

SEA LEVEL CHANGE

1. Acceleration of sea level rise (SLR) in response to Global Climate Change is well underway; the rate of sea-level rise during the 20th century is the highest rate in the last 2,000 years. The rate of global SLR is expected to increase in the 21st century although the magnitude is uncertain.
2. Rates of sea-level rise are not constant. For example, at about 14.6 ka a rapid rise of ~ 20 m occurred within ~ 340 years (Meltwater Pulse 1A, MWP-1A), highlighting the potential for rapid contributions to sea level rise by ice sheets.
3. Major challenges remain in understanding sea level change at the regional level. This is due to uncertainties associated with GIA, steric changes and dynamic ocean processes, and tectonics.
4. The study of past sea-level changes is pertinent for testing climate and ice sheet models under different forcing conditions. Estimations of past sea-level during previous warm periods provides constraints on the magnitudes of sea-level rise and the ice mass balance of the Greenland and Antarctic ice sheets.
5. Oscillation in sea level due to oceanographic controls exert significant control on coastal change at sub centennial time scales. In some areas these oscillations are driven by climatic oscillations that are understood and therefore predictable. In other areas the causes are uncertain.

TROPICAL CYCLONES

6. It is unknown if the magnitude and intensity of tropical cyclones in the Atlantic and Gulf coasts will increase in the future. Nevertheless SLR will exacerbate flooding from tropical cyclones.
7. Tropical cyclones result in punctuated response of coasts to SLR and variations in sediment supply (tipping points in coastal evolution). The relationships between storm magnitude and duration and sand erosion and transport, and hence shoreline recovery, are poorly understood.
8. Changes in wave climate (wave height, frequency and direction) can profoundly impact coasts, even in a stable sea-level scenario. The relationships between wave regime and climate oscillations are well established in some regions, and therefore predictable, but in other regions, such as the US west coast, remain problematic.

COASTAL EVOLUTION

9. In low gradient coastal settings, vertical land motions are generally dominated by shallow processes over deep processes, with the exception of subsidence driven by oil, gas, and water extraction.

10. Deltas of the world (e.g. Asia, Europe, Gulf of Mexico) are experiencing unprecedented change that is due to anthropogenic influence, in particular alteration of sediment delivery and distribution, local land-use and increased subsidence.
11. Sediment type and volume of sediment delivery in response to climate change is important in both deltaic and non-deltaic coastal settings. Organic and terrigenous sediment accumulation determines upper limits of accretion rates.
12. Passive inundation models convey the message that SLR is a prediction and not an ongoing process and detract for the importance of rates of rise in coastal change.
13. Sea-level rise leads to pervasive shoreline retreat. Numerical models indicate that that shoreline response can be as much as 1000 m per 1m rise. However, actual rates of response have been highly variable in the past and current rates of change are highly variable across relatively small stretches of coastline. This variability highlights the importance of other factors in regulating coastal response to SLR. These include sand availability, substrate conditions, frequency and magnitude of storm impacts and the antecedent topography across which these shorelines are migrating.
14. Biological processes are important to mitigate and control landform evolution and therefore coastal change.
15. Human modification can strongly modify natural functioning and response to climate change. For example, it can modify sediment dynamics and can result in a shift from a tide-dominated to wave-dominated systems within a century. It also leads to more flooding threats.

IMPACTS OF SEA-LEVEL RISE AND COASTAL FLOODING

16. Coastal flooding poses significant socio-economic & environmental threats globally and future climate and socio-economic change drivers will only exacerbate these impacts.
17. The impacts of SLR include coastal flooding, groundwater contamination and saltwater intrusion, and related soil salinization that can extend tens of kilometers inland (e.g. in the Venice Lagoon region).
18. There is a need to generate geohazard and coastal vulnerability maps. These are user friendly and more useful to public and planners than reports, figures and model outputs. These maps must be updated using more sophisticated coastal monitoring that relies on latest technologies in order to provide the best adaptive strategies for coastal sustainability.
19. To understand vulnerability and resilience to environmental hazards, we must understand not just the physical impact of the hazard, but the way that physical impact affects the activities by which people make their livelihood. Well-intentioned policies and infrastructure projects that fail

- to understand these connections often end up futile or even counterproductive.
20. Coastal protection involves maintenance costs which increase with time. Energy scarcity and cost needs to be integrated into societal programs to deal with climate change.
 21. Education and engagement of stakeholders is critical for success. Incorporating science into decision making still requires the identification of gaps of knowledge and understanding how they can be filled.
 22. Coastal sustainability requires coordination among governmental, regional and municipal institutions and agencies with overlapping fields of interest and responsibility.
 23. Coastal response to global climate change is a global issue. There is a need to increase international collaboration to expand our knowledge and to assist those countries where change is occurring at alarming rates but where scientific information is critically needed to mitigate change. An example would be the Philippines. An example of where international collaboration is working is Bangladesh.