Geophysical Research Abstracts, Vol. 8, 09485, 2006
SRef-ID:


# The relationship between global mean sea level rise and the reference frame

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The Terrestrial Reference Frame is the fundamental means by which we relate observations in space and time. For example, in order to generate a homogeneous and consistent time series of geo-referenced altimeter measurements over the span of the Topex/Poseidon and Jason-1 missions, we must examine carefully the role of improvements in measurement modelling, force modelling, and improved reference frame realizations. In this paper, we quantify the effects of improvements in force modelling, for example the use of new GRACE-derived gravity models, the effect of time-variable gravity derived from GRACE on altimeter satellite orbits. In addition, we examine the effects of modelling geocenter in altimeteric satellite POD, and look at how the application of atmospheric loading might affect the time-series of precise orbits for Topex/Poseidon and Jason-1.