



**INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI
SHORT ABSTRACT OF THESIS**

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Thesis Title: Dynamics of Braided River Morphology Using Advanced Geo-spatial Technology and Modeling Techniques

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SHORT ABSTRACT

The sand bed braided rivers are morphologically dynamic rivers. The braided river morphology has intra-seasonal variability in terms of bank erosion, bar migration, bar formation and sediment mixing. These features represent the short term morphological variation during the flood waves passing over the river. These morphological features are governed by many variables such as discharge, sediment flux, river bed slope and river flow width. The river stage variation is an important variable in understanding river characteristics. The satellite altimetry is used to retrieve water level variations at different reaches of the river with certain return period. The improved methodology is proposed in this study to retrieve water levels at braided reaches of the Brahmaputra river. These water level information's at different locations over the Brahmaputra river are used to generate the water surface profiles. The water surface profiles are generated for the monsoon and non-monsoon season. The retrieved water level time series are converted to discharge using rating curves for Guwahati and Tezpur gauge sites. The hydrological modeling of the Brahmaputra river is done to estimate the spatio-temporal variations of river discharge. The hydrodynamic modeling of the Brahmaputra river is performed from upstream of Dibrugarh to downstream of Dhubri. Manning's roughness coefficients are estimated using altimeter derived hydraulic parameters of the river at different locations as an input to the hydrodynamic model. To perform the comparative analysis, Manning's roughness coefficients are also estimated from different empirical equations using particle size distributions. The simulated water levels from altimetry derived Manning's roughness coefficient were in close range with altimetry retrived water levels for years 2014 and 2015 except over the nodal reaches of the river. It is found that the simulated water surface profiles are over-predicting for all the reaches of the Brahmaputra river with Manning's roughness coefficients derived using empirical equation.