structure and circulation of the oceans.

The red lines on this map show where we have the highest quality hydrographic data, from the sea surface to the ocean bottom:
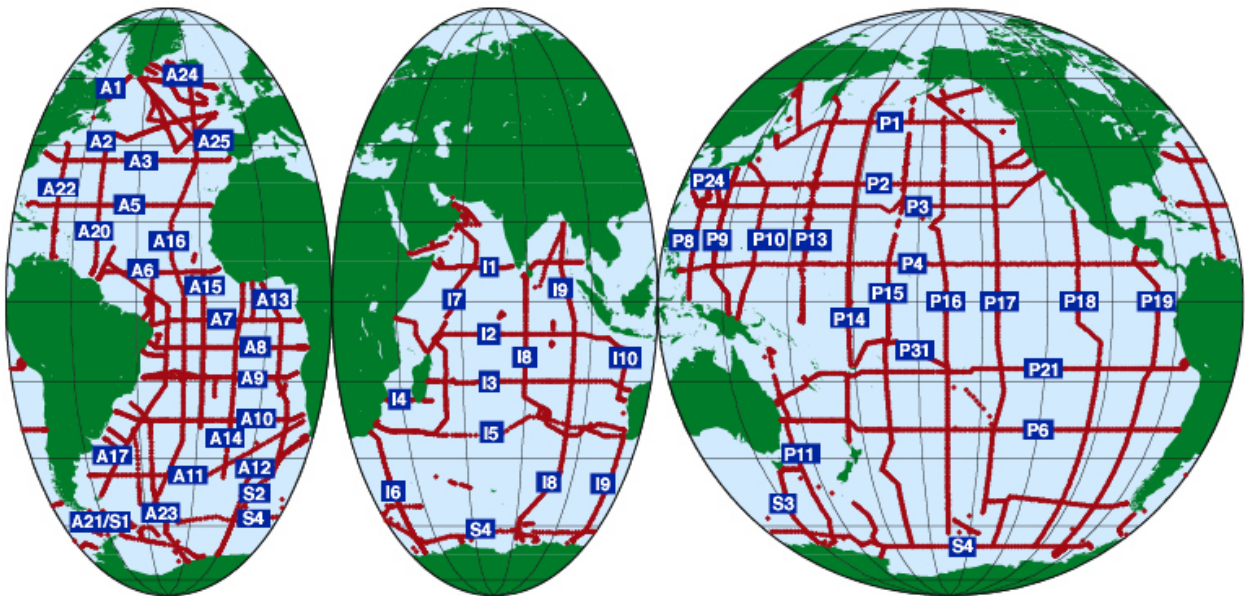
We have decadal repeats of roughly half of these lines, which makes it relatively easy to examine aspects of decadal-scale changes in seawater characteristics, at any level of the water column. We also have a fair amount of Arctic Ocean and Nordic Seas data not shown on the map. And we have a carefully-made gridded data set (at one-degree spatial resolution) that is often used in data-assimilating ocean models (making it easy to compare those data with the actual data).

Jim has a Java application for Mac OS or Windows one can use to examine and explore those data: Java OceanAtlas (JOA). [If you do a data project, it is easier to advise you if you use JOA, but use of JOA is not required.] Therefore the first step in a data/JOA project is to download JOA and get it running on your computer. You would think this would be a snap, and it should be. But do not wait to install JOA - do this right away. Then if you have problems, we can solve them. In fact, that is one purpose of this note: to urge you to get started with JOA, so that we can iron out any problems.

The web site http://joa.ucsd.edu has the JOA application, support files, data, and more. The JOA developer has prepared versions of the JOA installers for Mac OS X and Windows. The latest versions have self-contained Java runtime environments—you don't have to separately install Java on your computer. The latest versions, 5.4 and 5.3, are available from the JOA web site.

For Windows download JOA 5.2.1 if you have Windows XP and download JOA 5.3 for Windows 7 and above. For Mac OS download JOA 5.2.1 if you have Mac O X 10.9 or earlier and download JOA 5.3 or JOA 5.4 if you have Mac OS X 10.10 or higher. For Mac OS 10.9 or earlier you may need to install Apple's Java runtime. See the web pages for links to this.

If you have installation issues, contact Jim (jswift@ucsd.edu) and the JOA developer, John "Oz" Osborne at tooz@oceanatlas.com.

Recommendation:

1. Download the version of JOA appropriate for your computer OS from http://joa.ucsd.edu/joa.

2. Install JOA on your computer: carefully follow the linked instructions you will find if you scroll down the http://joa.ucsd.edu/joa page.

3. Do the JOA Guided Tour http://joa.ucsd.edu/tour/1. **If you get this far, you are good to go with JOA, and ready to use JOA** to do the DPO Examples (http://joa.ucsd.edu/dpo/), or explore any of the data at http://joa.ucsd.edu/data. [Jim has many more data than on this web site talk with Jim!]

For your data projects you will work on your own or, if you wish, with another student. You will need to pick a project theme. That is not as critical as you might think because we will meet and you will find me helpful in choosing an interesting and feasible project focus.

There are many types of projects one can do. Here are a few general ideas which you could perhaps use as a framework for a specific project idea (but there are many other possibilities):

Trace the influence of a water mass or oceanographic feature of your choice away from its source. Or trace some oceanographic feature (e.g., a property maximum or minimum - almost anything that can be described or calculated).

Examine water properties on surfaces, such as an isopycnals (perhaps with an intent to examine the influence of some process).

Compare regions of the ocean which have some sort of conceptual connection, such as two or more subtropical or subpolar gyres, Labrador Sea versus area around Sea of Okhotsk, Weddell Sea vs. Ross Sea or vs.. Nordic Seas, etc.

Compare data from different years from the same area. [T, or S, or O2, or CFC, or ocean carbon data.]

Compare results from actual data (your choice of region or water mass or feature, etc.) with results from data from the statistical compilation of oceanographic data used in many models.

Examine (and calculate) seasonal differences using the World Ocean Atlas data.

Examine interannual variability of nearly any layer in the Labrador Sea, the subtropical North Pacific off Hawaii, or the North Atlantic off Bermuda (locations where we have multi year monthly or seasonal data ready to use).

Compare waters with some particular characteristic in common in different ocean regions.

Please contact Jim by email (jswift@ucsd.edu) to start a conversation. Jim is usually on campus between 7:45 am and 12:30 pm. It's best to make an appointment instead of just dropping by. Jim's office is in the Deep Sea Drilling West building, Room 50, which is in north end of the building, and reached via a door in the mid-building breezeway which divides the building. Jim's office phone is 858-534-3387 (or on-campus extension x43387). He will attend some of the lectures, too.

PLEASE NOTE: Jim will be traveling October 17th - November 2nd. He can be reached by email while away, but **you should have your first meeting with Jim before October 17th**.