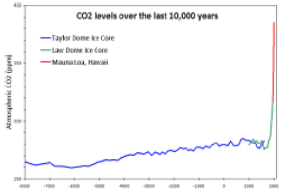
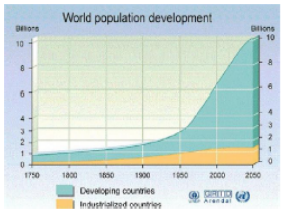
Perspectives

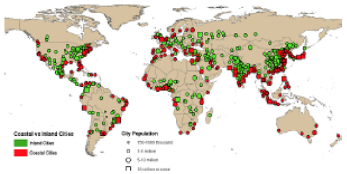
Research drivers for marine science?



Understanding global environment change in an earth-system context, where we yet don't understand either the inherent variability of the ocean, or its interactions with other earth-system components (e.g., ocean- atmosphere, ocean – cryoshere).



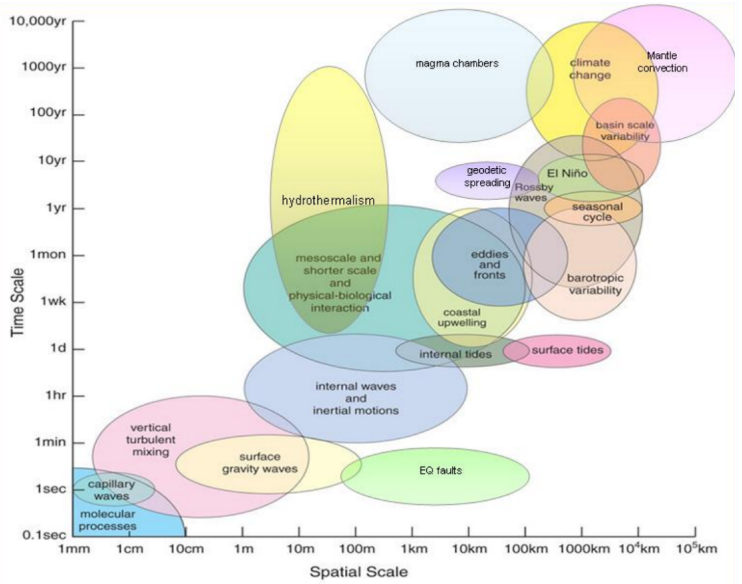
Understanding consequences of increasing global population (most in the developing world) with associated increasing demand for food, energy and mineral resources) from the world's oceans.



Understanding consequences of increasing coastal urbanisation (by 2030, 9 of 12 top urban agglomerations will be port-cities) – what is the impact, interaction, and hazard risk of mankind living at the coast?

Credit: Ian Wright [1]
National Oceanography Centre Southampton

Relevant spatial and temporal scales



Credit: Richard Lampitt et al. [2]
National Oceanography Centre Southampton

[1] http://www.uk-imon.info/documents/Presentations%20-%20New%20Technologies/002%20Wright%20UK-IMON.pdf
[2] http://www.oceanobs09.net/plenary/files/draft%20papers/Lampitt-Favali_Draft_Plenary_18JAN.pdf

Perspectives

Essential Ocean Variables

Readiness level: CONCEPT | PILOT | MATURE [Click on each EOV for their repsective spec sheets]

PHYSICS	BIOGEOCHEMISTRY	BIOLOGY AND ECOSYSTEMS
Sea state	Dissolved Oxygen	Phytoplankton biomass and productivity
Ocean surface vector stress	Inorganic macro nutrients	Harmful Algal Bloom (HAB) incidence
Sea ice	Carbonate System	Zooplankton diversity
Sea surface height	Transient tracers	Fish abundance and distribution
Sea surface temperature	Suspended particulates	Apex predator abundance and distribution
Subsurface temperature	Nitrous oxide	Live coral cover
Surface currents	Carbon isotope (^{13}C)	Sea grass cover
Subsurface currents	Dissolved organic carbon	Mangrove cover
Sea surface salinity		Macroalgual canopy cover
Subsurface salinity		
Heat flux / radiation		

UNESCO IOC WMO UNEP ICSU

http://goosocean.org/index.php?option=com_content&view=article&id=14&Itemid=114

Perspectives

How does robotics community fit in?

Driverless cars

http://mindprod.com/environment/driverless.html

Competitions

http://www.darpa.mil/program/darpa-robotics-challenge

Low-cost systems & their applications

www.irobot.com/For-the-Home/Vacuuming/**Roomba**.aspx

High-end systems & their applications

mars.nasa.gov/msl/

Group 4: Data delivered and information required

What are the mature data products delivered by AUVs. What gaps do these fill in observational capabilities (extent, resolution) and how are these used in science and industry?

What level of interpretation (time, expertise) is necessary in the workflows used to deliver the information needed for the above applications?

How would our ability to deliver the information scale if both the demand and amount of data was multiplied by 100. What technologies are needed to overcome the bottlenecks in our ability to turn data into information?

Victor Zykov (SOI, USA) / Sophia Schillai (U Soton, UK)

Group 4. **Data Delivered & Information Required**

-Data typically delivered incl. **x,y,z,t,**(C,T,D,u,v,w,I,R,G,B,etc…) yet users often interested in ***distilled answers***, e.g. **patterns, relations, causality** between various features, processes, and phenomena.

-To have certainty about the trends and patterns, it is **critical to *characterize inherent uncertainty*** in raw data traced to products

-***2-way traceability*** between data and products: preserve knowledge about uncertainty in time, space, instrument calibration, reanalysis.

-Data / metadata **logging has to be made *automatic and effortless***, including new metadata formed at each stage of interpretation.

-For scalability, **automation needs to extend *beyond data collection***, including evaluation (in situ or otherwise) of mission performance vs **objectives specified by users in *application specific terms***