



Contemplating Ocean Wave Measurements

Paul Liu

NOAA, GLERL, Ann Arbor, United States (paul.c.liu@noaa.gov, (734) 741-2055)

From all indications, the earliest starting usage of single point wave measurement, as Barber (1969) proudly puts it some years ago: "was made in Britain about 1945", in which a bell-shaped metal casting with one side made of thin metal sheet that moved slight inward and outward as the pressure of the water varied when waves passed over and the deflection was detected electrically through a cable connecting the instrument to the shore recording station. So we are now well into the 7th decade since the concept of making ocean waves recording at a single point was initiated. Since then the gage has been evolved through pressure sensor, surface piercing resistance staff or wire, accelerometer buoy, sonic, radar, or laser among others. But the basic conceptual basis remains the same that stems from measuring waves at a single point location. Over the past 65 years, however, no one seems to have ever questioned whether or not the single point wave measurement actually describing the reality of the processes of waves that's representing the vast ocean.

Aside from some manifest shortcomings of single-point wave measurements, such as the inability of measuring breaking waves and wave lengths, and the uncertainty in pin pointing true wave crest and wave trough in the ambience ocean, the single-point wave measurement has always been the main element used for estimating general wave information, usually depicted by mean properties typically a significant wave height or standard wave spectrum, never really meant for exact or detailed processes studies. Nevertheless it has been the source of ground truth over the years for all theoretical and modeling corroboration and ratification purposes. Not everyone may agree, but there is a general stagnation and egregious lack of significant progress and advancement in ocean wave studies in recent years, that just may be an indication that we don't really know what is truly happening out there in the open ocean and need more detail, concerted ocean wave measurements.

In order to possibly remedy the drawbacks we just expressed, we wish to propose the following approaches:

1. We need more, much more, ocean wave measurements! Ocean wave measurement for detailed wave research programs have all but totally ceased around the world in recent years. We need to reinvigorate wave measurements and data collection.
2. We wish to encourage all sea-going vessels be equipped with wave measurement devices and making continuous wave measurements throughout their voyage and make all their wave data available for academic research.
3. While we are not at all downgrading the many solid contributions of the conventional single-point wave measurement over the years, we feel strongly that it is timely that we should instigate and promote the need of making spatial wave measurement as the next step in the evolution of ocean wave studies in the 21st century.

With these relatively modest steps, which are by no means inconsequential to carry through, we think there are excellent chances to rejuvenate the presently stagnate ocean wave studies and leading to further more tangible understanding on what's really going on in the oceans and thus further revitalize ocean wave research studies with new incentives and excitement – and, of course hopefully, along with it a vitally more useful and friendly ocean wave environment as a likely resource rather than menace!