Decision and Information System for the Coastal waters of Oman (DISCO)
An integrative tool for managing coastal resources under changing climate

Joaquim I. Goes
Lamont Doherty Earth Observatory at Columbia University
THE ARABIAN SEA IN THE CONTEXT OF THE WORLD’S OCEANS
NASA's SeaWIFS and MODIS-Aqua monthly composite images of Chl $a$ in the Arabian Sea showing the spatial expanse of *Noctiluca* blooms
Trends in area averaged (Arabian Sea) Chlorophyll a during winter.
Green Noctiluca scintillans
(MIXOTROPH)
Annual trends of air temperature over the Eurasian Continent
Annual trends of snow cover extent over the Himalayan-Tibetan Plateau Region
Green *NOCTILUCA* blooms
Muscat, Oman

18th Feb-2018
Role of meso- and microscale eddies in the evolution of Chl-a in the Sea of Oman
Salps - the largest consumer of *Noctiluca*
Jellyfish blooms at sea and along the shore in seawater intake.
STAKEHOLDERS IN OMAN

Royal Oman Navy

Fish-farm- Quaryat

Reefinery- Sohar

Desalination plant - Sohar
Mechanisms driving regime shifts depicted using “stability landscapes”
Northern Arabian Sea is past the tipping point
The changing food-web of the Arabian Sea due to green *Noctiluca* blooms
DISCO data flow and product dissemination to Stakeholders

Field & Laboratory Data
- Water quality & floristic sampling from field stations & archival oceanographic & fisheries surveys

Satellite Imagery
- Ocean Color, SST, SSH and others

Atmosphere-NCOM-CoSINE
- 3-D regional circulation, seawater chemistry & ecosystem dynamics

Coastal Infrastructure Files
- Water Treatment Plants, Fish Farms, Fishing Grounds

DISCO-EASy-GIS
- Automated data storage, visualization, integration, algorithm implementation and analysis, including EOF and Time-series analysis tools & FTP access

Products
- Maps of Sea State variables, HABs, HAB trajectories and other customized maps for decision support

Data dissemination to scientists & stakeholders using computers, tablets, or smart phones
All data are made available via a Windows-based GIS (EASy) Platform that allows for processing, analysis of large volumes of data customized product generation.
Particle tracking for monitoring bloom dispersal and evolution to be used as an early warning tool
Recent events forecasted by the DISCO system. left) Massive sardine kill in the Bandar Al-Rouda Harbor on Oct 10, 2019, (middle) the fate of the tracked oil spill from the two bombed tankers (FA=Front Altair, KC=Kokuka Courageous) on June 13, 2019; right) the track (observed-pink, forecasted-blue), intensity (forecasted 10 meter winds), and ocean-response (simulated SST) of cyclone Kyarr in late October 2019, followed by cyclone Maha.
الآن: منطقة الغبرة - مسقط!
CoSiNE + Mixotrophy

CoSiNE-N Model
Carbon-Silicate-Nitrogen-Ecosystem
Based on Chai, et al. 2002

Updates to NCOM-CoSiNE Model
PIGMENT-BASED METHOD FOR DETECTING AND MONITORING OF GREEN *NOCTILUCA* BLOOMS (IN PREP. FOR PACE MISSION)
APPLICATION OF DISCO FOR BIODIVERSITY AND CONSERVATION STUDIES

The panel on the left overlays all tracks on a base map of geomagnetic inclination. The panel on the right is a snapshot in the time series of tracks on June 17, 2012 overlaid on a base map of sea surface height and current velocity. The panels suggest that turtles move and navigate by sensing the earth’s magnetic field and drift with currents.
*Noctiluca* blooms off the west coast of India and N-S progression along the coast – Nov 2020