**DAILY ASSESSMENT FORMAT**

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| **Date:** | **02/07/2020** | **Name:** | **Rashmi KB** |
| **Course:** | **IIRS Outreach Program on Satellite Photogrammetry** | **USN:** | **4AL16EC056** |
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| **Github Repository:** | **rashmikb** |  |  |

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| **FORENOONSESSION DETAILS** |
| **Image of session**    **HISTORY OF MAPPING AND SURVEYING**   * First Maps were mental maps used for navigation * Indus Valley civilization had a system of underground drainage * About 5000 years ago the Babylonians produced property descriptions and simple property maps on stone tablets * First known surveying by ancient Egyptians- used to reestablish property corners destroyed by flooding of R. Nile * About 2000-2500 years ago Greeks and Romans surveyed and mapped their new settlements with a great degree of precision using methods that changed very little up to this century * Instruments: Chain, Tape, Theodolites, Compass, Levels, EDM, TS, GPS/GNSS * Classical Methods- Triangulation/trilateration: 19th 20th Cen * Oct. / Nov. 1957: Launch of SPUTNIK-1 & -2 * Jan. 1958: Launch of Explorer-1: * 1958: Earth's Flattening from Satellite Data [f = (a-b)/a)=1/298.3]     **BRIEF HISTORY OF NAVIGATION**   * Landmark based navigation: Stones-Trees-Monuments (local use) * Celestial Navigation Ok for latitude, poor for longitude until accurate clock invented in1760 * 13th Century: Magnetic Compass * 1907: Gyrocompass * 1912: Radio Direction Finding * 1930's: Radar and Inertial Nav * 1940-60's: "Loran-NB (Very Low frequency Radio-based) * 1950-70's: Loran-C/Chayka (High frequency Radio-based) * 1960's: Omega/Alpha\*(Radio-based) &Transit * 1980's: Development of GPS * 1993/95: GPS - IOC/FOC * 1993/95: GLONASS-IOC/FOC * 1994: International GPS Service IGS begins (now GNSS) * 2006:GNSS conceptualization * 2000's: eLoran (Enhanced Loran-20m)/eChayka * 2010: GLONASS resumes * 2010's: conceptualization of integrated receivers with GNSS * 2013-16: IRNSS * 2019/20: Beidou   **SATELLITE NAVIGATION**  A satellite navigation system is a system that uses satellites to provide autonomous geo-spatial positioning. Example:  **GLOBAL**   * NAVSTAR GPS * GLONASS * BEIDOU * GALILEO   **REGIONAL**   * IRNSS * QZSS   **NAVSTAR GLOBAL POSITIONING SYSTEM**  In 1973 the U.S. DOD decided to establish, develop, test, acquire, and deploy a spaceborne Global Positioning System (GPS), resulting in the NAVSTARGPS Wooden (1985) defined: "It is an all-weather, space based navigation system development by the U.S. DOD to satisfy the requirements for the military forces to accurately determine their position, velocity, and time in a common reference system, anywhere on or near the Earth on a continuous basis".  **GNSS**  **The theoretical definition:**   * "GNSS, A worldwide position and time determination system that includes one or more satellite constellations. aircraft receivers and system integrity monitoring. augmented as necessary to support the required navigation performance for the intended operation." * GNSS is the result of a recognition by the civilian community of the benefits that can be derived from the development of a 'true' civilian global positioning system that is: * Multimodal (air, sea and land users), Capable of meeting future navigation & timing requirements, Global standard, Cost effective, Easy to use, Fundamentally based around the integration andaugmentationof technologies   **3 CLASSES OF GPS RECEIVERS**   * Geodetic class: capable of sub-centimeter accuracy, high-precision mapping * Mapping grade: capable of <3 meters accuracy, portable, less expensive * Navigation: capable of 10 meters accuracy, light weight, cheap   **GPS SURVEYING TECHNIQUES**  Static  For long baselines (>20Km), where the highest possible accuracy is required  This is the traditional technique for providing Geodetic Networks and the only solution for large areas  **Rapid Static / Fast Static**   * For baselines up to 20Km * Short Occupation times/high production   **Stop and Go**   * Detail Surveys. Any application where many points close together have to be surveyed * Fast, economical & Ideal for open areas   **Kinematic**   * Used to track the trajectory of a moving object * Can be used to profile roadways, stockpiles, etc.   Precise Point Positioning (PPP) is a positioning technique that removes or models GNSS system errors to provide a high level of position accuracy from a single receiver. A PPP solution depends on GNSS satellite clock and orbit corrections, generated from a network of global reference stations. Once the corrections are calculated, they are delivered to the end user via satellite or over the Internet. These corrections are used by the receiver, resulting in decimeterlevel or better positioning with no base station required.  PPP delivers accuracy up to 3 centimeters. A typical PPP solution requires a period of time to converge to decimeter accuracy in order to resolve any local biases such as the atmospheric conditions, multipath environment and satellite geometry. The actual accuracy achieved and the convergence time required is dependent on the quality of the corrections and how they are applied in the receiver.  Similar in structure to an SBAS system, a PPP system provides corrections to a receiver to increase position accuracy. However, PPP systems typically provide a greater level of accuracy and charge a fee to access the corrections. PPP systems also allow a single correction stream to be used worldwide, while SBAS systems are regional.    https://novatel.com/-/media/Images/Hexagon/HexagonCore/Novatel/assetsnew/assets/Intro-to-GNSS/Figs/_resampled/Figure-43.ashx?la=en&hash=0C3FC8ED4F3F8B2A830BE945BEDC30A8  PPP is able to provide position solutions at centimeter to decimeter level by combining precise satellite positions and clocks with un-differenced, dual-frequency (to remove the first order effect of the ionosphere), pseudo range and carrier-phase GNSS observables. In static mode, PPP can provide even sub-centimeter positioning precision. PPP differs from traditional DoubleDifference (DD) relative baseline positioning (e.g., Real Time Kinematics, RTK) in the sense that it does not require access to simultaneous observations from one or more close reference stations accurately-surveyed As a result, PPP provides absolute positioning information, contrarily to RTK, which instead provides relative positioning information with respect to a reference station. PPP just requires precise orbit and clock data, which are computed by a processing center with measurements coming from reference stations belonging to a relatively sparse network (i.e., thousands of km apart would suffice). This makes PPP a very attractive alternative to RTK for those areas where RTK coverage is limited or not available. |