

1. SUMMARY OF IMPORTANT SCIENTIFIC QUESTIONS

The meeting identified a number of important scientific questions. These were of two types:

- (i) What is the description of certain events? and
- (ii) Which model is needed to predict these events.

Considering events in decreasing time scale, the following statements summarize the important questions addressed in the body of the report.

(a) Climatology and Large Scale Circulation

In order to construct a model of the mean circulation we need to parameterise flow across the outer boundary reef (in terms of swell, tides and topography) and also to parameterise the internal friction and bottom friction due to the reefs within the Lagoon. To operate or test a model we need a description of the wind forcing (climatology), fresh water inflow, dynamic height and baroclinic motions at the shelf edge (Coral Sea).

From a validated model might come knowledge of the rate of mixing of coastal water and the transfer rate of water across the Lagoon ocean boundary.

(b) Long Period Motions

We need a description of the circulation that results from the forcing at the Lagoon boundaries (open ocean, wind forcing, river inflow) which occurs at periods of a few days to many months (seasonal).

We need to know which are the dominant forcing mechanisms for the currents on these time scales. Wind forcing is one candidate but geopotential anomalies which impose alongshore pressure gradients may also be important. We also need to know the effect on Lagoon circulation of baroclinic (internal) motions in the Coral Sea. How well can long period waves be explained by wind forced models, if the effects of reefs are appropriately parameterised?

(c) Episodic Events

Two obvious transient events are floods and tropical cyclones. We need to determine from measurements how large is the storm surge response from these events (particularly from strong winds and cyclones). Can existing models of storm surge and the surface wave field from these episodic events explain the observations?

(d) Tidal Motions

We require a descriptive study of tide height, current and internal motion to facilitate modelling and eventually model testing.

We need to demonstrate that non-linear tidal effects (such as reef induced mixing) in the Great Barrier Reef Lagoon are important and also need to develop models of these non-linear effects.

(e) Surface Waves and Swell

We need to parameterise the propagation of swell across the coral reefs. It would be useful to know the climatology of surface waves for input to models of circulation that use swell as a parameter.