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Observations of large-amplitude internal wave of the second mode in Luzon Strait

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Among the regions of the World Ocean where intense internal waves occur, the South China Sea is known as an area where the largest internal waves can be met. Comprehensive studies of internal waves, which were carried out there during the last decade, reveal the substantial effects of both the first and second modes. The place where the record amplitude waves are generated is Luzon Strait. In May, 2006, we performed the studies in Luzon Strait, aboard the "Ocean Researcher 1" vessel of the National Taiwan University. In those experiments, we could detect a passage of a solitary internal wave of the second mode in deep water, and to measure its parameters. The observations were carried out at a calm sea, after some days of the passage of a big typhoon Chanchu through the South China Sea. In the measurements, a 150-kHz acoustic Doppler current profiler, the EK 500 echo-sounder, radar that registered the pattern of the sea surface, and a neutral-buoyancy body with temperature and depth sensors were used. In addition, ambient underwater noises were measured by a hydrophone. On May 23, a solitary internal wave passed under the vessel, with a height of 50 m and apparent features of the second mode, was found. The undersurface 200-m water layer suffered from an elevation. At the same time, the deep water layers were depressed. The internal wave moved with an extraordinarily high speed of more than 3 m/s in the north-west direction. The passage of the internal wave was accompanied by a wide rip band that was detected by the vessel radar and the digital camera. The passage also caused the underwater noise. This work was supported by National Science Council of Taiwan in Taiwan-Russia two-side research projects (No. NSC96-2923-E-002-002-MYZ) and by Russian Foundation for Basic Research.