A reevaluation of the atmospheric pressure correction for Cosmic-Ray Neutron Sensing

J. Weimar, P. Schattan, M. Köhli, M. Schrön, S. Achleitner, L. Stevanato and U. Schmidt

Why reevaluate?
1. Discrepancies with field data
2. Existing literature targets other energy regime

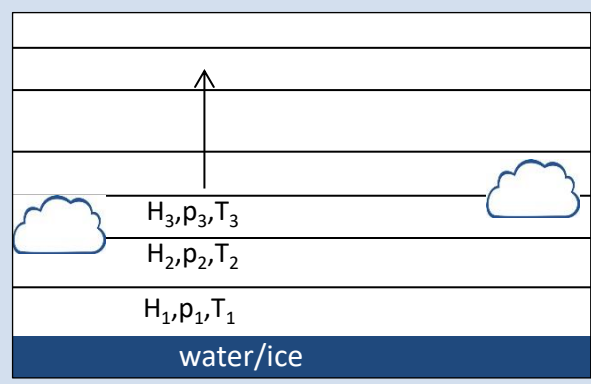
How reevaluate?
1. Saturated field data $N = N(\theta,p,h,i) = N(p,h,i)$
2. Simulate and reproduce with Monte Carlo codes

Field data

Long term, local

Short term, different heights

MCNP 6 Simulation



Simulate whole atmosphere + detector response weighting

Compare Simulation - measurements

1. Calibrate Simulation setup and physic options
2. Compare to field data and existing literature
3. Find suitable global model adapted to CRNS

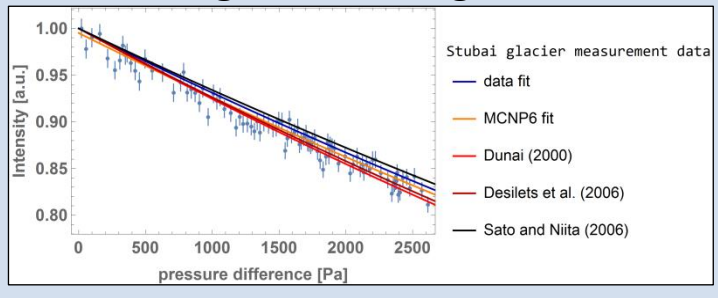
Preliminary Results

Weißsee – long term

Model/data	Lambda [hPa]
Field data	150.3 (58)
Dunai (2000)	135.8
Desilets (2006)	136.0
Sato (2006)	141.5
MCNP(Bertini/Isabel)	147.4 (25)

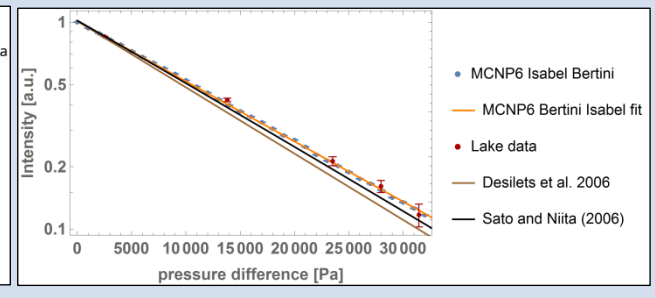
- Bertini/Isabel + LAQGSM physics model work best for MCNP 6 simulations
- Discrepancies between Weißsee and Stubai glacier relatively large

Stubai glacier – long term



Model/data	Lambda [hPa]
Field data	140.1 (28)
Dunai (2000)	135.8
Desilets (2006)	136.4
Sato (2006)	140.8
MCNP(Bertini/Isabel)	139.7 (15)

Lakes – short term



Model/data	Lambda [hPa]
Field data	148.6 (29)
Dunai (2000)	135.9 (05)
Desilets (2006)	135.7 (03)
Sato (2006)	141.5 (07)
MCNP(Bertini/Isabel)	149.4 (04)

- 2006 Sato and Niita - Analytical Functions to Predict Cosmic-Ray Neutron Spectra in the Atmosphere
- 2006 Desilets et al. - Extended scaling factors for in situ cosmogenic nuclides:New measurements at low latitude
- 2000 Dunai - Scaling factors for production rates of in situ produced cosmogenic nuclides: a critical reevaluation
- 1984 Tomasi et al. - Vertical distribution features of atmospheric watervapor in the Mediterranean, Red Sea and Indian
- 1976 Minzner et al. – the 1976 international standard atmosphere and its relationship to earlier standards