

Date

Tuesday 17 July 2007

Title of session

Workshop 5 - Reference Frameworks and Active Networks

Name of presenter/chair

Chair: Neil Ackroyd, Director of Data Collection and Management, Ordnance Survey

Presenter: Prof. Paul Cross, Department of Geomatic Engineering, University College London

Rapporteurs

Jenny Harding, Ordnance Survey and Nicholas Hutchings, Defence Geographic Centre

Presentation title: NMA realisation and maintenance of global reference frames

Through the presentation, a high level description was provided of realisation and maintenance of global reference frames as related to NMAs.

Beginning with an introduction to geodesy, it was explained how coordinates are defined for points on a dynamic earth. Explanation was given of the role of the International Earth Rotation Service (IERS) in defining and maintaining global coordinate systems, and of the role of the International GNSS Service maintaining a global network of GPS and GLONASS sites. The International Laser Ranging Service (ILRS) plays a crucial part for determining the Earth's centre of gravity. A picture of how the Earth rotates is provided by tracking of specific quasars using Very Long Baseline Interferometry (by the International VLBI Service). These organisations and the International DORIS (Doppler Orbitography and Radiopositioning) Service all produce data towards determining geodetic coordinates.

The International Terrestrial Reference Frame (ITRF) needs to take account of the centre of mass of the whole Earth, scale and orientation. Many measurements are collected to realise the reference system, which consists of a list of coordinates and list of velocities for how the coordinated points are moving.

The original WGS84 reference frame was based on Doppler points and not GPS. Today this reference frame is aligned with ITRF. Since coordinates in WGS84 change with time due to plate tectonics and improvement in the reference frame coordinates, what is really needed is a 4 dimensional reference frame.

Issues for NMAs include the fact that they must define the reference frame against which they geo-code spatial data. Further, transformation parameters to the reference frame need to be maintained to take account of tectonic drift, local deformations etc. It is also necessary to compute and maintain a geoid. If coordinates are kept aligned to one particular reference frame (ITRF/WGS84) actual coordinates will change over time.

Key messages from the presentation are that all nations need a Continuous GPS Network (CGPS) and one day reference frames will be 4-dimensional to take account of change with time.

Questions	Answers
<p>Gottfried Konecny (Saudi Arabia): What is the situation in Europe with regard to geodetic reference frames?</p>	<p>As in Australia, Europe has adopted a fixed area approach which does not take account of tectonic movement and deformation. For this reason the coordinate system may be barely fit for purpose. EUREF is an organisation which monitors deformation at the European level.</p>
<p>Kamil Eren (Saudi Arabia): Giving an example of ITRF97 being established in north-west Turkey, an area with tectonic faults, and a decision is needed as to whether to make it 4D- what is the speaker's opinion?</p>	<p>The solution is to have a 4D framework, as it won't need to be changed. In addition users will expect coordinates of points to change with time.</p>