Super Cyclone Gonu was the strongest tropical cyclone on record in the Arabian Sea. Gonu attained Category 5 status with peak 1-min sustained winds of 263 km/h with gusts up to 315 km/h and a central pressure of 909 mbar on 4 June 2007 about 475 km east of Masirah Island off the coast of Oman. The cyclone gradually weakened due to cooler water temperatures and drier air as it approached the Arabian Peninsula. Cyclone Gonu crossed the eastern-most tip of Oman at Ras al-Hadd with winds of 164 km/h late on 5 June, making it the strongest tropical cyclone on record to strike the Arabian Peninsula. On 6 June, the cyclone turned to the north-northwest and made landfall on the Makran coast of Iran as a tropical storm on 7 June. Gonu caused about $4 billion in damage and at least 49 deaths in the Sultanate of Oman, where the cyclone was considered the worst natural disaster in its history. Gonu dropped heavy rainfall near the eastern coastline, reaching up to 610 mm, which caused wadi flooding and heavy damage. The shore parallel cyclone track resulted in coastal damage due to storm surge and storm wave impact along a 300 km stretch of Omani coastline. In Iran, the cyclone caused 23 deaths and $215 million in damage. The widespread failure of tide gauges along the Gulf of Oman called upon a field survey crew to collect high water marks based on established protocol (Fritz et al., 2010). The team surveyed 270 km of impacted Omani coastline from Ras al-Hadd to Abu-Abali within 2 months of Gonu’s landfall from 1 to 4 August 2007. The team measured coastal high water marks, inundation distances, wadi and overland flow depths. Further coastal erosion and deposition was documented. Ephemeral infrastructure damage was recorded at various scales. The high water marks peaked at Ras al-Hadd at the eastern tip of Oman exceeding 5 meters. The steep bathymetry between Ras al-Hadd to Muscat limited the relative contribution of storm surge, but increased storm wave impact. The Iranian coastline inside the Gulf of Oman from the Straits of Hormuz with Qeshm and Hormuz Islands to Jask and up to 150 km east of Jask was surveyed in October 2010, while part of a UNESCO field workshop searching for evidence of Makran tsunamis. Cyclone Gonu high water marks exceeded 5 m at several locations along a 100 km stretch of coastline extending east of Jask to Vavik. A high resolution finite element mesh of the Arabian Sea is created to model the storm surge of Gonu using the Advanced Circulation Model (ADCIRC). Modeling results are compared to measurements and used to determine the contribution from storm surge and storm waves. The storm surge flooding hazard is expected to increase in the rare event of a cyclone landfall along the shallow shelf between Muscat, Oman and Al Fujayrah, United Arab Emirates (UAE) or near the Island of Masirah, Oman. Prior to Super Cyclone Gonu in 2007, only two similar cyclones struck the coast of the Sultanate of Oman in the last 1100 years. The two storms (in 1890 and 865) entered the Gulf of Oman, like Gonu, except both turned southwest to strike the northern coast of Oman. The 1890 storm drenched the coast from Soor to Suwayq and caused flooding inland as far as the Wadi Samail and
Wadi Beni Ghafir. Mattrah and Muscat were the hardest hit with many ships washing ashore. The storm is known to have killed about 727 people and destroyed date trees equivalent to $1.5 billion at the time. While less is known about the 865 storm, it had similar affects as the 1890 storm between Gobrah and Sohar.

The multi-hazard aspect is analyzed by comparing overlapping field observations of Cyclone Gonu with the Indian Ocean Tsunami of 2004 in Oman and Iran. The corresponding 2004 Indian Ocean tsunami runup points were recorded based on eyewitness accounts while surveying cyclone Gonu. On Sunday 26 December 2004 at 00:58:53 UTC, a great earthquake with a moment magnitude of 9.0 – or possibly greater (Stein and Okal, 2005) – nucleated 250 km southwest of the North tip of Sumatra, Indonesia. A large tsunami was generated and severely damaged coastal communities in countries along the Indian Ocean, including Indonesia, Thailand, Sri Lanka, India, Maldives and Somalia (Synolakis and Kong, 2006; Synolakis and Okal, 2005). The tsunami death toll was estimated at up to 300,000. Beyond the loss of human lives, the tsunami also destroyed livelihoods, traumatized whole populations and severely damaged habitats. In the near field of the epicenter Sumatra was hardest hit by the tsunami (Borrero, 2005; Borrero et al., 2006; Fritz et al., 2006). In the mid field the tsunami severely affected Sri Lanka across the Bay of Bengal at a distance of 1600 km from the epicenter or at a third of the distance between Sumatra and Somalia along the westward path of the tsunami (Liu et al., 2005). The Maldives at half way point between Sumatra and Somalia were hit an hour after Sri Lanka at a distance of 2500 km from the epicenter (Fritz et al., 2006). In East Africa the tsunami impact focused on Somalia some 5000 kilometers to the west of the earthquake epicenter (Fritz and Borrero, 2006). The Puntland coast in northern Somalia was impacted by tsunami runup heights of up to 9 m and inundation distances of up to 700 m. Hardest hit was a 650 kilometers stretch of the Somali coastline between Garacad (Mudung region) and Xaafuu (Bari region), which forms part of the Puntland Province near the Horn of Africa. The tsunami resulted in the death of some 300 people and extensive destruction of shelters, houses and water sources as well as fishing boats and equipment. Most of the victims were reported along the low lying Xaafuu peninsula. The Somalia survey was complemented by a second UNESCO survey circling Yemen’s Socotra Island to cover 12 villages in October 2006 (Fritz and Okal, 2008). Maximum runup heights were typically on the order of 5 to 9 m in northern Somalia and 2 to 6 m on Socotra. However only 500 km to the north of Socotra the run-up heights decayed rapidly to 3 m in Oman near Salalah and values of 1 to 2 m further north on Masirah Island (Okal et al., 2006). The 2004 Indian Ocean tsunami may represent a worst case scenario in terms of far field tsunami Hazard for areas inside the Arabian Sea. The 2004 Indian Ocean tsunami exceeded the 2013 Baluchistan (Pakistan) tsunami in the Arabian Sea. The 1945 Makran tsunami remains the largest documented tsunami in the northern Arabian Sea. Coastal protection in the West Indian Ocean must be approached from a multi-hazard perspective given the combined tropical cyclone and tsunami hazards. The importance of raising tropical cyclone and tsunami public awareness is highlighted.