COMPARISON OF WATER VAPOUR ESTIMATES IN ANKARA, TURKEY

IRD.P21

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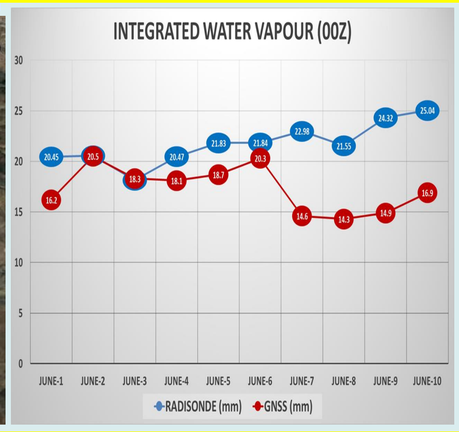
Meteorological and climate studies are enrichments with new observation technic and technology as well as secondary equipment's such as Global Positioning System GPS/ Global Navigation Satellite System (GNSS). To determine the accurate data in GNSS, it is need to know Integrated Water Vapour (IWV) which cause to tropospheric zenith delay. Vice versa IWV could be calculate from zenith travel time delays from GPS signals data with atmospheric pressure and temperature of GPS site. IWV which is produced from radiosonde data generally use as reference to determine the accuracy of GPS data. Nowadays GNSS meteorology is very familiar in Geomatics engineering. Perceptible Water Vapour (PWV) or Integrated Water Vapour (IWV) or Vertical Integrated Liquid (VIL) are different use in different meteorological systems and they are calculate from meteorological satellite data, radar data and radiosonde data.

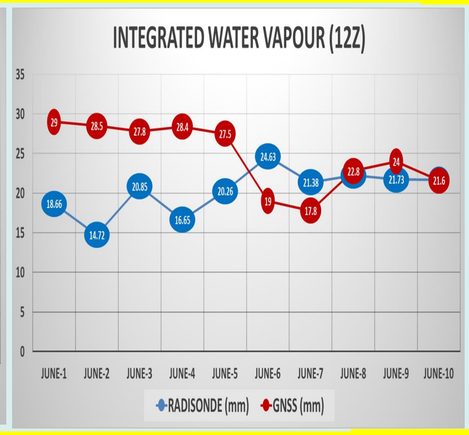
Spatial and temporal fluctuatings of water vapour content in the lower atmosphere cause time delays in signals propagating from space to targets on the ground. Different measurement methods exist to estimate water vapour. Global Navigation Satellite Systems (GNSS) provides continuous water vapour estimates. In this study, GNSS derived water vapour estimates are compared to radiosonde and radar observations. Statistical analysis of the differences between three data sets, GNSS, radar and radiosonde are summarized.

In this study, it is intended to investigate relation between GNSS Ankara station's IWV, Ankara radiosonde station's IWV and Ankara Radar's VIL data. For this purpose, two term which are June 1 to 10 in 2010 and May 15 to 30 in 2015 are selected. These two term are consist of both dry and wet days. Data are obtained from NASA The Crustal Dynamics Data Information System (CDDIS) for GNSS IWV data, NOAA Integrated Global Radiosonde Archive (IGRA) for radiosonde IWV data and TSMS for radar VIL data.

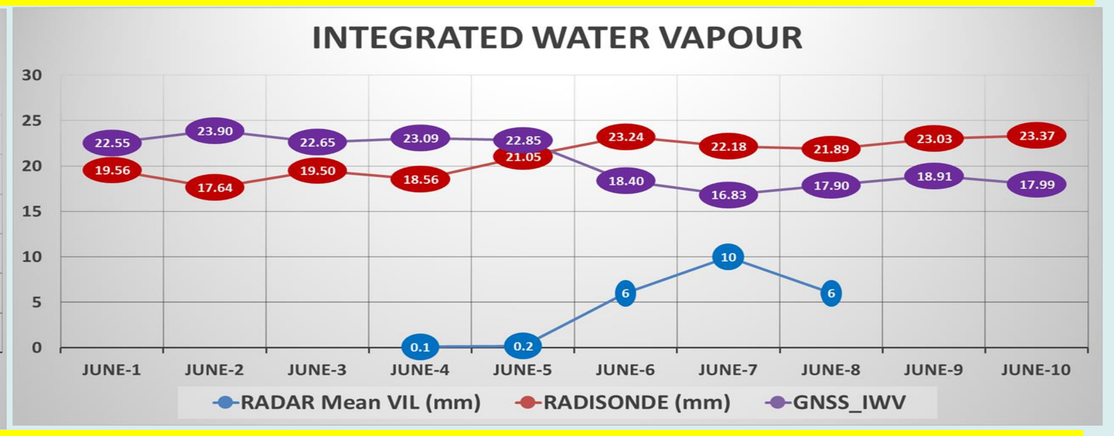
Stations geographic position

IWV data of GNSS and Radiosonde (00Z and 12Z)

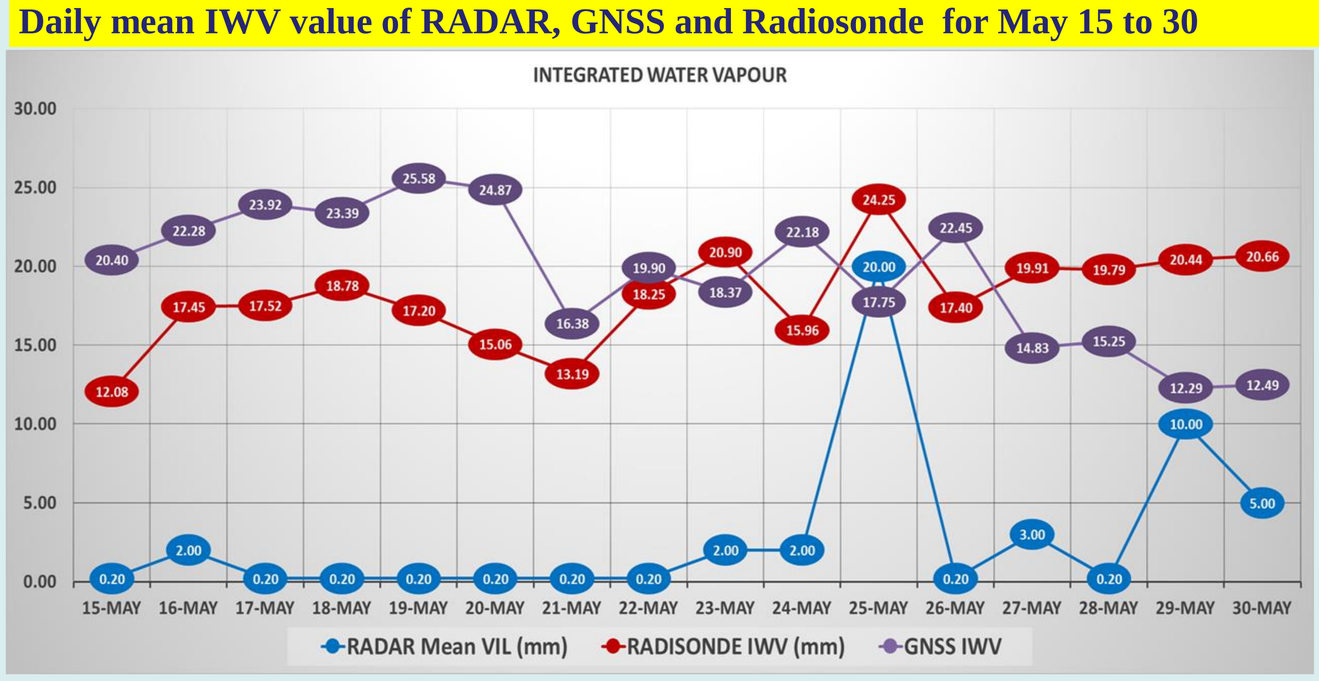




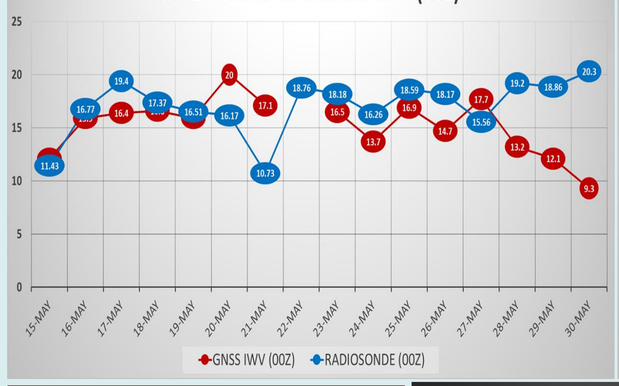
Daily mean IWV value of RADAR, GNSS and Radiosonde for June 1 to 10

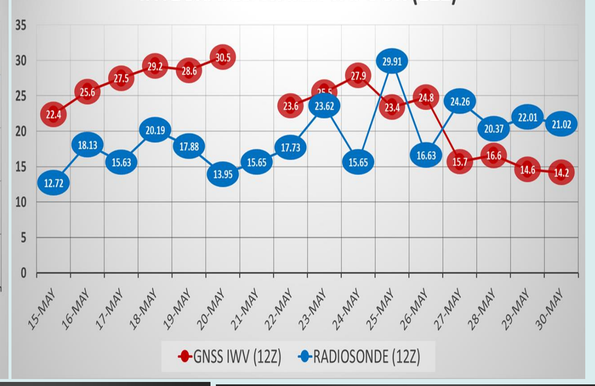


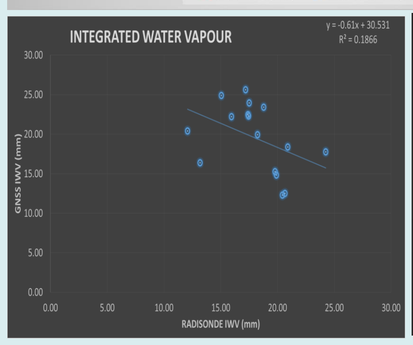
Daily mean IWV value of RADAR, GNSS and Radiosonde for May 15 to 30

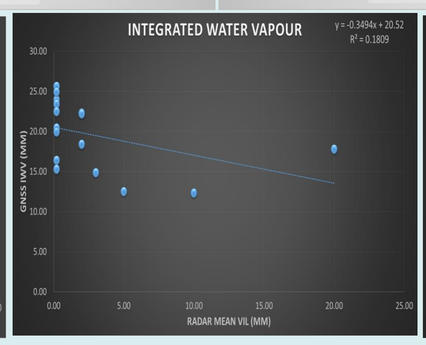


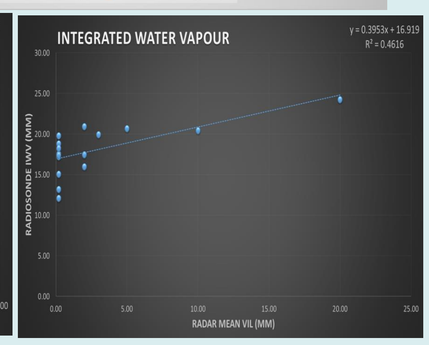
IWV data of GNSS and Radiosonde (00Z and 12Z)









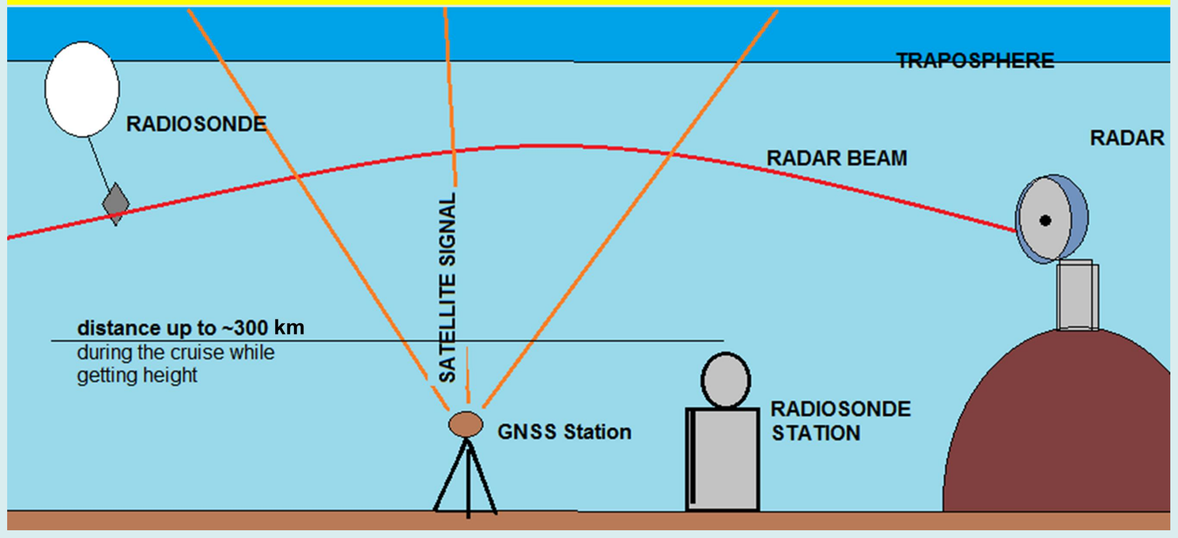


CONCLUSION

Comparing results are relation of GNSS and Radiosonde is quite good esp. during to precipitation and also Radar values get to closer to GNSS and Radiosonde during to precipitation. During to precipitation sky is covered by clouds and the water vapour distribute generally uniform in atmosphere esp. in stratiform type weather conditions. Causes of errors should be as follows;

- **Satellite signal which come from satellite to directly GNSS station pass throughout troposphere and its effected by troposphere humidity as a result GNSS IWV representative of troposphere layer water vapour. GNSS observations are stationary observations.**
- **When radiosonde balloon is released it start to cruise freely in atmosphere and it's cruising depends on to winds in atmosphere and it can be go far away up to 300km in any directions. During to cruise while getting height it goes far away and also it collects data on its way. So it is naturally collect different values from stationary station.**

Errors Source



- **Radar make observation with its beam. Beam path is not goes strait ahead in atmosphere. It is goes like as curve which is suit to the world's roundness and when it crush to water droplet it turns back to RADAR antenna. The result of this, firstly if the droplet size is too small or moisture in atmosphere is in a vapour form such as in clear air RADAR may not be observed it. Secondly, due to RADAR beam shape is like curve it can not measure all layer moisture. So RADAR VIL values could not representative troposphere layer total moisture.**

To free from errors radiosonde values must be use with measurement points coordinates. If RADAR's value or meteorological satellite values use for comparing GNSS IWV values it is need to make a private study for this purpose.