

ON THE ESTABLISHMENT OF THE LOWEST ASTRONOMICAL TIDE FOR
MARINE PARCEL COMMENCEMENT IN PENINSULAR MALAYSIA

RASHEILA BINTI RAHIBULSADRI

UNIVERSITI TEKNOLOGI MALAYSIA

ON THE ESTABLISHMENT OF THE LOWEST ASTRONOMICAL TIDE FOR
MARINE PARCEL COMMENCEMENT IN PENINSULAR MALAYSIA

RASHEILA BINTI RAHIBULSADRI

A thesis submitted in fulfilment of the
requirements for the award of the degree of
Master of Science (Geomatic Engineering)

Faculty of Geoinformation and Real Estate
Universiti Teknologi Malaysia

DECEMBER 2015

ALHAMDULILLAH...

Specially dedicated to;

Mak (Adilah) & Abah (Rahibulsadri)

My husband (Mohammad Shahir)...and my "baby bump"...

ACKNOWLEDGEMENT

I wish to thank my supervisor, Dr. Abdullah Hisam Omar, for giving me the opportunity to do this research and all his help and advice throughout my time at UTM. I also wish to thank the other members of my research team (Cadastre Modernization): Nazirah Mohamad Abdullah, Noor Anim Zanariah Yahaya, Wan Muhammad Azzat Wan Azhar, Ashraf Abdullah, Siti Zainun Mohamad and Mohd Farid Al Azmi Isahak for their support and help throughout my studies at UTM and through this process.

It is also worthy to mention Department of Survey and Mapping Malaysia (DSMM) especially to Dr Teng Chee Hua and Mr Chan Keat Lim. They have contributed significantly regarding data and knowledge sharing.

I would also like to express my gratitude to Hery Purwanto from Institut Teknologi Malang, for his informal discussion on Tidal Analysis.

In conclusion, I wish to extend my gratitude to all my family and friends for their support.

ABSTRACT

Tidal datum is a standard height defined by a certain phase of the tide. Tidal datum is also the beginning for establishing privately owned land, state owned land, Territorial Sea, Exclusive Economic Zone (EEZ), and high seas boundaries. A review of previous studies shows that technical aspect is one of the major problems in marine cadastre development because there is no reference datum to implement marine administration for marine cadastre. Thus, technical aspect is needed to support marine cadastre development. Foundational to this, marine parcel is a part of space in marine administration which included air space, water column, seabed profile and subsea. It is also consisting vertical and horizontal and water tidal datum elements in marine area. The objectives of this study are to determine the tidal datum, Lowest Astronomical Tide (LAT) for Peninsular Malaysia and to analyse the stability of LAT as a datum for marine cadastre commencement. Tide datasets were processed using Total Tide Solution (TOTIS) software for computing the LAT as the reference datum for marine cadastre. Tidal epoch is from year 1992 to year 2013. Based on the analysis, the range of stability value for LAT with respect to Mean Sea Level (MSL) is -0.002 metre to -0.500 metre. Therefore, LAT is potential to be used as a reference datum for marine parcel commencement in Malaysia due to its stability and consistency as a lowest water level.

ABSTRAK

Datum pasang surut adalah ketinggian piawai yang ditakrifkan oleh fasa air pasang surut tertentu. Datum pasang surut juga diaplikasikan sebagai permulaan bagi menentukan hakmilik tanah persendirian, hakmilik tanah negara, laut wilayah, zon ekonomi eksklusif (EEZ), dan sempadan laut. Kajian ke atas kajian-kajian sebelum ini menunjukkan bahawa aspek teknikal merupakan salah satu masalah utama dalam pembangunan kadaster marin kerana tiada lagi datum rujukan dalam pentadbiran marin bagi pembangunan kadaster marin. Secara asasnya, ruang petak marin merupakan sebahagian daripada ruang dalam pentadbiran marin termasuk ruang udara, ruang air, profil dasar laut dan dasar laut. Ia juga terdiri daripada elemen datum pasang surut air menegak dan mendatar bagi kawasan marin. Objektif kajian ini adalah bagi menentukan datum pasang surut, pasang surut astronomi terendah (LAT) di Semenanjung Malaysia dan bagi menganalisis kestabilan LAT sebagai datum permulaan kadaster marin. Dataset pasang surut telah diproses menggunakan perisian Total Tide Solution (TOTIS) bagi menghitung LAT sebagai datum rujukan kadaster marin. Tempoh data air pasang surut adalah dari tahun 1992 hingga ke tahun 2013. Berdasarkan kepada analisis, julat kestabilan nilai LAT terhadap aras laut min (MSL) adalah -0.002 meter hingga -0.500 meter. Oleh itu, LAT sangat berpotensi untuk digunakan sebagai datum rujukan bagi permulaan ruang petak marin di Malaysia disebabkan oleh tahap kestabilan dan juga konsisten sebagai paras air yang paling rendah.