Directional analysis of ASIS wave data during GASEX 01

Column:	Description:
1	Time (Decimal day)
2	Wind speed at 6.5m (m/s)
3	WInd direction at 6.5m (deg)
4	Peak Frequency, fp (Hz)
5	Significant Wave Height (m)
6	Peak frequency of wind sea (Hz)
7	Fraction of wave energy in wind sea
8	Direction of wind sea (deg)
9	Peak frequency of primary swell (Hz)
10	Fraction of wave energy in primary swell
11	Direction of primary swell (deg)
12	Peak frequency of secondary swell, if any (Hz)
13	Fraction of wave energy in secondary swell
14	Direction of secondary swell, if any (deg)

During GASEX, an array of 8 capacitance wave staffs were deployed on the ASIS buoy. Five of the staffs were deployed in a pentagon (0.93 cm radius) around the outer cage of ASIS; the remaining three formed a smaller triangular array near the center of the buoy. An analysis of data from the 6 staffs forming a centered pentagon has been carried out to yield 2D directional energy spectra for wavelengths over 2m. The directional distributions were estimated using the maximum likelihood method, applied to the surface elevation data, which were first corrected to account for the motion of the buoy. During GASEX one of the perimeter staffs was not functioning, hence only 5 staffs are used in the analysis.

A wave partitioning scheme (Gerling, 1992) was applied to the 2D spectra (60 min blocks) in order to identify significant wave trains. For each wave train, the peak frequency, direction and energy are obtained. Here energy is given as a fraction of the total. Up to three wave trains were identified during GASEX. Note that the peak frequencies of the 1D wave spectra do not necessarily correspond to peaks of the wave trains. This is because the wave trains are identified from 2D spectra, where directional spreading may be significant.

The wave field was dominated by a swell propagating from the NE (fp ~0.1Hz). Early in the experiment (JD 46-48), a smaller secondary swell (fp~0.08) was observed, propagating from the south.

An analysis of ECMWF wind fields confirmed the existence of a storm in the southern ocean several days period to this.

During JD 53, a small secondary swell (fp ~ 0.15 Hz) from the east appears: this short-lived swell is associated with the decay in wind. During GASEX, the wind sea energy was typically < 20% of the total wave energy, though it reached 60% during the higher winds of JD 53.