

# 21 January 2011

page last updated: 13 January 2011

## *Fortuitous Evaporation Pan Observations and an Approach at Modeling Evapotranspiration on the Alaskan North Slope*

John Mumm



*Class A Evaporation Pan located at the Imnavait Creek Basin on the North Slope of Alaska*

*Credit: John Mumm*

### Abstract

Evapotranspiration (ET) plays a significant role in the hydrologic cycle of all basins, yet is only occasionally measured in the Arctic. The energy environment surrounding the simple evaporation pan varies considerably from that of the natural environment. Yet, an evaporation pan, although simple in concept, is a sound way to estimate the potential ET and also determine an ET pan coefficient assuming there is also a complementary estimate of actual ET. The few existing ET estimates in the Arctic are based on water balance, energy balance and methods like the Priestley-Taylor method that require less input data. Also developing a better understanding of ET at local scales allows for ground truth data that can be used to compare with future modeling of ET at larger scales with satellite imagery.

An evaporation pan was installed in 1986 on the North Slope of Alaska with the intention of collecting data for only 3 years; but in reality, pan evaporation data has been collected for 22 years at this Arctic site. The summer maximum, average, minimum and standard deviation are 420 mm, 324 mm, 280 mm and 40 mm, respectively

from 1986 to 2008 (1989 missing). The pan evaporation results can also be correlated with other measured variables (such as air temperature, net radiation, summer precipitation, etc.). During the summer of 2010 two m<sup>2</sup> plots were quantified using visible, near IR and thermal imagery. This data was used to generate a value of the normalized difference vegetation index (NDVI). According to previous research, field measurements can be used to generate an estimate of leaf area index (LAI). This was compared to the thermal data collected, since the relationship between LAI and temperature is the main input to the two-source energy balance model which can estimate evapotranspiration rates.